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A2 GCE
APPLIED INFORMATION AND COMMUNICATION TECHNOLOGY

G055/01/IC   Networking Solutions

INSTRUCTIONS FOR CANDIDATES   **JUNE 2016**

INFORMATION FOR CANDIDATES
• This document consists of **12** pages.

NOTICE TO CANDIDATES

The work you submit for these pre-release tasks **must** be your own.

- If you copy from someone else or allow another candidate to copy from you, or if you cheat in any other way, you may be **disqualified** from at least the subject concerned.

- You **must** always keep your work secure and confidential while you are preparing it. **If it is stored on a computer network, keep your password secure. When printing work, collect all copies from the printer and destroy the copies you don't need.**

- Any materials (e.g. books, information from the internet you have used to help complete this work, etc.) **must** be clearly acknowledged in the work itself.

- All work **must** be submitted to your teacher once completed. Ensure you include your name, candidate number and centre number on all pages and that each page is hole punched in the top left-hand corner and secured with a treasury tag.

- **You must not submit any materials other than your response to the pre-release tasks.**

- When you hand in your completed tasks, you will be required to sign that you have understood and followed the regulations by completing a Candidate Authentication Statement.

- Your work will be returned to you at the start of the exam, in the exam room. At the end of the exam, you **must** attach **all** tasks to your question paper using the treasury tag.

ALWAYS REMEMBER:

YOUR WORK MUST BE YOUR OWN

PRE-RELEASE TASKS – INSTRUCTIONS FOR CANDIDATES

Read the attached case study and these instructions carefully, then carry out the tasks detailed below. There are two types of task.

In Task 1 you will produce notes that will help you to answer questions in the examination for this unit. The other tasks will be marked and will contribute up to 30 of the 100 marks available for this unit.

You will need your completed tasks when you take the examination for this unit.

The work produced in response to the pre-release tasks **must** be submitted to your teacher when it is completed. The work **must** be presented as a hard copy.

It is not acceptable for you to copy large parts of material from other sources as the tasks require you to apply your knowledge to the case study. Any books, information leaflets or other materials (e.g. videos, software packages or information from the internet) which you have used to help you complete this work **must** be clearly acknowledged in the work itself. To present material copied from books or other sources without acknowledgement will be regarded as deliberate deception.

You **must not** submit any material other than your response to the pre-release tasks.

The work **must** be collated so that it is presented in task order.

Each page of the work **must** be marked clearly with your name, candidate number, centre number and task number.

When you have completed the tasks, you **must** sign and date a Candidate Authentication Statement. You **must** then ask your teacher to sign to confirm that the work is your own.

Task 1

The initial recommendations have been accepted and you will now proceed with the design. To help prepare for this, and to gain a fuller understanding of the network requirements, you will undertake some further research.

Make some notes that can be used to help inform future decisions about the network design. Your notes should include:

- the advantages and disadvantages of all users having access to shared resources on the network;
- the WAN services that might be available to GreenFish employees with access to the internet;
- the network software needed for the GreenFish network;
- the legal and security issues related to the use of this network and procedures that might be implemented to reduce risk;
- the advantages and disadvantages to GreenFish of peer-to-peer and client-server networks;
- broadband speeds and their effect on download time for users of the GreenFish network;
- the transmission media and connectors that might be used throughout the network and its connection to the Internet Service Provider (ISP);
- how IP addressing might be used on this network.

Task 2

This task refers to the table in **Appendix 1** and the diagram in **Appendix 2**.

For each device in the table in **Appendix 1**:

1.   Fill in the second column to describe the function of the device in the proposed GreenFish network.

2.   Show and label the position and connection information of the device on the diagram in **Appendix 2**.

[18]

Briefly evaluate the method(s) you used to do this task.   **[3]**

Task 3

The DSL router, which forms the connection to the ISP network, will be given a public IP address of 92.232.43.252 and a subnet mask of 255.255.255.252.

When a packet of data arrives at the GreenFish network, it will arrive with an IP header, similar to the diagram shown below.

Version	Length	Type of Service	**Total Length** e.g. = 532 bytes		
Identifier			Flags	Fragmented Offset	
Time to Live e.g. 112		Protocol	**Header Checksum** e.g. Hex: b1e6		
Source IP address e.g. = 74.125.239.152					
Destination IP address = 92.232.43.252					
Data (e.g. 512 bytes including the TCP port number for the end device in the GreenFish network)					

Discuss how the **fields in bold** in the IP header are used to ensure that the packet of data reaches its destination and can be dealt with in the appropriate way by the GreenFish network. You should consider how devices in the GreenFish network, and on the route through the internet, use this information to enable safe delivery.

The work you produce for Task 3 **must not** exceed 250 words and you **must** include a word count.

The quality of your written communication will be assessed through this task   **[9]**

CASE STUDY

GreenFish is a digital advertising agency that will operate out of a new office in the centre of Bristol. GreenFish specialises in online advertising campaigns, creating high quality webpages for its clients. The company has a current workforce of 16.

Job roles in the company are allocated as follows:

- 2 directors;
- 1 project manager;
- 2 administration officers;
- 3 web developers;
- 4 graphic designers;
- 4 content writers.

The two directors will work from their laptop computers while in the office. A director will sometimes need to visit a client to discuss the requirements for an online campaign and to demonstrate webpages as they are developed.

The project manager and administration officers will each have a standard desktop computer. Each computer will have a wired connection to the company network through which it will access a shared internet connection. These computers will have standard office, browsing and communication software, project management software and access to a shared network printer.

All other employees will have their own workstation with high specification computer equipment, which will have a wired connection to the company network and shared access to the internet. The type of computer and operating system for each workstation will differ. Every workstation will be set up specifically for the tasks being done by the employee.

The three web developers will use specialist web authoring software and will transfer files regularly to and from a testing server on the company network and to and from customers' web hosting servers.

The graphic designers will often modify large image files. Sometimes these files are sent electronically by clients and sometimes they are downloaded from websites. Workstations must have specialist software, a large amount of disk storage and a fast internet connection in order to allow the graphic designers to work efficiently. Occasionally, work may be printed, but this is rare as most communication is made electronically.

Content writers will need fast access to websites, forum sites, video and audio streams and communication services for effective research of current trends and ideas for new material.

GreenFish employees must have strong IT skills and be able to manage the security, integrity and availability of their work.

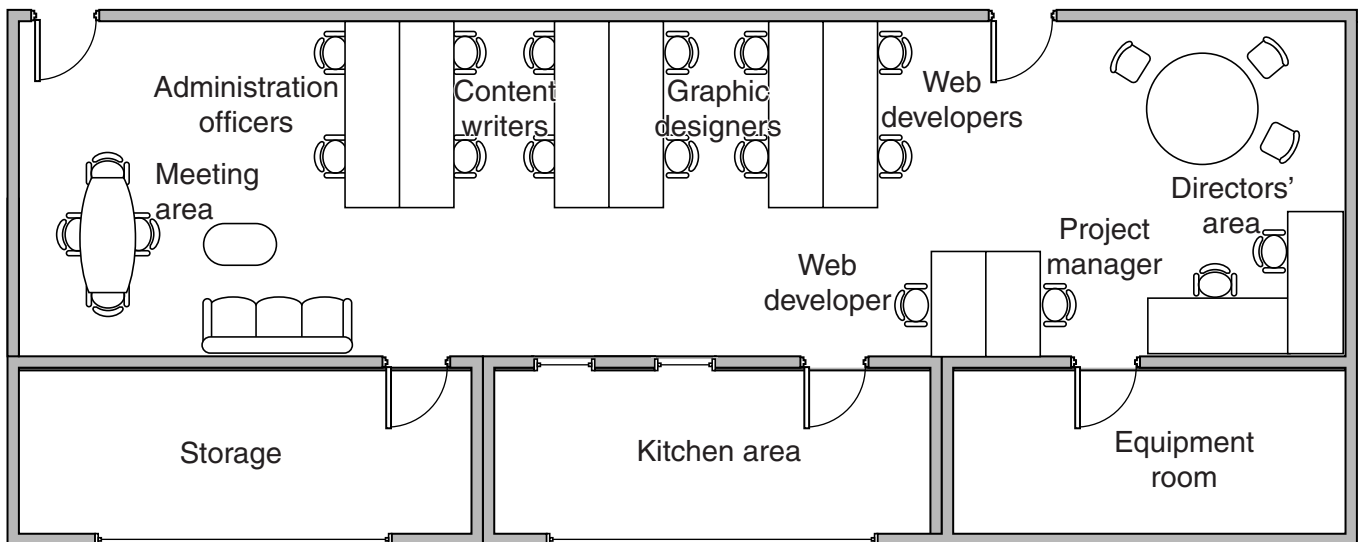The proposed layout of the new office network is shown in **Fig. 1**.
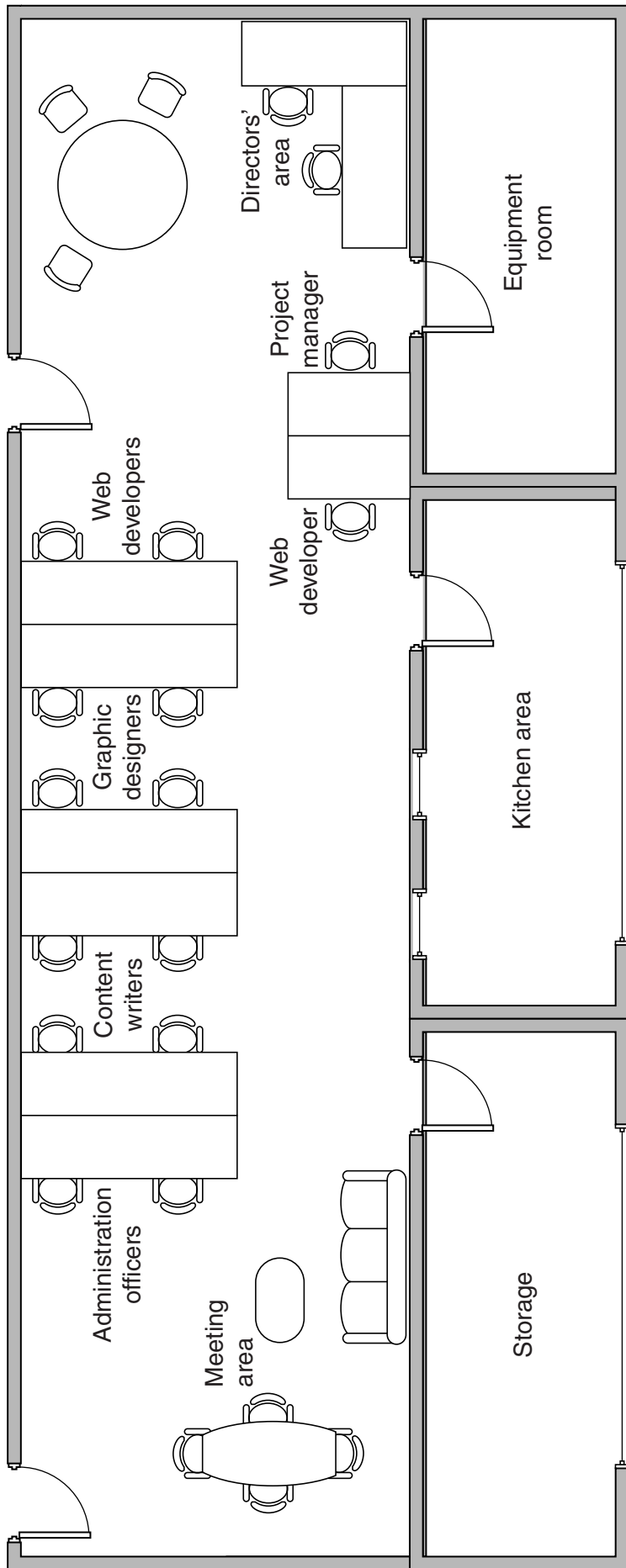
Fig. 1

You have been asked to give advice on the design and implementation of a network for GreenFish. The initial recommendations were as follows:

- This will be a wired, peer-to-peer network with shared access to a fast broadband connection.

- There will be 14 fixed workstations.

- All fixed workstations will have a wired connection to the company network, through which they will share internet access.

- The network will include one additional device that will act as a web server and will be used as a testing web server for the web developers.

- External access to the web server will be included, so that clients can be shown their website during the development stage without having to travel to the GreenFish office.

- The network will include one Network Attached Storage (NAS) device that will be connected to the network and will be used for employees to share work with others and to archive their finished work.

- There will be a networked, colour printer attached directly to the network. Printing activity is predicted to be minimal but when it is needed it should be immediately available to the user.

- The company will need a small wireless network, connected to the wired network. Wireless access should be available throughout the office, to allow the directors' laptops to access the shared broadband and the colour printer.

- The wireless part of the network will allow guest access so that the shared broadband is publicly available for visitors to the company.

- A DSL broadband connection is already available in the equipment room. The IP address of the router connected to GreenFish's ISP is 92.232.43.252 and the router will be configured to allocate private IP addresses between 192.168.2.2 and 192.168.2.254 to devices on the GreenFish network.

- One wireless access point will provide the wireless link to the main router.

- GreenFish will use the services of its ISP to host email, using company email addresses (@greenfish.co.uk) and employees will access their email through a web browser.

Appendix 1

Device	Describe the function of the device in this network
14 workstations	
NAS device	
Broadband (DSL) router	
Wireless access point	
24-port switch	
Web server	

 Turn over

8

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Appendix 2

Web developers

Graphic designers

Content writers

Administration officers

Meeting area

Directors' area

Project manager

Web developer

Equipment room

Kitchen area

Storage

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