



## 4.9.4.7 DHCP, NAT & Port Forwarding

1) A company has a network which has a DHCP server and a web server.

a) A device wishes to join a subnet on the network, so it communicates with the DHCP server.

Explain:

- The purpose of the DHCP system
- Why the DHCP system is used
- What will happen during this communication

[4 marks]

The web server has the IP address 192.168.16.12 and must be accessible from computers that are connected to the Internet but outside of the company's own network.

As the web server has a non-routable IP address, it cannot be accessed directly from outside the network. Therefore, access to the web server will be facilitated by the External Router, which supports Network Address Translation (NAT) and port forwarding.

b) Explain how the External Router will have been configured so that the webserver can be accessed by computers outside the network.

[2 marks]

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2) A packet of data is to be transmitted across the internet from a Computer A in the UK to a Computer B in Belgium.

Explain in detail how the packet will be routed across the internet from Computer A to Computer B. Include how:

- The path of the packet to the destination is determined
- How private and public IP addresses are translated

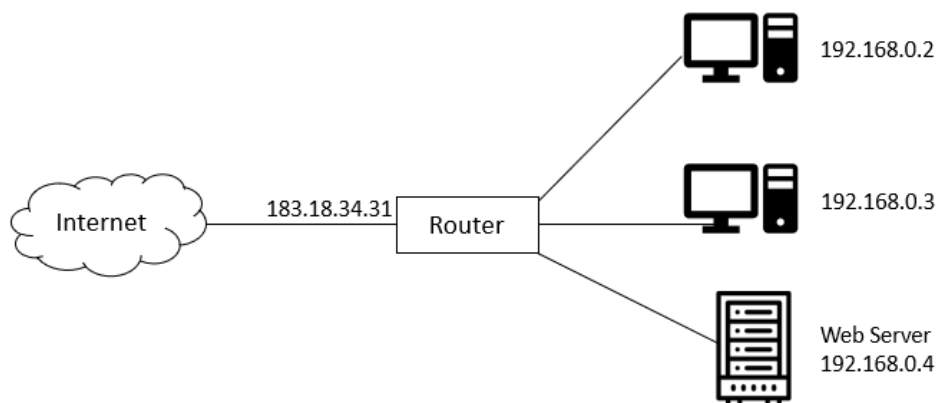
[4 marks]





- 3) **Figure 1** shows a diagram of the LAN in the student's house. The LAN connects three computers, including the web server, to the Internet via a router.

**Figure 1**



The router's public IP address is 183.18.34.31. The non-routable IP addresses of each of the computers on the LAN is shown in **Figure 1**.

The router uses Network Address Translation (NAT) because the computers on the LAN, including the web server, have non-routable IP addresses.

The router also incorporates a switch and a DHCP server.

- a) Explain how a computer located outside the LAN can access the web server, despite the fact that the web server is identified by a non-routable IP address.

**[3 marks]**

- b) Explain why it might be undesirable to allow the network settings of the web server to be configured by a DHCP server.

**[1 mark]**

- c) The student uses the computer with IP address 192.168.0.2 to download a file from an FTP server on the Internet using the File Transfer Protocol (FTP).

Describe how NAT will be used in this process, to handle both the outgoing request and the returned data.

**[4 marks]**





- d) The replacement of IPv4 with IPv6 would mean that NAT is no longer necessary.

Explain why this is the case.

[1 mark]

