

This laboratory will help you set up and configure a network for use at a small business or home office.

⌚ You have 90 minutes to complete the practical test. You are strongly advised to practice the test beforehand. In the last 30 minutes you will present your work and be assessed.

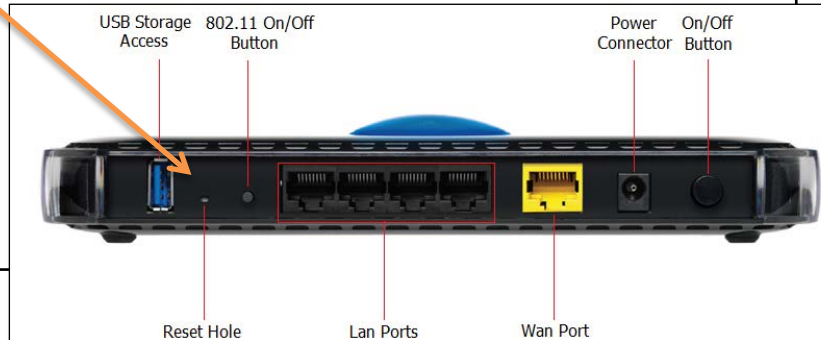
Form **groups of four**

You will need ...

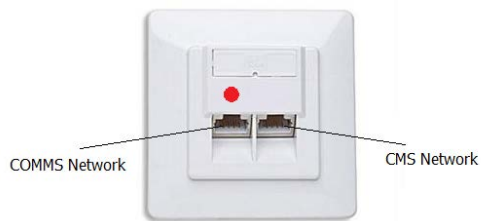
Download and print the [marking scheme](#)

- ☐ [NETGEAR N600 Wireless Dual Band Router - WNDR3400](#)
- ☐ Two PCs

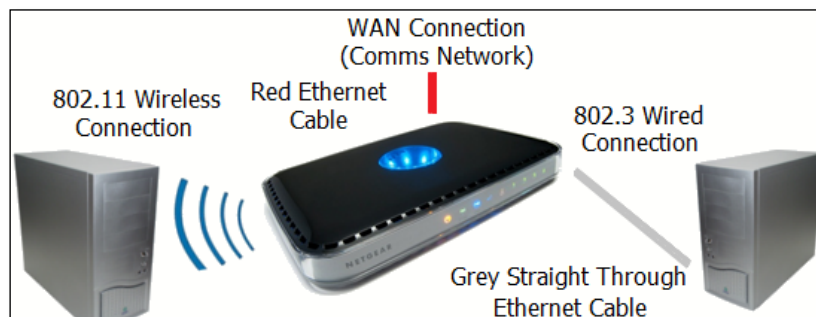
- ☐ Log into two computers on the COMMS network. Run the 'Reset Network Settings' program on the desktop, and ensure the machines have an IP address starting with 10.0.*.*
- ☐ Turn the router on. Use a paper clip to reset the router to its default factory configuration.
- ☐ Connect one PC to a LAN port on the router using a grey straight through cable.
- ☐ Identify the 'COMMS network' RJ45 socket on the trunking.



The COMMS network socket is the RJ45 socket on the left of the socket pair. It is labelled with odd numbering and is connected to the female RJ45 socket on the laboratory bench via a red Ethernet cable. The right hand socket is the CMS network, labelled with even numbering and connected to the rear of the laboratory PC with a grey Ethernet cable.



- ☐ Disconnect the red cable from the female RJ45 socket on the laboratory bench and connect it to the router's WAN port.



Configure the Wired PC

- ☐ Click *Start > Control Panel > Network and Internet > Network and Sharing Centre > Change Adapter Settings*
- ☐ Select the *Local Area Network Connection* and then click *Properties*
- ☐ Click the *Networking* tab.
- Under *This connection uses the following items*, click either Internet Protocol Version 4 (TCP/IPv4) and then click *Properties*
- ☐ Set to *Obtain an IP address automatically* and *Obtain DNS server address automatically*

Initial Router Configuration

- ☐ Configure the router from the machine with the wired connection. Open a web browser. In the address bar type -

http://www.routerlogin.net

The router should be prompting for a Username and a Password. The username is ***admin*** and the password is ***password***

WAN SETUP

- ☐ Select the *Advanced Tab*, Under *Setup* in the left hand menu click *Internet Setup*
- Configure as shown below.
- Make sure the account name is cleared. Click *Apply*.

Internet Protocol Version 4 (TCP/IPv4) Properties

General Alternate Configuration

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

☒ Obtain an IP address automatically

☐ Use the following IP address:

IP address: . . .

Subnet mask: . . .

Default gateway: . . .

☒ Obtain DNS server address automatically

☐ Use the following DNS server addresses:

Preferred DNS server: . . .

Alternate DNS server: . . .

☐ Validate settings upon exit

Advanced...

OK Cancel

Internet Setup

Apply Cancel Test

Does your Internet connection require a login?

☐ Yes

☒ No

Account Name (If Required)

Domain Name (If Required)

Internet IP Address

☒ Get Dynamically from ISP

☐ Use Static IP Address

IP Address

IP Subnet Mask

Gateway IP Address

Domain Name Server (DNS) Address

☒ Get Automatically from ISP

☐ Use These DNS Servers

Primary DNS

Secondary DNS

Router MAC Address

☒ Use Default Address

☐ Use Computer MAC Address

☐ Use This MAC Address

WIRELESS LAN SETUP

☐ Select the Advanced Tab, Under *Setup* in the left hand menu click *Wireless Setup*

☐ Configure the Wireless Network (2.4 Hz b/g/n) *Name (SSID)* with a unique *name*.

☐ Under Security Options, select WPA2-PSK [AES], enter a unique pass phase.

☐ Make a note of the SSID name and pass phrase, you will be configuring the wireless connection on the PC with these latter.

☐ Click Apply

Configuring the Wireless PC

☐ Click *Start > Control Panel > Network and Internet > Network and Sharing Centre*

☐ Select the *Wireless Network* and then click *Properties*

☐ Click the *Networking* tab. Under *This connection uses the following items*, click either Internet Protocol Version 4 (TCP/IPv4) and then click *Properties*

☐ Set to *Obtain an IP address automatically* and *Obtain DNS server address automatically*

☐ Click the network icon Network Icon in the notification area of the desktop. The resulting pane will give you a list of detected wireless networks and display the wireless network's name, signal strength, security type, radio type (802.11b/g/n), and Service Set Identifier (SSID)

☐ Select the SSID name you configured earlier, and enter the pass phrase

Wireless Setup

Apply Cancel

Region Selection
Region: Europe

Wireless Network (2.4GHz b/g/n)
☐ Enable Wireless Isolation
☒ Enable SSID Broadcast
Name (SSID): NETGEAR31
Channel: Auto
Mode: Up to 145 Mbps

Security Options
☐ None
☐ WPA-PSK [TKIP]
☒ WPA2-PSK [AES]
☐ WPA-PSK [TKIP] + WPA2-PSK [AES]
Passphrase: gracefulviolet498 (8-63 characters or 64 hex digits)

Wireless Network (5GHz a/n)
☐ Enable Wireless Isolation
☒ Enable SSID Broadcast
Name (SSID): NETGEAR31-5G
Channel: 44
Mode: Up to 300 Mbps

Security Options
☐ None
☐ WPA-PSK [TKIP]
☒ WPA2-PSK [AES]
☐ WPA-PSK [TKIP] + WPA2-PSK [AES]
Passphrase: gracefulviolet498 (8-63 characters or 64 hex digits)

☒ Obtain an IP address automatically
☐ Use the following IP address:
IP address: . . .
Subnet mask: . . .
Default gateway: . . .
☒ Obtain DNS server address automatically
☐ Use the following DNS server addresses:

Currently connected to:
GreenNET 2 Internet access

Dial-up and VPN
University of Greenwich

Wireless Network Connection
GreenNET
eduroam
NETGEAR31

Open Network and Sharing Center

Connect to a Network

Type the network security key

Security key:

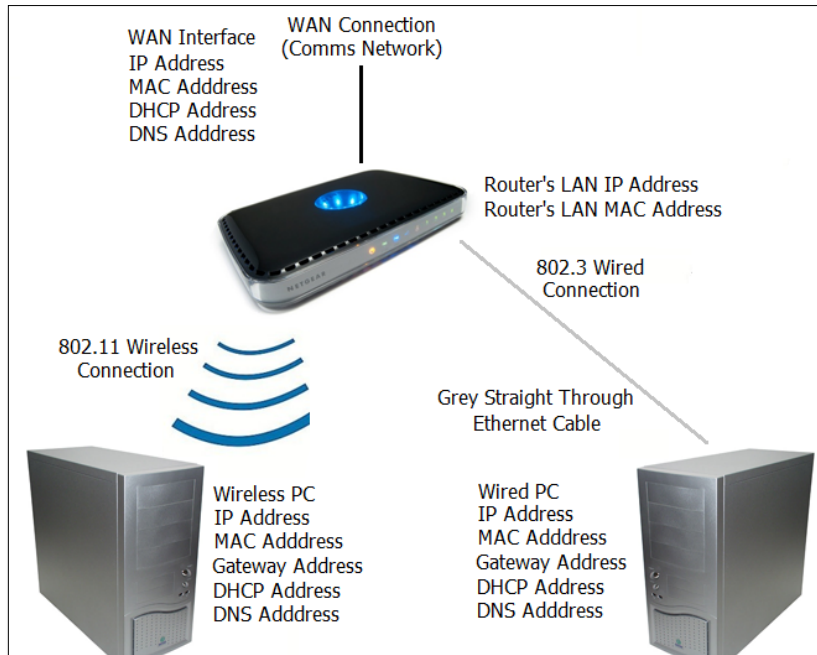
☐ Hide characters

You can also connect by pushing the button on the router.

OK Cancel

TASK 1: LAN Configuration

Using the **ping** and **ipconfig /all** commands on the PCs, and the **Router Status** and **Attached Devices** menus on the router, complete the following tables:



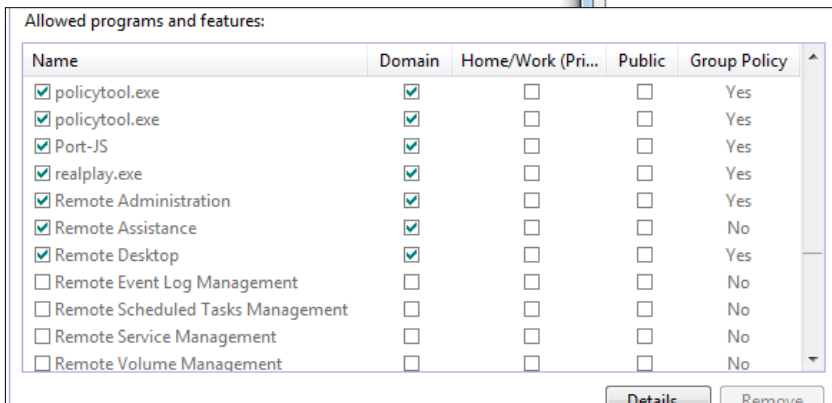
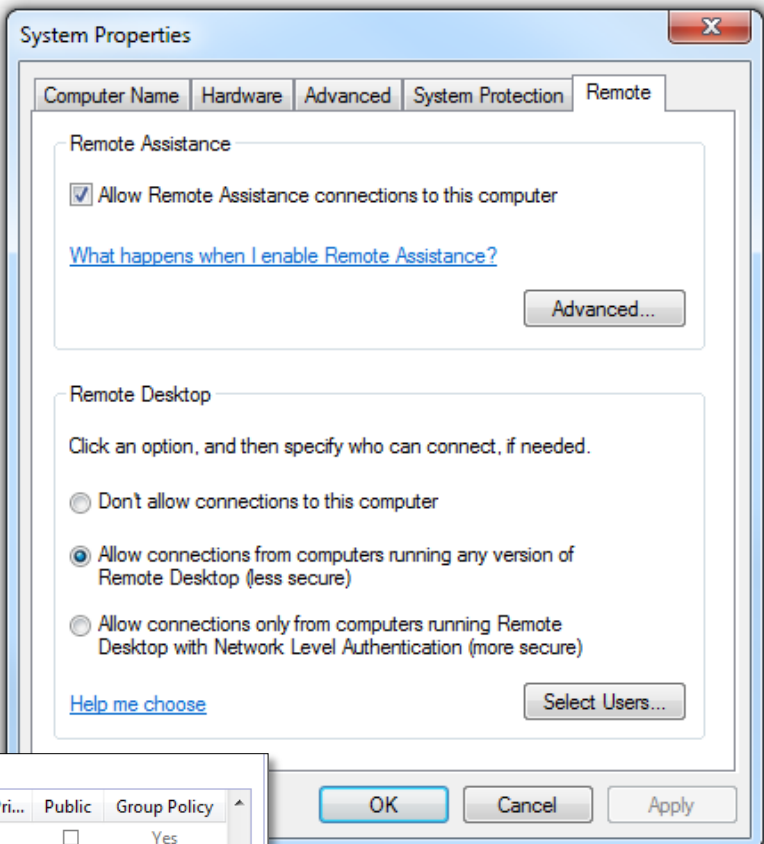
WIRED PC	Wired PC's IP Address	
	Wired PC's MAC Address	
	Default Gateway IP Address	
	DHCP IP Addresses	
	DNS IP Addresses	
WIRELESS PC	Wireless Connection IP Address	
	Wireless Connection MAC Address	
	Default Gateway IP Address	
	DHCP IP Address	
	DNS IP Addresses	
ROUTER ADDRESSES	LAN IP Address	
	LAN MAC Address	
	Internet Port IP Address	
	Internet Port MAC Address	
	Internet Port DHCP Address	
	Internet Port DNS Address	

Demonstrate to the lecturer

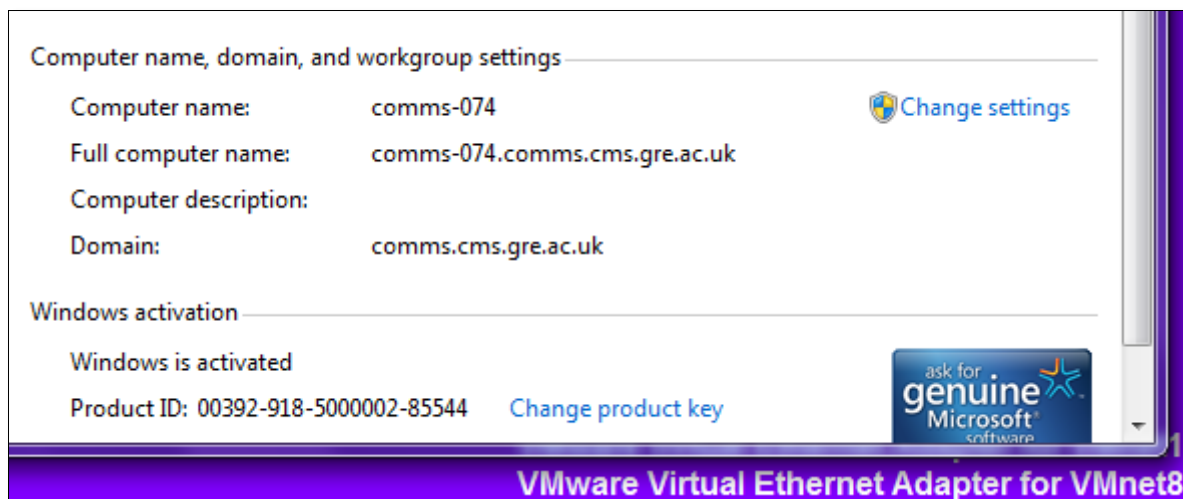
Ping Router from Wireless Machine	PASS / FAIL
Ping Router from Wired Machine	PASS / FAIL
Ping wired machine from wireless machine	PASS / FAIL
Ping wireless machine from wired machine	PASS / FAIL
Ping DHCP Server from wireless machine	PASS / FAIL
Ping DHCP Server from wired machine.	PASS / FAIL

Configure the wired computer to be accessed by Remote Desktop

- ❑ Open the *System and Security* folder in Control Panel. Click *Start*, point to *Settings*, click *Control Panel*, and then double-click the *System* icon.
- ❑ On the *Remote* tab, select the *Allow connections from computers running any version of Remote Desktop* and click *OK*.
- ❑ Open the *System and Security* folder in Control Panel, under *Windows Firewall*, select *Allow a program through Windows Firewall*, and tick *Remote Desktop*

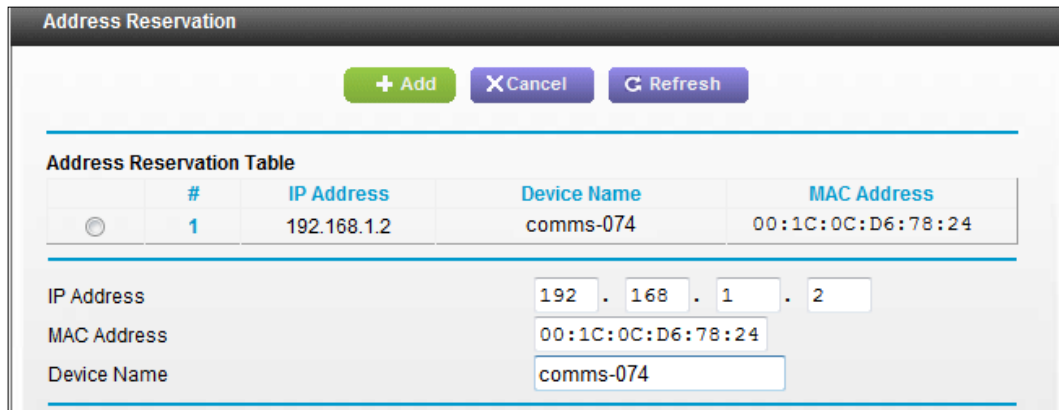


- ❑ From the task bar click *start*, then right click on *Computer*, select *properties*, and make a note of the *Computer name*. You will need this later.



Configure the router to allow Remote Access

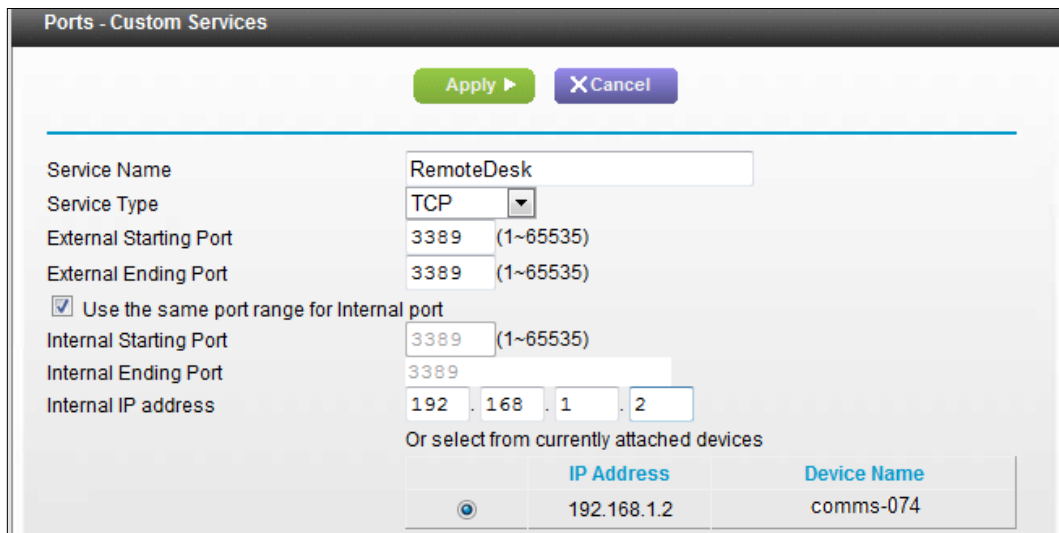
❑ Log in to the router. Select the *Advanced* Tab, Under *Setup* in the left hand menu click *LAN Setup*, Click *Add* under *Address Reservation*. Enter a Private IP address from the 192.168.0.0 network, that you wish to reserve for the wired machine i.e. 192.168.0.2, enter the MAC address of the Local Area Network Connection interface of the wired machine, and enter the Computer Name of the machine:



#	IP Address	Device Name	MAC Address
1	192.168.1.2	comms-074	00:1C:0C:D6:78:24

IP Address: 192 . 168 . 1 . 2
MAC Address: 00:1C:0C:D6:78:24
Device Name: comms-074

❑ Select the *Advanced* Tab, Under *Setup* in the left hand menu click *Advanced Setup* and select *Port Forwarding / Port Triggering* and Select *Add Custom Service* and configure as shown. Ensure that in the *Server IP Address* you put the NAT IP address of the machine you wish to gain Remote Access through the Internet



Service Name: RemoteDesk
Service Type: TCP
External Starting Port: 3389 (1~65535)
External Ending Port: 3389 (1~65535)
☒ Use the same port range for Internal port
Internal Starting Port: 3389 (1~65535)
Internal Ending Port: 3389
Internal IP address: 192 . 168 . 1 . 2

Or select from currently attached devices

IP Address	Device Name
192.168.1.2	comms-074

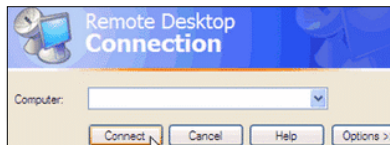
❑ Click Apply and Log off the router. Turn the router off, wait ten seconds and restart the router.

Start a Remote Desktop Connection

- ❑ Choose a third machine in the laboratory that is outside the LAN you have configured. Log on to the COMMS network. Run the 'Reset Network Settings' program on the desktop, to make sure the machine has an IP address starting with 10.0.*.*
- ❑ Click *Start*, point to *Programs* or *All Programs*, point to *Accessories*, point to *Communications*, and then click *Remote Desktop Connection*.
- ❑ In *Computer*, type the *Internet IP Address* that has been assigned to your router. Click *Connect*. The *Log On to Windows dialog box* appears. The username and password are:-

USERNAME: **.!student**

PASSWORD: **£3NinetyFive**



The Remote Desktop window will open and you will see the desktop settings, files, and programs that are on the computer. To change connection settings, such as screen size, click *Options* before you connect.

TASK 2: Complete the following table:

Router's LAN IP Address.	
Wired PC's IP Address.	
Wireless PC's Wireless Connection IP Address.	
Router's Internet Port IP Address.	

TASK 3

Demonstrate
to the lecturer

Remote Desktop Session

PASS / FAIL

Trouble Shooting

Common problems which will cause the remote desktop session not to work are:-

- Machine used to initiate remote desktop session is not logged in under the COMMS network.
- COMMS machine used to initiate remote desktop has no 10.0.*.* IP address or incorrect IP address. Ensure the red Ethernet cable is connected to the machine. Run the 'Reset Network Settings' program icon on the desktop, to make sure the machine has an IP address starting with 10.0.*.*
- Machine used to initiate remote desktop session has prior network configuration not cleared:-
 - Click *Start > Control Panel > Network and Internet > Network and Sharing Centre*
 - Select the connection you want to change and then click *Properties*
 - Click the Networking tab. Under *This connection uses the following items*, click either Internet Protocol Version 4 (TCP/IPv4) and then click *Properties*
 - Set to *Obtain an IP address automatically* and *Obtain DNS server address automatically*
- Router's WAN port not connected to COMMS network port - check that the router and the machine used to initiate remote desktop are both on the COMMS Class A network 10.0.0.0
- Firewall incorrectly configured on remote machine.
- Address Reservation or Port Forwarding not configured correctly on router.

TASK 4: Reflection (This is a group reflection)

Identify the sections of the laboratory you have understood and demonstrate your understanding - beyond the simple level of completing the laboratory - through cognitive processes such as analysing, explaining, interpreting, and evaluating. Illustrate, by the use of examples how the laboratory contributed towards your understanding and your Degree programme.

For the sections of the laboratory which you struggled with, or were uncertain of, identify why this was the case. Evaluate the effectiveness of your learning strategy, including factors such as motivation, preparation, commitment, time management, communication, constraints and support. With reflection to past experience, identify how you could improve your learning and performance to overcome the barriers encountered in this laboratory such that they do not infringe upon the next laboratory you undertake.

With relation to the sections of the laboratory you encountered difficulty with, state how, and by when you intend to gain competence in these areas.

Critically appraise the laboratory; identify sections you thought were positive, facilitated your understanding and contributed to your Degree programme; identify sections that require improvement and state how and why would you change the laboratory to improve the laboratory for the next year's students.

TASK X: (Optional)

Enable your home machine to be controlled via remote desktop from the University. If your Internet Service Provider (ISP) has supplied you with a fixed IP address, you should be able to connect to your home machine by following the procedures set out in the laboratory above. To connect to your home machine simply enter the fixed IP address your ISP has supplied when you start a remote desktop session.

If your Internet Service Provider (ISP) has supplied you with a dynamic IP address, in addition to the above you will need to register with a Dynamic DNS service such as <http://www.dyndns.com/> and configure the Dynamic DNS settings in the router.

*After the first 90 minutes, fill in your names on [the marking scheme](#) and call the tutor to assess your work. **ALL** team members need to individually upload their laboratory documents into **week 1.11 (in PDF format)**. Make sure that the marking scheme has the names of all the members of your team.*

Network Address Translation (NAT):

The process of modifying network address information in datagram packet headers while in transit across traffic routing device for the purpose of remapping a given address space into another. Most often today, NAT is used in conjunction with network masquerading (or IP masquerading) which is a technique that hides an entire address space, usually consisting of private network addresses (RFC 1918), behind a single IP address in another, often public originates in the masqueraded network, since this establishes the translation tables. For example, a web browser in the masqueraded network can browse a website outside, but a web browser outside could not browse a web site in the masqueraded network. However, most NAT devices today allow the network administrator to configure translation table entries for permanent use. This feature is often referred to as "static NAT" or port forwarding and allows traffic.

Port Forwarding:

When a computer on the internet sends data to the external IP address of the router, the router needs to know what to do with the data. Port Forwarding tells the router which computer on the local area network to send the data to. When port forwarding rules are setup the router takes the data off of the external IP address: port number and sends that data to an internal IP address: port number.

Private IP addresses:

The Internet Assigned Numbers Authority (IANA) has reserved the following three blocks of the IP4 address space for private internets. These IP address should not be used on the Internet:

10.0.0.0 - 10.255.255.255

172.16.0.0 - 172.31.255.255

192.168.0.0 - 192.168.255.255

These addresses are common in home and office local area networks (LANs), as globally routable addresses are scarce, expensive to obtain, or their use is not necessary. These addresses are private because they are not globally delegated, meaning they aren't allocated to a specific organisation. Anyone can use these addresses without approval from a regional Internet registry (RIR). Consequently, they are not routable within the public Internet. If such a private network needs to connect to the Internet, it must use either a network address translator (NAT) gateway, or a proxy server.

Remote Desktop:

The Remote Desktop facility allows the remote control a computer from another computer. This allows the use of data, applications, and network resources that are on the computer to be accessed from the internet.