

INFT 2031 – Laboratory 7

Topic: Group Policy & DHCP

Approx. Time	Lesson	Notes
30 minutes	Group Policy (contd.)	Individual; Hands-On
30 minutes	DHCP Review Read Chapter 6 – DHCP in Online eBook	Individual
45 minutes	DHCP configuration	Individual; Hands-On
15 minutes (continue as homework)	Review Questions	Individual; Research

Part 1: Group Policy (contd.)

This section is continuation of Lab 6's Group Policy exercises. You need to have completed Lab 6's Group Policy exercises prior to starting this lab.

Task 1: Policy Inheritance (Block Inheritance, Enforced and Exemptions)

Group Policy Inheritance: GPOs are applied in the following order

1. Local GPO
2. Site
3. Domain
4. Parent OU
5. Child OU

All of the individual GPO settings are inherited by default (can be overridden). For example, a GPO on a parent container is also applied to child containers. At each level, more than one GPO can be applied. If there is more than one GPO per container, the policies are applied in bottom up order that they appear in Group Policy tab.

When multiple policies conflict, the following protocol is used to determine which policy to apply:

1. If there is no conflict, then both policies are applied
2. If there is a conflict, later settings overwrite the earlier settings (by default).
3. Computer policies usually overwrite user policies

Block Policy Inheritance: In this subtask, you'll test **blocking policy inheritance**.

- Create an OU within Student OU called *ResearchStudents* (Click on *Start* → *Administrative Tools* → *Active Directory Users and Computers*).
- Add a user called *Keith Morgan* (username *KeithM*) to the *ResearchStudents* OU with password as "Password1".
- Add Keith Morgan to the *StudentUsers* group.
- Configure the home folder for Keith Morgan to be the H: drive mapped to `\\<server>\StudentData\<username-of-student>`
- Since research students need access to registry and update them you'll block policy inheritance as follows:
 - Open GPMC
 - Right-click on *ResearchStudents* OU and select "Block Inheritance"

- Now logon as Keith Morgan and verify access to regedit.

Enforced Policy: In this subtask, you'll test "**Enforced**" capability of GPOs

- You notice that after the previous task, research students are not only able to access registry but also the control panel (which is set by the "Student Policy").
- It is determined that resources must adhere to *Default Domain Policy* GPO while all students (including research students) should adhere to *Student Policy* GPO. To disallow any blocking of *Default Domain Policy* and *Student Policy* in OUs in *Warabrook* domain and *Students* OU respectively, you can set the "Enforced" flag as follows:
 - Logon to the server as an Administrator, open *GPMC*.
 - Traverse to *Warabrook* domain in *GPMC*. Right-click on *Default Domain Policy* GPO and select *Enforced*.
 - Next, traverse to *Students* OU in *GPMC*. Right-click on *StudentPolicy* GPO and select *Enforced*
- Now logon as Keith Morgan and verify access to *regedit* while no access to the Control Panel.

Exemptions to Group Policy: In this subtask, you'll test how **exemptions from Group Policy** can be set to specific users.

- A lecturer has decided that student *Jeff Kay* (username: *std0777*) requires access to *registry* for his project and asked you to enable this setting so as to complete his project using the lab computers.
- To enable Jeff Kay to access registry, you have decided to exempt *Jeff Kay* from being applied the *RemoveRegistryEditing* GPO
- You can set the exemption as follows:
 - Logon as Administrator, open *GPMC*. Open *Group Policy Objects* folder in *INFT2031* domain.
 - Click on *RemoveRegistryEditing* GPO and select *Delegation* tab on the right-hand windows. Next click on *Advanced...* button.
 - Click on *Add* button and search for *std0777* username.
 - In the *Permissions for Jeff Kay*, select *Deny* on *Apply Group Policy*.
 - Click *Apply* and *OK*.
 - Close *GPMC*
- Logon as *std0777* and verify exemption from *RemoveRegistryEditing* GPO. Logon as *std0121* and verify that *RemoveRegistryEditing* GPO is applied.

Task 2: Group Policy Modelling

Group Policy application can become complex in a large environment and having a tool to decide which GPOs are applied can be quite helpful for troubleshooting. For instance, which setting, policies are applied for containers (OUs), computers, groups or users. The *Group Policy Modeling* tool within *GPMC* is a handy tool for this purpose.

You'll use the *Group Policy Modeling* tool to verify the GPOs applied to *std0777*, *std0121* users and *Students* OU on your client computer:

- Open *GPMC*
- Traverse *Group Policy Modeling* in the *INFT2031* forest.
- Right-click on *Group Policy Modeling* and select *Group Policy Modeling Wizard...*
- Click *Next*.
- In the *Domain Controller Selection* screen, keep default selections and click *Next*.

- For user *std0777* GP Modeling, select *User* in *User Information* selection group. Select *std0777* user for user. You can use *Browse* button to find the user. Click *Next*.
- For *Computer Information*, select your client computer (e.g. INFT2031-PC).
- Select *Skip to the final page of this wizard without collecting additional data* and click *Next*.
- Click *Next* and *Finish*.
- Review the summary – especially Applied GPOs and Denied GPOs. You will notice that in *User Configuration Summary*, *RemoveRegistryEditing* is coming up as a Denied GPO while *StudentPolicy* and *Default Domain Policy* are coming up as Applied GPOs.
- You can view the settings applied by clicking the *Settings* tab. Review all setting applied for *std0777* student for the client computer by the different GPOs.

Similarly, use *Group Policy Modeling* tool to verify GPOs applied for *std0121* user, *KeithM* user and *Student OU*.

Part 2: DHCP Overview

(Source: *Windows Server 2008: TCP/IP Fundamentals for Microsoft Windows*).

This section consists of sections from *Chapter 6 - Dynamic Host Configuration Protocol* of the *Windows Server 2008: TCP/IP Fundamentals for Microsoft Windows* ebook.

DHCP is a TCP/IP standard that reduces the complexity and administrative overhead of managing network client IPv4 addresses and other configuration parameters. A properly configured DHCP infrastructure eliminates the configuration problems associated with manually configuring TCP/IP addressing.

A DHCP infrastructure consists of the following elements:

- **DHCP servers**: Computers that offer dynamic configuration of IPv4 addresses and related configuration parameters to DHCP clients.
- **DHCP clients**: Network nodes that support the ability to communicate with a DHCP server to obtain a dynamically leased IPv4 address and related configuration parameters.
- **DHCP relay agents**: Network nodes, typically routers, that listen for broadcast and unicast DHCP messages and relay them between DHCP servers and DHCP clients. Without DHCP relay agents, you would have to install a DHCP server on each subnet that contains DHCP clients.

Each time a DHCP client starts, it requests IPv4 addressing information from a DHCP server, including:

- IPv4 address
- Subnet mask
- Additional configuration parameters, such as a default gateway address, Domain Name System (DNS) server addresses, a DNS domain name, and Windows Internet Name Service (WINS) server addresses.

When a DHCP server receives a request, it selects an available IPv4 address from a pool of addresses defined in its database (along with other configuration parameters) and offers it to the DHCP client. If the client accepts the offer, the IPv4 addressing information is leased to the client for a specified period of time.

The DHCP client will typically continue to attempt to contact a DHCP server if a response to its request for an IPv4 address configuration is not received, either because the DHCP server cannot be reached or because no more IPv4 addresses are available in the pool to lease to the client. For DHCP clients that are based on Microsoft Windows XP or Windows Server 2003 operating systems, the DHCP Client service uses the alternate configuration when it cannot contact a DHCP server. The alternate configuration can be either an Automatic Private IP Addressing (APIPA) address or an alternate configuration that has been configured manually.

How DHCP works?

DHCP uses the following basic process to automatically configure a DHCP client:

1. When the TCP/IP protocol initializes and has DHCP enabled on any of its interfaces, the DHCP client sends a DHCPDiscover message to find the DHCP servers on the network and to obtain a valid IPv4 address configuration.
2. All DHCP servers that receive the DHCPDiscover message and that have a valid IPv4 address configuration for the client send a DHCPOffer message back to the DHCP client.
3. The DHCP client selects an IPv4 address configuration to use from the DHCPOffer messages that it receives and sends a DHCPRequest message to all the DHCP servers, requesting the use of the selected configuration. The DHCPRequest message identifies the server that sent the offer that the DHCP client selected. The other DHCP servers that receive the DHCPRequest message that sent offers place their offered IPv4 addresses back into the available pool of addresses.
4. The selected DHCP server assigns the IPv4 address configuration to the DHCP client and sends a DHCPAck (acknowledgment) message to the DHCP client. The DHCP client computer finishes initializing the TCP/IP protocol on the interface. Once complete, the client can use all TCP/IP services and applications for normal network communications and connectivity to other IPv4 hosts.

Figure 6-1 shows the basic DHCP process.

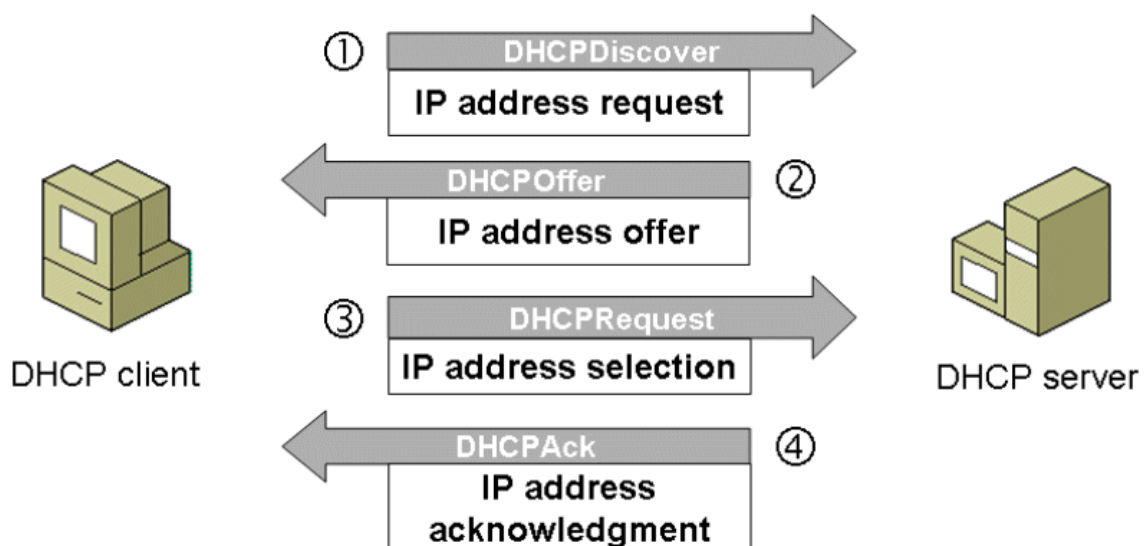


Figure 6-1 The basic DHCP process

If a computer has multiple network adapters, the DHCP process occurs separately over each network adapter that is configured for automatic TCP/IP addressing until each network adapter in the computer has been allocated a unique IPv4 address configuration

If a DHCP server is on the DHCP client's subnet, the server receives the broadcast DHCPDiscover message. If no DHCP server on the DHCP client's subnet (a more typical configuration), a DHCP relay agent on the DHCP client's subnet receives the broadcast DHCPDiscover message and relays it as a unicast DHCPDiscover message from the DHCP relay agent to one or more DHCP servers.

The DHCP relay agent sends the DHCPDiscover message as a unicast IPv4 packet rather than as an IPv4 and MAC-level broadcast. If the DHCP relay agent is configured with multiple DHCP servers, it sends each DHCP server a copy of the DHCPDiscover message.

Figure 6-3 to 6-6 shows the DHCP process with DHCP relay agent. Figure 6.3 sends of the DHCPDiscover message by a DHCP relay agent that is configured with two DHCP servers.

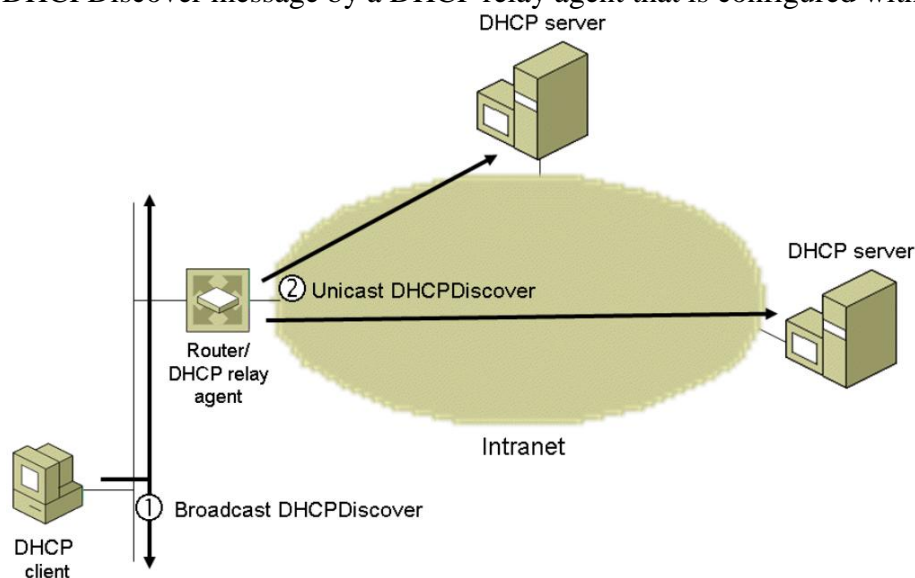


Figure 6-3 Sending the DHCPDiscover message

Figure 6-4 shows the sending of the DHCPOffer message.

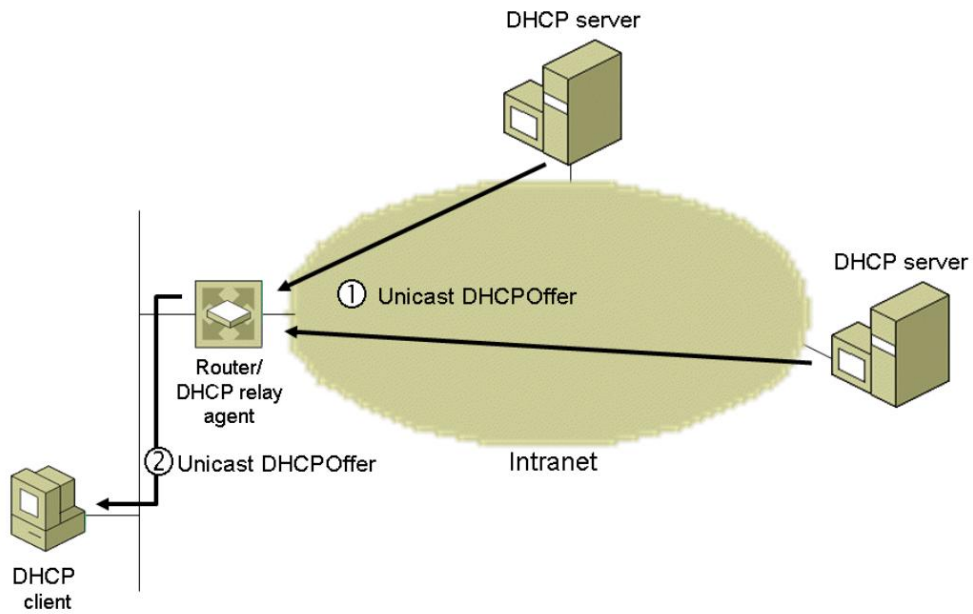


Figure 6-4 Sending of DHCP Offer message

Figure 6-5 shows the sending of the DHCP Request message.

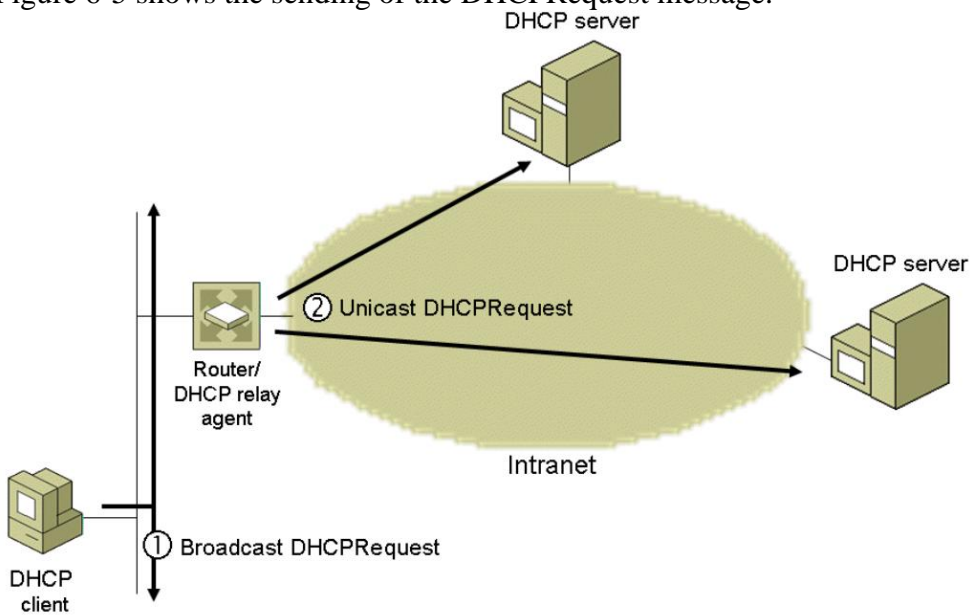


Figure 6-5 Sending the DHCP Request message

Figure 6-6 shows the sending of the DHCP Ack message.

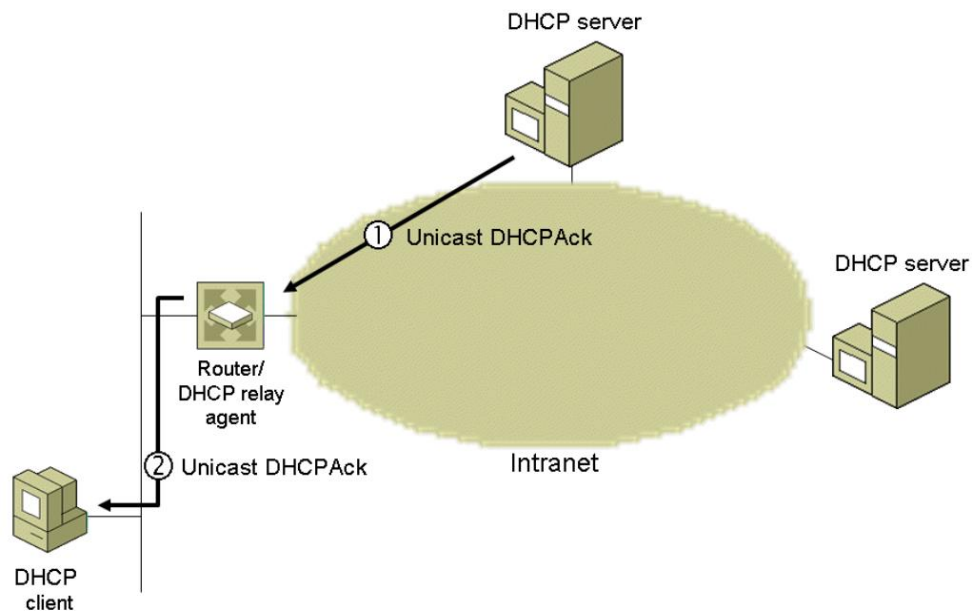


Figure 6-6 Sending the DHCPACK message

Read Chapter 6 - Dynamic Host Configuration Protocol (pages 159- pages 185) in *Windows Server 2008: TCP/IP Fundamentals for Microsoft Windows* for further details in DHCP configuration in IPv4. Note that this eBook is posted in the **Resources** folder in INFT2031 Blackboard course site.

Part 3: DHCP Configuration

The Windows DHCP Server Service

(Source: *Windows Server 2008: TCP/IP Fundamentals for Microsoft Windows*)

Before you install a Windows-based DHCP server, ask yourself these questions:

- What IPv4 configuration options will DHCP clients obtain from a DHCP server (such as default gateway, DNS servers, a DNS domain name, or WINS servers)?

The IPv4 configuration options determine how you should configure the DHCP server and whether the options should be created for all clients in the entire network, clients on a specific subnet, or individual clients.

- Will all computers become DHCP clients?

If not, consider that non-DHCP clients have static IPv4 addresses, and you might have to exclude those addresses from the scopes that you create on DHCP servers. If a specific DHCP client requires a specific IPv4 address, you must reserve the address.

- Will a DHCP server supply IPv4 addresses to multiple subnets?

If so, each subnet must contain a DHCP relay agent. If a subnet does not have a DHCP relay agent, you must install a separate DHCP server on the subnet.

- How many DHCP servers do you require?

To ensure fault tolerance for DHCP configuration, you should use at least two DHCP servers. You might need additional DHCP servers for branch offices of a large organization.

Scenario: IT Building's DHCP configuration

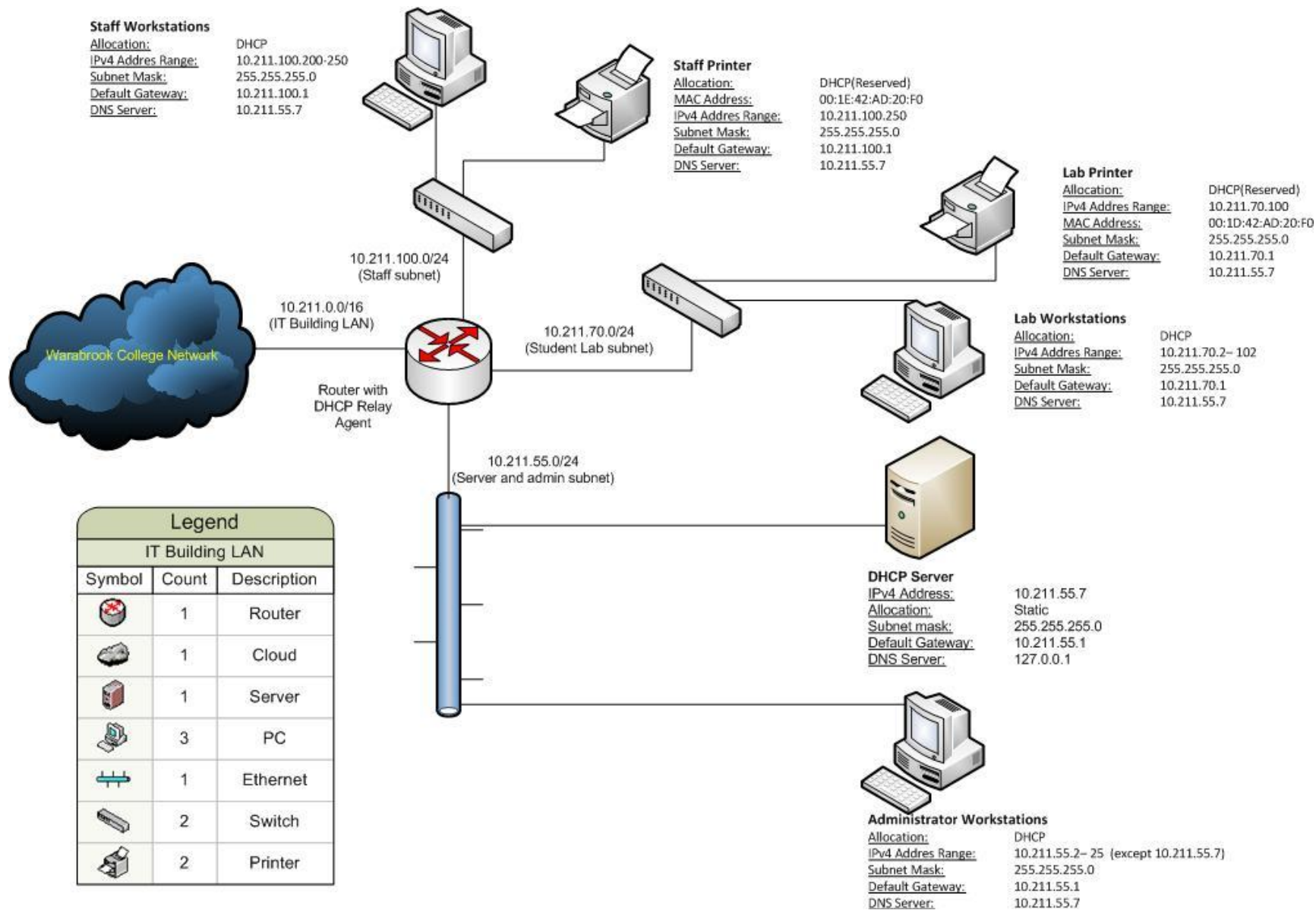
Warabrook College's campus has an IT Building and plans to configure 3 subnets in the building's LAN. There are 3 subnets in the IT Building as described below:

Subnet 1	Server and admin subnet
Subnet address	10.211.55.0/24
Description	This subnet consists of server and administrators' workstations. The DHCP server is configured in a server on this subnet.

Subnet 2	Student Lab subnet
Subnet address	10.211.70.0/24
Description	This subnet consists of all lab workstations and network printers in the student labs.

Subnet 3	Staff subnet
Subnet address	10.211.100.0/24
Description	This subnet consists of staff workstations and network printers used by staff.

The network diagram for the IT Building's LAN is given below. You are asked to configure the DHCP server on Warabrook campus's IT Building's LAN.



Task 1: Installing DHCP Server Service

Firstly, you will install DHCP Server Service role on the Windows Server 2008.

1. Firstly, log into your Windows Server 2008 as an administrator. Ensure that following IPv4 configurations for the network adaptor:

IPv4 address: 10.211.55.7
Subnet mask: 255.255.255.0
Default gateway: 10.211.55.1
Preferred DNS server: 127.0.0.1
Alternate DNS server: 10.211.55.1

2. Next, open Server Manager and install DHCP Server service:
 - a. Click *Start* → *Administrative Tools* → *Server Manager*
 - b. Select *Roles* and click *Add Roles*.
 - c. Click *Next* and select *DHCP Server* and click *Next*.
 - d. Read through the “Introduction to DHCP Server” and click *Next*
 - e. Keep defaults for “Select Network Connection Bindings” and click *Next*.
 - f. Leave the default settings for “IPv4 DNS Server settings” and click *Next*. (The DNS Server setting will be 10.211.55.7)
 - g. You will not configure WINS for this network. Therefore, select “WINS is not required for applications on this network” and click.
 - h. In the “Add or Edit DHCP Scopes” windows you’ll add the following scope:

Scope Name	Server and admin subnet
Starting IP Address	10.211.55.2
Ending IP Address	10.211.55.25
Subnet mask	255.255.255.0
Default Gateway	10.211.55.1
Subnet Type	Wired (lease duration will be 6 days)
Activate Scope	Yes

- i. In the “Configure DHCPv6 Stateless Mode” window, select “*Enable DHCPv6 stateless mode for this server. IPv6 clients will be automatically configured without using this DHCP server*” and click *Next*.
- j. In “Authorise DHCP Server”, select “Use current credentials” to authorise the DHCP Server and click *Next*.
- k. Finally, click *Install* to install the DHCP Service.

Task 2: Configuring DHCP Scopes

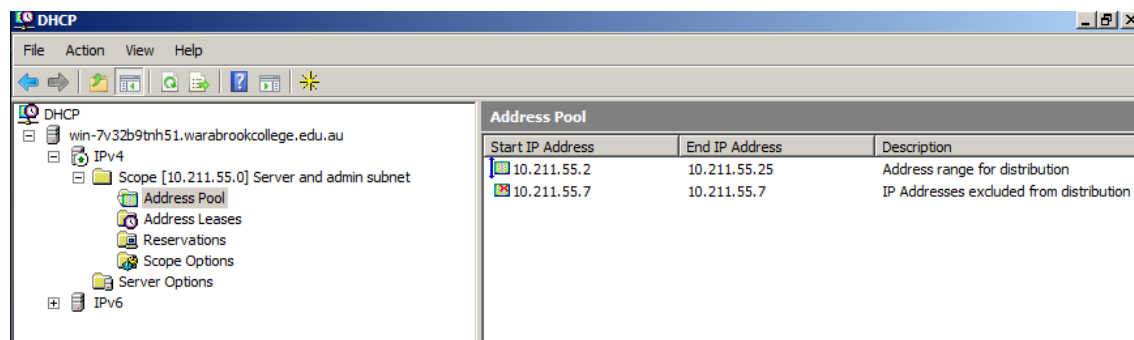
After installing DHCP server, the DHCP console is available for DHCP configurations.

1. First open the DHCP console, by clicking *Start* → *Administrative Tools* → *DHCP*
2. Next traverse to IPv4 configuration. You will notice the “Server and admin subnet” scope created in the previous task. Expand the scope to view the following contents in the scope:
 - Address pool
 - Address Leases
 - Reservations
 - Scope Options

3. Click on Address pool to view the address range which is 10.211.55.2 – 10.211.55.25.
4. Review the network diagram above. You'll notice that in the "Server and admin subnet", DHCP Server IPv4 address is statically assigned and therefore should not be assigned dynamically by the DHCP Server. We will create an exclusion range of IP addresses within the address range of the scope to avoid DHCP Server from distributing DHCP Server's IPv4 address.

Creating Exclusion Range:

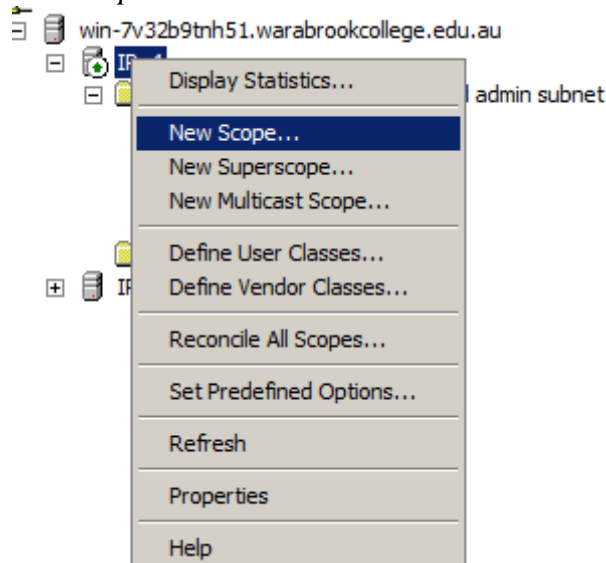
- Right-click on Address Pool and select *New Exclusion Range*.
- In the *Add Exclusion* window, enter the following for the start and end IP addresses
 Start IP address: 10.211.55.7
 End IP address: 10.211.55.7



5. In this step, we will first review the network diagram and create a scope for the Student Lab subnet:
 - Review the subnets in the network diagram

Creating a new Scope:

- You can create a new scope by right-clicking IPv4 icon on DHCP console and selecting *New Scope...*



- Click *Next* in the New Scope Wizard
 - Fill in the above information for scope name and description and click *Next*

Scope Name	Student Lab subnet
Description	The scope provides IPv4 addresses to nodes in student labs

- For the IP Address Range, use the following (see network diagram) and click *Next*:

Starting IP Address	10.211.70.2
Ending IP Address	10.211.70.102
Subnet mask	255.255.255.0

- For exclusion, there are no-exclusions in this scope's address range. Click *Next*.
- For the lease duration, configure the lease to be 6 days. Click *Next*.
- Choose to configure DHCP options. Click *Next*.
- Enter the following information for router (default gateway) and click *Next*:

Default Gateway	10.211.70.1
------------------------	-------------

- Configure the following for the DNS Server and click *Next*:

DNS Server	10.211.55.1
-------------------	-------------

New Scope Wizard

Domain Name and DNS Servers
The Domain Name System (DNS) maps and translates domain names used by clients on your network.

You can specify the parent domain you want the client computers on your network to use for DNS name resolution.

Parent domain:

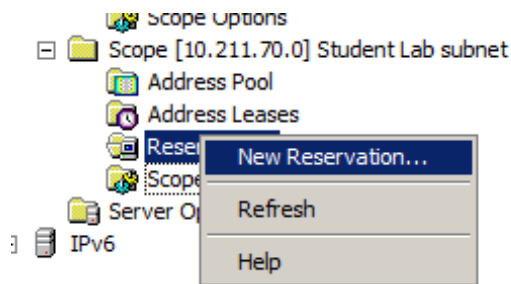
To configure scope clients to use DNS servers on your network, enter the IP addresses for those servers.

Server name: IP address:

- Do not specify WINS Servers. Click *Next*.
- Activate Scope and click *Next*.
- Click *Finish* to complete Scope configurations.
- Explore the *Student Lab subnet* scope. You'll notice that no reservations have been specified in the *Reservations* folder in the Scope. Review the network diagram. You'll notice that the Lab Printer is reserved an IPv4 address. 10.211.70.100. Place a reservation for the Lab printer.

Creating a reservation:

- Right-click on *Reservations* and select *New Reservation...*



- In the *New Reservation* window, provide the following information based on the network diagram and scenario:

Reservation Name	Lab printer
IP Address	10.211.70.100
MAC Address	001D42AD20F0
Description	Reservation for lab printer

6. Similar to step 5, create a new scope for the Staff subnet.

Scope Name	Staff subnet
Scope Description	The scope provides IPv4 addresses to staff subnet
Starting IP Address	10.211.100.200
Ending IP Address	10.211.100.250
Subnet mask	255.255.255.0
Lease Duration	6 days
Default Gateway	10.211.100.1
DNS Server	10.211.55.7
Activate Scope	Yes

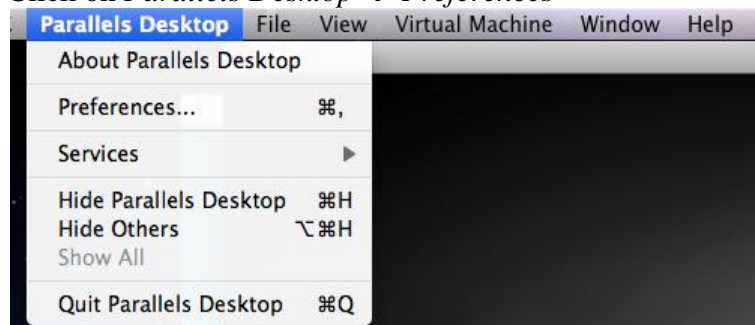
Reservation information:

Reservation Name	Staff printer
IP Address	10.211.100.250
MAC Address	001E42AD20F0
Description	Reservation for lab printer

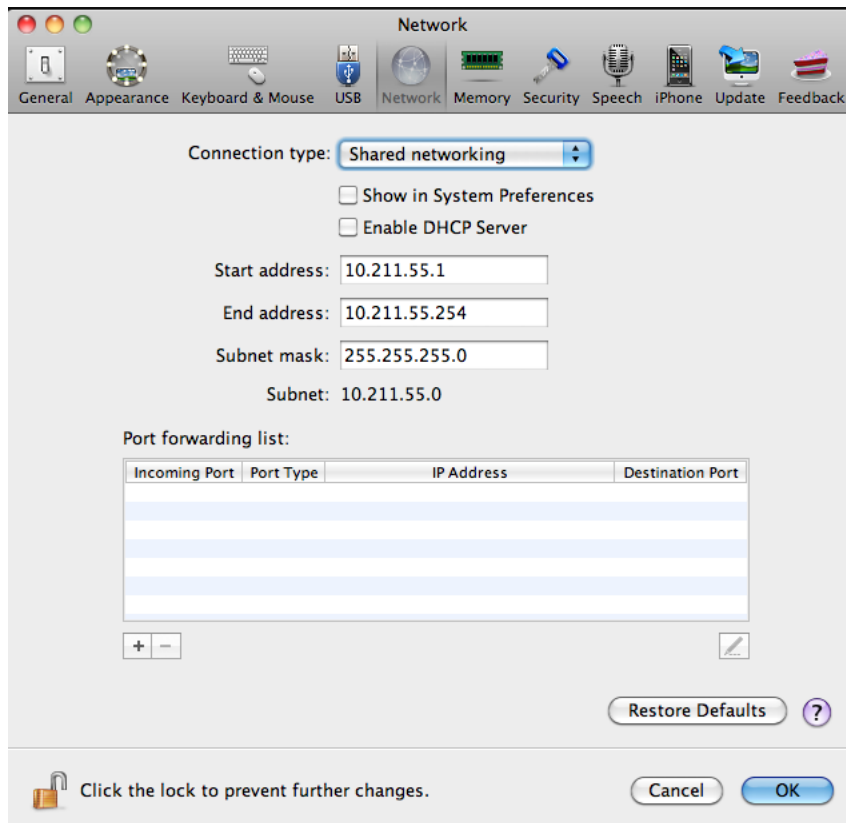
7. In this section, you'll obtain an IPv4 address to your Windows 7 client from the DHCP Server, as a workstation in the "Server and admin subnet".

- Firstly, ensure that you disable the DHCP Service in Parallels Desktop

- Click on *Parallels Desktop* → *Preferences*

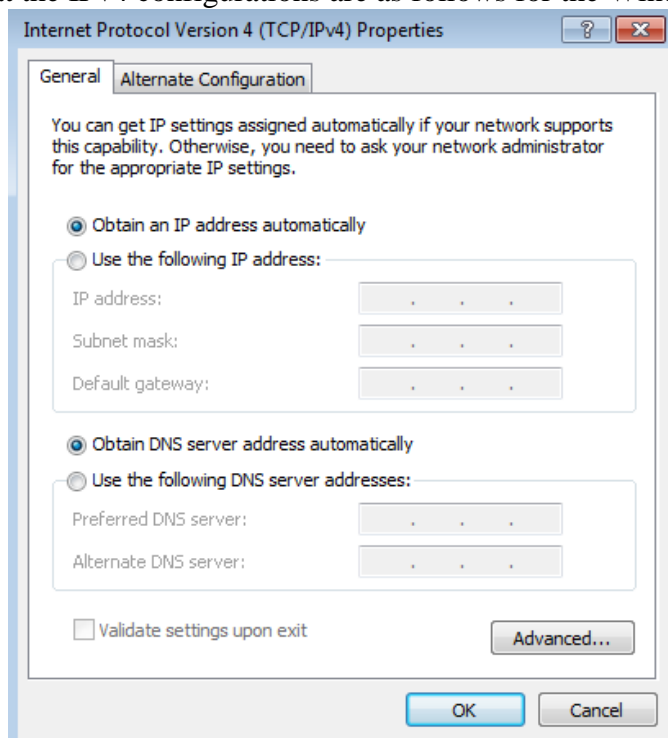


- Next, select *Network* tab. Ensure that you uncheck "Enable DHCP Server" for "Shared Networking" Connection type as shown in the picture.



This will ensure that the DHCP Server on Parallels is not running.

- Next, ensure that your Windows 7 client is on *Shared Networking* mode and start the Windows 7 client.
- Ensure that the IPv4 configurations are as follows for the Windows 7 machine:



- Next, open a command window and `ipconfig /all`. Write down the following information for the IPv4 address:

IPv4 Address: _____

Subnet Mask: _____

Default Gateway: _____

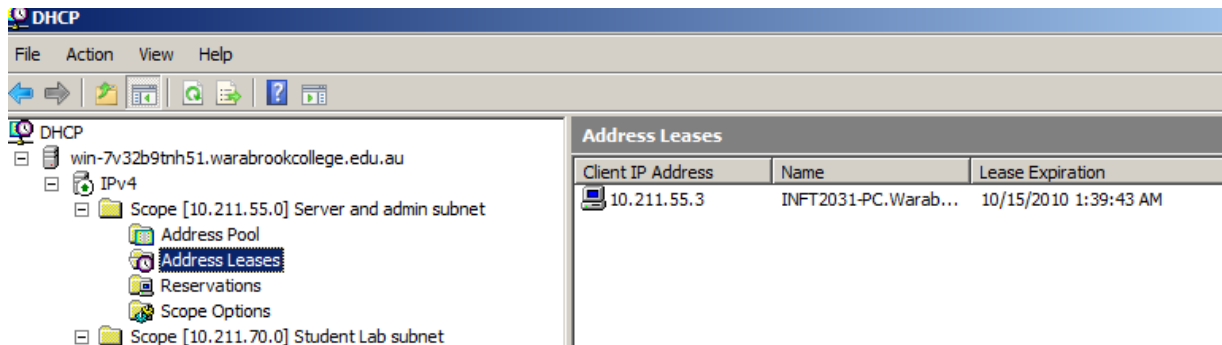
DNS Server: _____

DHCP Server: _____

Lease Obtained: _____

Lease Expires: _____

- Log in to the DHCP Server, open DHCP Console and view address leases for *Server and admin subnet*. You'll notice the lease given to the client.



Part 3: Review Exercises: Security

In this part of the lab, attempt review exercises for Security chapter posted on Blackboard.

References:

Windows Server 2008: TCP/IP Fundamentals for Microsoft Windows, by Joseph Davies, Edited by Anne Taussig, Microsoft Corporation, 2006

Note:
