Module Overview

• Installing a DHCP Server Role
• Configuring DHCP Scopes
• Managing a DHCP Database
• Securing and Monitoring DHCP
Lesson 1: Installing a DHCP Server Role

• Benefits of Using DHCP
• How DHCP Allocates IP Addresses
• How DHCP Lease Generation Works
• How DHCP Lease Renewal Works
• How DHCP Interacts with DNS
• What Is a DHCP Relay Agent?
• DHCP Server Authorization
• Demonstration: Adding the DHCP Server Role
# Benefits of Using DHCP

DHCP reduces the complexity and amount of administrative work by using automatic IP configuration.

<table>
<thead>
<tr>
<th>Automatic IP Configuration</th>
<th>Manual IP Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP addresses are supplied automatically</td>
<td>IP addresses are entered manually</td>
</tr>
<tr>
<td>Correct configuration information is ensured</td>
<td>IP address could be entered incorrectly</td>
</tr>
<tr>
<td>Client configuration is updated automatically</td>
<td>Communication and network issues can result</td>
</tr>
<tr>
<td>A common source of network problems is eliminated</td>
<td>Frequent computer moves increase administrative effort</td>
</tr>
</tbody>
</table>
How DHCP Allocates IP Addresses

Non-DHCP Client:
Static IP configuration

DHCP Client1:
IP configuration from DHCP server

DHCP Client2:
IP configuration from DHCP server

Lease Generation

Lease Renewal

DHCP Server

DHCP Database

IP Address1: Leased to DHCP Client1
IP Address2: Leased to DHCP Client2
IP Address3: Available for lease
How DHCP Lease Generation Works

1. DHCP client broadcasts a DHCPDISCOVER packet
2. DHCP servers broadcast a DHCPOFFER packet
3. DHCP client broadcasts a DHCPREQUEST packet
4. DHCP Server1 broadcasts a DHCPACK packet
How DHCP Lease Renewal Works

1. DHCP client sends a DHCPREQUEST packet
2. DHCP Server1 sends a DHCPACK packet
3. If the client fails to renew its lease after 50% of the lease duration has expired, the DHCP lease renewal process begins again after 87.5% of the lease duration has expired
4. If the client fails to renew its lease after 87.5% of the lease has expired, the DHCP lease generation process starts over again with a DHCP client broadcasting a DHCPDISCOVER
How DHCP Interacts with DNS

- DHCP can:
  - Register client records into DNS zones
  - Use DNS dynamic update protocol

- To use secure DNS dynamic updates, add DHCP servers to the AD DS DnsUpdateProxy global group

- DHCP policies:
  - Automatically assign settings based on FQDN
  - Register workgroup computers with guest DNS suffix
  - Disable PTR registrations without disabling host record registration
What Is a DHCP Relay Agent?

A DHCP relay agent listens for DHCP broadcasts from DHCP clients and then relays them to DHCP servers in different subnets.
DHCP Server Authorization

DHCP authorization registers the DHCP Server service in the Active Directory domain to support DHCP clients

If DHCP Server1 finds its IP address on the list, the service starts and supports DHCP clients

DHCP client receives IP address from authorized DHCP Server1
In this demonstration, you will see how to install and authorize the DHCP server role.
Lesson 2: Configuring DHCP Scopes

• What Are DHCP Scopes?
• What Is a DHCP Reservation?
• What Are DHCP Options?
• How Are DHCP Options Applied?
• Demonstration: Creating and Configuring a DHCP Scope
What Are DHCP Scopes?

• A **DHCP scope** is a range of IP addresses that are available to be leased

• **DHCP scope properties include:**
  - Network ID
  - Lease duration
  - Scope name
  - Subnet mask
  - Network IP address range
  - Exclusion range
What Is a DHCP Reservation?

A DHCP reservation occurs when an IP address within a scope is set aside for use with a specific DHCP client.

- **IP Address 1**: Leased to Workstation 1
- **IP Address 2**: Leased to Workstation 2
- **IP Address 3**: Reserved for File and Print Server
What Are DHCP Options?

DHCP options:
- Are values for common configuration data
- Apply to the server, scopes, reservations, and class options

Common scope options are:
- Router (Default Gateway)
- DNS Name
- DNS Servers
- WINS Servers
How Are DHCP Options Applied?

You can apply DHCP options at various levels:

- Server
- Scope
- Class
- Reserved client

Typically, you do not apply the class or reserved client options
Demonstration: Creating and Configuring a DHCP Scope

In this demonstration, you will see how to configure scope and scope options in DHCP
Lesson 3: Managing a DHCP Database

• What Is a DHCP Database?
• Backing Up and Restoring a DHCP Database
• Reconciling a DHCP Database
• Moving a DHCP Database
What Is a DHCP Database?

The *DHCP database* is a dynamic database that contains configuration information such as:

- Scopes
- Address leases
- Reservations

Windows Server 2012 stores the DHCP database in the `%Systemroot%\System32\Dhcp` folder.

The DHCP database files include:

- `Dhcp.mdb`
- `Dhcp.tmp`
- `J50.log` and `J50*.log`
- `Res*.log`
- `J50.chk`
In the event that the server hardware fails, the administrator can restore the DHCP database only from an offline storage location.
Reconciling a DHCP Database

DHCP Server

DHCP Database

Registry

Detailed IP address lease information

Summary IP address lease information

Compared and reconciles inconsistencies in the DHCP database

Example:

<table>
<thead>
<tr>
<th>Registry</th>
<th>DHCP database</th>
<th>After reconciliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client has IP address 192.168.1.34</td>
<td>IP address 192.168.1.34 is available</td>
<td>Lease entry is created in DHCP database</td>
</tr>
</tbody>
</table>
Steps for moving a DHCP database:
1. Back up the DHCP database on the old server
2. Stop the old DHCP server service
3. Copy the DHCP database to the new server and, if necessary, install the DHCP server role
4. Restore the database
5. Start the DHCP Server service
Lesson 4: Securing and Monitoring DHCP

• Preventing an Unauthorized Computer from Obtaining a Lease
• Restricting Unauthorized, Non-Microsoft DHCP Servers from Leasing IP Addresses
• Delegating DHCP Administration
• What Are DHCP Statistics?
• What Is DHCP Audit Logging?
• Discussion: Common DHCP Issues
To prevent an unauthorized computer from obtaining a lease:

- Ensure that unauthorized users do not have physical or wireless access to your network
- Enable audit logging for every DHCP server on your network
- Regularly check and monitor audit log files
- Use 802.1X-enabled LAN switches or wireless access points to access the network
- Configure NAP to validate that a client computer is compliant with system health requirements
To eliminate an unauthorized DHCP server, you must locate it and then either physically disable it or disable the DHCP service, to prevent it from communicating on the network.
To delegate who can administer the DHCP service:

- Limit the membership of the DHCP Administrators group
- Add users to the DHCP Users group if they need read-only access to the DHCP console

<table>
<thead>
<tr>
<th>Account</th>
<th>Permissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHCP Administrators group</td>
<td>Can view and modify any data about the DHCP server</td>
</tr>
<tr>
<td>DHCP Users group</td>
<td>Has read-only DHCP console access to the server</td>
</tr>
</tbody>
</table>
What Are DHCP Statistics?

DHCP statistics are collected at either the server level or the scope level.

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Time</td>
<td>5/7/2012 1:27:39 PM</td>
</tr>
<tr>
<td>Up Time</td>
<td>17 Hours, 37 Minutes, 10 Seconds</td>
</tr>
<tr>
<td>Discovers</td>
<td>673</td>
</tr>
<tr>
<td>Offers</td>
<td>673</td>
</tr>
<tr>
<td>Delayed Offers</td>
<td>0</td>
</tr>
<tr>
<td>Requests</td>
<td>1321</td>
</tr>
<tr>
<td>Acknowledged (Acks)</td>
<td>190</td>
</tr>
<tr>
<td>Nacks</td>
<td>600</td>
</tr>
<tr>
<td>Declines</td>
<td>0</td>
</tr>
<tr>
<td>Releases</td>
<td>0</td>
</tr>
<tr>
<td>Total Scopes</td>
<td>1</td>
</tr>
<tr>
<td>Scopes with delay configured</td>
<td>0</td>
</tr>
<tr>
<td>Total Addresses</td>
<td>140</td>
</tr>
<tr>
<td>In Use</td>
<td>7 (5%)</td>
</tr>
<tr>
<td>Available</td>
<td>133 (95%)</td>
</tr>
</tbody>
</table>

DHCP Server

Server Statistics window
What Is DHCP Audit Logging?
Common issues that can occur when you do not configure DHCP properly:

- Address conflicts
- Failure to obtain a DHCP address
- Address obtained from an incorrect scope
- DHCP database suffered data corruption or loss
- DHCP server has exhausted its IP address pool
Lab: Implementing DHCP

- Exercise 1: Implementing DHCP
- Exercise 2: Implementing a DHCP Relay Agent (Optional Exercise)

Logon Information

Virtual machines
- 20410C-LON-DC1
- 20410C-LON-SVR1
- 20410C-LON-RTR
- 20410C-LON-CL1
- 20410C-LON-CL2

User name: Adatum\Administrator
Password: Pa$$w0rd

Estimated Time: 45 minutes
A. Datum Corporation has an IT office and data center in London, which supports the London location and other locations as well. A. Datum has recently deployed a Windows 2012 Server infrastructure with Windows 8 clients.

You have recently accepted a promotion to the server support team. One of your first assignments is to configure the infrastructure service for a new branch office. As part of this assignment, you need to configure a DHCP server that will provide IP addresses and configuration to client computers. Servers are configured with static IP addresses and do not use DHCP.
Lab Review

• For what is the DHCP scope used?
• How should you configure a computer to receive an IP address from the DHCP server?
• Why do you need MAC address for a DHCP server reservation?
• What information do you need to configure on a DHCP relay agent?
Module Review and Takeaways

• Review Questions
• Best Practices
• Tools