DHCP Address Allocation Using Option 82

The DHCP Address Allocation Using Option 82 feature provides the Cisco IOS Dynamic Host Configuration Protocol (DHCP) server the ability to allocate dynamic IP addresses based on the relay information option (option 82) information sent by the relay agent.

Automatic DHCP address allocation is typically based on an IP address, whether it be the gateway address (giaddr field of the DHCP packet) or the incoming interface IP address. In some networks, it is necessary to use additional information to further determine which IP addresses to allocate. By using option 82, the Cisco IOS relay agent has long been able to include additional information about itself when forwarding client-originated DHCP packets to a DHCP server. The DHCP Address Allocation Using Option 82 feature now allows the Cisco IOS DHCP server to also use option 82 as a means to provide additional information to properly allocate IP addresses to DHCP clients.

Feature History for the DHCP Address Allocation Using Option 82 Feature

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.2(13)ZH</td>
<td>This feature was introduced.</td>
</tr>
<tr>
<td>12.3(4)T</td>
<td>This feature was integrated.</td>
</tr>
<tr>
<td>12.2(27)SBA</td>
<td>This feature was integrated into Cisco IOS Release 12.2(27)SBA.</td>
</tr>
</tbody>
</table>

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click Cancel at the login dialog box and follow the instructions that appear.
Contents

- Prerequisites for DHCP Address Allocation Using Option 82, page 2
- Restrictions for DHCP Address Allocation Using Option 82, page 2
- Information About DHCP Address Allocation Using Option 82, page 2
- How to Configure DHCP Address Allocation Using Option 82, page 4
- Configuration Example for DHCP Address Allocation Using Option 82, page 8
- Command Reference, page 11
- Glossary, page 23

Prerequisites for DHCP Address Allocation Using Option 82

You must know the format of the option 82 information that will be configured in the DHCP class configuration. This option 82 format may vary from product to product.

Restrictions for DHCP Address Allocation Using Option 82

If the relay agent inserts option 82 but does not set the giaddr field in the DHCP packet, the DHCP server interface must be configured as a trusted interface by using the `ip dhcp relay information trusted` global configuration command. This configuration prevents the server from dropping the DHCP message.

Information About DHCP Address Allocation Using Option 82

Before you configure the DHCP Address Allocation Using Option 82 feature, you should understand the following concepts:

- Option 82, page 2
- DHCP Address Allocation Using Option 82 Feature Design, page 3
- Benefits of DHCP Address Allocation Using Option 82, page 4

Option 82

DHCP provides a framework for passing configuration information to hosts on a TCP/IP network. Configuration parameters and other control information are carried in tagged data items that are stored in the options field of the DHCP message. The data items themselves are also called options. Option 82 is organized as a single DHCP option that contains information known by the relay agent.
DHCP Address Allocation Using Option 82 Feature Design

This feature is designed to allow the Cisco IOS DHCP server to use option 82 information to help determine which IP addresses to allocate to clients. The information sent via option 82 will be used to identify which port the DHCP request came in on. This feature does not parse out the individual suboptions contained within option 82. Rather, the address allocation is done by matching a configured pattern byte by byte.

The feature introduces a new DHCP class capability, which is a method to group DHCP clients based on some shared characteristics other than the subnet in which the clients reside.

Usage Scenario for DHCP Address Allocation Using Option 82

In an example application, DHCP clients are connected to two ports of a single switch. Each port can be configured to be part of two VLANs: VLAN1 and VLAN2. DHCP clients belong to either VLAN1 or VLAN2 and it is assumed that the switch can differentiate the VLAN that a particular DHCP Discover message belongs to (possibly through Layer 2 encapsulation). Each VLAN has its own subnet and all DHCP messages from the same VLAN (same switch) will have the giaddr field set to the same value indicating the subnet of the VLAN.

The problem is that for a DHCP client connecting to port 1 of VLAN1, it must be allocated an IP address from one range within the VLAN's subnet, whereas a DHCP client connecting to port 2 of VLAN1 must be allocated an IP address from another range. Both these two IP address ranges are part of the same subnet (and have the same subnet mask). In the normal DHCP address allocation, the DHCP server will look only at the giaddr field and thus will not be able to differentiate between the two ranges.

To solve this problem, a relay agent residing at the switch inserts the relay information option (option 82), which carries information specific to the port, and the DHCP server must inspect both the giaddr field and the inserted option 82 during the address selection process.

DHCP Class Capability

There are two ways to use DHCP class: Use it in conjunction with the giaddr field to further refine the granularity of address scoping within a DHCP pool, and use it instead of the giaddr field to select a pool for a client. For the initial release of this feature, only the first method will be implemented.

When a DHCP address pool has been configured with one or more DHCP classes, the pool becomes a restricted access pool, which means that no addresses will be allocated from the pool unless one or more of the classes in the pool is matched. This design allows DHCP classes to be used for either access control (no default class is configured on the pool) or to provide further address range partitions with the subnet of the pool.

Multiple pools can be configured with the same class, eliminating the need to configure the same pattern in multiple pools.

The following capabilities are currently supported for DHCP class-based address allocation:

- Specifying the full relay agent information option value as a raw hexadecimal string by using the `relay-information hex` command in the new relay agent information configuration mode.
- Support for bitmasking the raw relay information hexadecimal value.
- Support for a wildcard at the end of the hexadecimal string specified by the `relay-information hex` command.
Benefits of DHCP Address Allocation Using Option 82

The DHCP Address Allocation Using Option 82 feature is designed to be easy to use and integrate with other Cisco IOS features such as the “DHCP Secured Address Assignment” feature introduced in Cisco IOS Release 12.2(15)T.

How to Configure DHCP Address Allocation Using Option 82

This section contains the following procedures:
- Enabling Option 82 for DHCP Address Allocation (optional)
- Defining the DHCP Class and Relay Agent Information Patterns (required)
- Defining the DHCP Address Pool (required)
- Verifying the Configuration (optional)

Enabling Option 82 for DHCP Address Allocation

By default, the Cisco IOS DHCP server can use information provided by option 82 to allocate IP addresses. To reenable this capability if it has been disabled, perform the task described in this section.

SUMMARY STEPS

1. enable
2. configure terminal
3. ip dhcp use class

DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td></td>
<td>- Enter your password if prompted.</td>
</tr>
<tr>
<td>Example: Router&gt; enable</td>
<td></td>
</tr>
<tr>
<td>configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td>Example: Router# configure terminal</td>
<td></td>
</tr>
<tr>
<td>ip dhcp use class</td>
<td>Controls whether DHCP classes are used for address allocation.</td>
</tr>
<tr>
<td></td>
<td>- This functionality is enabled by default.</td>
</tr>
<tr>
<td></td>
<td>- Use the no form of this command to disable this functionality, without deleting the DHCP class configuration.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Router(config)# ip dhcp use class</td>
<td></td>
</tr>
</tbody>
</table>
Troubleshooting Tips

If DHCP classes are configured in the pool, but the DHCP server does not make use of the classes, verify if the `no ip dhcp use class` command was configured.

Defining the DHCP Class and Relay Agent Information Patterns

This task shows how to define the DHCP class and relay agent information patterns.

Prerequisites

You must know the hexadecimal value of each byte location in option 82 to be able to configure the `relay-information hex` command. The option 82 format may vary from product to product. Contact the relay agent vendor for this information.

SUMMARY STEPS

1. enable
2. configure terminal
3. ip dhcp class `class-name`
4. relay agent information
5. `relay-information hex pattern [^] [bitmask mask]`
6. Repeat Steps 3 through 5 for each DHCP class you need to configure.

DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong> enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router&gt; enable</td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong> configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router# configure terminal</td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong> ip dhcp class <code>class-name</code></td>
<td>Defines a DHCP class and enters DHCP class configuration mode.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router(config)# ip dhcp class CLASS1</td>
<td></td>
</tr>
<tr>
<td><strong>Step 4</strong> relay agent information</td>
<td>Enters relay agent information option configuration mode.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router(dhcp-class)# relay agent information</td>
<td></td>
</tr>
<tr>
<td><strong>Step 5</strong> <code>relay-information hex pattern [^] [bitmask mask]</code></td>
<td></td>
</tr>
<tr>
<td><strong>Step 6</strong> Repeat Steps 3 through 5 for each DHCP class you need to configure</td>
<td></td>
</tr>
</tbody>
</table>
DHCP Address Allocation Using Option 82

How to Configure DHCP Address Allocation Using Option 82

Cisco IOS Release: Multiple releases (see the Feature History table)

Troubleshooting Tips

You can enable the `debug ip dhcp server class` command to display the class matching results.

Defining the DHCP Address Pool

This task shows how to define the DHCP address pool.

SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `ip dhcp pool name`
4. `network network-number [mask | prefix-length]`
5. `class class-name`
6. `address range start-ip end-ip`
7. Repeat steps 5 and 6 for each DHCP class you need to associate to the DHCP pool.

DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 5</strong> relay-information hex * [bitmask *]</td>
<td>(Optional) Specifies a hexadecimal value for the full relay information option.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
</tbody>
</table>
| Router(dhcp-class-relayinfo)# relay-information hex 01030a0b0c02050000000123 | - The pattern argument creates a pattern that is used to match to the DHCP class.  
- If you omit this step, no pattern is configured and it is considered a match to any relay agent information option value, but the relay information option must be present in the DHCP packet.  
- You can configure multiple relay-information hex commands in a DHCP class. |
| **Step 6** Repeat Steps 3 through 5 for each DHCP class you need to configure. | — |

Troubleshooting Tips

You can enable the `debug ip dhcp server class` command to display the class matching results.
DHCP Address Allocation Using Option 82

How to Configure DHCP Address Allocation Using Option 82

Cisco IOS Release: Multiple releases (see the Feature History table)

Verifying the Configuration

This task shows you how to verify the configuration of the DHCP Address Allocation Using Option 82 feature.

**SUMMARY STEPS**

1. enable
2. more system: running-config
3. exit

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
</table>
| **Step 3** ip dhcp pool name | Configures a DHCP address pool on a Cisco IOS DHCP server and enters DHCP pool configuration mode.  
Example:  
Router# ip dhcp pool ABC |
| **Step 4** network network-number [mask | prefix-length] | Configures the subnet number and mask for a DHCP address pool on a Cisco IOS DHCP server.  
Example:  
Router(dhcp-pool)# network 10.0.20.0 |
| **Step 5** class class-name | Associates a class with a pool and enters DHCP pool class configuration mode.  
Example:  
Router(dhcp-pool)# class CLASS1 |
| **Step 6** address range start-ip end-ip | (Optional) Sets an address range for a DHCP class in a DHCP server address pool.  
Example:  
Router(dhcp-pool-class)# address range 10.0.20.1 10.0.20.100 |
| **Step 7** Repeat steps 5 and 6 for each DHCP class you need to associate to the DHCP pool. | Each class in the DHCP pool will be examined for a match in the order configured. |
configuration example for dhcp address allocation using option 82

This section contains the following configuration example:

- DHCP Address Allocation Using Option 82: Example, page 8

DHCP Address Allocation Using Option 82: Example

The example configures two DHCP classes. CLASS1 defines the group of DHCP clients whose address requests contain the relay agent information option with the specified hexadecimal values. CLASS2 defines the group of DHCP clients whose address requests contain the configured relay agent information suboptions. CLASS3 has no pattern configured and is treated as a "match to any" class. This type of class is useful for specifying a "default" class.

In the following example, the subnet of pool ABC has been divided into three ranges without further subnetting of the 10.0.20.0/24 subnet. If there is a DHCP Discover message from the 10.0.20.0/24 subnet with option 82 matching that of class CLASS1, an available address in the range from 10.0.20.1 to 10.0.20.100 will be allocated. If there is no free address in CLASS1's address range, the DHCP Discover message will be matched against CLASS2, and so on.

Thus, each class in the DHCP pool will be examined for a match in the order configured by the user. In pool ABC, the order of matching is CLASS1, CLASS2, and finally CLASS3. In pool DEF, class CLASS2 does not have any address range configured. By default, the address range for a particular class is the pool's entire subnet(s). So, clients matching CLASS2 may be allocated addresses from 11.0.20.1 to 11.0.20.254.

Multiple pools can be configured with the same class, eliminating the need to configure the same patterns in multiple pools. In the future, further classification method may be implemented. For example, there may be a need to specify that one or more pools should only be used to service a particular class of devices (for example, cable modems and IP phones).

---

### DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong> enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Router&gt; enable</td>
<td>- Enter your password if prompted.</td>
</tr>
<tr>
<td><strong>Step 2</strong> more system:running-config</td>
<td>Displays the running configuration.</td>
</tr>
<tr>
<td>Example:</td>
<td>- This command will display the configured DHCP</td>
</tr>
<tr>
<td>Router# more system:running-config</td>
<td>classes and DHCP pools.</td>
</tr>
<tr>
<td><strong>Step 3</strong> exit</td>
<td>Exits privileged EXEC mode.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Router# exit</td>
<td></td>
</tr>
</tbody>
</table>

Cisco IOS Release: Multiple releases (see the Feature History table)
ip dhcp class CLASS1
  relay agent information
    relay-information hex 01030a0b0c02050000000123
    relay-information hex 01030a0b0c02*
    relay-information hex 01030a0b0c020500000000000000000000FF

ip dhcp class CLASS2
  relay agent information
    relay-information hex 01040102030402020202
    relay-information hex 01040101030402020202

ip dhcp class CLASS3
  relay agent information

! Associates the DHCP pool with DHCP classes
ip dhcp pool ABC
  network 10.0.20.0 255.255.255.0
  class CLASS1
    address range 10.0.20.1 10.0.20.100
  class CLASS2
    address range 10.0.20.101 10.0.20.200
  class CLASS3
    address range 10.0.20.201 10.0.20.254

ip dhcp pool DEF
  network 11.0.20.0 255.255.255.0
  class CLASS1
    address range 11.0.20.1 11.0.20.64
  class CLASS2

Additional References

The following section provides references related to the DHCP Address Allocation Using Option 82 feature:

Related Documents

<table>
<thead>
<tr>
<th>Related Topic</th>
<th>Document Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHCP commands</td>
<td>Cisco IOS IP Command Reference, Volume 1 of 4: Addressing and Services, Release 12.3</td>
</tr>
<tr>
<td>DHCP configuration tasks</td>
<td>Cisco IOS IP Configuration Guide, Release 12.2</td>
</tr>
</tbody>
</table>

Standards

<table>
<thead>
<tr>
<th>Standards</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.</td>
<td>—</td>
</tr>
</tbody>
</table>
MIBs

<table>
<thead>
<tr>
<th>MIBs</th>
<th>MIBs Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.</td>
<td>To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at the following URL: <a href="http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml">http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml</a></td>
</tr>
</tbody>
</table>

RFCs

<table>
<thead>
<tr>
<th>RFCs</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>RFC 2131</td>
<td>Dynamic Host Configuration Protocol</td>
</tr>
<tr>
<td>RFC 2132</td>
<td>DHCP Options and BOOTP Vendor Extensions</td>
</tr>
<tr>
<td>RFC 3046</td>
<td>DHCP Relay Agent Information Option</td>
</tr>
</tbody>
</table>

Technical Assistance

<table>
<thead>
<tr>
<th>Description</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.</td>
<td><a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a></td>
</tr>
</tbody>
</table>
Command Reference

This section documents new and modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.3T command reference publications.

New Commands
- address range
- class
- ip dhcp class
- relay agent information
- relay agent information
- relay-information hex

Modified Command
- debug ip dhcp server
address range

To set an address range for a Dynamic Host Configuration Protocol (DHCP) class in a DHCP server address pool, use the `address range` command in DHCP pool class configuration mode. To remove the address range, use the `no` form of this command.

```
address range start-ip end-ip
no address range start-ip end-ip
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Start-ip</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Starting IP address that defines the range of addresses in the address pool.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>End-ip</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ending IP address that defines the range of addresses in the address pool.</td>
</tr>
</tbody>
</table>

**Defaults**

No default behavior or values

**Command Modes**

DHCP pool class configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.2(13)ZH</td>
<td>This command was introduced.</td>
</tr>
<tr>
<td>12.3(4)T</td>
<td>This command was integrated into Cisco IOS Release 12.3(4)T.</td>
</tr>
<tr>
<td>12.2(27)SBA</td>
<td>This command was integrated into Cisco IOS Release 12.2(27)SBA.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

If this command is not configured for a DHCP class in a DHCP server address pool, the default value is the entire subnet of the address pool.

**Examples**

The following example sets the available address range for class 1 from 10.0.20.1 through 10.0.20.100:

```
ip dhcp pool ABC
network 10.0.20.0 255.255.255.0
class CLASS1
  address range 10.0.20.1 10.0.20.100
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip dhcp class</td>
<td>Defines a DHCP class and enters DHCP class configuration mode.</td>
</tr>
</tbody>
</table>
class

To associate a class with a Dynamic Host Configuration Protocol (DHCP) address pool and enter DHCP pool class configuration mode, use the `class` command in DHCP pool configuration mode. To remove the class association, use the `no` form of this command.

```plaintext
class class-name

no class class-name
```

**Syntax Description**
- `class-name` Name of the DHCP class.

**Defaults**
No default behavior or values.

**Command Modes**
DHCP pool configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.2(13)ZH</td>
<td>This command was introduced.</td>
</tr>
<tr>
<td>12.3(4)T</td>
<td>This command was integrated into Cisco IOS Release 12.3(4)T.</td>
</tr>
<tr>
<td>12.2(27)SBA</td>
<td>This command was integrated into Cisco IOS Release 12.2(27)SBA.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
You first define the class using the `ip dhcp class` global configuration command. If a nonexistent class is named by the `class` command, the class will be automatically created. Each class in the DHCP pool will be examined for a match in the order configured.

**Examples**
The following example associates DHCP class 1 and class 2 with a DHCP pool named ABC:

```plaintext
ip dhcp pool ABC
  network 10.0.20.0 255.255.255.0
  class CLASS1
    address range 10.0.20.1 10.0.20.100
  class CLASS2
    address range 10.0.20.101 10.0.20.200
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip dhcp class</code></td>
<td>Defines a DHCP class and enters DHCP class configuration mode.</td>
</tr>
</tbody>
</table>
**ip dhcp class**

To define a Dynamic Host Configuration Protocol (DHCP) class and enter DHCP class configuration mode, use the `ip dhcp class` command in global configuration mode. To remove the class, use the `no` form of this command.

```
ip dhcp class class-name
no ip dhcp class class-name
```

### Syntax Description

| class-name | Name of the DHCP class. |

### Defaults

No default behavior or values.

### Command Modes

Global configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.2(13)ZH</td>
<td>This command was introduced.</td>
</tr>
<tr>
<td>12.3(4)T</td>
<td>This command was integrated into Cisco IOS Release 12.3(4)T.</td>
</tr>
<tr>
<td>12.2(27)SBA</td>
<td>This command was integrated into Cisco IOS Release 12.2(27)SBA.</td>
</tr>
</tbody>
</table>

### Usage Guidelines

DHCP class configuration provides a method to group DHCP clients based on some shared characteristics other than the subnet in which the clients reside.

### Examples

The following example defines three DHCP classes and their associated relay agent information patterns. Note that CLASS3 is considered a “match to any” class because it has no relay agent information pattern configured:

```
ip dhcp class CLASS1
 relay agent information
 ! Relay agent information patterns
 relay-information hex 01030a0b0c02050000000123
 relay-information hex 01030a0b0c020102020102
 relay-information hex 01030a0b0c02050000000000000000000000FF

ip dhcp class CLASS2
 relay agent information
 ! Relay agent information patterns
 relay-information hex 01040102030402020102
 relay-information hex 01040101030402020102

ip dhcp class CLASS3
 relay agent information
```
<table>
<thead>
<tr>
<th>Related Commands</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>relay agent</td>
<td>Enters relay agent information option configuration mode.</td>
</tr>
<tr>
<td></td>
<td>information</td>
<td></td>
</tr>
<tr>
<td></td>
<td>relay-information</td>
<td>Specifies a hexadecimal string for the full relay agent</td>
</tr>
<tr>
<td></td>
<td>hex</td>
<td>information option.</td>
</tr>
</tbody>
</table>

Cisco IOS Release: Multiple releases (see the Feature History table)
ip dhcp use class

To control whether the Cisco IOS DHCP server uses Dynamic Host Configuration Protocol (DHCP) classes during address allocation, use the **ip dhcp use class** command in global configuration mode. To disable the use of DHCP classes during address allocation, use the **no** form of this command.

```
ip dhcp use class
no ip dhcp use class
```

**Syntax Description**
This command has no arguments or keywords.

**Defaults**
This command is enabled by default.

**Command Modes**
Global configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.2(13)ZH</td>
<td>This command was introduced.</td>
</tr>
<tr>
<td>12.3(4)T</td>
<td>This command was integrated into Cisco IOS Release 12.3(4)T.</td>
</tr>
<tr>
<td>12.2(27)SBA</td>
<td>This command was integrated into Cisco IOS Release 12.2(27)SBA.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**
When you use the **no ip dhcp use class** command, the DHCP class configuration is not deleted.

**Examples**
The following example shows the DHCP server configured to use the relay agent information option during address allocation:

```
ip dhcp use class
```
relay agent information

To enter relay agent information option configuration mode, use the `relay agent information` command in Dynamic Host Configuration Protocol DHCP class configuration mode. To disable this functionality, use the `no` form of this command.

```
relay agent information
no relay agent information
```

**Syntax Description**

This command has no arguments or keywords.

**Defaults**

No default behavior or values

**Command Modes**

DHCP class configuration

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.2(13)ZH</td>
<td>This command was introduced.</td>
</tr>
<tr>
<td>12.3(4)T</td>
<td>This command was integrated into Cisco IOS Release 12.3(4)T.</td>
</tr>
<tr>
<td>12.2(27)SBA</td>
<td>This command was integrated into Cisco IOS Release 12.2(27)SBA.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

If this command is omitted for DHCP class-based address allocation, then the DHCP class matches to any relay agent information option, whether it is present or not.

Using the `no relay agent information` command removes all patterns in the DHCP class configured by the `relay-information hex` command.

**Examples**

The following example shows the relay information patterns configured for DHCP class 1.

```
ip dhcp class CLASS1
relay agent information
    relay-information hex 01030b0c02050000000123
    relay-information hex 01030b0c02050000000123
    relay-information hex 01030b0c0205000000000000 bitmask 0000000000000000000000FF

ip dhcp class CLASS2
relay agent information
```

**Related Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>relay-information hex</td>
<td>Specifies a hexadecimal string for the full relay agent information option.</td>
</tr>
</tbody>
</table>
relay-information hex

To specify a hexadecimal string for the full relay agent information option, use the relay-information hex command in relay agent information option configuration mode. To remove the configuration, use the no form of this command.

```
relay-information hex pattern [*] [bitmask mask]
```

```
no relay-information hex pattern [*] [bitmask mask]
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>pattern</td>
<td>String of hexadecimal values. This string creates a pattern that is matched against the named DHCP class.</td>
</tr>
<tr>
<td>*</td>
<td>(Optional) Wildcard character.</td>
</tr>
<tr>
<td>bitmask mask</td>
<td>(Optional) Hexadecimal bitmask.</td>
</tr>
</tbody>
</table>

**Defaults**

No default behavior or values

**Command Modes**

Relay agent information option configuration mode.

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.2(13)ZH</td>
<td>This command was introduced.</td>
</tr>
<tr>
<td>12.3(4)T</td>
<td>This command was integrated into Cisco IOS Release 12.3(4)T.</td>
</tr>
<tr>
<td>12.2(27)SBA</td>
<td>This command was integrated into Cisco IOS Release 12.2(27)SBA.</td>
</tr>
</tbody>
</table>

**Usage Guidelines**

The relay-information hex command sets a pattern that is used to match against defined DHCP classes. You can configure multiple relay-information hex commands for a DHCP class. This is useful to specify a set of relay information options that can not be summarized with a wildcard or a bitmask.

The pattern itself, excluding the wildcard, must contain a whole number of bytes (a byte is two hexadecimal numbers). For example, 010203 is 3 bytes (accepted) and 01020 is 2.5 bytes (not accepted).

If you omit this command, no pattern is configured and it is considered a match to any relay agent information value, but the relay information option must be present in the DHCP packet.

You must know the hexadecimal value of each byte location in option 82 to be able to configure the relay-information hex command. The option 82 format may vary from product to product. Contact the relay agent vendor for this information.
Examples

The following example shows the configured relay agent information patterns. Note that CLASS 2 has no pattern configured and will “match to any” class.

```bash
ip dhcp class CLASS1
relay agent information
  relay-information hex 01030a0b0c02050000000123
  relay-information hex 01030a0b0c02*
  relay-information hex 01030a0b0c02050000000000 bitmask 0000000000000000000000FF
```

```bash
ip dhcp class CLASS2
relay agent information
```
debug ip dhcp server

To enable Cisco IOS Dynamic Host Configuration Protocol (DHCP) server debugging, use the `debug ip dhcp server` command in privileged EXEC mode. To disable DHCP server debugging, use the `no` form of this command.

```
dehap ip dhcp server {events | packets | linkage | class}
no debug ip dhcp server {events | packets | linkage | class}
```

**Syntax Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>events</code></td>
<td>Reports server events, such as address assignments and database updates.</td>
</tr>
<tr>
<td><code>packets</code></td>
<td>Decodes DHCP receptions and transmissions.</td>
</tr>
<tr>
<td><code>linkage</code></td>
<td>Displays database linkage information, such as parent-child relationships in</td>
</tr>
<tr>
<td></td>
<td>a radix tree.</td>
</tr>
<tr>
<td><code>class</code></td>
<td>Displays DHCP class-based information.</td>
</tr>
</tbody>
</table>

**Command Modes**

Privileged EXEC

**Command History**

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0(1)T</td>
<td>This command was introduced.</td>
</tr>
<tr>
<td>12.2(13)ZH</td>
<td>The <code>class</code> keyword was added.</td>
</tr>
<tr>
<td>12.3(4)T</td>
<td>This command was integrated into Cisco IOS Release 12.3(4)T.</td>
</tr>
<tr>
<td>12.3(8)YA</td>
<td>This command was integrated into Cisco IOS Release 12.3(8)YA.</td>
</tr>
<tr>
<td>12.3(11)T</td>
<td>The output was enhanced to show the static mappings.</td>
</tr>
<tr>
<td>12.2(27)SBA</td>
<td>This command was integrated into Cisco IOS Release 12.2(27)SBA.</td>
</tr>
</tbody>
</table>

**Examples**

The following example shows a combination of DHCP server events and decoded receptions and transmissions:

```
Router# debug ip dhcp server events
Router# debug ip dhcp server packets
```

DHCPD:DHCPDISCOVER received from client 0b07.1134.a029 through relay 10.1.0.253.
DHCPD:assigned IP address 10.1.0.3 to client 0b07.1134.a029.
DHCPD:Sending DHCPPOFFER to client 0b07.1134.a029 (10.1.0.3).
DHCPD:unicasting BOOTREPLY for client 0b07.1134.a029 to relay 10.1.0.253.
DHCPD:DHCPREQUEST received from client 0b07.1134.a029.
DHCPD:Sending DHCPACK to client 0b07.1134.a029 (10.1.0.3).
DHCPD:unicasting BOOTREPLY for client 0b07.1134.a029 to relay 10.1.0.253.
DHCPD:checking for expired leases.

The following example shows database linkage information:

```
Router# debug ip dhcp server linkage
```

DHCPD:child pool:10.1.0.0 / 255.255.0.0 (subnet10.1)
DHCPD:parent pool:10.0.0.0 / 255.0.0.0 (net10)
DHCPD:child pool:10.0.0.0 / 255.0.0.0 (net10)
DHCPD:pool (net10) has no parent.
DHCPD:child pool:10.1.0.0 / 255.255.0.0 (subnet10.1)
DHCPD:parent pool:10.0.0.0 / 255.0.0.0 (net10)
DHCPD:child pool:10.0.0.0 / 255.0.0.0 (net10)
DHCPD:pool (net10) has no parent.

The following example shows when a DHCP class is removed:

Router# debug ip dhcp server class

DHCPD:deleting class CLASS1

The following example shows the debug output when the configured pattern does not match:

Router# debug ip dhcp server class

DHCPD:Searching for a match to 'relay-information 0106000 400020202020800060009e80b8800' in class CLASS1
DHCPD:Searching for a match to 'relay-information 0106000400020202020800060009e80b8800' in class CLASS1
DHCPD:Searching for a match to 'relay-information 0106000

The following example shows the debug output when you unconfigure a DHCP pattern in a DHCP class and then configure the pattern in the DHCP class:

Router# debug ip dhcp server class

DHCPD:pattern 'relay-information 123456' removed from class CLASS1
DHCPD:Added pattern 'relay-information 010600040002020202 0800060009e80b8800' for class CLASS1

The following example shows the debug output when the configured pattern does match:

Router# debug ip dhcp server class

DHCPD:Searching for a match to 'relay-information 0106000 400020202020800060009e80b8800' in class CLASS1
DHCPD:input pattern 'relay-information 010600040002020202 0800060009e80b8800' matches class CLASS1
DHCPD:input matches class CLASS1

The following example shows the debug output when static mappings are configured:

Router# debug ip dhcp server

Loading abc/static_pool from 10.19.192.33 (via Ethernet0): !
[OK - 333 bytes]


!IP address Type Hardware address Lease expiration.

"10.9.9.1/24 id 0063.6973.636f.2d30.3036.302e.3437"
*May 26 23:14:21.707: DHCPD: Adding binding to radix tree (10.9.9.1)
Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>debug dhcp</td>
<td>Displays debugging information about the DHCP client and monitors the status of DHCP packets.</td>
</tr>
<tr>
<td>debug ip ddns update</td>
<td>Enables debugging for DDNS updates.</td>
</tr>
<tr>
<td>host (host-list)</td>
<td>Specifies a list of hosts that will receive DDNS updates of A and PTR RRs.</td>
</tr>
<tr>
<td>ip ddns update hostname</td>
<td>Enables a host to be used for DDNS updates of A and PTR RRs.</td>
</tr>
<tr>
<td>ip ddns update method</td>
<td>Specifies a method of DDNS updates of A and PTR RRs and the maximum interval between the updates.</td>
</tr>
<tr>
<td>ip dhcp client update dns</td>
<td>Enables DDNS updates of A RRs using the same hostname passed in the hostname and FQDN options by a client on an interface.</td>
</tr>
<tr>
<td>ip dhcp-client update dns</td>
<td>Enables DDNS updates of A RRs using the same hostname passed in the hostname and FQDN options by a client.</td>
</tr>
<tr>
<td>ip dhcp update dns</td>
<td>Enables DDNS updates of A and PTR RRs for most address pools.</td>
</tr>
<tr>
<td>ip host-list</td>
<td>Specifies a list of hosts that will receive DDNS updates of A and PTR RRs.</td>
</tr>
<tr>
<td>show ip ddns update</td>
<td>Displays information about the DDNS updates.</td>
</tr>
<tr>
<td>show ip ddns update method</td>
<td>Displays information about the DDNS update method.</td>
</tr>
<tr>
<td>show ip dhcp server pool</td>
<td>Displays DHCP server pool statistics.</td>
</tr>
<tr>
<td>show ip host-list</td>
<td>Displays the assigned hosts in a list.</td>
</tr>
<tr>
<td>update dns</td>
<td>Dynamically updates a DNS with A and PTR RRs for some address pools.</td>
</tr>
</tbody>
</table>
Glossary

**address pool**—The range of IP addresses assigned by the DHCP server. Address pools are indexed by subnet number.

**client**—A host trying to configure its interface (obtain an IP address) using DHCP or BOOTP protocols.

**Dynamic Host Configuration Protocol** —DHCP. A protocol that provides a mechanism for allocating IP addresses dynamically so that addresses can be reused when hosts no longer need them.

**relay agent**—A router that forwards DHCP and BOOTP messages between a server and a client on different subnets.

**server**—DHCP or BOOTP server.

---

**Note**

Refer to the *Internetworking Terms and Acronyms* for terms not included in this glossary.

---

CCVP, the Cisco logo, and Welcome to the Human Network are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn is a service mark of Cisco Systems, Inc.; and Access Registrar, Aironet, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, CCSP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Enterprise/Solver, EtherChannel, EtherFast, EtherSwitch, Fast Step, Follow Me Browsing, FormShare, GigaDrive, HomeLink, Internet Quotient, IOS, iPhone, IP/TV, iQ Expertise, the iQ logo, iQ Net Readiness Scorecard, iQuick Study, LightStream, Linksys, MeetingPlace, MGX, Networkers, Networking Academy, Network Registrar, PIX, ProConnect, ScriptShare, SMARTnet, StackWise, The Fastest Way to Increase Your Internet Quotient, and TransPath are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or Website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0711R)

Copyright © 2003–2005 Cisco Systems, Inc. All rights reserved.