



## CHAPTER 12

# DHCPv6 Subscriber Manager Integration Configuration

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## Introduction

This chapter describes how to configure the DHCPv6 Lease Query Login Event Generator (LEG) on the Cisco Service Control Subscriber Manager, and how to use the command-line utilities (CLUs).

## Information About Configuring the DHCPv6 Lease Query LEG

The DHCPv6 Lease Query LEG on the Cisco Service Control Subscriber Manager is configured using the leaseqv6.cfg and dhcpv6\_pkg.cfg configuration files. These files reside in the ~pcube/sm/server/root/config directory. The leaseqv6.cfg file is used to set the general configuration, and the dhcpv6\_pkg.cfg file is used to configure the dynamic package association. Configuring the dhcpv6\_pkg.cfg file is optional.

The configuration files consist of sections with a bracketed section title, for example, [DHCPv6-Lease-Query]. Each section consists of several parameters having the format parameter=value. The number sign (#) at the beginning of a line signifies that it is a remark.

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## Configuring the DHCPv6 Lease Query LEG

The following is a description of the configuration variables of the leaseqv6.cfg file.

The [DHCPv6-Lease-Query] section contains the following parameters:

- start
  - Defines whether the Subscriber Manager runs the DHCPv6 Lease Query LEG at startup.
  - Possible values for this parameter are yes and no. The default value is no.
  - To run the LEG, this parameter must be set to yes.
- max\_concurrent\_sessions
  - Defines the number of concurrent sessions the DHCPv6 Lease Query LEG should support. This parameter limits the resources used by this module.
  - Possible values for this parameter are integers. The default value is 256.
- server\_mode
  - Defines whether the DHCP servers, that are specified are in the active\_standby mode or in the active\_active mode. In the active\_active mode, the lease query request is sent to all the configured DHCPv6 servers. In the active\_active mode, the lease information of the servers should be shared between the configured servers.
  - In the active\_standby mode, the lease query request is sent to one of the active servers.
  - The default value is active\_standby.
- dhcpv6\_servers
  - Defines a list of DHCPv6 servers to which the DHCPv6 Lease Query LEG can send lease-query messages. If more than one server is defined, the messages are sent to one server or the other.
  - Possible values are one IPv6 unicast address, or two IPv6 unicast addresses separated by a comma. There is no default value. You must enter at least one IPv6 address.

- **server\_port**

Defines the UDP port to which the DHCPv6 servers listen and to which the lease query messages are sent. We recommended the use of 9547, which is the default value, when working with the DHCP Forwarder.
- **listening\_port**

Defines the UDP port to which the DHCPv6 Lease Query LEG listens and to which the lease query replies are sent. We recommended the use of 8547, which is the default value, when working with the DHCP Forwarder.
- **client\_port**

Defines the UDP port that the DHCPv6 Lease Query LEG uses when sending lease query messages to the DHCPv6 servers. We recommended the use of 8546, which is the default value, when working with the DHCP Forwarder.
- **client\_ipv6\_address**

Retrieves the IPv6 address of the Subscriber Manager.

The default value is the loopback IP address of the Subscriber Manager. The loopback address should not be `::1`. The host string `localhost6` should be configured in the `/etc/hosts` file and should be a complete 128-bit IPv6 address of the Subscriber Manager.
- **fail\_over\_criteria**

Defines the number of consecutive request failures (timeouts) that will trigger a failover. Because the queries are not answered when the server fails, these queries will time out. The consecutive timed-out queries are counted, and when they reach this threshold, the second server is set as the active server. The default value for the `fail_over_criteria` parameter is 3.

The `ipv6_session_timeout` parameter defines the time taken to detect a failed server. Only when the configured amount of queries fail, will the fail-over process be triggered.
- **use\_forwarder**

Defines whether the DHCPv6 Lease Query LEG utilizes the DHCP Forwarder application on the local machine.

Possible values for this parameter are `true` and `false`. The default value is `true`.
- **support\_auto\_logout**

Defines whether the LEG should query the DHCPv6 servers whenever the auto logout mechanism identifies an expired lease.

Possible values for this parameter are `true` and `false`. The default value is `false`.

Modifying the parameter requires the Subscriber Manager to be restarted.

**Note**

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This parameter should have the same value for all the external supported LEGs (if the LEGs are enabled). For example, if it is configured as `true` in DHCP Lease Query LEG, the value should be `true` in the DHCPv6 Lease Query LEG too.

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**Note**

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Auto Logout Mechanism will not renew the `IA_NA` address; because, the DHCPv6 server expects a complete 128-bit address to retrieve the lease information.

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- `ipv6_session_timeout`  
Defines the timeout, in seconds, for a session from the time the DHCPv6 lease query message is sent. If the timeout expires, the session is discarded. This parameter affects the time of server failure detection. The fail-over process is triggered only when a session fails for the configured number of times.  
The default value is 30 seconds.
- `log_timed_out_queries`  
Defines whether the DHCPv6 Lease Query LEG logs messages regarding session timeout.  
Possible values for this parameter are true or false. The default value is true.
- `log_failed_queries`  
Controls the log messages pertaining to the queries that are not sent.  
Possible values for this parameter are true or false. The default value is true.
- `log_all_queries`  
Controls the log messages pertaining to each query sent and replies, if any, received.  
Possible values for this parameter are true or false. The default value is false.  
Use this parameter only for troubleshooting.
- `log_login_failures`  
Controls log messages pertaining to the replies that did not result in the login of a subscriber to the Subscriber Manager.  
Possible values for this parameter are true or false. The default value is true.
- `ia_na_supported`  
Defines whether the DHCPv6 Lease Query LEG will support the IA\_NA prefix. If the value is set to true, the IA\_NA address found in the lease query reply is used as another prefix for the same subscriber.  
Possible values for this parameter are true or false. The default value is false.
- `ia_na_prefix_length`  
This configuration will be valid only if the `ia_na_supported` parameter value is set to true.  
Defines how many bits from the IA\_NA address should be treated as the prefix. As per this length, the prefix value is taken from the IA\_NA address.  
The default value is 64. The supported range of the prefix length is between 32 to 64.
- `enable_snmp_bg_for_vlinks`  
Defines whether the SNMP bonding group process should handle the subscriber VLink association.  
Possible values for this parameter are true or false. The default value is false.

The [Subscriber ID] section defines the functionality of how the DHCPv6 Lease Query LEG handles the subscriber ID. This section contains the following parameters:

- `dhcpv6_option`  
Defines which DHCP option to use as the subscriber ID. The format of this parameter is the option number itself. For DHCP vendor-specific options that have suboptions, the format is the DHCP option and suboption type, separated by a colon, for example, 17:1026. The default value is 37 (the default Relay-Agent-Information using the Remote-ID information as described in RFC 4649).
- `dhcpv6_option_type`

Defines the format type of the DHCPv6 option defined by the `dhcpv6_option` parameter.

Optional values are `binary`, indicating a binary string converted to an ASCII hexadecimal string, or `string`, indicating an ASCII string. The default value is `binary`.

**Note**

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IP fallback is not supported for IPv6.

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The following is a sample configuration file:

```
[DHCPv6-Lease-Query]
start=yes
dhcpv6_servers =2607:f0d0:1002:11::1,2607:f0d0:1002:11::2
server_mode=active_standby
client_ipv6_address=2607:f0d0:1322:15::2
fail_over_criteria=5
ipv6_session_timeout=30
log_timed_out_queries=true
log_failed_queries=true
log_all_queries=true
log_login_failures=true
use_forwarder=true
dhcpv6_option=17:1026
dhcpv6_option_type=binary
```

## Configuring Policy Association



### Note

The configuration described in this section is optional.

Subscriber policy configuration in the DHCPv6 Lease Query LEG can be handled in one of the following ways:

- Dynamic assignment of policy information using information extracted from the DHCP packet. See the [“Dynamic Assignment of Policy Information” section on page 12-6](#).
- Static assignment of a constant package ID for all subscribers who log in via the DHCPv6 Lease Query LEG. See the [“Static Assignment of Policy Information” section on page 12-8](#).

### Dynamic Assignment of Policy Information

Dynamic assignment of policy information is supported when policy information is submitted in the DHCPv6 packets. The DHCPv6 Lease Query LEG concatenates the desired options and creates a *policy name*. It is possible to map, using the configuration, between the *policy names* and the application policy parameters, such as package IDs. The DHCPv6 Lease Query LEG can support multiple policies.

To extract the policy information data from the DHCP packet, use the `dhcpv6_pkg.cfg` configuration file to define the option types that contain the policy information and define the conversion map of the *policy names* to the package IDs (or any other policy) of the Cisco Service Control Application for Broadband (Cisco SCA BB).

The `[DHCPv6.Policy.Package]` section contain the following parameters:

- `options_order_for_policy_name`  
Defines the DHCP options that contain the policy association information and defines the order of concatenation of the data.  
This parameter has no default value.  
The format is `option[:subtype],option[:subtype]`
- `options_type`  
Defines the format type of the DHCPv6 options and fields defined by the `options_order_for_policy_name` parameter.  
Possible values for this parameter are binary (a binary string that is converted to an ASCII hexadecimal string), string (an ASCII string), or integer (a 4-byte integer converted to an IP address string in dotted notation). List options in the same way as `options_order_for_policy_name`.  
This parameter has no default value.
- `name_seperator_value`  
Defines the separator character to be used between two options when concatenating them to each other to create the policy name. Any character is accepted. The default value is underscore (`_`).
- `use_default`  
Determines whether to use a default policy when no policy information can be extracted from the DHCPv6 data, such as, the configurable options are missing or no options are configured.  
Possible values for this parameter are true or false. The default value is false.

- `default_policy`  
Defines the default policy ID to use if no policy information is extracted from the DHCPv6 data. This parameter is relevant only if the `use_default` parameter is set to true.  
Possible values for this parameter are any integer numbers. This parameter has no default value.
- `allow_login_with_no_policy`  
Defines whether to perform a login without policy information when no policy information can be extracted from the DHCP data and the `use_default` parameter is set to false.  
This parameter is relevant only if the `use_default` parameter is set to false.  
Possible values for this parameter are true or false. The default value is true.
- `ignore_policy_list`  
Defines a list of indexes separated by commas, where each index represents a policy or package value. During a login, if the value of the current subscriber policy is one of the values defined in this parameter, a login operation occurs without the subscriber policy value being changed.
- `policy_property_name`  
Defines the name of the application property that contains the policy information. This parameter has no default value.

**Note**

The `policy_property_name` parameter is case sensitive and must be written exactly as defined by the SCA BB Console. For example, `packageId`.

- `log_all`  
Defines whether to write detailed user-log messages for all policy association events.  
Possible values for this parameter are true or false. The default value is false.
- `log_default_assignment`  
Defines whether to write a user-log message for every assignment of the default value (as defined by the `default_policy` parameter).  
Possible values for this parameter are true or false. The default value is false.
- `mapping_table.<policy_name>`  
Contains multiple entries containing information to be converted from the policy information as it appears in the DHCP packet to the policy property value to be used by the Cisco SCA BB application.  
These entries do not have default values.

**Note**

The `policy_name` value is case sensitive and must be written exactly as it exists in the DHCP packets.

## Dynamic Assignment of Policy Information Example

Suppose the policy information appears inside option 17 (Vendor-Specific Option) of the DHCPv6 packet, and both subtypes—250 and 251—are in use, configure the `options_order_for_policy_name` parameter as follows:

```
options_order_for_policy_name=17:250,17:251
```

Suppose option 17 with subtype 250 contains the type of package (gold, silver, or bronze), and option 17 with subtype 251 contains domain information (the package type has a different meaning in different domains). If the separator value is configured to the default value, configure the `mapping_table` entries as follows:

```
mapping_table.gold_domain1=11
mapping_table.gold_domain2=12
mapping_table.silver_domain1=13
mapping_table.silver_domain2=14
```

This configuration means that if the DHCP packet contains the value *gold* inside option 17 with subtype 250, and the value *domain1* inside option 17 with subtype 251, the package ID that is associated to the subscriber in the Subscriber Manager will have the value 11.

The following is an example of the entire configuration file:

```
[DHCPv6.Policy.Package]
options_order_for_policy_name=17:250,17:251
name_separator_value=_
use_default=true
default_policy=1
policy_property_name=packageId
allow_login_with_no_policy=false
log_all=false
log_default_assignment=false
mapping_table.gold_domain1=11
mapping_table.gold_domain2=12
mapping_table.silver_domain1=13
mapping_table.silver_domain2=14
```

## Static Assignment of Policy Information

If the installation does not require dynamic assignment of package information, the configuration file `dhcipv6_pkg.cfg` should define the default package ID to be assigned to all the subscribers, as shown in the following example:

```
[DHCPv6.Policy.Package]
policy_property_name=packageId
allow_login_with_no_policy=false
use_default=true
default_policy=1
```

All other configuration parameters should not be set.

## Applying the Configuration on the Cisco Service Control Subscriber Manager

After editing the relevant configuration files, use the following `p3sm` command-line utility to load the configuration file:

```
>p3sm --load-config
```



## Information About the DHCPv6 Lease Query LEG CLU

The **p3v6leasequery** CLU displays the DHCPv6 Lease Query LEG configuration, status, and statistics. The command format is **p3v6leasequery <operation>**.

Table 12-1 lists the p3leasequery operations.

**Table 12-1** p3leasequery Operations

Operation	Description
<b>--show</b>	Displays all the DHCPv6 Lease Query LEG configurations and statuses.  DHCPv6 Lease Query LEG does not support server-wise statistics.
<b>--show-statistics</b>	Displays the counters of the DHCPv6 messages handled and the number of login operations performed.
<b>--reset-statistics</b>	Resets the counters of the DHCPv6 messages handled and the number of login operations performed.
<b>--show-version</b>	Displays the version number of the DHCPv6 Lease Query LEG.
<b>--show-policy</b>	Displays the policies associated to the DHCPv6 Lease Query LEG.
<b>--help</b>	Displays a list of available operations and arguments, with a short explanation of their meanings.

- [Viewing the DHCPv6 Lease Query LEG Status, page 12-9](#)
- [Viewing the DHCPv6 Lease Query LEG Statistics, page 12-10](#)
- [Viewing the DHCPv6 Lease Query LEG Statistics, page 12-10](#)
- [Viewing the DHCPv6 Lease Query LEG Version, page 12-10](#)

### Viewing the DHCPv6 Lease Query LEG Status

The following is an example of using the **p3v6leasequery** CLU with the **show** operation:

```
>p3v6leasequery --show

DHCPV6 Lease-Query LEG:
=====
Active:      true
Mode :      active_standby
DHCPV6 Servers:
    Active:  2607:f0d0:1002:11:0:0:0:1
    Standby: N/A
    Session timeout: 30
    Fail over criteria: 3
IA_NA Supported: false
IA_NA Prefix Length: 64
Subscriber ID:
```

```

Option: 37
Format: binary
Command terminated successfully
>

```

## Viewing the DHCPv6 Lease Query LEG Policy

The following is an example of using the **p3v6leasequery** CLU with the **show policy** operation:

```
>p3v6leasequery --show-policy
```

```

Policy Name: packageId
=====
separator           : _
use default         : false
default value       : 0
allow no package    : true
log success         : false
log default success : false
Number of mappings  : 0

```

## Viewing the DHCPv6 Lease Query LEG Statistics

The following is an example of the **p3v6leasequery** CLU using the **show-statistics** operation:

```
>p3v6leasequery --show-statistics
```

```

DHCP Lease-Query LEG Statistics:
=====
Lease-Queries Sent:           1
Lease-Queries Replied:       1
Active Lease Replies:         1
Non-Active Lease Replies:     0
Total timed-out sessions:     0
Consecutive timed-out sessions: 0
Number of fail-overs:         0
Invalid Replies:              0
Failed log-in operations:     0
Failed log-out operations:    0
Sessions in process:          0
Max-Concurrent sessions:     1
Command terminated successfully
>

```

## Viewing the DHCPv6 Lease Query LEG Version

The following is an example of the **p3v6leasequery** CLU using the **show-version** operation:

```
>p3v6leasequery --show-version
```

```

DHCPv6 LEASE QUERY LEG 3.8.5 Build 100
>

```