



CHAPTER 7

About the DHCP Lease Query Login Event Generator

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Introduction

This chapter describes the Service Control Management Suite (SCMS) Subscriber Manager (SM) DHCP Lease Query Login Event Generator (LEG) software module.

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- [Information About DHCP Lease Query LEG Functionality, page 7-4](#)
- [Information About the Functionality of the DHCP Lease Query LEG with Multiple DHCP Servers, page 7-7](#)

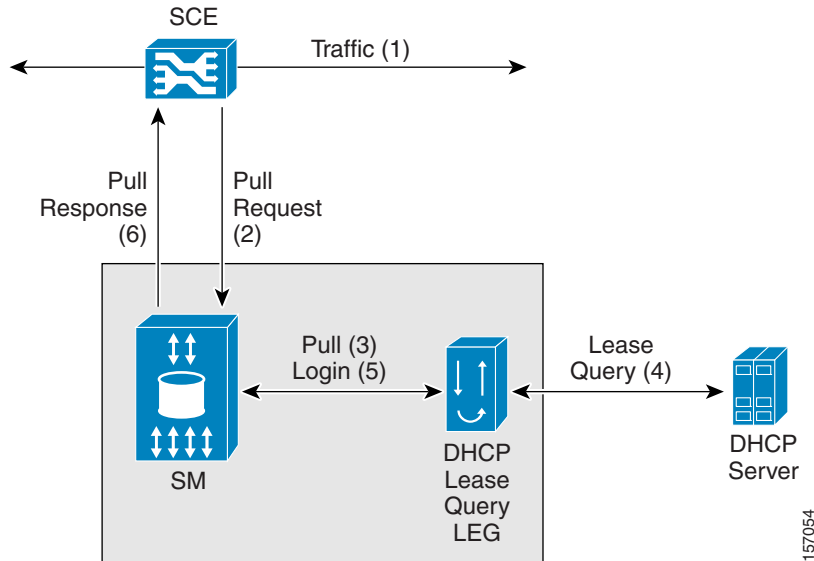
Information About the DHCP Lease Query LEG

The SCMS SM DHCP Lease Query LEG is a software module that handles pull-requests from the different service control engine (SCE) platforms in the network. The LEG queries the DHCP server using a DHCP Lease-Query transaction. The DHCP Lease Query LEG can be run on the SM server or on the SCE device. If you use an SM, the LEG must be used on the SM, not on the SCE.

DHCP Lease Query LEG Operation

Figure 7-1 represents the operation of the DHCP Lease Query LEG.

Figure 7-1 DHCP Lease Query LEG Operation - SM Installation



The subscriber's traffic (1) triggers a pull-request from the SCE (2). The SM receives the request for processing. If the SM does not find a subscriber with a matching IP address in the subscriber database, it passes the pull-request to the DHCP Lease Query LEG (3). The LEG queries the DHCP server. If the server finds a match for the IP address in its database, the server replies with the subscriber information (4). The LEG performs a login operation (5). This operation updates the subscriber database based on the received information and logs the subscriber into the SCE (6), which triggered the pull-request.

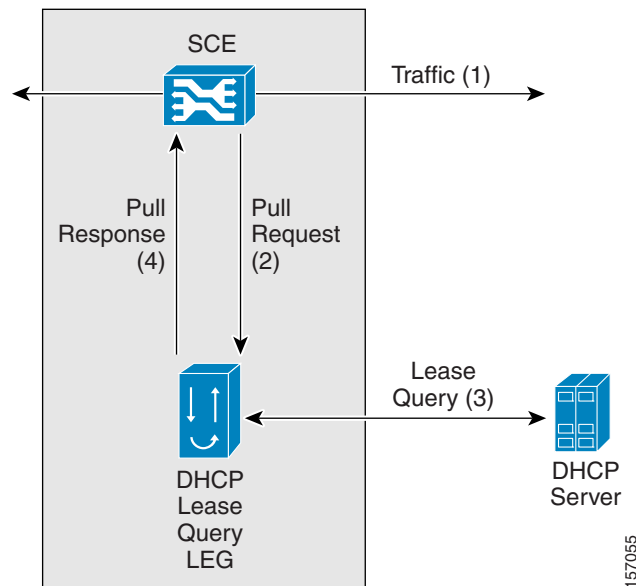


Note

The DHCP Lease Query LEG does not support the active_active mode.

If desired, install the DHCP Lease Query LEG directly on the SCE device to integrate the SCE with DHCP servers without the use of an SM server. Figure 7-2 represents the operation of the LEG when installed on the SCE device:

Figure 7-2 DHCP Lease Query LEG Operation - SCE Installation



The subscriber's traffic (1) triggers a pull-request from the SCE (2). The Lease Query LEG receives the request and queries the DHCP server. If the server finds a match for the IP address in its database, the server replies with the subscriber information (3). Based on the received information, the LEG responds to the SCE with a pull-response, which includes the subscriber ID and the IP address lease-time returned from the DHCP server (4).



Note

An Internet Engineering Task Force (IETF) standard defines the DHCP Lease-Query transaction. The LEG supports the RFC 4388 standard. For more information, see the [IETF website](#).

Information About the DHCP Lease Query LEG with Multiple DHCP Servers

The Cisco SCMS SM DHCP Lease Query LEG with multiple DHCP servers can support a maximum of three DHCP servers. This LEG queries all the servers that are configured, and accepts the lease provided by any of the servers that responds first. The DHCP Lease Query LEG with multiple servers works only in the active_active mode. Also, the server_mode parameter of the DHCP Lease Query LEG configuration file, leaseq.cfg, should be in the active_active mode.



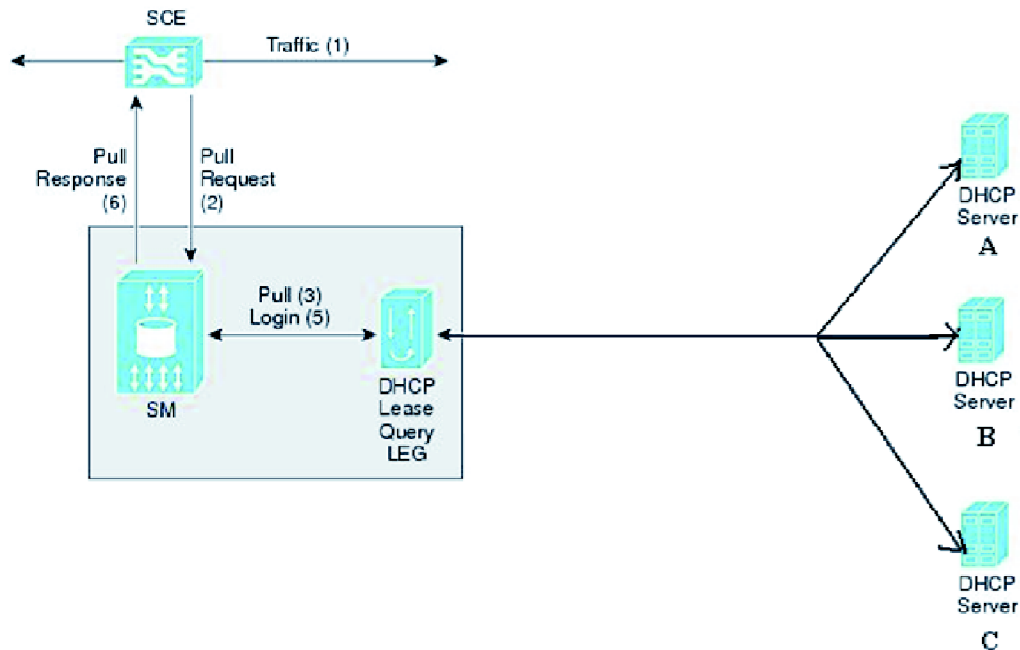
Note

The DHCP Lease Query LEG with multiple servers does not support the active_standby mode.

Operating the DHCP Lease Query LEG with Multiple DHCP Servers

Figure 7-3 represents the operation of the DHCP Lease Query LEG with multiple DHCP servers.

Figure 7-3 DHCP Lease Query LEG Operation with Multiple DHCP Servers - SM Installation



The subscriber's traffic (1) triggers a pull-request from Cisco SCE (2). The Subscriber Manager receives the request for processing. If the Subscriber Manager does not find a subscriber with a matching IP address and the respective details in the subscriber database, it passes the pull request to the DHCP Lease Query LEG (3). The LEG queries all the three available DHCP servers. If any of these servers find a match for the IP address in their database, the server replies with the corresponding subscriber information (4). The LEG performs a login operation (5). This operation updates the subscriber database based on the information received and logs the subscriber into Cisco SCE (6), which in turn triggers the pull request.

Information About DHCP Lease Query LEG Functionality

- [The DHCP Lease Query LEG Process, page 7-5](#)
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The DHCP Lease Query LEG Process

The DHCP Lease Query LEG processes DHCP Lease Query transactions to the DHCP server using the IP address indicated in the pull request from Cisco SCE. The DHCP server replies whether there is an active lease (DHCPLEASEACTIVE message) for this IP address and provides information about the subscriber associated with this IP address according to the list of options requested by the LEG. By default, the LEG requests information about the lease time, server identifier, and the modem's MAC address, and adds package association-related options, if needed.

The DHCP Lease Query LEG supports up to two redundant DHCP servers. The LEG identifies a server failure by counting the consecutive requests that time out. After a configurable threshold of timed-out requests, the LEG starts to send the requests to the recently activated server, which was previously in standby. The LEG does not return to the failed server until the activated server fails.

When installing the LEG on the SM server, it runs with the privileges assigned to the user **pcube** on this machine. On UNIX platforms, because only the super-user (root) can open ports under 1024, the LEG cannot open the DHCP ports. To solve this problem, a simple application is supplied with the LEG, which forwards the DHCP packets between the LEG and the DHCP servers. This application is the DHCP Forwarder, which is described in the [DHCP Forwarder Application, page 10-1](#) chapter.

When installing the LEG on the SCE device, there is no need to use the DHCP Forwarder application.

**Note**

The trigger for the DHCP Lease Query LEG to send a query to the DHCP Server is unknown subscriber traffic followed by the pull request from the SCE. Therefore, if the subscriber's package is changed at the DHCP Server, the SM receives the new package information only when the subscriber next logs in.

DHCP Lease Query Transaction

The DHCP Lease Query transaction is a DHCP transaction where the client (LEG) sends a DHCPLEASEQUERY message to the server, indicating the information it wants to query. In turn, the LEG queries the IP address. The server can reply with several types of messages, for example, a DHCPLEASEACTIVE message means that an active lease was found, and the request information is supplied, and a DHCPLEASEUNASSIGNED message means this IP is currently not assigned to any subscriber.

The following is a detailed description of the attributes extracted from the *DHCP Lease Query transaction*:

- **Subscriber ID**—By default, the subscriber ID is the modem MAC address, which you extract from option 82 (Remote ID sub-option of the DHCP Relay Agent Information Option). Therefore, the DHCP server must support and store option 82 for each Customer Premise Equipment (CPE). This default can be overwritten by configuration. Furthermore, the LEG can assign the IP address as a fallback if the option does not exist in the server's response. This fallback is disabled by default.
- **Server Identifier**—The IP address of the DHCP server is identified from option 54.
- **Lease time**—The assigned IP is added to the SM or SCE database with a lease time taken from option 51. Note that if option 51 does not appear in the DHCPLEASEACTIVE reply, an infinite lease time is assigned for this IP address.
- **Package**—Configurable options in the DHCP message determine how to assign the package information. The LEG includes a component that converts the package information data from the DHCP packet to a subscriber package ID. If the packet does not contain package information, it is possible to log in the subscriber with a default package, or log in the subscriber with no package information at all. The package options are assumed to be encoded as strings.

After extracting the preceding information, the LEG logs the subscriber into the SM/SCE.

Installation and Usage

The DHCP Lease Query LEG is part of the SM/SCE installation package. The SM installation package also includes configuration files and the Command-Line Utility of the LEG.

For information about using the DHCP Lease Query LEG on the SM, see [Subscriber Manager Integration - Configuration](#). For information about installing and using the DHCP Forwarder application see [DHCP Forwarder Application](#). For information about using the DHCP Lease Query LEG on the SCE, see [Service Control Engine Integration - Configuration](#).

Information About the Functionality of the DHCP Lease Query LEG with Multiple DHCP Servers

- [The DHCP Lease Query LEG Process, page 7-5](#)
- [DHCP Lease Query Transaction, page 7-5](#)
- [Installation and Usage, page 7-6](#)

DHCP Lease Query LEG with Multiple DHCP Servers Process

This LEG processes DHCP Lease Query transactions to all the available three DHCP servers using the IP address indicated in the pull request from Cisco SCE. Any of the DHCP servers responds with information about whether there is an active lease (DHCPLEASEACTIVE message) for this IP address and provides information about the subscriber associated with this IP address according to a list of options requested by the LEG. By default, the LEG requests the lease time, server identifier, and modem's MAC address, and adds package association-related options if needed.

The DHCP Lease Query LEG supports a maximum of three DHCP servers. The LEG identifies a server failure by counting the request timeout that is applicable for all the three servers. After a configurable threshold of timed-out request, the LEG starts to send the request to all the three servers. The LEG does not return until all the three servers reach session timeout.

**Note**

By default, the session timeout for the server request is 20 seconds. However, we recommend that you configure a maximum value for session timeout. For example, DHCP server 1 can respond quickly when compared to DHCP server 2. In such a scenario, configure the session timeout value based on DHCP server 2.

DHCP Lease Query with Multiple DHCP Servers Transaction

The DHCP Lease Query transaction is a DHCP transaction where the client (LEG) sends a DHCPLEASEQUERY message to all the servers that are configured, indicating the information it wants to query. In turn the LEG queries the corresponding IP address. The server can reply with several types of messages, for example, a DHCPLEASEACTIVE message means that an active lease was found, and the request information is supplied, and a DHCPLEASEUNASSIGNED message means this IP is currently not assigned to any subscriber.

The following is a detailed description of the attributes that can be extracted from the DHCP Lease Query with multiple DHCP servers transaction:

- **Subscriber ID**—By default, the subscriber ID is the corresponding modem's MAC address, that you extract from option 82 (Remote ID suboption of the DHCP Relay Agent Information option). Therefore, the DHCP server must support and store option 82 for each Customer Premise Equipment (CPE). This default can be overwritten by configuration. Furthermore, the LEG can assign the corresponding IP address as a fallback if the option does not exist in the server's response. This fallback is disabled by default.
- **Server Identifier**—The IP address of the DHCP server is identified from option 54.
- **Lease Time**—The assigned IP is added to Cisco Subscriber Manager or the Cisco SCE database with the lease time taken from option 51. Note that if option 51 does not appear in the DHCPLEASEACTIVE reply, an infinite lease time is assigned for this IP address.
- **Package**—Configurable options in the DHCP message determine how to assign the package information. The LEG includes a component that converts the package information data from the DHCP packet to a subscriber package ID. If the packet does not contain package information, it is possible to log in the subscriber with a default package, or log in the subscriber with no package information at all. The package options are assumed to be encoded as strings.

After extracting the preceding information, the LEG logs the subscriber into Cisco Subscriber Manager or Cisco SCE.

Installation and Usage

The DHCP Lease Query LEG is part of the Cisco Subscriber Manager or Cisco SCE installation package. The SM installation package also includes configuration files and the command-line utility of the LEG.