SCMS RADIUS Listener LEG Reference Guide

OL-7200-01

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

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SCMS RADIUS Listener LEG *Reference Guide*

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Preface

This document briefly describes the concept of a Radius Listener Login Event Generator (LEG), and explains how to install and configure the Radius Listener LEG on the Service Control Management Suite, Subscriber Manager (SCMS SM) platform.

Audience

This document is intended for readers that are familiar with the CNR extensions concept and with Cisco Service Control Subscriber Management and Subscriber Integration concepts.

Document Conventions

The following typographic conventions are used in this guide:

Typeface or Symbol	Meaning
Italics	References, new terms, field names, and placeholders.
Bold	Names of menus, options, and command buttons.
`Courier`	System output shown on the computer screen.
`Courier Bold`	CLU command code typed in by the user in examples.
`Courier Italic`	Required parameters for CLU commands.
`[italic in brackets]`	Optional parameters for CLU commands.
➲	A one-step procedure.
	Note. Notes contain important information.
	Warning. Warning means danger of bodily injury or of damage to equipment.

Technical Support

Cisco TAC Website

The Cisco TAC website (*http://www.cisco.com/tac* (http://www.cisco.com/tac)) provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The Cisco TAC website is available 24 hours a day, 365 days a year.

Accessing all the tools on the Cisco TAC website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a login ID or password, register at this URL: *http://tools.cisco.com/RPF/register/register.do* (http://tools.cisco.com/RPF/register/register.do)

Opening a TAC Case

The online TAC Case Open Tool (*http://www. cisco.com/tac/caseopen* (http://www.cisco.com/tac/caseopen)) is the fastest way to open P3 and P4 cases. (Your network is minimally impaired or you require product information). After you describe your situation, the TAC Case Open Tool automatically recommends resources for an immediate solution.

If your issue is not resolved using these recommendations, your case will be assigned to a Cisco TAC engineer. For P1 or P2 cases (your production network is down or severely degraded) or if you do not have Internet access, contact Cisco TAC by telephone. Cisco TAC engineers are assigned immediately to P1 and P2 cases to help keep your business operations running smoothly.

To open a case by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553-2447

For a complete listing of Cisco TAC contacts, go to this URL: *http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml* (http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml)

TAC Case Priority Definitions

To ensure that all cases are reported in a standard format, Cisco has established case priority definitions.

Priority 1 (P1)—Your network is “down” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Priority 2 (P2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Priority 3 (P3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Priority 4 (P4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

About the Radius Listener LEG

The Radius Listener LEG is a software module that receives Radius Accounting messages, and according to their content, invokes logon operations to the P-Cube SM. The Radius Listener LEG is an extension to the SM software and runs concurrently with the SM.

When the Radius Listener LEG receives an Accounting-Start message, it extracts from the message's attributes the subscriber ID, the subscriber IP-address, and optionally the subscriber package index, and triggers a logon operation to the SM. In the same manner, an Accounting-Stop message triggers a logout operation.

The Radius Listener LEG was carefully developed and thoroughly tested with several Radius AAA servers and NAS devices.

This chapter contains the following sections:

- Terms and Concepts 1-1

Terms and Concepts

The following is a list of some terms and concepts that are necessary to understand the Radius Listener and SM configuration and operation. Additional information regarding the various issues can be found in the *SM User Guide*.

NAS (Network Access System)

The Radius Listener LEG refers to all of its Radius clients as NAS devices, even though they might be Radius servers acting as a proxy or forwarding messages.

Radius Accounting Start/Stop

The Radius Accounting messages must hold an attribute called Acct-Status-Type. This attribute can receive among other values, the value of **start** or **stop**. When an Accounting message contains the Acct-Status-Type with the value **start,** it is called an Accounting-Start message. For additional information, see the relevant Radius RFC documents.

Subscriber Mappings

The main function of the Radius Listener LEG is to provide the SM with network-ID-to-subscriber mappings in real time.

The SCE Platform requires mappings between the network IDs (IP addresses) of the flows it encounters and the subscriber IDs. The SM database contains the network IDs that map to the subscriber IDs. The SCE network-ID-to-subscriber mappings are constantly updated from the SM database.

Subscriber Domain

The SM provides the option of partitioning SCE Platforms and subscribers into subscriber domains. A subscriber domain is a group of SCE Platforms that share a group of subscribers. Subscriber domains can be configured using the SM configuration file and can be viewed using the SM CLU.

For additional information about domains and domain aliases, see *Appendix* A of the *SM User Guide.*

Subscriber Package

The policy enforced by Cisco solutions on a certain subscriber is usually defined by a policy package. The Radius Listener can handle the package ID in any of the following ways:

- set according to a value of a Radius attribute
- set using a constant default value
- do not set

For additional information, see Mapping of Radius Attribute to Subscriber Package, and the *User Guide* of the Cisco application that you are using (*Service Control Application for Broadband* or *Service Control Application for Mobile*).

Topologies

The following figure illustrates a topology in which a Radius server/proxy forwards or proxies the Radius Accounting messages to the Radius Listener LEG.

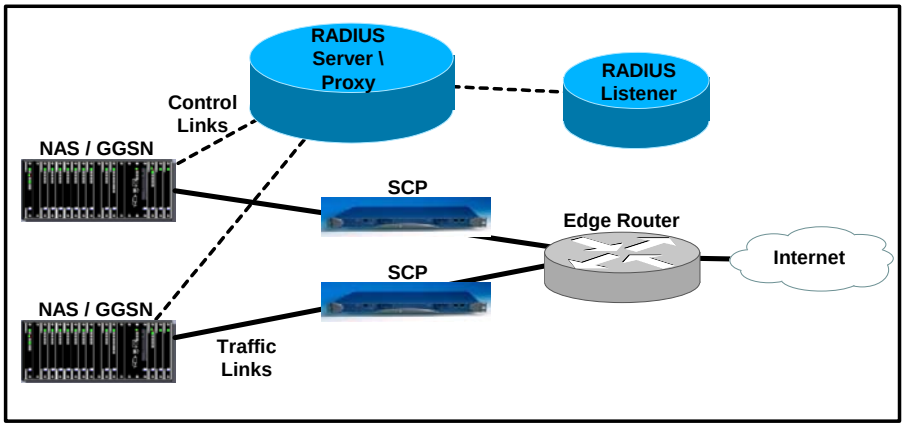

Figure 1-1: Example of Radius Server Forwarding Radius Accounting Messages to Radius Listener LEG

The following figure illustrates a topology in which the NAS performs authentication with the Radius server, and sends Radius Accounting messages to the Radius Listener LEG and, optionally, to the Radius server.

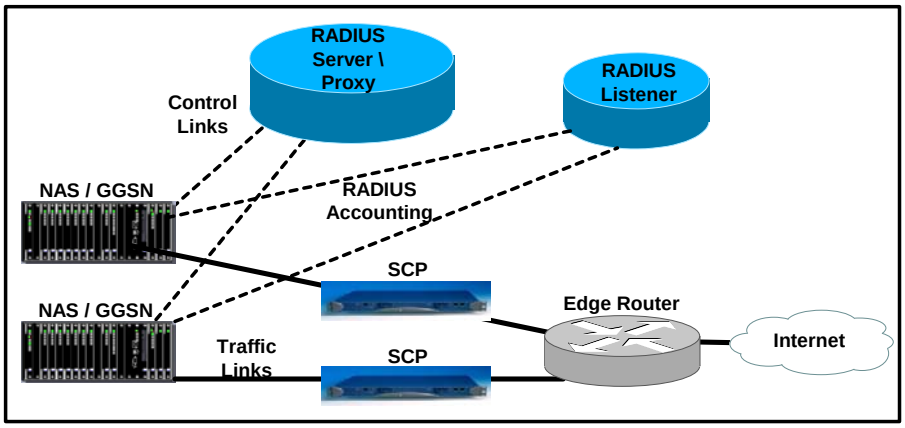

Figure 1-2: Example of NAS Sending Radius Accounting Messages to both the Radius Listener LEG and the Radius Server

Installing the Radius Listener LEG

This section describes the procedures for configuring and running the Radius Listener LEG. It also describes the uninstall procedure.

The Radius Listener LEG is provided as part of the SM installation package. The configuration files and command line utility of the listener are included in the SM installation.

This chapter contains the following sections:

- Installation Procedure Overview 2-1
- Installation Procedure 2-1
- Uninstalling the Radius Listener LEG 2-3

Installation Procedure Overview

Following is a general overview of the Radius Listener LEG installation procedure. Refer to the relevant sections for specific instructions.

To install the Radius Listener LEG:

Step 1 Edit the SM configuration file. See *Step 1: Edit the SM Configuration File* ("Step 1" on page 2-2).

Step 2 Load the configuration file using the `p3sm` command line utility. See *Step 2: Load the Configuration File* ("Step 2" on page 2-2).

Step 3 Configure the NAS. See *Step 3: Configure the NAS* ("Step 3" on page 2-2).

Installation Procedure

The following general steps must be performed when Installing:

Step 1 (on page 2-2)

Step 2 (on page 2-2)

Step 3 (on page 2-2)

Procedure for configuring a Radius client (on page 2-2)

Step 1

Step 1: Edit the SM Configuration File

Edit the SM configuration file. See *General Configuration* (on page 3-1).

Step 2

Step 2: Load the Configuration File

Run the `p3sm` command line utility from the SM CLU `sm-inst-dir`/sm/server/bin (`sm-inst-dir` refers to the SM installation directory):

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

Step 3

Step 3: Configure the NAS

The NAS that are sending Radius Accounting messages to the Radius Listener may be Radius servers acting as Radius clients that proxy or forward Radius Accounting messages to the Radius Listener.

These Radius clients must be configured according to the Radius Listener configuration, as performed in **Step 1** (on page 2-2) above. There are many different Radius client devices, each of which is configured in a different manner.

Procedure for configuring a Radius client

The following general steps must be performed when configuring a Radius client:

Step 1 Configure the SM machine as the destination of accounting messages.

You must configure the following parameters:

- The SM IP address.
- The UDP ports that the Radius Listener listens to.
- The shared secret configured for this client in the SM configuration file. See *Radius Clients Configuration* (on page 3-2).

Step 2 Verify that the Accounting-Start message is sent with the following attributes:

a) The attribute configured in the subscriber ID attribute mapping in the SM configuration file. See *Mapping of Radius Attribute to Subscriber ID* (on page 3-3).

b) The Framed-IP-Address attribute.

c) (*Optional*) The attribute configured in the Subscriber package attribute mapping in the SM configuration file. See *Mapping of Radius Attribute to Subscriber Package* (on page 3-4).

Step 3 Verify that the Accounting-Stop message is sent with the following attributes:

a) The attribute configured in the subscriber ID attribute mapping in the SM configuration file. See *Mapping of Radius Attribute to Subscriber ID* (on page 3-3).

b) (*Optional*) The Framed-IP-Address attribute.

c) It is recommended that, if possible, you configure the Radius client **not** to send Authentication and Accounting-Intermediate messages to the SM, in order to reduce the load of packet handling.

Uninstalling the Radius Listener LEG

This section explains how to uninstall the Radius Listener LEG.

Uninstall Procedure Overview

To uninstall the Radius Listener LEG:

Step 1 Stop the Radius Listener LEG using the `SM configuration file`.

Step 2 Reload the configuration file using the `p3sm` command line utility.

Uninstall Procedure

To stop the Radius Listener LEG:

Step 1 Edit the SM configuration file and set the Radius Listener **start** parameter to **no**. See *General Configuration* (on page 3-1).

Step 2 Run the `p3sm` command line utility:

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

CHAPTER 3

Configuration

The Radius Listener is configured using the SM configuration file **p3sm.cfg**, which resides in the **sm-inst-dir**/sm/server/root/config directory (sm-`inst-dir refers to the SM installation directory).`

This file is built of sections that are defined by brackets; for example [Radius.Subscriber ID]. Each section consists of several parameters having the format parameter=value. The number sign (“#”) at the beginning of a line signifies that this is a remark line.

General Radius Listener LEG configuration resides in the [Radius.Listener] section. All additional Radius Listener LEG sections start with the prefix “Radius.”; for example [Radius.NAS.nas1], and they are initially defined as remark lines.

This chapter contains the following sections:

- General Configuration 3-1
- Radius Clients Configuration 3-2
- Radius Attributes Mapping Configuration 3-3

General Configuration

The `[Radius.Listener]` section in the SM configuration file contains the following parameters:

- **start**

  Defines whether the SM should run the Radius Listener at startup.

  Possible values for this parameter are `yes` and `no`. The default value is `no`.

- **accounting_port**

  Defines the Radius Listener's accounting port number.

  The default value is `1813`.

Example

Following is a portion of a configuration file illustrating sample configuration of `[Radius.Listener]` section:

```
[Radius Listener]

# The following parameter defines whether the SM should run the Radius
Listener at startup. Receives the values: yes, no. (default no)

start=no

# accounting port number (default 1813)
accounting_port=1813
```

Radius Clients Configuration

The Radius Listener must be configured with the Radius clients/NAS devices that transmit Radius messages to it, so it will be able to accept these Radius messages.

Each `[Radius.NAS.XXX]` section specifies a single Network Access System (NAS), where XXX represents the NAS name.

To configure a new NAS:

Step 1 Copy the example Radius.NAS.XXX section that exists in the configuration file, and remove the remarks from the parameters and section header.

Step 2 Configure a section name from the format `[Radius.NAS.my_name_for_the_NAS]`.

Step 3 Configure the following parameters:

- **domain**

  Set the **domain** parameter with a valid subscriber domain name.

- **IP_address**

  Set the **IP_address** parameter with the NAS IP address that the Radius messages arrive with. IP address should be in dotted notation (xxx.xxx.xxx.xxx).

- **NAS_identifier**

  Set the **NAS_identifier** parameter with a **NAS-ID** attribute that the Radius messages are sent with.

- **secret**

  Set the **secret** parameter with the secret key defined in the NAS for this connection.

For more information about the **domain**, **IP address**, and **NAS-identifier** parameters usage, see *Appendix A - Domain Association Algorithm* ("Domain Association Algorithm" on page A-1).

Example

Following is a is a portion of a sample configuration file illustrating how to configure the NAS:

```
[Radius.NAS.Access134]

# P-Cube's subscriber domain name
domain = subscribers

# IP address in dotted notation
IP_address = 202.156.24.100

# name of the NAS that exists in the NAS-ID attribute
NAS_identifier =ACCESS134

# secret string
secret = secret123
```

Radius Attributes Mapping Configuration

Mapping of Radius Attribute to Subscriber ID

Note The configuration described in this section is optional

The subscriber ID is usually put in the User-Name Radius attribute; however, in certain installations a different Radius attribute might be used. For example, in wireless environments, the 3GPP-IMSI or the 3GPP2-IMSI attributes might be used. The default is to use the User-Name attribute.

To define what attribute to use for the subscriber ID, the `[Radius.Subscriber ID]` section should be configured. To define the attribute to be used, configure the following parameters:

- **radius_attribute**

  Configure the `radius_attribute` parameter with the Radius attribute number. Use the value `26` in case of Vendor Specific Attributes (VSA).

- **radius_attribute_type**

  Configure `radius_attribute_type` parameter according to the Radius attribute format. Possible values for this parameter are `integer` and `string`. The default value is `integer`.

Example

Following is a portion of a sample configuration file illustrating how to configure the subscriber ID assignment option. In this example, the User-Name attribute is assigned to the subscriber ID:

```
[Radius.Subscriber ID]
# Radius protocol attribute number
radius_attribute=1

# the type of the attribute (type "integer" or "string")
radius_attribute_type = string
```

Configuring a Vendor Specific Attribute (VSA)

To configure the use of a Vendor Specific Attribute (VSA):

- Set the **radius_attribute** parameter to 26.
- Set the **radius_attribute_vendor_id** parameter with the VSA vendor ID.
- Set the **radius_sub_attribute** parameter with the specific sub-attribute value.

Example

Following is a portion of a sample configuration file illustrating how to configure the subscriber ID assignment option. In this example, the 3GPP_IMSI vendor-specific attribute is assigned to the subscriber ID:

```
[Radius.Subscriber ID]
# in case of a vendor specific attribute (VSA)
# when the 'radius_attribute' is set to 26
# configuration for 3GPP_IMSI
radius_attribute = 26
radius_attribute_vendor_id=10415
radius_sub_attribute=1

# the type of the attribute (type "integer" or "string")
radius_attribute_type = string
```

Mapping of Radius Attribute to Subscriber Package

Note The configuration described in this section is optional.

Subscriber package configuration in the Radius Listener can be handled in any of the following ways:

- Extract the data from a Radius attribute
- Set a default value for all subscribers that log on via the Radius Listener
- Not set any package to the subscriber

Extracting data from a Radius Attribute

The attribute configuration is done in the same manner as described in *Mapping of Radius Attribute to Subscriber ID* ("Mapping of Radius Attribute to Subscriber Package" on page 3-4).

In addition, the following parameters should be configured:

- **packet_types**

  Possible values for this parameter are `access-request`, `access-accept`, `accounting-request`, `accounting-response`, `all`, and/or `none`; where multiple choices are separated by a comma (,). The default value is `all`.

- This parameter should be set with **accounting-request** to describe in what Radius messages to look for this attribute.

- **use_default**

  Defines whether to use a default value if the attribute was not found.

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

- **default**
- Defines the default value to use if the attribute was not found.
- There is no default value. **Note:** This parameter **must** be set if **use_default** was set to **true**.

Example

Following is a portion of a sample configuration file illustrating how to configure the subscriber package assignment option. In this example, a VSA is assigned to the subscriber package.

```
[Radius.Property.Package]

# following is configuration for using Vendor Specific Attributes (VSA)
radius_attribute = 26
radius_sub_attribute = 1
radius_attribute_vendor_ID = 5655

# Radius protocol packet types to look for the attribute
# (type "access-request", "access-accept", "accounting-request"
# "accounting-response" , "all" or "none" separated with ',')
packet_types = accounting-request

# the type of the attribute (type "integer" or "string")
radius_attribute type = integer

# this flag indicates whether to use default value
# if the attribute was not found (when not mandatory)
use_default = true

# default property value
default = 0
```

Setting a Value for All Subscribers

Do **not** configure the radius attribute parameters; however, **do** configure the **use_default** parameter to **true** and set the value of the **default** parameter as needed.

Not Setting Any Package to the Subscriber

Leave the `[Radius.Property.Package]` section as remark lines.

Radius Listener CLU

This chapter contains the following sections:

- p3radius Utility 4-1

p3radius Utility

The **p3radius** utility is used for viewing Radius Listener configuration and statistics. Radius Listener configuration includes configured NASes as well as general Radius Listener parameters.

Command format: `p3radius <OPERATION>`The following tables list the **p3radius** operations and options.

Table 4-1 p3radius Operations

Operation	Description
--show	Displays all of the NAS and Radius configurations, as well as other general info (status of ports, etc.)
--show-statistics	Displays counters of Radius messages handled and number of logon operations performed

The user of the Radius Listener LEG can use the `p3radius` command line utility to view the Radius Listener's status and statistics.

Radius Listener Status

Following is an example using the `p3radius` command line utility with the `show` operation:

```
> p3radius --show
running: true
listen-only: true
ports:
 authentication: 1812
 accounting      1813

NASs:
====
name:         Access134
nasId:        ACCESS134
ip:           202.156.24.100
secret:       secret123
domain:       subscribers
auth-servers: none
acct-servers: none
login on:     accounting-start

Radius Servers: none
Command terminated successfully
>
```

Radius Listener Statistics

Following is an example of using the `p3radius` command line utility with the `show-statistics` operation:

```
> p3radius --show-statistics
Statistics:
===========
Packets Received:       0
Packets Transmitted:    0
Access Requests:        0
Access Accept:          0
Access challenge:       0
Access Reject:          0
Accounting Request:     0
Accounting Response:    0
Dropped:                0
Successful logins:      0
Failed logins:          0
Successful logouts:     0
Failed logouts:         0
Packet processing time: 0.0
Over flows:             0
Command terminated successfully
>
```

Domain Association Algorithm

This section describes the algorithm used for deciding the subscriber domain to which a subscriber should be logged on. The Radius Listener decides which domain the subscriber should be logged on to, according to the NAS that sent the Accounting-Start.

However, if the only NAS the Radius Listener is configured with is the proxy device (as in the following figure), which is the device it receives the Radius messages from, then the listener cannot distinguish between NAS1 and NAS2 subscribers and cannot map them to different subscriber domains.

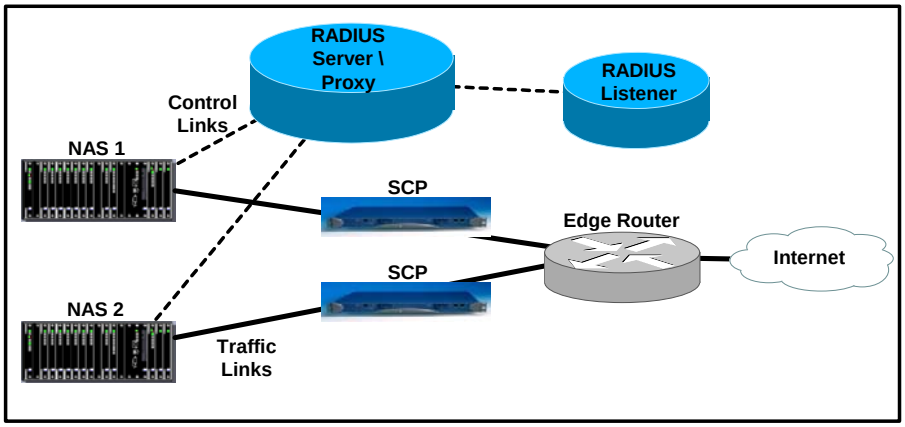

Figure A-1: Example of when the only NAS that the Radius Listener is configured with is the Proxy Device

To solve the problem of distinguishing between the two NASes, the following algorithm is used:

Step 1 If a NAS-Identifier attribute exists in the Accounting-Start message and a NAS is configured with that identifier, this NAS subscriber domain configuration is used.

Step 2 Otherwise, the same test will be performed on the NAS-IP-Address attribute. If it the NAS-IP-Address attribute exists in the Accounting-Start message and such a NAS was configured, then this NAS domain configuration is used.

Step 3 Otherwise, the domain configured for the NAS identified by the Accounting-Start packet source IP address is used.

Using the Radius attributes provides the ability to distinguish between the two NASes.

Note If **none** of the three NAS identification characteristics (packet source IP, NAS-Identifier, or NAS-IP-Address) matches the Radius message, the message is dropped due to Radius packet processing reasons, so the domain selection stage will not be performed.

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