



## **Cisco SCMS SM RADIUS Listener LEG Reference Guide**

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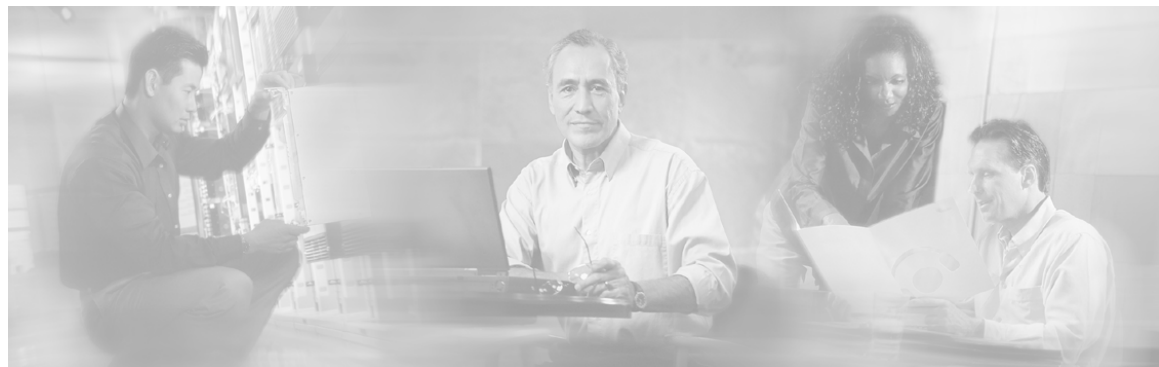
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## Preface

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This document 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.

## Document Revision History

Cisco Service Center Release	Part Number	Publication Date
Release 3.0	OL-7202-02	December, 2005
<b>Description of Changes</b>		
Reorganization of documentation. No major changes or new features were added to this revision.		
Release 2.5.7	OL-7202-01	May, 2005

## Audience

This document is intended for system administrators and system integrators who are familiar with the RADIUS extensions concept and with Cisco Service Control Subscriber Management and Subscriber Integration concepts.

## Organization

This guide contains the following topics:

Chapter	Title	Description
Chapter 1	<i>About the RADIUS Listener LEG</i> (on page 1-1)	Describes the Subscriber Manager RADIUS Listener LEG software module and the terms and concepts used in this guide.
Chapter 2	<i>Installing the RADIUS Listener LEG</i> (on page 2-1)	Details the procedures for installing the software on the Subscriber Manager. It also describes uninstalling the software and upgrading procedures.
Chapter 3	<i>Configuring the RADIUS Listener LEG</i> (on page 3-1)	Describes the configuration procedure for the RADIUS Listener LEG.
Chapter 4	<i>Using the RADIUS Listener LEG CLU</i> (on page 4-1)	Provides a description of the command-line utility commands when the software is installed on the Subscriber Manager.
Appendix A	<i>Domain Association Algorithm</i> (on page A-1)	Describes the algorithm used for deciding the subscriber domain to which a subscriber should be logged on.

## Related Documentation

The following publications are available for the *Cisco SCMS SM RADIUS Listener LEG* Reference Guide:

- *SCMS Subscriber Manager User Guide*

## Conventions

This document uses the following conventions:

Convention	Description
<b>boldface</b> font	Commands and keywords are in <b>boldface</b> .
<i>italic</i> font	Arguments for which you supply values are in <i>italics</i> .
[ ]	Elements in square brackets are optional.
{x   y   z}	Alternative keywords are grouped in braces and separated by vertical bars.
[x   y   z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string, or the string will include the quotation marks.

screen font	Terminal sessions and information the system displays are in screen font.
<b>boldface screen font</b>	Information you must enter is in <b>boldface screen font</b> .
<i>italic screen font</i>	Arguments for which you supply values are in <i>italic screen font</i> .
→	This pointer highlights an important line of text in an example.
^	The symbol ^ represents the key labeled <b>Control</b> —for example, the key combination <b>^D</b> in a screen display means hold down the <b>Control</b> key while you press the <b>D</b> key.
< >	Non printing characters, such as passwords, are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Notes use the following conventions:




---

**Note**

Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

---

Cautions use the following conventions:




---

**Caution**

Means *reader be careful*. You are capable of doing something that might result in equipment damage or loss of data.

---

Warnings use the following conventions:




---

**Warning**

Means *reader be warned*. You are capable of doing something that might result in bodily injury.

---

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### Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

<http://www.cisco.com/tac>

P3 and P4 level problems are defined as follows:

- P3—Your network is degraded. Network functionality is noticeably impaired, but most business operations continue.
- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for *Cisco.com* (on page [viii](#)), go to the following website:

<http://tools.cisco.com/RPF/register/register.do>

If you cannot resolve your technical issue by using the TAC online resources, Cisco.com registered users can open a case online by using the TAC Case Open tool at the following website:

<http://www.cisco.com/tac/caseopen>

## Contacting TAC by Telephone

If you have a priority level 1 (P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.
- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.



## 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 Subscriber Manager (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 the subscriber ID, the subscriber IP-address, and optionally, the subscriber package index from the message attributes, 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 *SCMS Subscriber Manager User Guide*.

#### NAS (Network Access System)

A network device that serves as an access point for a remote user. It initiates RADIUS transactions to the RADIUS server to authenticate a remote user.

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 the value of *start*, *stop*, or other RADIUS Accounting messages. An Accounting-Start message contains the *Acct-Status-Type* with the value *start*.

For additional information, see the relevant RADIUS RFC documentation.

## Subscriber Mappings

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.

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

For information about the SCE platforms, see the *SCE 1000* and *SCE 2000 User Guides*.

## 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 *SCMS Subscriber Manager User Guide*.

## Subscriber Package

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

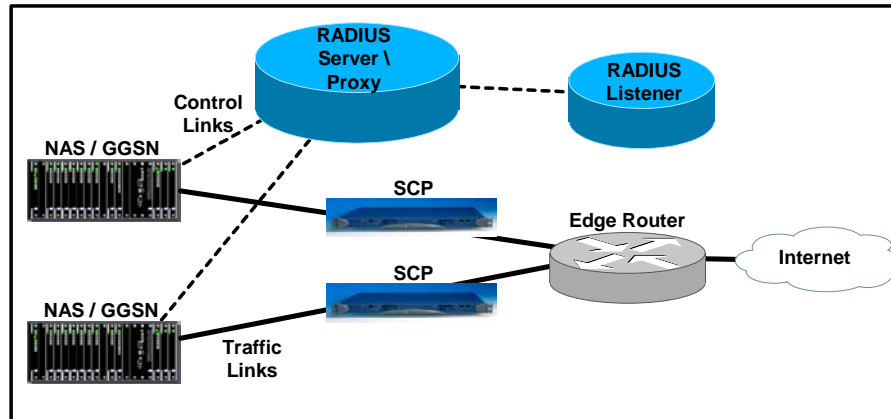
- set according to a value of a RADIUS attribute
- set using a constant default value
- do not set

For additional information, see [Mapping of RADIUS Attribute to Subscriber Package](#) (on page 3-4), and the *Service Control Application for Broadband User Guide*.

## Topologies

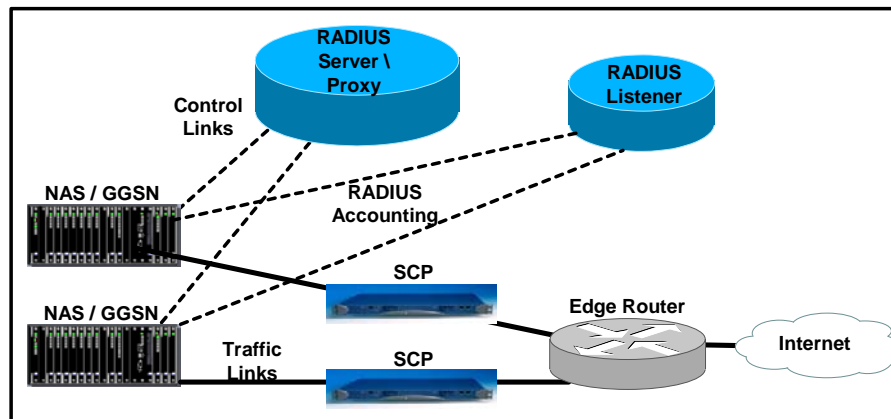
The following diagram illustrates a topology in which a RADIUS server/proxy forwards or proxies the RADIUS Accounting messages to the RADIUS Listener LEG.

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

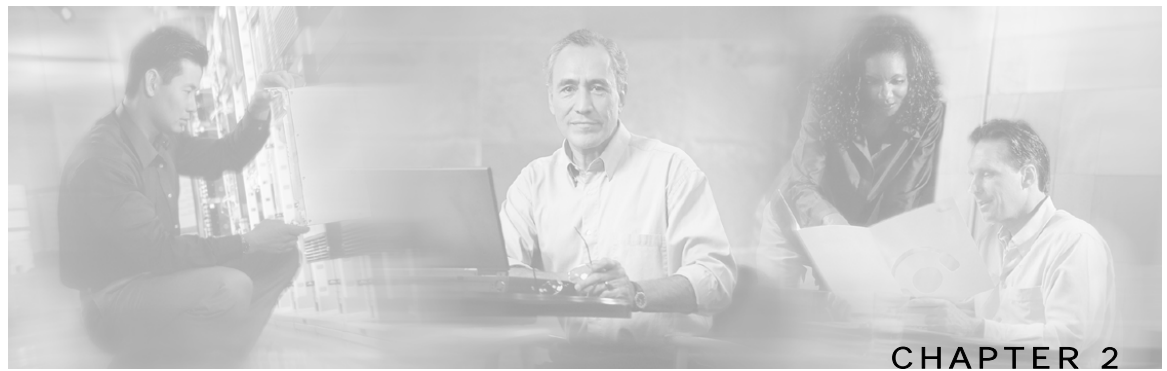


The following diagram illustrates a topology in which the NAS performs authentication with the RADIUS server, and sends RADIUS Accounting messages to the RADIUS Listener LEG and, optionally, to the RADIUS server.

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 installing 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:

- [Installing the RADIUS Listener LEG Software](#) 2-1
- [Uninstalling the RADIUS Listener LEG](#) 2-2

## Installing the RADIUS Listener LEG Software

To install the RADIUS Listener LEG:

- 
- Step 1** Edit the RADIUS Listener LEG configuration file. To run the RADIUS Listener LEG at SM startup, set the *start* parameter to **yes**. See [Configuring the General Settings](#) (on page 3-1).
- Step 2** Load the configuration file using the `p3sm` command-line utility. 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** Configure the NAS devices that are sending RADIUS Accounting messages to the RADIUS Listener LEG. The NAS devices 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 above. There are many different RADIUS client devices, each of which is configured in a different manner. See [Configuring the NAS Devices](#) (on page 3-2) for instructions on configuring the RADIUS clients on NAS devices.

---

# Uninstalling the RADIUS Listener LEG

To uninstall the RADIUS Listener LEG:

- 
- Step 1** Edit the SM configuration file and set the RADIUS Listener *start* parameter to **no**. See [Configuring the General Settings](#) (on page 3-1).
- 

**Note:** The RADIUS Listener LEG is not removed from the SM installation. You can reinstall the software again by setting the start parameter to **yes**.

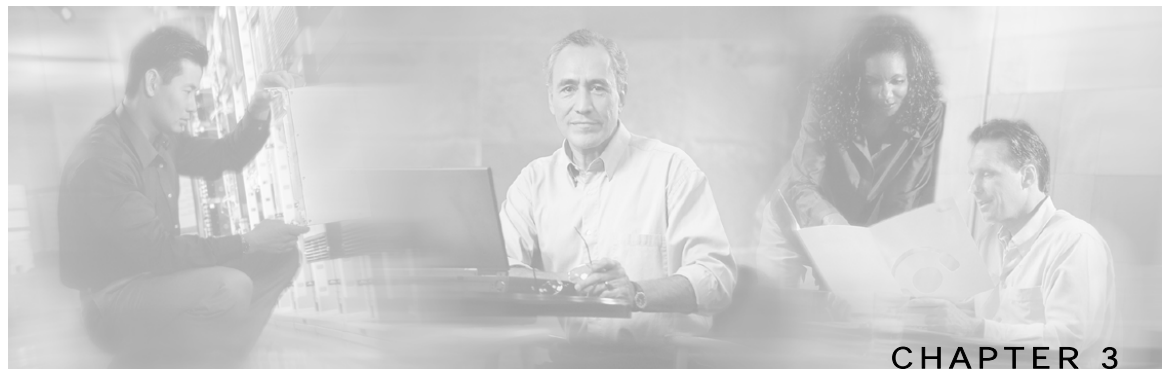
---

- Step 2** Run the `p3sm` command line utility:

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

---





## Configuring the RADIUS Listener LEG

The RADIUS Listener LEG 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).

The configuration file is made up of sections headed by a bracketed section title; 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 it is a remark.

The General RADIUS Listener LEG configuration settings reside in the [Radius Listener] section. All additional RADIUS Listener LEG sections start with the prefix **Radius.**, such as [Radius.NAS.nas1], and they are initially defined as remark lines.

This chapter contains the following sections:

- [Configuring the General Settings](#) 3-1
- [Configuring the NAS Devices](#) 3-2
- [Configuring RADIUS Attributes Mapping](#) 3-3
- [Configuring the RADIUS Client](#) 3-6

## Configuring the General Settings

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 accounting port number.  
The default value is 1813.

## Example

The following example is a portion of a configuration file illustrating the `[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
```

## Configuring the NAS Devices

The RADIUS Listener LEG must be configured with the RADIUS clients/NAS devices that transmit RADIUS messages to the LEG, to accept 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 device:

- 
- 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

The following example is a portion of a configuration file illustrating how to configure the NAS:

```
[Radius.NAS.Access134]

# Cisco'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
```

# Configuring RADIUS Attributes Mapping

## 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. Enter the value of **26** for 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

The following is an example 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 the Vendor Specific Attribute (VSA):

- 
- Step 1** Set the *radius\_attribute* parameter to 26.
  - Step 2** Set the *radius\_attribute\_vendor\_id* parameter with the VSA vendor ID.
  - Step 3** Set the *radius\_sub\_attribute* parameter with the specific sub-attribute value.
- 

## Example

The following is an example 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
- Do not set any package to the subscriber

## Extracting Data from a RADIUS Attribute

The attribute configuration is performed 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).

Additionally, the following parameters should be configured:

- *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 the *use\_default* parameter is set to **true**.

---

## Example

The following example is a portion of a 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]
# the following is the configuration for using Vendor Specific Attributes
(VSA)
radius_attribute = 26
radius_sub_attribute = 1
radius_attribute_vendor_ID = 5655

# 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, set the *use\_default* parameter to **true** and set the value of the *default* parameter as needed.

## Not Setting Any Package to the Subscriber

Edit the `[Radius.Property.Package]` section with all remark lines. The number sign ("**#**") at the beginning of a line signifies a remark line.

# Configuring the RADIUS Client

The RADIUS clients are needed to send RADIUS messages to the RADIUS Listener and must be configured to do so.

To configure a RADIUS client:

---

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

You must configure the following parameters:

- a) The SM IP address
- b) The UDP ports to which the RADIUS Listener listens
- c) The shared secret configured for this client in the SM configuration file

**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:

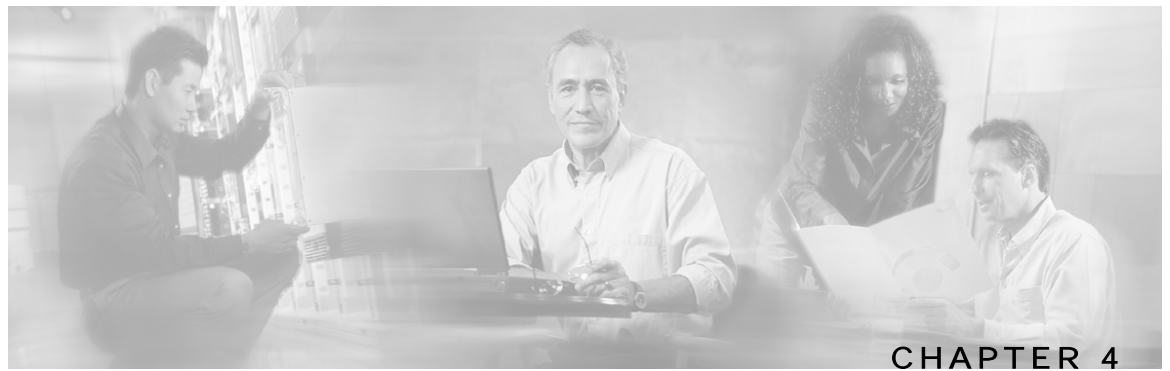
- a) The attribute configured in the subscriber ID attribute mapping in the SM configuration file. See [Mapping of RADIUS Attribute to Subscriber ID](#) (on page 3-3)
  - b) (*Optional*) The Framed-IP-Address attribute
- 



**Note**

It is recommended that you configure the RADIUS client **not** to send Authentication and Accounting-Intermediate messages to the SM to reduce the load of packet handling.

---



## Using the RADIUS Listener LEG CLU

---

This chapter contains the following sections:

- [p3radius Utility](#) 4-1

### p3radius Utility

The **p3radius** utility is used to view RADIUS Listener configurations, status, and statistics. RADIUS Listener configuration includes all configured NAS devices and general RADIUS Listener parameters.

The **p3radius** command format is `p3radius <OPERATION>`.

The following table lists the **p3radius** operations.

Table 4-1 p3radius Operations

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

## Viewing the RADIUS Listener LEG Status

The 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

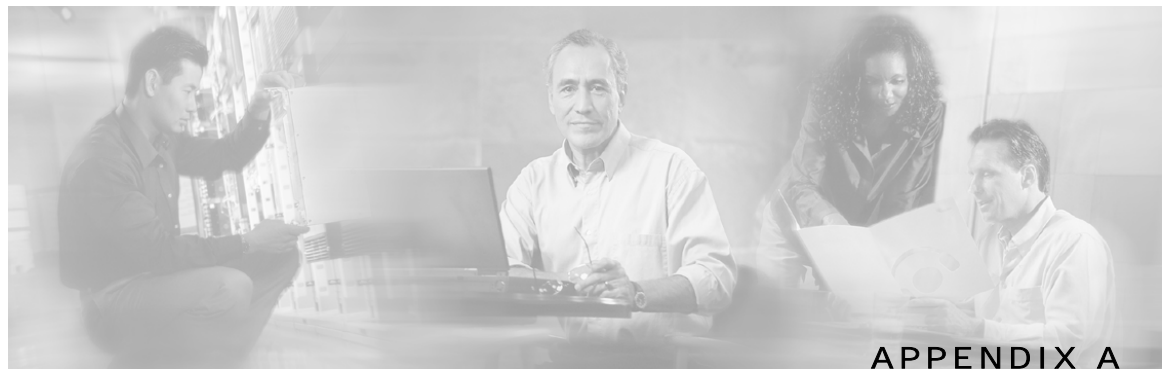
Radius Servers: none
Command terminated successfully
>
```

## Viewing the RADIUS Listener LEG Statistics

The following is an example of 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
>
```



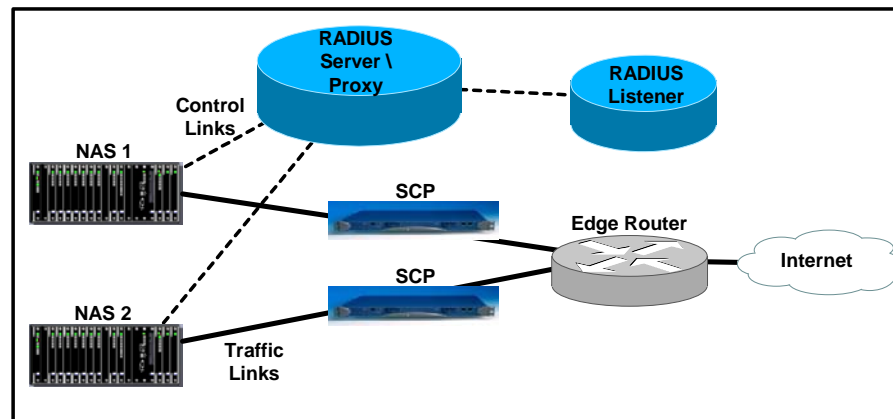


## Domain Association Algorithm

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

However, if the only NAS the Radius Listener is configured with is the proxy device (as illustrated in the following diagram), which is the device from where the RADIUS Listener receives messages, the RADIUS 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 two NAS devices, the following algorithm is used:

- If a NAS-Identifier attribute exists in the Accounting-Start message and a NAS device is configured with that identifier, this NAS subscriber domain configuration is used.
- If the NAS-Identifier attribute does not exist, the same test will be performed on the NAS-IP-Address attribute. If the NAS-IP-Address attribute exists in the Accounting-Start message the NAS device was configured, this NAS domain configuration is used.
- 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 NAS devices.



---

**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 because of Radius packet processing reasons. The domain selection stage will not be performed.

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