CHAPTER **10**

Managing Subscribers

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Introduction

The SCE platform is subscriber aware, that is, it can relate traffic and usage to specific customers. This ability to map between IP flows and a specific subscriber allows the system to do the following:

- Maintain the state of each subscriber transmitting traffic through the platform
- Provide usage information for specific subscribers
- Enforce the appropriate policy on subscriber traffic (each subscriber can have a different policy)
- Information About Subscribers, page 10-2
- Importing and Exporting Subscriber Information, page 10-10
- Removing Subscribers and Templates, page 10-13
- Importing and Exporting Anonymous Groups, page 10-17
- Monitoring Subscribers, page 10-19
- Configuring Subscriber Aging, page 10-33
- Managing VPNs and VPN Subscriber Mappings, page 10-36
- Configuring the Cisco SCE Platform and SM Connection, page 10-38

Information About Subscribers

This section contains the following topics:

Who is a Subscriber?

In the Service Control solution, a subscriber is defined as a managed entity on the subscriber side of the SCE Platform to which accounting and policy are applied individually.

A subscriber can contain on or more IP address mappings, such as IPv4 or IPv6, IPv4 and IPv6.

Table 10-1 lists several examples of subscribers in Service Control solutions.

Table 10-1   *Subscriber Examples*

Subscriber	Subscriber Characteristics	
	Managed Entity	**Subscriber (Entity) Identified By**
DSL residential subscriber	DSL residential user IP address	The list of IP addresses is allocated by a Radius server
Cable residential subscriber	Cable residential user	IP address The list of IP addresses of the CPEs is allocated dynamically by a DHCP server
Owner of a 3G-phone that is subscribed to data services	3G-phone owner	The MS-ISDN, which is dynamically allocated by a Radius server.
A corporate/enterprise customer of the service provider	The corporate/enterprise and the traffic it produces	The set of NAT-ed IP addresses, which are allocated statically
A CMTS	The CMTS and the broadband traffic of the Cable Modem users that connect to the Internet through the CMTS	- A range of IP addresses - A group of VLAN tags

Table 10-1   Subscriber Examples (continued)

Subscriber	Subscriber Characteristics	
VPN-based subscriber (all or part of a VPN)	VLAN-based subscriber	• A set of IP addresses or ranges in a certain VPN • A VLAN tag or range of VLAN tags
SCMP subscriber	SCMP subscriber	A combination of the following three items: • IP address or range • Manager-Id of the SCMP peer device • Subscriber ID including the GUID Each subscriber is assigned a Manager-Id based on the management entity that created the subscriber. The possible managers are the SM, CLI and an SCMP peer device.

Subscriber Modes in Service Control Solutions

Service Control solutions support several modes of handling subscribers:

- Subscriber-less mode
- Anonymous subscriber mode
- Static subscriber aware mode
- Dynamic subscriber aware mode

Note that not all the Service Control solutions support all modes.

The most basic mode is **Subscriber-less** mode. In this mode, there is no notion of subscriber in the system, and the entire link where the SCE platform is deployed is treated as a single subscriber. Global Application level analysis (such as total p2p, browsing) can be conducted, as well as global control (such as limiting total p2p to a specified percentage). From a configuration stand point, this is a turnkey system and there is no need to integrate or configure the system from a subscriber perspective.

In **Anonymous subscriber** mode, analysis is performed on an incoming network ID (IP address, VLAN or VPN ID), as the SCE platform creates an 'anonymous/on-the-fly' record for each subscriber. This permits analyzing traffic at an individual network ID level (for example, to identify/monitor what a particular 'subscriber' IP is currently doing) as well as control at this level (for example, to limit each subscriber's bandwidth to a specified amount, or block, or redirect). Anonymous-subscriber allows quick visibility into application and protocol usage without OSS integration, and permits the application of a uniform control scheme using predefined templates.

There are two possible **Subscriber Aware** modes. In these modes, subscriber IDs and currently used network IDs are provisioned into the SCE platform. The SCE platform can then bind usage to a particular subscriber, and enforce per-subscriber policies on the traffic. Named reports are supported (such as top subscribers with the OSS IDs), quota-tracking (such as tracking a subscriber-quota over time even when network IDs change) as well as dynamic binding of packages to subscribers. The two Subscriber Aware modes are:

- **Static subscriber aware**—The network IDs are static. The system supports the definition of static-subscribers directly to the SCE platform. This is achieved by using the SCE platform CLI, and defining the list of subscribers, their network IDs and policy information using interactive configuration or import/export operations.

- **Dynamic subscriber aware**—The network IDs change dynamically for each subscriber login into the Service Provider's network. In this case, subscriber awareness is achieved by integrating with external provisioning systems (either directly or through the SM) to dynamically learn network-ID to subscriber mappings, and distribute them to the SCE platforms.

Subscriber Database: Capacity and Limits

The capacity of the subscriber database depends on three variables:

- Subscriber context size—Determined by the specific SML application loaded to the SCE platform. This size is multiplied by the number of subscribers.

- Available memory per traffic processor—The main memory consumers in a traffic processor are flows and subscribers. The total number of subscribers that can be supported is the number of subscribers per traffic processor multiplied by the number of traffic processors.

- Available memory in the control processor—The control processor holds one entry per subscriber. However, the control database is usually not the limiting factor regarding the number of subscribers, since the control processor entry (context size) is much smaller than the traffic processor entry.

Table 10-2 contains the maximum subscribers capacities for the SCE platform. Note the following:

- These capacities are the maximum limits imposed by the SCOS. Usually actual numbers would be lower due to large subscriber context size.

- There is a difference between the maximum number of network ID entries and the numbers of specific types of network IDs due to hardware limitations.

Table 10-2   Maximum Number of Subscribers and Network IDs

Subscribers	Network IDs	IP addresses	IP ranges	VLAN tags	Static Subscribers	Virtual Gi with VPN
1,000,000	1,000,000	1,000,000	250,000	4096	250,000	250,000

The maximum number of subscribers are same for all system modes. The maximum number of IPv4 subscribers, IPv6 subscribers, and network IDs in Dual stack mode varies based on the Dual stack mode configuration. If the const-db value of the Dual stack mode is configured as 20, the device supports a maximum of 800,000 IPv4 subscribers and 200,000 IPv6 subscribers. When the Dual stack mode is enabled and all subscribers are dual stack subscribers (subscribers with one IPv4 and one IPv6 address), then the device supports only a maximum of 500,000 dual stack subscribers. For details on configuring the system modes, see the "Configuring the System Mode" section on page 3-17.

Similarly, IP addresses and IP ranges also varies based on the const db value of the Dual stack mode.

The number of static subscribers and VLAN subscribers are not based on the const db value of the Dual stack mode. These are dependent on the type of subscriber logged in first.

Working with Large Numbers of Subscribers

A very large number of subscribers, approaching the upper limit of the SCOS capacity, is more typical in mobile installations. As the actual number of subscriber increases, the impact is expected to be approximately four flows per subscriber.

Actual Maximum Number of Subscribers

As shown in Table 10-2, there is an absolute maximum numbers of subscribers based on SCOS capacity. However, the actual maximum number of subscribers supported is based on the limit specified while loading the SCA BB application.

There are two ways to specify the actual maximum number of subscribers:

- The capacity options mechanism: This mechanism is based on various capacity options supplied by the application. The actual capacity option used is either specified while loading the application or a previously-configured default capacity option is used.

- Specific capacity CLI command (see "Configuring the Actual Maximum Number of Subscribers" section on page 10-31): This specific command overrides the capacity option configured when loading the application. It provides the following options:

    100K, 250K, 500K, 1M

Subscriber Mapping Limits

Refer to Table 10-3 for the maximum number of IP mappings permitted per single subscriber. An IP mapping may be either a single IP address or a range of addresses.

Table 10-3   Maximum Number of IP Mappings per Single Subscriber

Mode	Pure IP	Private IP
Standalone	1024	200
Cascade	200	50

Rate of Creating Anonymous Subscribers

The maximum rate for creation of anonymous subscribers is 360 per second.

Aging Subscribers

Subscribers can be aged automatically by the SCE platform. 'Aging' is the automatic removal of a subscriber, performed when no traffic sessions assigned to it have been detected for a certain amount of time. The most common usage for aging is for anonymous subscribers, since this is the easiest way to ensure that anonymous subscribers that have logged-out of the network are removed from the SCE platform and are no longer occupying resources. Aging time can be configured individually for introduced subscribers and for anonymous subscribers.

VPN-Based Subscribers

A VPN-based subscriber contains a set of mappings of the form: IP@VpnName, where IP can be either a single IP address or a range of addresses. A VPN-based subscriber is VLAN-based.

Most VPN-based subscriber functionality is managed via the SM, with the role of the SCE platform CLI being more limited.

The SCE platform CLI can be used to do the following:

- Display VPN-related mappings
- View all automatic VLAN VPNs
- Clear all automatic VLAN VPNs (only VPNs that have no active subscriber mappings).

Automatic VLAN VPNs

The SCE platform will automatically create a new VPN under the following conditions

- The VPN name does not currently exist

  and

- The VPN name is a number in the range [0 to 4095]

The number is used as the VLAN mapping of the newly created VPN. VLAN mappings cannot be added to automatic VPNs.

Synchronizing Subscriber Information in a Cascade System

In a hot standby, cascade setup with full redundancy, the external provisioning server updates only the active SCE platform. However, the standby SCE platform must always be updated with the latest subscriber-related information (login, logout). This is required to minimize information loss in case of failover. In general, the only entity that is allowed to change subscriber information in the standby SCE platform is the active SCE platform. The standby SCE platform does not accept any subscriber operations (it returns a STANDBY_VIOLATION error instead), and it also does not generate any asynchronous subscriber notifications (such as pull-response or logout-notification).

There are only two exceptions to this rule:

- Standby SCE platform can change subscriber information of the default subscriber.
- Standby SCE platform can perform subscriber aging

Therefore, when working as a pair, the active SCE platform constantly updates the standby SCE platform with external data information. In addition, the standby SCE platform constantly requests external data information from the active SCE platform. The synchronization is bi-directional to ensure that the subscriber databases in both SCE platforms are identical.

Note that external data is only relevant for introduced subscribers (both static and dynamic). It has no meaning for anonymous subscribers or the default subscriber. No more than two minutes of external data information will be lost by the standby SCE platform if a failover occurs.

The following subscriber information is considered as external data:

- Subscriber name
- IP mappings
- Tunables

- Manager name
- Aging time
- Lease time
- Is-static flag

Only the active SCE platform communicates with the SM. The SM is aware of the active/standby state of each SCE platform, and is also aware of a failover.

Specifically, this means the following:

- In push mode, the SM pushes events to the active SCE platform, which updates the standby SCE platform.
- In pull mode, only the active SCE platform pulls subscribers from the SM.
- The standby SCE platform can create anonymous subscribers based on the updates received from the active SCE platform, but does not generate pull-response for them.
- If SCE-SM connection failure, the SM handles the SCE recovery of the active SCE platform only. The active SCE platform propagates the information to the standby SCE platform.

Anonymous Groups and Subscriber Templates

An anonymous group is a specified IP range, possibly assigned a subscriber template. When an anonymous group is configured, the SCE platform generates anonymous subscribers for that group when it detects traffic with an IP address that is in the specified IP range. If a subscriber template has been assigned to the group, the anonymous subscribers generated have properties as defined by that template. If no subscriber template has been assigned, the default template is used.

Anonymous groups can have overlapping IP ranges. When the SCE detects traffic for an IP address which is contained in more than one anonymous group, the group with the longest prefix is used to create the anonymous subscriber for that IP address.

Subscriber templates are identified by a number from 0-199. Subscriber templates 1-199 are defined in csv formatted subscriber template files. However, template #0 cannot change; it always contains the default values.

If an anonymous group is not explicitly assigned a template, the group uses template #0.

Important Information

- Maximum number of anonymous groups—5000 for IPv4 and 1000 for IPv6
- Maximum rate of creating anonymous subscribers—360 per second
- Maximum number of subscriber templates—200 (numbered 0-199)

Subscriber Files

This section contains the following topics:

Individual subscribers, anonymous groups, and subscriber templates may all be defined in csv files. A csv file is a text file in a comma-separated-values format. Microsoft Excel™ can be used to view and create such files. The subscriber data is imported into the system using the appropriate CLI command. The SCE platform can also export the currently configured subscribers, subscriber templates and anonymous groups to csv-formatted files.

Subscriber csv files and subscriber template csv files are application-specific. Refer to the relevant application documentation for the definition of the file format.

Each line in a csv file should contain either a comment (beginning with the character '#'), or a list of comma-separated fields.

Subscriber csv files are application-specific, but a default format is defined by the SCE, which is used when the application does not choose to over-ride it. The application might over-ride the format when additional data is desired for each subscriber or subscriber template. Refer to the relevant Service Control Application documentation to see if the application defines a different format.

Subscriber template csv files are application-specific. Refer to the relevant Service Control Application documentation of the file format.

Anonymous groups csv files are not application specific. Their format is described below.

Subscriber Default csv File Format

Each line has the following structure:

name, mappings, packageId

- **Name**—Subscriber.

- **Mappings**—Contains one or more mappings, specifying the Tunnel IDs or IP addresses mapped to this subscriber. Multiple mappings are separated by a semicolon. Tunnel IDs and IP addresses and ranges cannot be specified for the same subscriber. The following mapping formats are supported:

    - IP address—In dotted decimal notation. Example: 10.3.4.5.

    - IP address range—Dotted decimal, followed by the amount of significant bits. Note that the non-significant bits (as determined by the mask) must be set to zero. Example: 10.3.0.0/16. Example for a bad range: 10.1.1.1/24 (Should be 10.1.1.0/24).

- **packageId**—ID of the package to which the subscriber is assigned

The following is an example of a subscriber csv file in the default format:

```
# A comment line
sub7, 10.1.7.0/24, 1
sub8, 10.1.11.32, 1
sub9, 10.2.22.10, 2
sub10, 10.3.33.10, 2
sub11, 10.4.44.10, 1
sub12, 10.1.11.90; 10.3.0.0/16, 2
```

IPv6 Subscriber csv File Format

Each line has the following structure:

name, mappings, mappings_ipv6, packageId

- **Name**—Subscriber.

- **Mappings**—Contains one or more mappings, specifying the Tunnel IDs or IP addresses mapped to this subscriber. Multiple mappings are separated by a semi-colon. Tunnel IDs and IP addresses and ranges cannot be specified for the same subscriber. The following mapping formats are supported:

    - IP address—In dotted decimal notation. Example: 10.3.4.5.

    - IP address range—Dotted decimal, followed by the amount of significant bits. Note that the nonsignificant bits (as determined by the mask) must be set to zero. Example: 10.3.0.0/16. Example of an incorrect range: 10.1.1.1/24 (It should be 10.1.1.0/24).

- **Mappings_IPv6**—Contains one or more IPv6 mappings. Multiple mappings are separated by a semicolon. The following mapping format is supported:

    - IPv6 address—In hexadecimal colon notation. Example: 2001:a:d:f::/64. The valid range is from 32 to 64.

- **PackageId**—The ID of the package to which the subscriber is assigned.

The following is an example of a subscriber csv file in the default format:

```
# A comment line
sub7, 10.1.7.0/24, 2001:a:d:f::/64,1
sub8, 10.1.11.32, 2001:a:d:d::/64,1
sub9, 10.2.22.10, ,2
sub10, , 2001:a:d:f::/64, 2
sub11, 10.4.44.10, 1
sub12, 10.1.11.90; 10.3.0.0/16, 2
```

Subscriber Anonymous Groups csv File Format

Each line has the following structure:

name, IP-range or IPv6-range, template-index, manager-name (optional)

- **name**—The anonymous group's name.

- **IP-range**—IPv4 or IPv6, followed by the amount of significant bits. In the case of IPv6, the range is between 32 to 64. Example: 10.3.0.0/16, 2001:a:d:f::/64.

- **template-index**—Iindex of the subscriber template to be used by subscribers belonging to this anonymous group.

- **manager-name** (optional)—Either the SM name or the name of the SCMP peer. Use SM to pull subscribers from the SM (if it exists). If not specified, SM is assumed.

The following is an example of an anonymous groups csv file:

```
# Yet another comment line
anon1, 10.1.1.0/24, 1, 1
anon2, 2001:a:d:f::/64, 2, 2
anon3, 10.1.3.0/32, 3, 3
anon4, 2001:a:d:d::/64, 3, 3
anon5, 10.1.5.0/31, 2
anon6, 10.1.6.0/30, 1
anon7, 0.0.0.0/0, 1
```

Importing and Exporting Subscriber Information

This section contains the following topics:

Editing the subaware.pro File

From Cisco SCE Release 3.8.5, you can also import and export IPv6 subscribers. Before importing and exporting IPv6 subscribers for the first time, modify the subaware.pro file located at /apps/data/scos/system/p3hidden/um/ssu/. To modify the file, follow these steps:

Step 1 From the Linux shell, open the file subaware.pro:

```
#>vi /apps/data/scos/system/p3hidden/um/ssu/subaware.pro
```

Step 2 Remove the pound symbol before the following line:

```
#smm.ssu.maindecoder.fields=name,mappings,mappings_ipv6,tuneable.packageId,tuneable.upVlin
kId,tuneable.downVlinkId,tuneable.monitor
```

Step 3 Include a pound symbol before the following line:

```
smm.ssu.maindecoder.fields=name,mappings,tuneable.packageId,tuneable.upVlinkId,tuneable.do
wnVlinkId,tuneable.monitor
```

Step 4 Save the subaware.pro file.

Step 5 From the SCE8000(config if)# prompt, type the following command to load the subaware.pro file:

```
SCE8000(config if)#>subscriber load property-file
```

Use the following commands to import subscriber data from csv files and to export subscriber data to these files:

- **subscriber import csv-file**
- **subscriber export csv-file [all]**
- **subscriber anonymous-group import csv-file**
- **subscriber anonymous-group export csv-file**
- **subscriber template import csv-file**
- **subscriber template export csv-file**

These subscriber management commands are LineCard interface commands. Make sure that you are in LineCard Interface command mode.

Options

The following options are available:

filename—The name of the csv file.

additivemapping—Appends new subscriber mappings with the existing ones.

How to Import Subscriber Information

From the SCE8000(config if)# prompt, type:

Command	Purpose
subscriber import csv-file *filename*	Imports the subscriber information from the specified file.
	If the information in the imported file is not valid, the command will fail during the verification process before it is actually applied.
subscriber import csv-file *filename* *additivemapping*	Imports the subscriber information from the specified file and appends the new subscriber mappings with the existing ones.

> **Note** The csv file used to import subscriber information should have the same fields as the subaware.pro file.

How to Export Subscriber Information

> **Note** To export subscribers managed by the SM, use the SM GUI or CLU (see the *Cisco Service Control Management Suite Subscriber Manager User Guide.*)

From the SCE8000(config if)# prompt, type:

Command	Purpose
subscriber export csv-file *filename* **[all]**	Exports all the static and dynamic subscribers information into the specified file.
subscriber export csv-file *filename*	Exports only the static subscribers information to the specified file.

How to Import a Subscriber Template

From the SCE8000(config if)# prompt, type:

Command	Purpose
subscriber template import csv-file *filename*	Imports the subscriber template from the specified file.

How to Export a Subscriber Template

From the SCE8000(config if)# prompt, type:

Command	Purpose
subscriber template export csv-file *filename*	Exports the subscriber template to the specified file.

Removing Subscribers and Templates

This section contains the following topics:

Use the following commands to remove all subscribers, anonymous groups, or subscriber templates from the system:

- **no subscriber all**
- **no subscriber anonymous-group all**
- **clear interface linecard subscriber anonymous**
- **default subscriber template all**

Use the following commands to remove a specific subscriber or anonymous group from the system:

- **no subscriber name**
- **no subscriber anonymous-group name**

These subscriber management commands are LineCard interface commands (with the exception of the **clear interface linecard subscriber anonymous** command, which is a Privileged Exec command). Make sure that you are in LineCard Interface command mode, and that the SCE8000(config if)# prompt appears in the command line.

How to Remove a Specific Subscriber

Options

The following option is available:

subscriber-name—The name of the subscriber to be removed

From the SCE8000(config if)# prompt, type:

Command	Purpose
no subscriber name *subscriber-name*	Removes the specified subscriber.

How to Remove All the Introduced Subscribers

From the SCE8000(config if)# prompt, type:

Command	Purpose
no subscriber all	Removes all introduced subscribers.
	• *subscriber-name* specifies the name of the subscriber to be removed.

How to Remove a Specific Anonymous Subscriber Group

Options

The following option is available:

group-name—The name of the anonymous subscriber group to be removed

From the SCE8000(config if)# prompt, type:

Command	Purpose
no subscriber anonymous-group name *group-name*	Removes the specified anonymous subscriber group.

How to Remove All the Anonymous Subscriber Groups

From the SCE8000(config if)# prompt, type:

Command	Purpose
no subscriber anonymous-group all	Removes all anonymous subscriber groups.

How to Remove All the Anonymous Subscribers

From the SCE8000# prompt, type:

Command	Purpose
clear interface linecard 0 subscriber anonymous all	Removes all anonymous subscribers.
	Note The **clear subscriber anonymous** command is a **Privileged EXEC** command.

⚠️

Caution   Because the **clear interface linecard subscriber anonymous all** command clears all the anonymous subscribers in the Cisco SCE, do not use the command in a production environment. Using this command in a production environment impacts anonymous subscribers' accountability. Use the command only when the linecard interface is shut down.

How to Remove All the Subscriber Templates

From the SCE8000(config if)# prompt, type:

Command	Purpose
default subscriber template all	Removes all subscriber templates.
	All anonymous subscribers will be assigned to the default subscriber template.

Removing VPN-based Subscribers

All VPN-based subscribers must be cleared to change the tunneling mode. If there are VPN-based subscribers that the SM cannot remove for some reason (for example, if there is no communication between the SM and the SCE platform), use this command.

✎

Note   Use this command *only* when the SCE platform is disconnected from the SM.

From the SCE8000(config if)# prompt, type:

Command	Purpose
no subscriber all with-vpn-mappings	Clears all VPN-based subscribers.

How to Remove Subscribers by Device

This section contains the following topics:

You can remove all subscribers managed by a specified device. The device can be either of the following:

- The SM
- A specified SCMP peer device

How to Remove Subscribers from the SM

From the SCE8000(config if)# prompt, type:

Command	Purpose
no subscriber sm all	Clears all subscribers from the SM.

How to Remove Subscribers from a Specified SCMP Peer Device

Options

The following option is available:

- **peer-device-name**—The name of the SCMP peer device from which to clear the subscribers.

From the SCE8000(config if)# prompt, type:

Command	Purpose
no subscriber scmp name *peer-device-name* **all**	Clears all subscribers from the specified SCMP peer device.

Creating Anonymous Groups

You can create anonymous groups in two ways:

- Define the group, along with the related IP address range, using the **subscriber anonymous-group** command. The SCE platform then generates anonymous subscribers for that group when it detects traffic with an IP address that is in the specified IP range.

- Create the group by importing anonymous groups from a csv file.

  Groups can also be exported to a csv file.

For information on deleting anonymous groups, see "How to Remove a Specific Anonymous Subscriber Group" section on page 10-14 and "How to Remove All the Anonymous Subscriber Groups" section on page 10-14

Defining Anonymous Groups

Use the **subscriber anonymous-group** command to define an anonymous group, assigning the following to the group created:

- group name
- range of IP addresses
- subscriber template to be assigned to all subscribers within that IP range (optional)

How to Define an Anonymous Group

Options

The following options are available:

- **group-name**—Name to be assigned to the anonymous group.
- **range**—Range of IP addresses that defines this group.

- **template**—Number of the subscriber template to assign to all subscribers in this group.

    The default is 0.

From the SCE8000(config if)# prompt, type:

Command	Purpose
subscriber anonymous-group name *group-name* **ip-range** *range* [**template** *template*]	Defines an anonymous group for IPv4. If no template is specified, the default template is applied to all subscribers in this group.
subscriber anonymous-group name *group-name* **ipv6-range** *ipv6-address/prefix* [**template** *template*]	Defines an anonymous group for IPv6. If no template is specified, the default template is applied to all subscribers in this group.

Importing and Exporting Anonymous Groups

This section contains the following topics:

- How to Import Anonymous Groups, page 10-17
- How to Export Anonymous Groups, page 10-18

How to Import Anonymous Groups

Options

The following option is available:

- **filename**—Name of the csv file.

From the SCE8000(config if)# prompt, type:

Command	Purpose
subscriber anonymous-group import csv-file *filename*	Creates anonymous groups by importing anonymous groups from the specified csv file. Imported anonymous groups information is added to the existing anonymous groups information. It does not overwrite the existing data. The SCE platform can support a maximum of 5000 anonymous groups.

How to Export Anonymous Groups

Options

The following option is available:

- **filename**—Name of the csv file.

From the SCE8000(config if)# prompt, type:

Command	Purpose
subscriber anonymous-group export csv-file *filename*	Exports all existing anonymous groups to the specified csv file.

Monitoring Subscribers

This section contains the following topics:

The CLI provides several commands that allow you to monitor subscribers. These commands can be used to display information regarding the following:

- Subscriber Database

- All subscribers meeting various criteria

- Individual subscriber information, such as properties and mappings

- Anonymous subscribers

Subscribers may be introduced to the SCE platform via the SCE platform CLI or via the Subscriber Manager. The monitoring commands may be used to monitor all subscribers and subscriber information, regardless of how the subscribers were introduced to the system.

How to Monitor the Subscriber Database

This section contains the following topics:

Use the following commands to display statistics about the subscriber database, and to clear the **total** and **maximum** counters.

- **show interface linecard 0 subscriber db counters**

  The following counters are displayed:

  - Current number of subscribers

  - Current number of introduced subscribers

  - Current number of anonymous subscribers

  - Current number of active subscribers (with active traffic sessions)

  - Current number of subscribers with mappings

  - Current number of IP mappings

  - Current number of vlan mappings

  - Max number of subscribers that can be introduced

  - Max number of subscribers with mappings

  - Max number of subscribers with mappings date / time

  - Total aggregated number introduced

  - Total number of aged subscribers

  - Total number of pull events

- Number of traffic sessions currently assigned to the default subscriber
- clear **interface linecard 0 subscriber db** counters

How to Display the Subscriber Database Counters

From the SCE8000# prompt, type:

Command	Purpose
show interface linecard 0 subscriber db counters	Displays the subscriber database counters.

Monitoring the Subscriber Database: Example

The following example shows the output from this command.

```
SCE8000#show interface linecard 0 subscriber db counters
Current values:
===============
Subscribers: 249999 used out of 999999 max.
Introduced/Pulled subscribers: 999999.
Anonymous subscribers: 0.
Subscribers with mappings: 249999 used out of 249999 max.
Single non-VPN IP mappings: 249999.
Non-VPN IP Range mappings: 0.
IP Range over VPN mappings: 0.
Single IP over VPN mappings: 0.
VLAN based VPNs with subscribers: 0 used out of 4095.
Subscribers with open sessions: 243562.
Subscribers with TIR mappings: 0.
Sessions mapped to the default subscriber: 2.
Peak values:
============
Peak number of subscribers with mappings: 249999
Peak number occurred at: 15:54:06 UTC TUE May 13 2008
Peak number cleared at: 07:47:49 UTC SUN May 11 2008
Event counters:
===============
Subscriber introduced: 249999.
Subscriber pulled: 0.
Subscriber aged: 0.
Pull-request notifications sent: 0.
Pull-request by ID notifications sent: 0.
Subscriber pulled by ID: 0.
State notifications sent: 0.
Logout notifications sent: 0.
Subscriber mapping TIR contradictions: 0.
```

Clearing the Subscriber Database Counters

From the SCE8000# prompt, type:

Command	Purpose
clear interface linecard 0 subscriber db counters	Clears the "**total**" and "**maximum**" counters.

Displaying Subscribers

This section contains the following topics:

You can display the names of all subscribers.

You can also display specific subscriber name(s) that meet various criteria:

- A subscriber property is equal to, larger than, or smaller than a specified value.
- Subscriber name matches a specific prefix or suffix.
- Mapped to a specified IP address range.
- Mapped to a specified VLAN ID.

Use the following commands to display subscribers:

- **show interface linecard 0 subscriber all-names**
- **show interface linecard 0 subscriber** [amount] [**prefix** 'prefix'] [**property** 'propertyname' **equals|greater-than|less-than** 'property-val']
- **show interface linecard 0 subscriber** [amount] **prefix** 'prefix'
- **show interface linecard 0 subscriber** [amount] **suffix** 'suffix'
- **show interface linecard 0 subscriber mapping IP** 'iprange' [VPN 'vpn-name']
- **show interface linecard 0 subscriber** [amount] **mapping intersecting IP** 'iprange' [VPN 'vpn-name']
- **show interface linecard 0 subscriber mapping VLAN-id** 'VLAN-id'

Displaying Subscribers: All the Current Subscriber Names

You can display the names of all subscribers currently in the SCE subscriber database.

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber all-names	Displays the names of all subscribers currently in the SCE subscriber database.

Displaying Subscribers: By Subscriber Property or Prefix

You can search for all subscribers that match a specified value of one of the subscriber properties, or are greater than or less than the specified value. You can also search for all subscribers that match a specified prefix. You can also find out how many subscribers match any one of these criteria, rather than displaying all the actual subscriber names.

This section contains the following topics:

How to Display Subscribers Matching a Specified Value of a Subscriber Property

Options

The following options are available:

- **propertyname**—Name of the subscriber property to match
- **property-val**—Value of that subscriber property to match

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber property *propertyname* **equals** *property-val*	Displays subscribers that match a specified value of a subscriber property.

How to Display Subscribers that are Greater than or Less than a Specified Value of a Subscriber Property

Options

The following options are available:

- **propertyname**—Name of the subscriber property to match
- **property-val**—Value of that subscriber property to match

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber property *propertyname* **greater-than|less-than** *property-val*	Displays subscribers that are greater than or less than a specified value of a subscriber property.

How to Display Subscribers Matching a Specified Prefix

Options

The following option is available:

- **prefix**—Subscriber prefix to match

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber prefix *prefix*	Displays subscribers that match a specified prefix.

How to Display Subscribers Matching a Specified Suffix

Options

The following option is available:

- **suffix**—Subscriber suffix to match

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber suffix *suffix*	Displays subscribers that match a specified suffix.

How to Display the Number of Subscribers Matching a Specified Value of a Subscriber Property

Options

The following options are available:

- **propertyname**—Name of the subscriber property to match
- **property-val**—Value of that subscriber property to match

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber amount property *propertyname* **equals** *property-val*	Displays the number of subscribers that match a specified value of a subscriber property.

How to Display the Number of Subscribers that are Greater than or Less than a Specified Value of a Subscriber Property

Options

The following options are available:

- **propertyname**—Name of the subscriber property to match
- **property-val**—Value of that subscriber property to match

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber amount property *propertyname* **greater-than|less-than** *property-val*	Displays the number of subscribers that are greater than or less than a specified value of a subscriber property.

How to Display the Number of Subscribers Matching a Specified Prefix

Options

The following option is available:

- **prefix**—Subscriber prefix to match

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber amount prefix *prefix*	Displays the number of subscribers that match a specified prefix.

How to Display Subscribers: By Mapping (IP Address, VPN, or VLAN ID)

This section contains the following topics:

You can display the subscribers who are mapped to any of the following:

- A specified IP address, or range of IP addresses
- IP addresses intersecting a given IP address or IP range
- A specified VLAN ID
- A specified VPN
- no mapping

You can also display just the number of subscribers with a specified mapping, rather than listing the actual subscribers.

How to Display Subscribers that are Mapped to a Specified IP Address, or Range of IP Addresses

Options

The following options are available:

- **ip-range**—IP address (x.x.x.x) or range of IP addresses (x.x.x.x/y) to match
- **vpn-name** (optional)—The name of the VPN in which to search for the IP address

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber mapping IP *ip-range* [**VPN** *vpn-name*]	Displays subscribers that are mapped to a specified IP address, or range of IP addresses.

How to Display Subscribers that are Mapped to IP Addresses that are Included in a Given IP Address or IP Range

Options

The following options are available:

- **ip-range**—IP address (x.x.x.x) or range of IP addresses (x.x.x.x/y) to match
- **vpn-name** (optional)—The name of the VPN in which to search for the IP address

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber mapping included-in IP *ip-range* [**VPN** *vpn-name*]	Displays subscribers that are mapped to IP addresses that are included in a given IP address or IP range.

How to Display Subscribers that are Mapped to a Specified VLAN ID

Options

The following option is available:

- **VLAN-id**—VLAN ID to match

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber mapping VLAN-id *VLAN-id*	Displays subscribers that are mapped to a specified VLAN ID.

How to Display Subscribers with no Mapping

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber mapping none	Displays subscribers with no mapping.

How to Display the Number of Subscribers that are Mapped to a Specified VLAN ID

Options

The following option is available:

- **VLAN-id**—VLAN ID to match

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber amount mapping VLAN-id *VLAN-id*	Displays the number of subscribers that are mapped to a specified VLAN ID.

How to Display the Number of Subscribers with no Mapping

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber amount mapping none	Displays the number of subscribers with no mapping.

How to Display Subscriber Information

This section contains the following topics:

You can display the following information about a specified subscriber:

- values of the various subscriber properties
- mappings (IP address or VLAN-ID)
- OS counters:
    - current number of flows
    - bandwidth

Use the following commands to display subscriber information:

- **show interface linecard 0 subscriber properties**
- **show interface linecard 0 subscriber name 'name'**
- **show interface linecard 0 subscriber name 'name' mappings**
- **show interface linecard 0 subscriber name 'name' counters**
- **show interface linecard 0 subscriber name 'name' properties**

How to Display a Listing of Subscriber Properties

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber properties	Displays a listing of subscriber properties.

How to Display Complete Information for a Specified Subscriber

Options

The following option is available:

- **name**—Subscriber name

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber name *name*	Displays complete information for a specified subscriber, including all values of subscriber properties and mappings.

How to Display Values of Subscriber Properties for a Specified Subscriber

Options

The following option is available:

- **name**—Subscriber name

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber name *name* **properties**	Displays values of subscriber properties for a specified subscriber.

How to Display Mappings for a Specified Subscriber

Options

The following option is available:

- **name**—Subscriber name

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber name *name* **mappings**	Displays mappings for a specified subscriber.

How to Display OS Counters for a Specified Subscriber

Options

The following option is available:

- **name**—Subscriber name

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber name *name* **counters**	Display OS counters for a specified subscriber.

Displaying Anonymous Subscriber Information

This section contains the following topics:

You can display the following information regarding the anonymous subscriber groups:

- aging (see "How to Display Aging for Anonymous Group Subscribers" section on page 10-34)
- currently configured anonymous groups
- currently configured subscriber templates
- configuration of a specified anonymous group
- number of subscribers in a specified anonymous group, or in all anonymous groups

Use the following commands to display anonymous subscriber information:

- **show interface linecard 0 subscriber templates [index]**
- **show interface linecard 0 subscriber anonymous-group [all] [name 'groupname']**
- **show interface linecard 0 subscriber amount anonymous [name 'groupname']**
- **show interface linecard 0 subscriber anonymous [name 'groupname']**

How to Display Currently Configured Anonymous Groups

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber anonymous-group all	Displays currently configured anonymous groups.

How to Display Currently Configured Templates for Anonymous Groups

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber templates	Display currently configured templates for anonymous groups.

How to Display Current Configuration for a Specified Anonymous Group

Options

The following options are available:

- **group-name**—Name of the anonymous subscriber group

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber anonymous-group name *group-name*	Displays current configuration for a specified anonymous group.

How to Display Subscribers in a Specified Anonymous Group

Options

The following options are available:

- **group-name**—Name of the anonymous subscriber group

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber anonymous name *group-name*	Displays subscribers in a specified anonymous group.

How to Display All the Subscribers Currently in Anonymous Groups

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber anonymous	Displays all subscribers currently in anonymous groups.

How to Display the Number of Subscribers in a Specified Anonymous Group

Options

The following options are available:

- **group-name**—Name of the anonymous subscriber group

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber amount anonymous name *group-name*	Displays the number of subscribers in a specified anonymous group.

How to Display the Total Number of Subscribers in All Anonymous Groups

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber amount anonymous	Displays the total number of subscribers in all anonymous groups.

Configuring the Actual Maximum Number of Subscribers

The actual maximum number of subscribers supported is based on the capacity option specified when loading the SCA BB application. If no capacity option is specified, the user-configured default capacity is used. However, you can override this capacity option using the following commands.

Note the following:

- You must configure the override before you load the application (PQI file). The configured maximum number of subscribers takes effect when the next **load** command is executed.

- If you have disabled the capacity option and then the next time you load a new application you want to use the capacity option, you must re-enable the capacity option before loading the application file (see "How to Restore the Configured Capacity Option" section on page 10-32).

- Use the **show subscriber max-subscribers** command to see what the current maximum number of subscribers is and whether the capacity option is enabled or disabled (see "How to Monitor the Maximum Number of Subscribers" section on page 10-32.)

How to Override the Configured Capacity Option

The default maximum number of subscribers is 250K.

Step 1   If a policy configuration (PQB file) has been applied on SCE platform, use the SCA BB console to retrieve it and save it before proceeding.

Step 2   Select the maximum number of subscribers:

From the SCE8000(config if)# prompt, type **subscriber max-subscribers (40K | 80K | 120K | 200K)** and press **Enter**.

Step 3   Disable the application capacity option:

From the SCE8000(config if)# prompt, type **subscriber capacity-options disable** and press **Enter**.

Step 4   Install the new application (PQI) file. (The configured subscriber maximum takes effect only after a new application file has been loaded.)

Step 5   If you saved the policy configuration (PQB file), apply it to the SCE platform using the SCA BB console.

How to Override the Configured Capacity Option in a Cascade Setup

The default maximum number of subscribers is 250, 000. To change the maximum number of subscribers in cascade topology, configure both the standby and the active Cisco SCE devices. Perform these steps:

Step 1   If a policy configuration (PQB file) has been applied on the standby Cisco SCE platform, use the Cisco SCA BB console to retrieve it and save it before proceeding further.

Step 2   Select the maximum number of subscribers:

```
SCE8000(config if)# subscriber max-subscribers {40K | 80K | 120K | 200K}
```

Step 3   Disable the application capacity option:

```
SCE8000(config if)# subscriber capacity-options disable
```

Step 4   Install the new application (PQI) file. (The configured subscriber maximum takes effect only after a new application file has been loaded.)

Step 5   If you saved the policy configuration (PQB file), apply it to the SCE platform using the SCA BB console.

Step 6   If a policy configuration (PQB file) has been applied on the active Cisco SCE platform, use the Cisco SCA BB console to retrieve it and save it before proceeding. Repeat from Step 1 to Step 5 on the active SCE platform.

Note   When you install the PQI file, the Package ID parameter of all the existing subscribers becomes 0. The subscribers are automatically deleted when the aging period of each subscriber elapses.

How to Restore the Configured Capacity Option

Step 1   If a policy configuration (PQB file) has been applied on SCE platform, use the SCA BB console to retrieve it and save it before proceeding.

Step 2   From the SCE8000(config if)# prompt, type **subscriber capacity-options enable** and press **Enter**.

Step 3   Install the new application (PQI) file. (The configured subscriber maximum takes effect only after a new application file has been loaded.)

Step 4   If you saved the policy configuration (PQB file), apply it to the SCE platform using the SCA BB console.

How to Monitor the Maximum Number of Subscribers

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber max-subscribers	Shows the configured maximum number of subscribers and whether the capacity options are in effect or have been overridden.

Configuring Subscriber Aging

This section contains the following topics:

As explained previously ("Aging Subscribers" section on page 10-5, aging is the automatic removal of a subscriber when no traffic sessions assigned to it have been detected for a certain amount of time. Aging may be enabled or disabled, and the aging timeout period (in minutes) can be specified.

Aging can be configured separately for introduced subscribers and for anonymous subscribers.

Use the following commands to configure and monitor aging.

- **[no] subscriber aging**
- **subscriber aging timeout**
- **show interface linecard 0 subscriber aging**

How to Enable Aging for Anonymous Group Subscribers

From the SCE8000(config if)# prompt, type:

Command	Purpose
subscriber aging anonymous	Enables aging for anonymous group subscribers.

How to Enable Aging for Introduced Subscribers

From the SCE8000(config if)# prompt, type:

Command	Purpose
subscriber aging introduced	Enables aging for introduced subscribers.

How to Disable Aging for Anonymous Group Subscribers

From the SCE8000(config if)# prompt, type:

Command	Purpose
no subscriber aging anonymous	Disables aging for anonymous group subscribers.

How to Disable Aging for Introduced Subscribers

From the SCE8000(config if)# prompt, type:

Command	Purpose
no subscriber aging introduced	Disables aging for introduced subscribers.

How to Set the Aging Timeout Period for Anonymous Group Subscribers

Options

The following option is available:

- **aging-time**—The time interval, in minutes, after which an inactive subscriber will be aged (2-14400).

From the SCE8000(config if)# prompt, type:

Command	Purpose
no subscriber aging anonymous timeout *aging-time*	Sets the aging timeout period for anonymous group subscribers.

How to Set the Aging Timeout Period for Introduced Subscribers

Options

The following option is available:

- **aging-time**—The time interval, in minutes, after which an inactive subscriber will be aged (2-14400).

From the SCE8000(config if)# prompt, type:

Command	Purpose
no subscriber aging introduced timeout *aging-time*	Sets the aging timeout period for introduced subscribers.

How to Display Aging for Anonymous Group Subscribers

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber aging anonymous	Displays aging of anonymous group subscribers.

How to Display Aging for Introduced Subscribers

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 subscriber aging introduced	Displays aging for introduced subscribers.

Managing VPNs and VPN Subscriber Mappings

This section contains the following topics:

How to Display VPN-Related Mappings

This section contains the following topics:

Use the following Viewer commands to display VPNs and VPN subscriber mappings. These commands display the following information:

- All the mappings for a specified VPN
- A listing of all currently logged-in VPNs
- A listing of all currently logged-in VPNs that were created automatically

How to Display Mappings for a Specified VPN

Options

The following option is available:

- **vpn name**—The name of the VPN for which to display mappings.

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 VPN name *vpn-name*	Displays mapping for a specified VPN.

How to Display a Listing of All VPNs

From the SCE8000> prompt, type:

Command	Purpose
show interface linecard 0 VPN all-names	Displays a listing of all currently logged-in VPNs.

Displaying a Listing of All VPNs: Example

```
SCE8000>show interface linecard 0 VPN all-names
```

How to Clear Automatic VPNs

From the SCE8000# prompt, type:

Command	Purpose
clear interface linecard 0 VPN automatic	Removes all VLAN VPNs that were created automatically by the SCE platform. (Only removes VPNs that have no active subscriber mappings).

Configuring the Cisco SCE Platform and SM Connection

This section contains the following topics:

The user can configure the behavior of the SCE platform in case of failure of the Subscriber Manager (SM):

- If SM functionality is critical to the operation of the system—Configure the desired behavior of the SCE platform if any loss of connection with the SM (may be due either to failure of the SM or failure of the connection itself).

- If SM functionality is not critical to the operation of the system—No action needs to be configured In this case you can specify that the system operational-status of the SCE platform should be 'warning' when the link is down.

Configuring the Behavior of the Cisco SCE Platform in Case the SM Fails

Options

The following options are available:

- **action**—The specified action will be performed in case of loss of connection between the SCE platform and the SM.

  Possible actions are:

  - **force-failure**—Force failure of SCE platform. The SCE platform then acts according to the behavior configured for the failure state.
  - **remove-mappings**—Remove all current subscriber mappings.
  - **shut**—The SCE platform shuts down and quits providing service.
  - **none** (default)—Take no action.

- **warning**—The system operational-status of the SCE platform should be 'warning' in case of loss of connection between the SCE platform and the SM. No action is taken.

To specify the action that the SCE platform will perform if the SCE-SM connection fails, use this command.

From the SCE8000(config if)# prompt, type:

Command	Purpose
subscriber sm-connection-failure action [force-failure|none|remove-mappings|shut]	Specifies the action that the SCE platform will perform if the SCE-SM connection fails.
subscriber sm-connection-failure warning	Specifies that the system operational-status of the SCE platform should be 'warning' if the SCE-SM connection fails.

Configuring the SM-Cisco SCE Platform Connection Timeout

You can also configure the timeout interval; the length of time that the SM-SCE platform connection is disrupted before a failed connection is recognized and the configured behavior is applied.

Options

The following option is available:

- **interval**—The timeout interval in seconds

From the SCE8000(config if)# prompt, type:

Command	Purpose
subscriber sm-connection-failure timeout *interval*	Configures the connection timeout.