CISCO SERVICE CONTROL SOLUTION GUIDE

Cisco Service Control Usage-Based Services Solution Guide,

Release 4.1.x

✎

Note   This document supports all 4.1.x releases.

1   Overview

The goal of a usage-based service is to report:

- An event on detection of a new flow or service
- Usage volume per subscriber session
- Usage volume per subscriber flow

The Gx solution provides enhanced support for the usage monitoring and flow detection events. Usage monitoring events use the monitoring key instance to track the accounted instance. The Service Control Engine (SCE) bucket ID is used as the monitoring key per package. The SCE bucket can be mapped to a single service, a set of services, or the entire traffic of the subscriber.

The Policy and Charging Rules Function (PCRF) provisions event setting. The Cisco Service Control solution monitors and reports user traffic to the PCRF. The PCRF uses the monitoring key and threshold to select the traffic that requires monitoring. The PCRF sets a reporting even that is notified when the threshold is crossed.

For more information on the Gx interface, see the *Cisco Service Control Mobile Solution Guide*.

2   Gx Support

Gx is a Third Generation Partnership Project (3GPP) Diameter application. In a Gx-enabled network, a Gx reference point is located between a Policy and Charging Rules Function (PCRF) and a Policy and Charging Enforcement Function (PCEF). The Gx reference point is used for charging control and policy control by applying the Attribute Value Pairs (AVPs) relevant to the application.

The PCRF acts as a Diameter server and performs the following functions:

- Uses the Gx interface to provision Policy and Charging Control (PCC) rules to the PCEF.
- Uses the Gx interface to remove PCC rules from the PCEF.
- Handles policy-control decisions.
- Provides network control for the service data flow detection, gating, Quality of Service (QoS), and flow-based charging (except credit management) towards the PCEF.
- Receives session and media-related information from the Application Functions (AFs) and informs the AFs about traffic plane events.

The PCEF acts as a Diameter client and performs the following functions:

- Uses the Gx interface to send traffic plane events to the PCRF.
- Enforces policy, handles flow-based charging, and controls QoS and the handling of user plane traffic.
- Provides service data flow detection and counting as well as online and offline charging interactions.
- Reports changes in the status of service data flows.

For more information on how to configure and monitor the Gx support in SCE, see the *Cisco Service Control Mobile Solution Guide*.

Attribute Value Pair

This section provides details on the AVPs that are used for Gx enhancements. Table 1 lists the AVPs that are used for Gx enhancements.

Table 1   AVPs for GX Enhancements

AVPs	Description	Values
Event-Trigger	Enables event triggering. Mandatory in the Gx Credit Control Action (CCA) or Reauthorize Request (RAR) messages.	SCE supports the following values: • USAGE_REPORT (26)—Used for monitoring usage. PCRF provides the Usage-Monitoring-Information AVP, which includes the Monitoring-Key and Granted-Service-Unit.
Monitoring-Key	Identifies a monitoring control instance.	PCRF uses Monitoring-Key AVP as part of the Usage-Monitoring-Information AVP.
Usage-Monitoring-Information	Identifies the usage monitoring control instance. Appears when the value of Event-Trigger AVP is USAGE_REPORT.	—
Granted-Service-Unit	Provides a threshold level to the PCEF.	The CC-Total-Octets AVP provides the threshold level for the total volume. The CC-Input-Octets and CC-Output-Octets AVPs provide the threshold level for the uplink volume and downlink volume. Volume measurement options are: • Total volume • Uplink volume only • Downlink volume only • Uplink and downlink volume
Used-Service-Unit	Provides the measured usage to the PCRF.	—
Usage-Monitoring-Level	SCE works with predefined PCC rules only. SCE does not support session level monitoring. The monitoring key may include the whole session.	PCC_RULE_LEVEL (1)
Usage-Monitoring-Report	Reports accumulated usage for all enabled monitoring or selected monitoring keys. If no monitoring keys are set, SCE reports all enabled monitoring. SCE reports accumulated usage when: • A usage threshold is reached • A package (containing the predefined PCC rules) is changed • The PCRF explicitly disables the usage monitoring • The PCRF requests for a report	USAGE_MONITORING_REPORT_REQUIRED (0) PCRF sets this value in the Usage-Monitoring-Report AVP.
Usage-Monitoring-Support	Indicates if usage monitoring is disabled for a certain monitoring key.	USAGE_MONITORING_DISABLED (0)—Usage monitoring disabled for the monitoring key.

Table 1 **AVPs for GX Enhancements (continued)**

AVPs	Description	Values
CC-Total-Octets	Granted-Service-Unit—Indicates the total uplink and downlink byte threshold. Used-Service-Unit—Indicates the total accumulated number of bytes.	—
CC-Input-Octets	Granted-Service-Unit—Indicates the total uplink byte threshold. Used-Service-Unit—Indicates the uplink accumulated number of bytes.	—
CC-Output-Octets	Granted-Service-Unit—Indicates the total downlink byte threshold. Used-Service-Unit—Indicates the accumulated downlink number of bytes.	—
Charging-Rule-Install	3GPP-defined AVP, used when you enable a Gx event. Includes the Charging-Rule-Name and Service-Flow-Detection AVPs.	The Charging-Rule-Install AVP is set as Charging-Rule-Name AVP = ServiceID in the SCE (string value).
Charging-Rule-Name	Includes the SCE ServiceID in string format that is used for the event configuration.	—
Charging-Rule-Remove	Deactivates or removes the service triggering event. Includes the service name that is to be removed.	—
PCC-Rule-Status	Indicates the status of the event.	ACTIVE (0)—Indicates that the detected service is active.

3 Configuring Gx Usage Monitoring (GUI)

In the SCA BB GUI, you can create quota profiles that define the limits and action of each bucket and assign specific services to that bucket. You must then attach the quota profile to a package, define a quota rule for the package for the relevant service, and configure usage monitoring.

For details on configuring and managing quotas, see the *Cisco Service Control Application for Broadband User Guide*.

To configure Gx Usage Monitoring, complete the following steps:

Step 1 Select Gx Usage Monitoring as the External Quota Type. For details on how to configure the external quota type, see the ("Configuring the External Quota Type" section on page 5.

Step 2 Create the Gx Quota Profile. For details on how to add a quota profile, see the "Adding a Quota Profile" section on page 5.

Step 3 Edit the buckets and assign services to the profile. For details on how to edit a quota profile, see the "Editing a Quota Profile" section on page 6.

Step 4 Assign the profile to the appropriate package. For details on how to assign the quota profile to a package, see the "Attaching the Quota Profile to a Package" section on page 8.

Step 5 Configure a rule for the package defining the action of the bucket for the relevant service in that package. For details on how to define a rule using the quota profile, see the "Defining a Rule Using the Quota Profile" section on page 9.

Configuring the External Quota Type

Use Quota Profile Editor to configure the External Quota Type. To open the Quota Profile Editor, from Policies tab of the Service Configuration window, choose **Configuration > Policies > Quota Settings**.

The external quota type options are displayed in the upper part of the Quota Profile Editor, as shown in Figure 1. The default quota type is Gy.

Figure 1   *Quota Profile Editor*

Click one of the External Type radio buttons:

- Gy—Enables the Gy interface adapter to be used for the external quota management. For more information, see the *Cisco Service Control Mobile Solution Guide*.
- SCE Subscriber API—Enables the external applications (policy servers) to connect directly to the SCE for subscriber provisioning. For more information, see *Cisco SCMS SCE Subscriber API Programmer Guide*.
- Gx Usage Monitoring—Enables the Gx interface to generate usage monitoring reports. For more information, see the *Cisco Service Control Mobile Solution Guide*.

Adding a Quota Profile

To add a quota profile, complete the following steps:

Step 1   In the **Quota Profile Edit** tab, click **Add**.

The Add Quota Profile dialog box appears (Figure 2).

Figure 2   *Add Quota Profile*

Step 2   In the name field, enter a unique name for the new quota profile.

Step 3   Select the Type from the drop-down list:

- Periodical
- Gx Usage Monitoring

> ✎
> **Note**   If Gx Usage Monitoring option is selected, the grace period is set to 2 seconds and the Error Handling is set to Grant. The default value of grace period for Gx Usage Monitoring is 2 seconds.

Step 4   Click **Finish**.

The Add Quota Profile window closes.

The new profile is added to the list of profiles displayed in the left (Quota Profile Edit) pane.

Editing a Quota Profile

After you create a quota profile, you can configure each bucket separately. For Gx Usage Monitoring profiles, you can configure the following for each bucket:

- Bucket tab—Enter a monitoring name for the monitoring key.
- Service tab—Attach services to the bucket.

> ✎
> **Note**   You cannot edit the Default Profile.

To configure a quota profile, complete the following steps:

Step 1   Click the profile name in the left pane.

The profile name and the individual buckets appear in the right pane (Figure 3).

Figure 3   *Quota Profile Editor-Quota Profile Edit Tab*
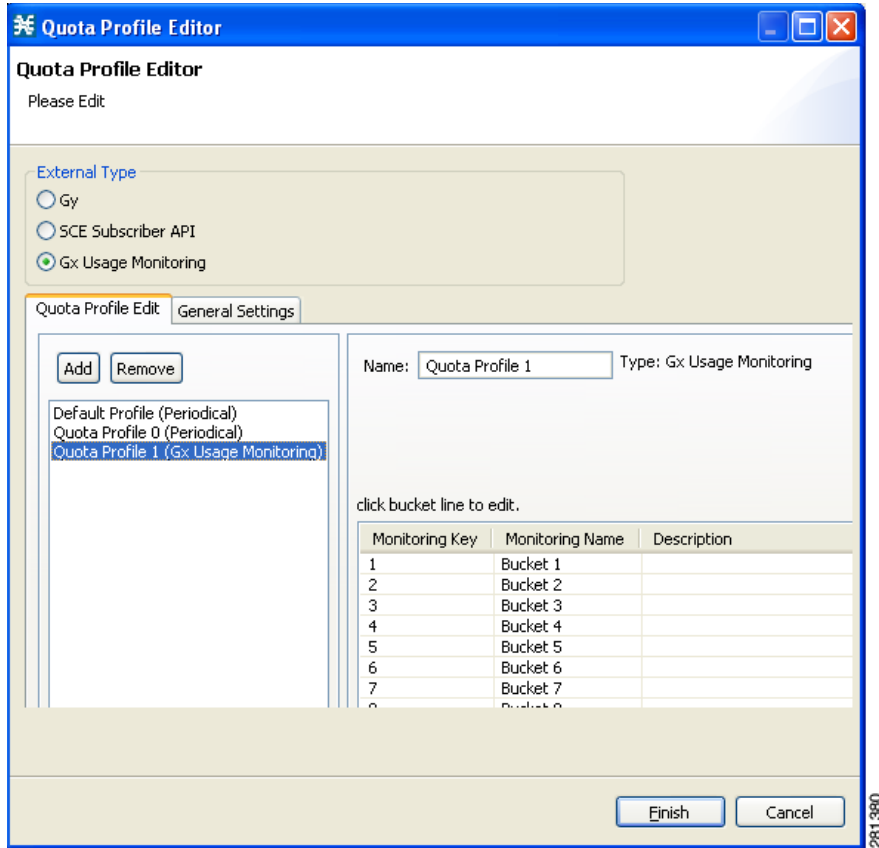
The bucket ID is mapped to the monitoring key and the bucket name is mapped to monitoring name. Cisco SCA BB supports a maximum of 127 buckets for Gx Usage Monitoring.

Step 2   Double-click the desired bucket to edit it.

The Quota Bucket Editor window appears (Figure 4).

Figure 4   *Quota Bucket Editor—Bucket Tab*
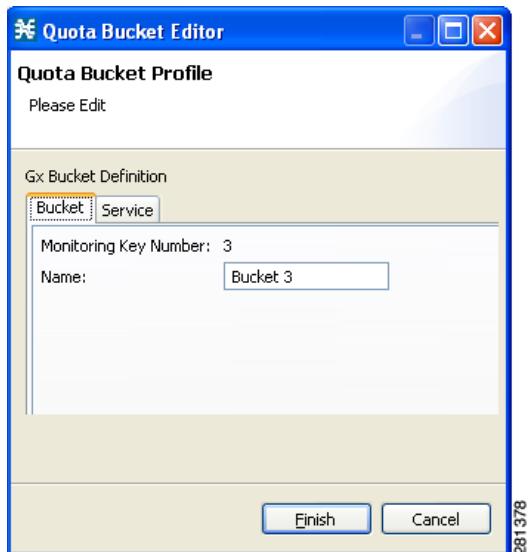
Step 3   Configure the Gx bucket.

- General bucket configuration—Use the Bucket tab.
- Attaching services to the bucket—To attach services to the bucket for all time frames, use the Service tab. Drag the service name and drop it under Attached services. If you drag a service, all its subservices in the tree are dragged as well.

  The services in the left pane are organized according to the service tree.

Step 4   Click **Finish**. The Quota Bucket Editor window closes.

Step 5   Click **Finish** again. The Quota Profile Editor window closes.

Attaching the Quota Profile to a Package

Attach the quota profile to the appropriate package.

To attach the quota profile to the appropriate package, complete the following steps:

Step 1   From the Policies tab of the Service Configuration window, right-click on the package.

Step 2   Click Edit Package.

Step 3   Click the Quota Management tab (Figure 5).

Step 4   From the Select Quota Profile drop-down list, choose the desired profile.

Figure 5   Package Settings—Quota Management Tab
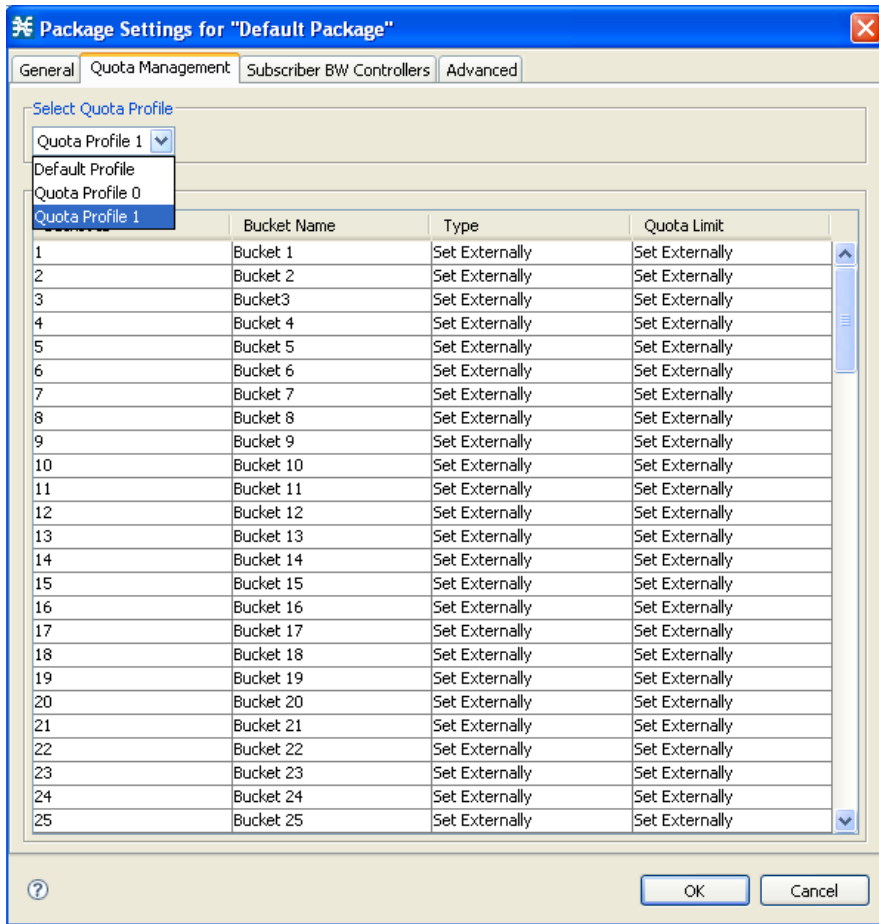
Step 5 Click **OK**.

Defining a Rule Using the Quota Profile

Add a rule to the package to define the action when the bucket exceeds its quota.
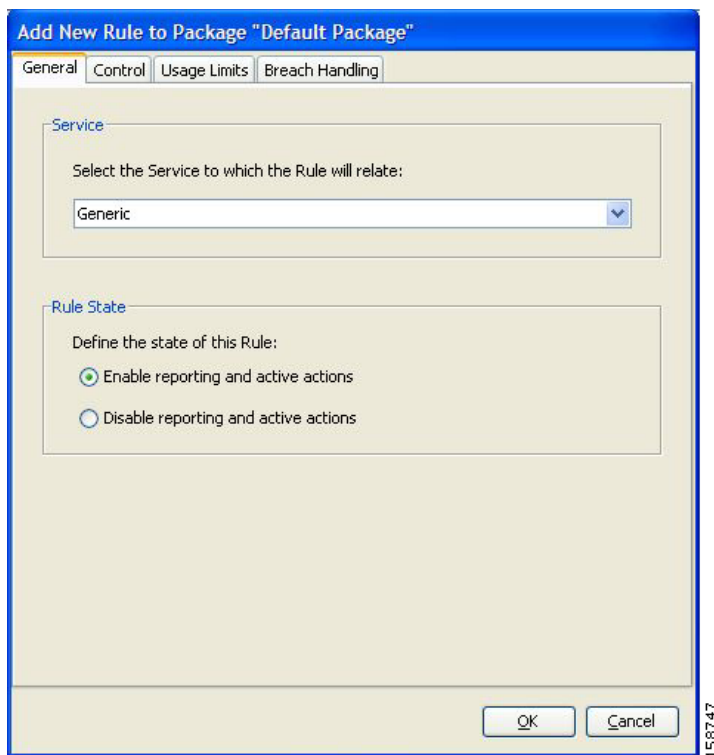
To add a rule, complete the following steps:

Step 1 Click the Add icon ➕ in the right pane in the Policies tab of the Service Configuration window.

The Add New Rule to Package dialog box appears (Figure 6).

Figure 6   *Add New Rule to Package*

Step 2 In the General tab, select the service attached to the bucket in the quota profile.

Step 3 Configure the Control, Usage Limits, and Breach Handling parameters.

For more information on configuring rules, see the *Cisco Service Control Application for Broadband User Guide*.

Step 4 Click **OK**.

4   Usage Monitoring Reports

This section describes the components that are configured to generate usage monitoring reports.

The Cisco SCE supports a combination of subscriber management and reporting features. Subscriber management is achieved by using one of the following combinations:

- Subscriber Manager (SM) and PCRF (Gx).
- Subscriber Manager for login and Vendor Specific Attribute (VSA), Gx for subscriber package and VSA.

For subscriber reporting or charging RDR, Gy, and Gx+ are used.

For subscriber management, you must configure SCE in the same way for all the subscribers. The system might not work if Gx manages some subscribers and Subscriber Manager manages some subscribers. If subscribers use different configuration, select different packages to manage the subscribers. Figure 7 shows the components that are configured for usage monitoring reports.

Note
- When VSA attributes are received from both Subscriber Manager and Gx, the last attributes are saved in the Cisco SCE DB. The Cisco SCE DB retains a record of old attributes.
- When a package ID is received from both the Subscriber Manager and GX, the last package ID received is used.

Figure 7 **System Components for Usage Monitoring Reports**
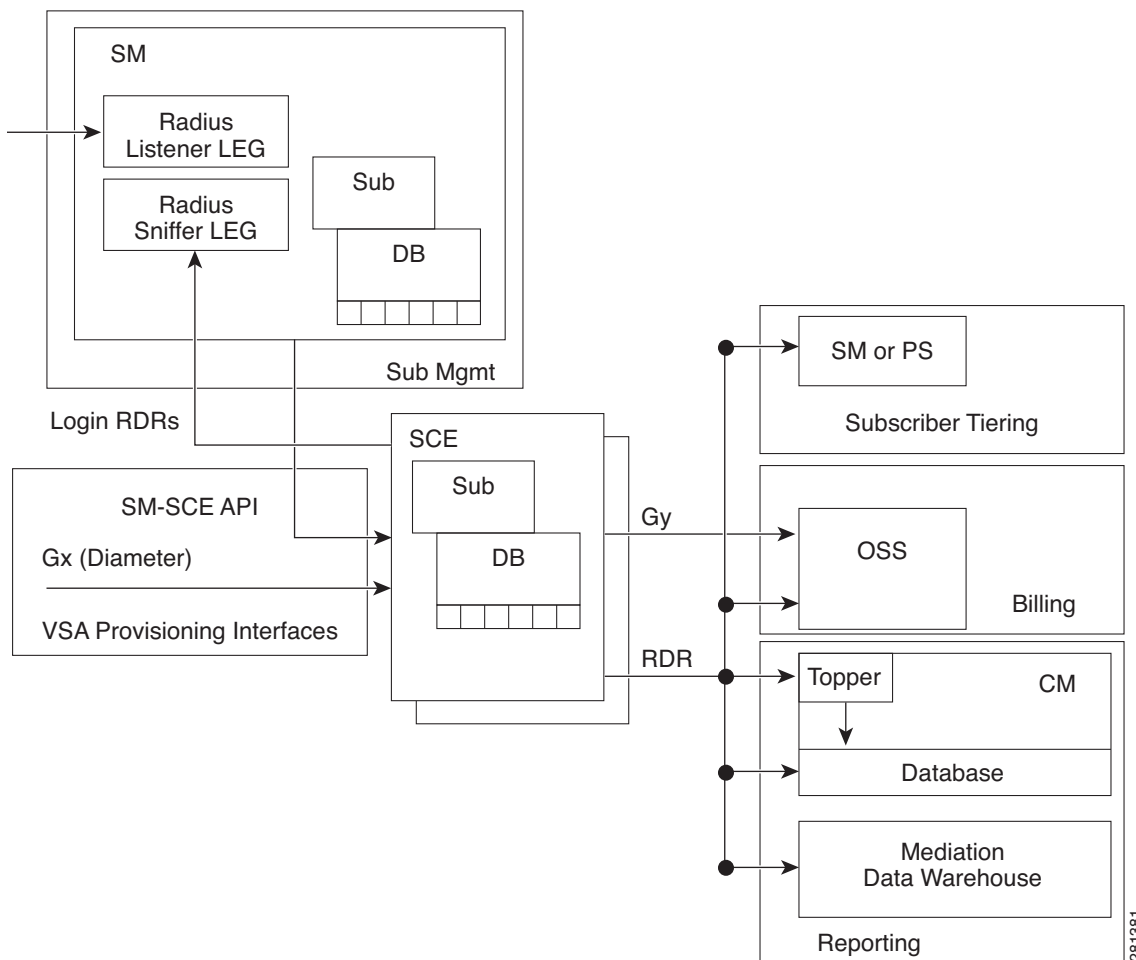
To generate usage reports, you require:

- The Subscriber Manager and SCE subscriber attribute database—The Subscriber Manager database provides attributes to SCE in PUSH or PULL mode, and during the SCE restart. The SCE subscriber attribute database includes up to 20 attributes per subscriber.
- Radius or Sniffer Login Event Generator (LEG) subscriber attribute extraction—The LEGs provide the configured data to Subscriber Manager which in turn supplies the data to the SCE.
- SCE with Subscriber Manager subscriber attribute provisioning—The Gx interface in the SCE extracts up to 20 attributes from a Gx message and stores it in the SCE database. The Subscriber Manager provides a list of attributes to the SCE and each attribute contains:
  – Attribute code (32 bits)
  – Flags (8 bits)

- – Attribute vendor-id (32 bits for VAS)
  - – Attribute-type
  - – Attribute length (24 bits)
  - – Attribute value
- Appending subscriber attributes into the SCE Raw Data Records (RDRs)—The SCE provides the subscriber attributes as part of the subscriber RDRs, HTTP transaction RDRs, and video transaction RDRs. provides details of the subscriber attributes.

Table 2   Subscriber Attributes

Attribute	Type	Max Size	Attribute Number	VSA	Vendor-ID
Acct-Multi-Session-ID	String	32	50	N	—
Acct-Session-ID	String	253	44	N	—
Famed-IP-Address	Address	4	8	N	—
Called-Station-ID	String	253	30	N	—
3GPP-IMEISV	String	16	20	Y	10415
3GPP-IMSI	String	15	1	Y	10415
3GPP-RAT-Type	String	1	21	Y	10415
3GPP-SGSN-Address	Address	4	6	Y	10415
3GPP-SGSN-MCC-MNC	String	6	18	Y	10415
3GPP-User-Location-Info	String	253	22	Y	10415
WiMax-BSID	String	30	46	Y	24757

- Adding subscriber attributes to the Collection Manager (CM) database—The Collection Manager generates the common reports based on the mobile subscriber attributes such as per device, location, network type, and APN.
  - – Device type reporting:
    - Radius device type
    - Diameter device type
  - – APN
  - – User location
  - – Network type
- Generating Mobile report—The Collection Manager or the SCA BB Reporter generates the mobile reports. Table 3 lists the mobile reports.

Table 3   List of Mobile Reports

Reports	Description	Parameters
Device Type Reports	Based on the subscriber RDR.	—

Table 3   List of Mobile Reports (continued)

Reports	Description	Parameters
Device type distribution (IMEI)	Number of unique subscribers per device type	Key: IMEI TAC Attribute: Number of unique subscribers per TAC.
Usage per device type	Total usage per device	Keys: • IMEI TAC • subscriberServiceCounterID Attributes: • Up Volume • Down Volume • Number of sessions • Duration
Application usage for specific device	Application usage	—
Network Type Reports	Mapped to 3GPP-RAT-Type.	—
Usage per Network type	Total usage per network	Keys: • Network Type • subscriberServiceCounterID Attributes: • Up Volume • Down Volume • Number of sessions • Duration
Application usage for Specific Network Type	Application usage	Key: IMEI TAC Attribute: Number of unique subscribers per TAC
APN Reports	Mapped from the Radius or Diameter Called-Station-ID field. String value up to 253.	—
Usage per APN	Total usage per APN	Keys: • APN • subscriberServiceCounterID Attributes: • Up Volume • Down Volume • Number of sessions • Duration
Application usage for Specific APN	Application usage	—
Location Based Reports	The user location is mapped to 3GPP-User-Location-Information. String value up to 253.	—
Number of Subscribers per Location	Number of subscribers	—

Table 3   List of Mobile Reports (continued)

Reports	Description	Parameters
Usage per Location	Total usage for location	Key: • Base Station • Number of unique subscribers per base station (BS) Attributes: • Up Volume • Down Volume • Number of sessions • Duration
SGSN Based Reports	Total usage for Serving GPRS Service Node (SGSN) type	Key: • SGSN Attributes: • Up Volume • Down Volume • Number of sessions • Duration

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation* at:
http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html.

Subscribe to *What's New in Cisco Product Documentation*, which lists all new and revised Cisco technical documentation, as an RSS feed and deliver content directly to your desktop using a reader application. The RSS feeds are a free service.

CISCO™

OL-30604-01