



Cisco SCA BB Introduction to Policy Integration Solution Guide

Version 3.0.3
OL-10609-01

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

Customer Order Number: DOC-1060901=
Text Part Number: OL-10609-01



THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The following information is for FCC compliance of Class A devices: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

The following information is for FCC compliance of Class B devices: The equipment described in this manual generates and may radiate radio-frequency energy. If it is not installed in accordance with Cisco's installation instructions, it may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in part 15 of the FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

Modifying the equipment without Cisco's written authorization may result in the equipment no longer complying with FCC requirements for Class A or Class B digital devices. In that event, your right to use the equipment may be limited by FCC regulations, and you may be required to correct any interference to radio or television communications at your own expense.

You can determine whether your equipment is causing interference by turning it off. If the interference stops, it was probably caused by the Cisco equipment or one of its peripheral devices. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.
- Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

Modifications to this product not authorized by Cisco Systems, Inc. could void the FCC approval and negate your authority to operate the product.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

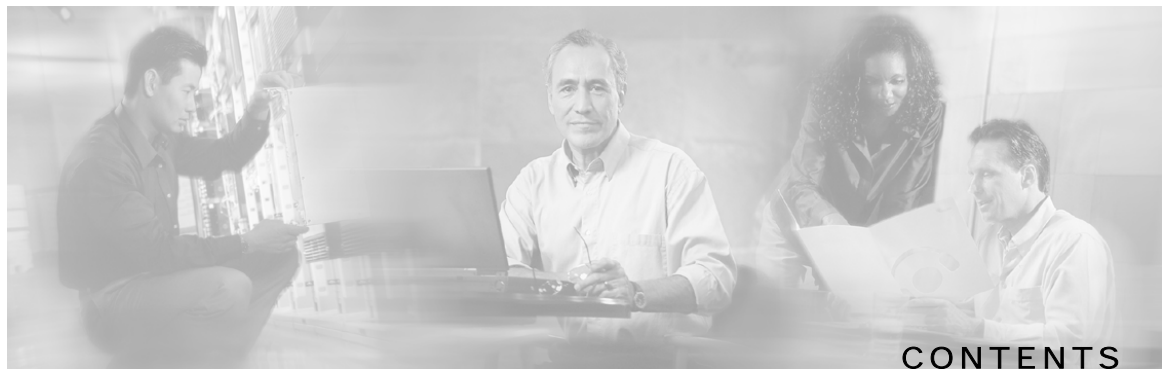
CCSP, the Cisco Square Bridge logo, Follow Me Browsing, and StackWise are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn, and iQuick Study are service marks of Cisco Systems, Inc.; and Access Registrar, Aironet, ASIST, BPX, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Empowering the Internet Generation, Enterprise/Solver, EtherChannel, EtherFast, EtherSwitch, Fast Step, FormShare, GigaDrive, GigaStack, HomeLink, Internet Quotient, IOS, IP/TV, IQ Expertise, the IQ logo, IQ Net Readiness Scorecard, LightStream, Linksys, MeetingPlace, MGX, the Networkers logo, Networking Academy, Network Registrar, Packet, PIX, Post-Routing, Pre-Routing, ProConnect, RateMUX, ScriptShare, SlideCast, SMARTnet, StrataView Plus, SwitchProbe, TeleRouter, The Fastest Way to Increase Your Internet Quotient, TransPath, and VCO are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or Website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0501R)

Printed in the USA on recycled paper containing 10% postconsumer waste.

Cisco SCAS BB Introduction to Policy Integration Solution Guide

Copyright © 2002-2006 Cisco Systems, Inc.
All rights reserved.



Preface iii

- Document Revision History iii
- Audience iii
- Organization iii
- Related Documentation iv
- Conventions iv
- Obtaining Documentation v
 - World Wide Web v
 - Documentation CD-ROM v
 - Ordering Documentation v
 - Documentation Feedback vi
- Obtaining Technical Assistance vi
 - Cisco.com vi
 - Technical Assistance Center vii

Solution Overview 1-1

- Cisco SCE Platform 1-3
- Policy and Service Configuration 1-4
- Real-Time Subscriber Management and Control 1-4
- Reports 1-5

Service Creation Integration Model 2-1

- Service Configuration 2-2
- Real time subscriber provisioning and monitoring 2-2
 - SM-API 2-2
 - SCE Subscriber API 2-3

Service Creation Integration - Examples 3-1

- Example I: Periodic-Quota Based Services 3-1
 - Business use-case 3-1

Overview 3-2

Step-by-Step Implementation 3-3

Example II: Turbo Button with "free usage" 3-16

Business Use Case 3-16

Overview 3-16

Step-by-Step Implementation 3-17

Index I-1



Preface

Document Revision History

Cisco Service Center Release	Part Number	Publication Date
Release 3.0.3	OL-10609-01	May, 2006

Description of Changes

The *Cisco SCA BB Introduction to Policy Integration* is a new guide to aid service providers and system integrators in Service Creation.

Audience

This document is for service providers and system integrators who will be integrating the Cisco Service Control Application for Broadband solution (referred to as Cisco SCA BB) with external components belonging to the customer ecosystem in order to provide a complete Service Creation solution. This document covers only the policy integration aspect. The document assumes that the reader is familiar with the Cisco SCA BB solution.

Organization

This guide covers the following topics:

Chapter	Title	Description
Chapter 1	<i>Solution Overview</i> (on page 1-1)	Describes the SCA BB solution and how it can serve as a platform for service creation for a service provider
Chapter 2	<i>Service Creation Integration Model</i> (on page 2-1)	Describes the model used for service creation integration solution creation
Chapter 3	<i>Service Creation Integration - Examples</i> (on page 3-1)	Describes the service integration use case examples

Related Documentation

This document provides an overview of the relevant interfaces. For more detailed descriptions please refer to the relevant user guides.

This application note makes reference to several documents and software that the reader should have.

- SCMS SM Software Package: *Cisco SCMS Subscriber Manager User Guide*
- *Cisco SCMS SCE Subscriber API Programmer Guide*
- SCA BB Software Package: *Cisco Service Control Application for Broadband User Guide*, *Cisco SCA BB Service Configuration API Programmer Guide*, and *Cisco SCMS Collection Manager User Guide*
- RDR Toolkit: For RDR Integration if needed
- Subscriber Integration White Paper: Paper on subscriber integration concepts

Conventions

This document uses the following conventions:

Convention	Description
boldface font	Commands and keywords are in boldface .
<i>italic font</i>	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.
boldface screen font	Information you must enter is in boldface screen font .
<i>italic screen font</i>	Arguments for which you supply values are in <i>italic screen font</i> .
<>	Nonprinting 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.

**Caution**

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

**Warning**

Warnings use the following conventions:

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

Obtaining Documentation

The following sections provide sources for obtaining documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following sites:

- <http://www.cisco.com>
- <http://www-china.cisco.com>
- <http://www-europe.cisco.com>

Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or as an annual subscription.

Ordering Documentation

Cisco documentation is available in the following ways:

- Registered Cisco Direct Customers can order Cisco Product documentation from the networking Products MarketPlace:

http://www.cisco.com/cgi-bin/order/order_root.pl

- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:
<http://www.cisco.com/cgi-bin/marketplace/welcome.pl>
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, in North America, by calling 800 553-NETS(6387).

Documentation Feedback

If you are reading Cisco product documentation on the World Wide Web, you can submit technical comments electronically. Click **Feedback** in the toolbar and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco.

You can email your comments to bug-doc@cisco.com.

To submit your comments by mail, use the response card behind the front cover of your document, or write to the following address:

Attn Document Resource Connection

Cisco Systems, Inc.

170 West Tasman Drive

San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides [Cisco.com](http://www.cisco.com) (on page [vi](#)) as a starting point for all technical assistance. Customers and partners can obtain documentation, troubleshooting tips, and sample configurations from online tools. For Cisco.com registered users, additional troubleshooting tools are available from the TAC website.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information and resources at anytime, from anywhere in the world. This highly integrated Internet application is a powerful, easy-to-use tool for doing business with Cisco.

Cisco.com provides a broad range of features and services to help customers and partners streamline business processes and improve productivity. Through Cisco.com, you can find information about Cisco and our networking solutions, services, and programs. In addition, you can resolve technical issues with online technical support, download and test software packages, and order Cisco learning materials and merchandise. Valuable online skill assessment, training, and certification programs are also available.

Customers and partners can self-register on Cisco.com to obtain additional personalized information and services. Registered users can order products, check on the status of an order, access technical support, and view benefits specific to their relationships with Cisco.

To access Cisco.com, go to the following website:

<http://www.cisco.com>

Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

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](http://www.cisco.com) (on page vi), 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>

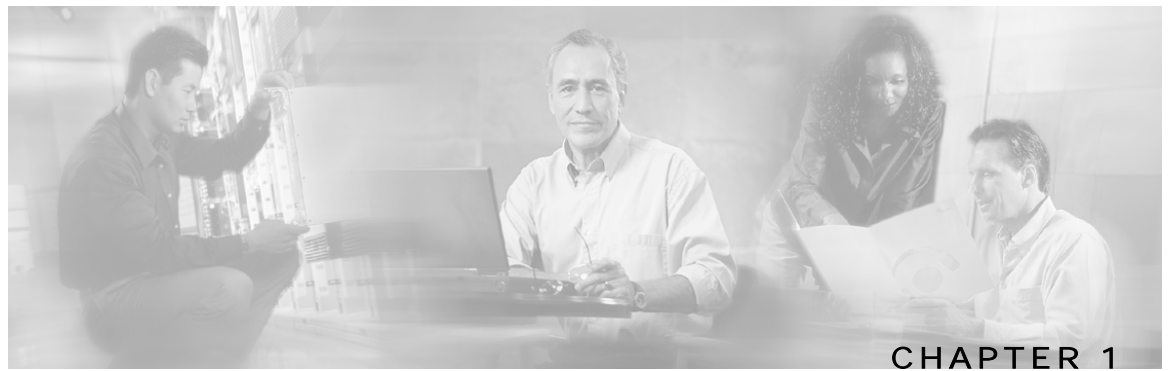
Contacting TAC by Telephone

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.



Solution Overview

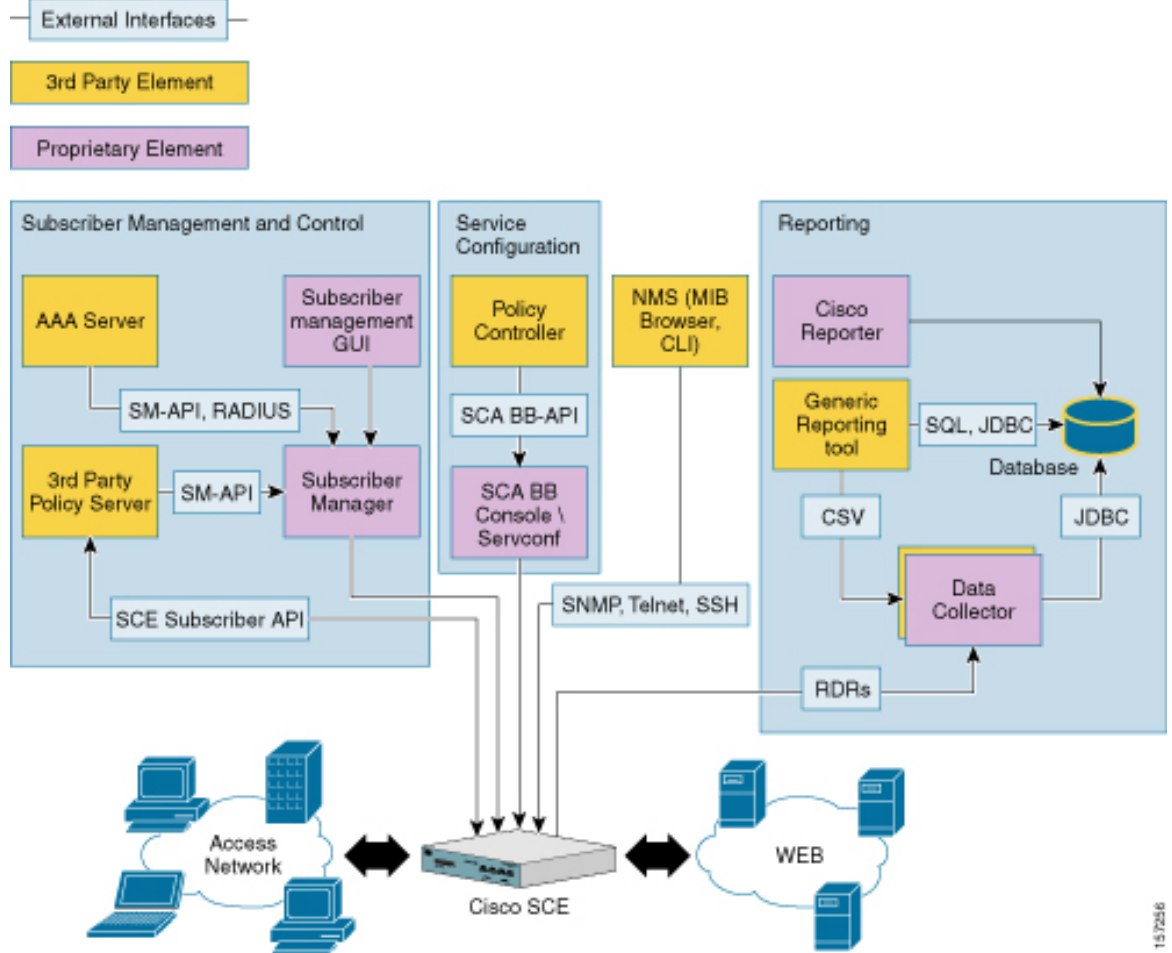
This chapter contains the following sections:

- [Cisco SCE Platform](#) 1-3
- [Policy and Service Configuration](#) 1-4
- [Real-Time Subscriber Management and Control](#) 1-4
- [Reports](#) 1-5

This chapter describes the logical components that make up the Cisco SCA BB solution. The SCA BB solution can serve as a platform for service creation for a service provider.

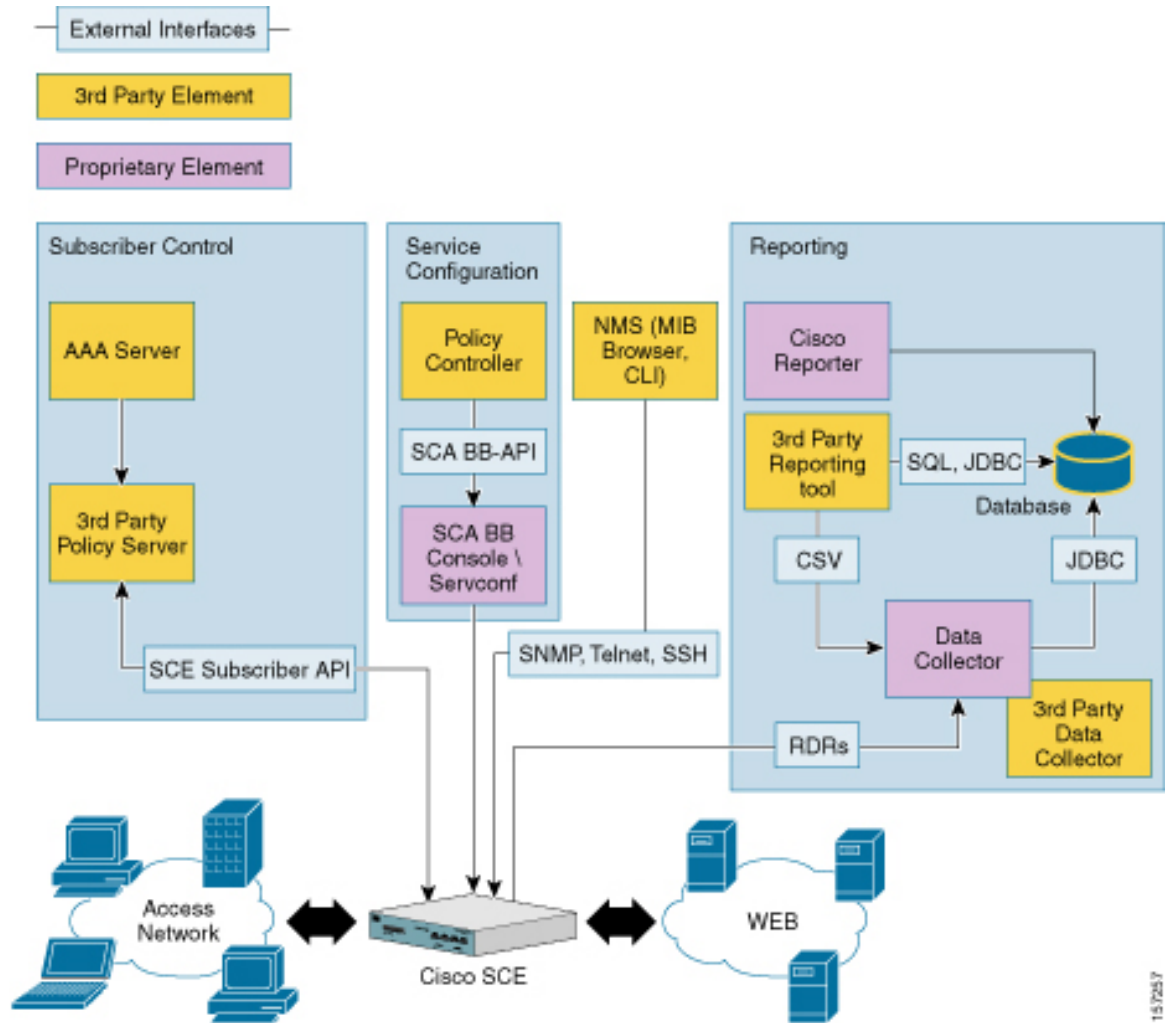
The following two diagrams illustrate the high level architecture of the SCA BB solution when integrated in a typical service provider environment, showing the major components and the relationships between them. The first diagram shows the SCA BB solution including the Subscriber Manager component. The second diagram shows direct integration with the SCE platform (also known as SM-less integration). In this case, the SM component is not included and the 3rd party Policy Server communicates directly with the SCE platform.

Figure 1-1: Cisco SCA BB Solution Eco System including SM



15.7256

Figure 1-2: Cisco SCA BB Solution Eco System - SM-less integration



Cisco SCE Platform

The Cisco SCE platform is a hardware accelerated, deep packet inspection device that forms the core of the solution. In a service creation scenario, the SCE platform is deployed inline on the subscriber IP data path, providing deep packet inspection and application/protocol recognition along with the enforcement of the relevant policies, per subscriber, according to the customer business logic.

The device is configured and monitored through NMS (over CLI, SNMP) and a number of proprietary tools used for service configuration, subscriber management, and multi-unit configuration. All of the tools are combined in the SCA BB Console application. The platform is subscriber aware (see [Real-Time Subscriber Management and Control](#) (on page 1-4)), and can be used for usage-based services, for example, subscriber level quota management and billing. The platform also generates network usage data at various granularities for monitoring and analysis purposes.

More details on the SCE platform and its various configuration interfaces can be found in the *Cisco SCE 2000 4xGBE Installation and Configuration Guide* and in the *Cisco SCE 2000 4xGBE Quick Start Guide*.

Policy and Service Configuration

Policy and service configuration refers to the static system configuration that defines the way traffic is analyzed and controlled globally, in addition to the various policies available for controlling specific subscriber traffic.

A policy definition according to the customer business logic is a prerequisite for any deployment, and provides the context for the definition of the other aspects of the solution.

Policy and service configuration is created using the SCA BB Console or using the SCA BB Service Configuration API. The service configuration is compiled into a proprietary file format called PQB, which can be applied to the SCE platform through the SCA BB Console or through the 'servconf' command line utility.

**Note**

For policy enforcement, the policy and service configuration needs to be applied prior to subscriber traffic coming through the SCE.

Service configuration is detailed in the *Cisco Service Control Application for Broadband User Guide* and in the *Cisco SCA BB Service Configuration API Programmer Guide*.

Real-Time Subscriber Management and Control

Subscriber management is required to be real-time for a subscriber aware solution in a dynamic-IP or dynamic policy environment. This aspect of the solution provides the capabilities related to:

- Mapping network IP addresses, or other network identifiers, to managed subscriber entities
- Real-time control of the policy applied to a subscriber
- Application of usage-quota restrictions
- Using other aspects of dynamic policy management such as self-care portals, turbo-buttons, etc.

The Cisco Service Control Subscriber Manager component provides most of this subscriber related functionality and APIs.

The SCA BB solution also facilitates subscriber management using direct integration with the SCE platform. In many cases this is beneficial to service providers who may better utilize existing applications (e.g. when the provider already invested in a complete Policy Server or similar system). The service provider may also decrease the number of deployed and managed network elements by eliminating the Cisco Service Control Subscriber Manager component and therefore optimize overall operational expenses.

Direct integration generally simplifies the deployment; however, the application that communicates to the SCE platform must implement some functionality that was previously provided by the Cisco Service Control Subscriber Manager. This includes: support for multiple SCE units, addressing high availability issues by supporting redundancy schemes, and different cases of fail-over.

Subscriber management integration can be implemented using two integration modes: Push and Pull. These modes utilize different sequences of events for subscriber logins. In Push mode, the external entity such as the Policy Server triggers a subscriber creation or update and provisions the information to the SCE prior to the subscriber sending data traffic. In Pull mode, the SCE identifies subscribers upon receiving data traffic belonging to an unknown (anonymous) source. It then queries the Policy Server by sending a request to provide the subscriber identity and thus triggering the login operation. The Policy Server will provision the required subscriber information back to the SCE.

Note that subscriber management and quota provisioning functionality may be implemented by two separate applications and in this case the SCE should be integrated with both of them.

The SCE is also able to extract subscriber identity information by intercepting RADIUS or DHCP traffic (when it comes through the box), which allows for a level of "automatic" provisioning of the subscribers. It may significantly simplify the initial login process of subscribers while further actions for policy update and quota management are done by the Policy Server and the Quota Management system.

More details can be found in the *Cisco SCMS Subscriber Manager User Guide*, the *Cisco SCMS Subscriber Manager Java API Programmer's Guide*, the *Cisco SCMS Subscriber Manager C/C++ API Programmer's Guide*, and the *Cisco SCMS SCE Subscriber API Programmer's Guide*.

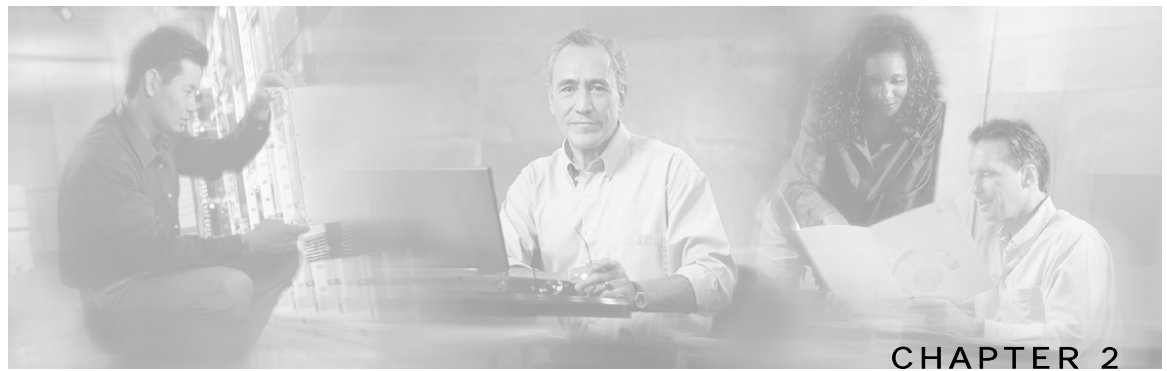
Reports

The Cisco SCA BB reporting solution includes the generation, collection, and aggregation of network usage as analyzed by the SCE devices. The data is available in several granularities, and is tailored for use in several scenarios such as: network analysis and trend determination, postpaid billing, and offline auditing.

Cisco SCA BB enables the collection of Raw Data Records (RDRs) through its Collection Manager software. RDRs can be stored in a JDBC compliant database or written to file depending on their type and the use case addressed by the customer. Reporting tools (either proprietary or generic) can be used to present the collected information. The SCA BB solution includes a reporter application as part of the SCA BB Console.

Reporting is a major function in most implementations of the Cisco SCA BB solution. However, it is not directly related to Service Creation, and therefore will not be discussed here.

More details on reporting can be found in the *Cisco SCMS Collection Manager User Guide*.



Service Creation Integration Model

This chapter contains the following sections:

- [Service Configuration](#) 2-2
- [Real time subscriber provisioning and monitoring](#) 2-2

In a Service Creation environment, the Cisco SCA BB would typically integrate with a Policy Server (PS) system, which would be a part of the provider's OSS. This system would manage subscriber policies in real time, provision usage quotas for a subscriber (as well as monitor subscriber usage), and handle billing for the solution.

The system can be either an internal system that is closed to the subscriber or an open system. The internal system has no subscriber facing interfaces (assigning subscribers with their predefined service-levels and quotas, as purchased offline). The open system allows subscribers to purchase and provision their own usage policies and quotas (based on the provider definitions) through a self care portal.

The full solution depends on the functionality and capabilities of the Policy Server, with the Cisco SCA BB solution providing the network enforcement and accounting platform within the full solution.

To keep the solution synchronized with the dynamic network mappings of the subscribers, it is necessary to integrate the solution with the provider's backend systems that are responsible for IP mapping (such as DHCP, AAA).

The main aspects of the solution that concern a Policy Server vendor or developer are:

- The service-configuration plane
- The real-time subscriber policy profile mapping
- Quota provisioning
- Monitoring plane

Subscriber IP mapping is also a requirement and in many cases the policy server is also responsible for subscriber IP mapping. However, it is not a mandatory functionality for the server since the mapping may also be done by integration with the backend system responsible for IP mapping (e.g. DHCP server) rather than through the policy server itself, or as mentioned previously, by intercepting data from RADIUS/DHCP traffic.

Reporting in the SCA BB solution is *less* relevant to the real-time-integration process - it is relevant only if postpaid billing is to be provided through RDR based interfaces. Further details on integration over the reporting plane can be found in the *SCMS Collection Manager User Guide* (for integration using the Cisco Collection Manager software), or in the *RDR-Toolkit* and the *Cisco Service Control Application for Broadband Reference Guide* for direct integration using RDRs.

Service Configuration

The Service Configuration is static and defines the various policy profiles available as plans, products, or packages for the service providers' customers. Defining the business logic according to the service provider's policy definitions allows the provider to assign a predefined policy to subscribers according to their subscription type. A policy profile defines:

- The per-service and overall QoS allocated to a subscriber
- The definitions of allowed and restricted (blocked) services that the subscription includes
- The structure of quotas on which the policy is based (i.e. which services are consumed from which quota, which services are not accounted for usage, etc.) and the corresponding definitions to be applied when subscribers' usage exceeds their allowed quota.

Service configuration is described in detail in the *Cisco Service Control Application for Broadband User Guide* and in the *Cisco SCA BB Service Configuration API Programmer Guide*.

Real time subscriber provisioning and monitoring

The SCA BB solution provides a number of APIs and interfaces that support real-time subscriber provisioning and monitoring.

- Subscriber Manager API (SM-API)—used for updating, querying, and configuring the SCMS Subscriber Manager in deployments that include the SM component.
- SCE Subscriber API—used for SM-less deployments and for quota management purposes.

SM-API

The SM-API is used for various subscriber management aspects throughout the SCA BB solution in deployments that use SM rather than direct integration. In such deployments, this API will be used by the Policy Server for defining the policy to be applied to a subscriber. The policy is identified by the policy profile (the package) ID, as defined in the service configuration. There are various use cases for the use of this API including: static introduction of a subscriber, self-provisioning, and turbo-button activation.

The SM-API is provided as a client API (both non-blocking and blocking implementations) and is available in Java and C/C++ (Windows, Sparc-Solaris platform, and Red Hat Linux).

The SM-API is provided as a part of the Cisco Service Control Management Suite Subscriber Manager suite. Further details can be found in the *Cisco SCMS SM Java API Programmer's Guide* and in the *Cisco SCMS SM C/C++ API Programmer's Guide*.

SCE Subscriber API

The SCE Subscriber API is used by the Policy Server for direct integration with the SCE without involving the SM component. The API supports a variety of functions such as:

- Network ID association—an association between a unique subscriber identifier, subscriber network identifier, and policy profile or package assigned to the subscriber
- Policy provisioning—an association between a unique subscriber identifier and a policy profile or package assigned to the subscriber
- Quota provisioning—an association between a unique subscriber identifier and a quota amount that is available for service consumption

Network ID association

The subscriber mapping API functionality includes the login operation to create the subscriber and, if the subscriber already exists, the modification of the subscriber attributes. This operation is invoked by the Policy Server when it needs to provision the subscriber identity and other information to the SCE. This occurs, for example, upon notification that the subscriber logged in to the network, or when the Policy Server responds to the pull request.

The login operation includes a number of parameters such as:

- Subscriber identifier (OSS ID)—uniquely identifies the subscriber
- Subscriber network ID—can represent multiple instances of IP address, IP range, VLAN, and tunnel ID
- (Optional) Policy profile identifier—the identifier of the policy profile assigned by the Policy Server and preconfigured during Service Configuration phase
- (Optional) Initial service quota—the initial service quota, if available, for the subscriber

The login operation can be reused in order to update (add or set) the subscriber network ID when the subscriber network ID is modified (e.g. when the DHCP server assigns a different IP address), or when adding IP address instances for a subscriber with multiple IP addresses, or when modifying the subscriber policy after the subscriber is created.

Policy Provisioning

The policy profile can be assigned to a subscriber using the login operation during the initial creation of the subscriber, or when the subscriber is upgraded or downgraded and requires the enforcement of a different policy.



Note

The policy may be provisioned this way regardless of the integration mode, i.e. push or pull.

Quota Provisioning

The quota provisioning mechanism is based on the ability to assign a quota to a subscriber for consuming a specific service and to later manage it. The SCE Subscriber API supports quota provisioning events such as:

- Quota setting and addition
- Notification that the quota falls below a configurable threshold
- Notification that the quota is completely depleted
- Notification of the value of the remaining quotas

The quota may be provisioned along with subscriber login (see [Network ID association](#) (on page 2-3)). This can be used, for example, in cases where the Policy Server also supports quota provisioning. When the network operator's ecosystem includes a separate Quota Provisioning system, the quota may be set after and independently on the login operation.

The quota is provisioned in small portions depending on the business logic of the service provider. When the current quota of a certain service/bucket in the SCE falls below a configured threshold (due to consumption of the service by the subscriber), or becomes depleted, the SCE sends a notification event to the Quota Provisioning system. This event may be interpreted as a quota replenishment request from the subscriber. The Quota Provisioning system may respond with a quota setting or adding operation.

The changes in quota reflecting consumption of the service by the subscriber may be reported using periodical or on demand notifications of the value of the remaining quota. It may be used, for example, to show the subscriber the current status of their quota via the portal. Subscribers can optionally be notified when they breach their quota.

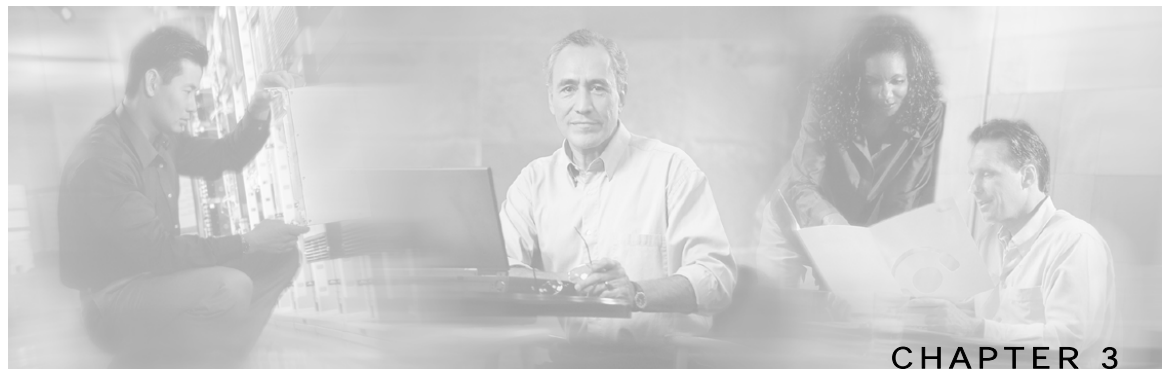
The remaining quota is reported to the Quota Provisioning system upon subscriber logout.

In order to improve the user-experience for a subscriber accessing a service for the first time (with no quota in place), a grace period can be configured using SCA BB during which time the subscriber will be allowed to access the service until the initial quota provisioning stage is complete.

Further details on quota provisioning can be found in the *Cisco Service Control Application for Broadband User Guide*.

The SCE Subscriber API is currently implemented in Java.

Further details on the SCE Subscriber API can be found in the *Cisco SCMS SCE Subscriber API Programmer Guide*.



Service Creation Integration - Examples

This chapter contains examples of particular use cases. The examples are basic, but illustrate the use of the various interfaces for implementing business logic primitives - actual implementations might be more complex and use a larger mixture of the primitives described here.

This chapter contains the following sections:

- [Example I: Periodic-Quota Based Services](#) 3-1
- [Example II: Turbo Button with "free usage"](#) 3-16

Example I: Periodic-Quota Based Services

Business use-case

Traffic is divided into two services:

- General Internet Access—General broadband Internet access.
- Premium Content—Access to specific content sites that the broadband operator is marketing as 'premium content'.

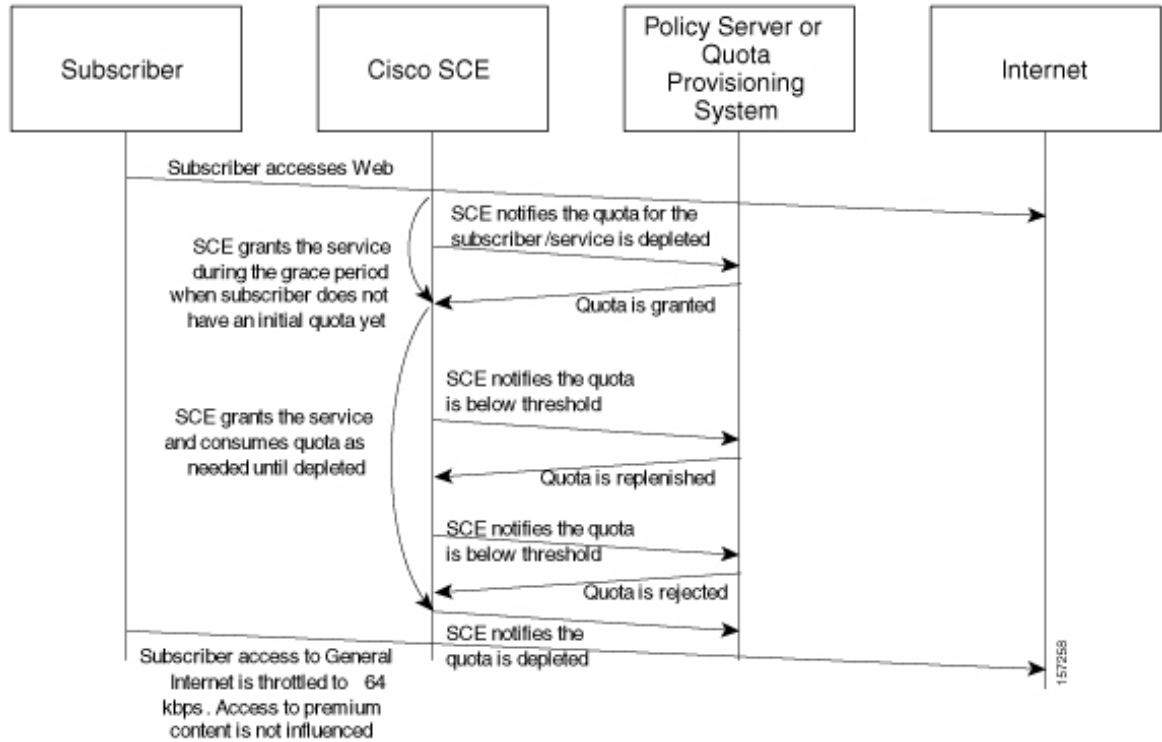
Users have a monthly quota (not accumulated across months) for general internet access. When the quota is depleted, the traffic rate is reduced to a dial-up rate of 64 kbps. Access to the Premium Content is not counted as part of the monthly quota and is not reduced to dial-up rates.

When the quota is depleted, the subscriber is notified using the subscriber-notification event.

Overview

The following figure shows an overview of the implementation of this business use case. It is recommended that you return to this section after reading the step-by-step description.

Figure 3-1: Periodic Quota - scenario overview



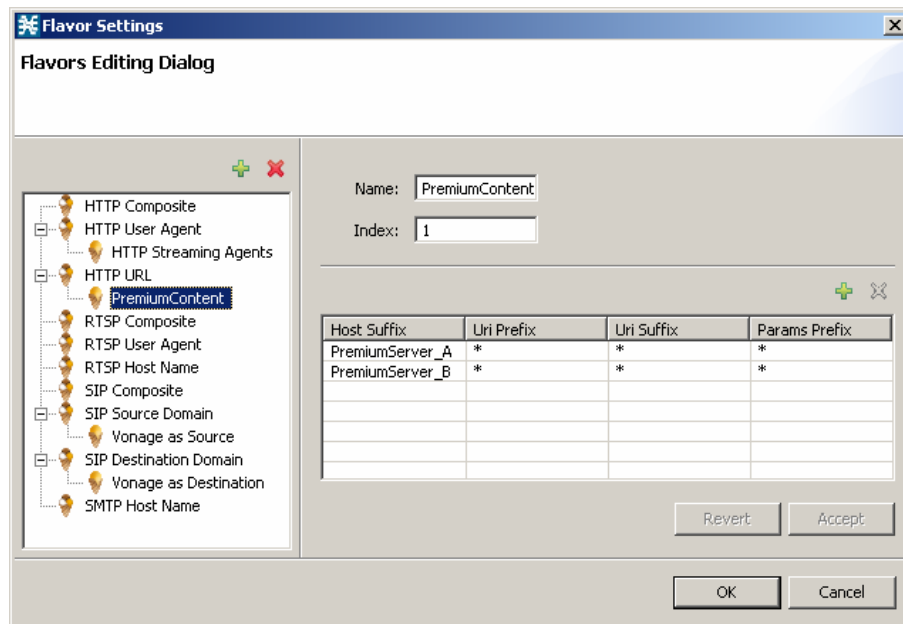
Step-by-Step Implementation

Step I: Policy Configuration

Defining the Premium Content Service

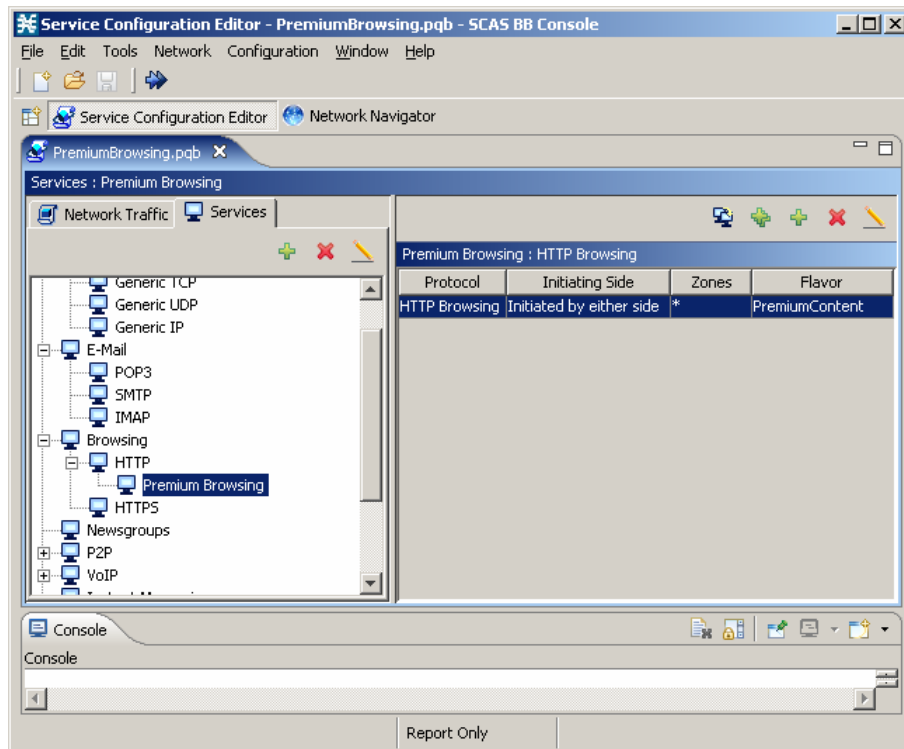
To define the Premium Content Service:

- Step 1** Define the list of servers for the Premium Content service using the Flavors Settings dialog. For simplicity, this assumes that the Premium Content service is defined based on a list of servers.



Example I: Periodic-Quota Based Services

- Step 2** Modify the services of the Premium Browsing service such that it is based on the HTTP protocol together with the PremiumContent flavor that contains the list of designated servers defined in Step 1.

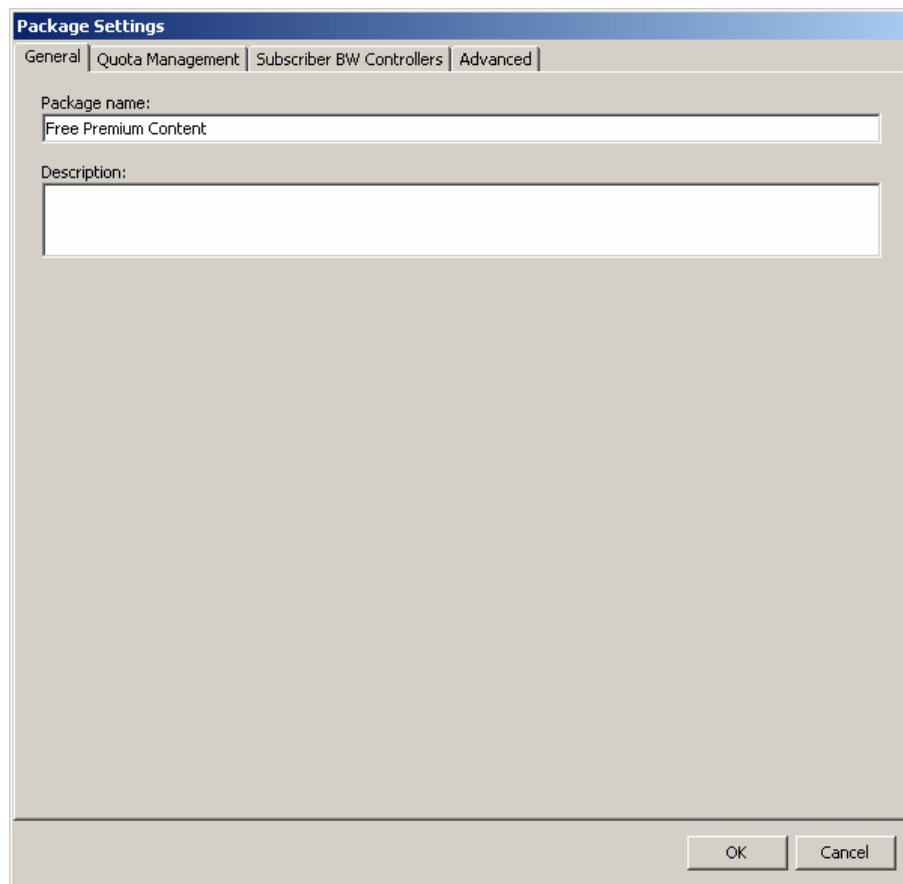


Assigning Services to Quotas

The business logic used in this example specifies that a subscriber's traffic will be partitioned between General Internet Access and Premium Content. General Internet Access is quota controlled from one bucket (both upstream and downstream consuming from the same bucket). Premium Content traffic will not be quota controlled (but rather post paid charged).

To assign services to quotas:

Step 1 Add a new package to the Premium Browsing service called Free Premium Content:



The screenshot shows a dialog box titled "Package Settings" with a blue header bar. Below the header is a tabbed interface with four tabs: "General", "Quota Management", "Subscriber BW Controllers", and "Advanced". The "General" tab is selected. Inside the dialog, there are two text input fields. The first is labeled "Package name:" and contains the text "Free Premium Content". The second is labeled "Description:" and is currently empty. At the bottom right of the dialog, there are two buttons: "OK" and "Cancel".

Example I: Periodic-Quota Based Services

Step 2 Set quota management to external control using the Quota Management tab:

Package Settings

General | **Quota Management** | Subscriber BW Controllers | Advanced

Select quota management mode:

External - replenished on external request

Periodical - replenished automatically at the end of the aggregation period

Aggregation Period

Hourly - ends on the hour

Daily - ends at midnight

Quota Buckets

Buckets define limits on the volume and session consumption of a subscriber.

Bucket ID	Name	Type	Quota Limit
1	Bucket 1	Volume (L3 KBytes)	Set Externally
2	Bucket 2	Volume (L3 KBytes)	Set Externally
3	Bucket 3	Volume (L3 KBytes)	Set Externally
4	Bucket 4	Volume (L3 KBytes)	Set Externally
5	Bucket 5	Volume (L3 KBytes)	Set Externally

OK Cancel

The package is created:

Service Configuration Editor - PremiumBrowsing.pqb - SCAS BB Console

File Edit Tools Network Configuration Window Help

Service Configuration Editor Network Navigator

*PremiumBrowsing.pqb x

Network Traffic : Controlled Traffic : Premium Content

Network Traffic Services

Filtered Traffic

Unknown Subscriber Traffic

Controlled Traffic

Default Package

Premium Content

Premium Content : Default Service

Service	Rule State	Description
Default Service	Enabled	controlled, unlimited quota

Console

Console

Report Only

Step 3 Add a new rule to the Premium Browsing service:

The dialog box titled "Add New Rule to Package 'Free Premium Content'" has four tabs: General, Control, Usage Limits, and Breach Handling. The "General" tab is active. It contains two main sections:

- Service:** A text box with the instruction "Select the Service to which the Rule will relate:" and a dropdown menu showing "PremiumBrowsing".
- Rule State:** A text box with the instruction "Define the state of this Rule:" and two radio buttons:
 - Enable reporting and active actions
 - Disable reporting and active actions

At the bottom right, there are "OK" and "Cancel" buttons.

The Free Premium Content package now contains two service rules.

The screenshot shows the "Service Configuration Editor - PremiumBrowsing.pqb - SCAS BB Console" window. The "Services" tab is selected, showing a tree view on the left with "Premium Content" highlighted. The main area displays a table for "Premium Content : Premium Browsing":

Service	Rule State	Description
Default Service	Enabled	controlled, unlimited quota
Premium Browsing	Enabled	controlled, unlimited quota

The bottom of the window shows a "Console" area with a "Report Only" button.

Example I: Periodic-Quota Based Services

- Step 4** Use the Edit Rule for Service dialog box and the Usage Limits tab to define all other services (except PremiumBrowsing) as consuming quota from bucket number 1 for both upstream and downstream traffic.

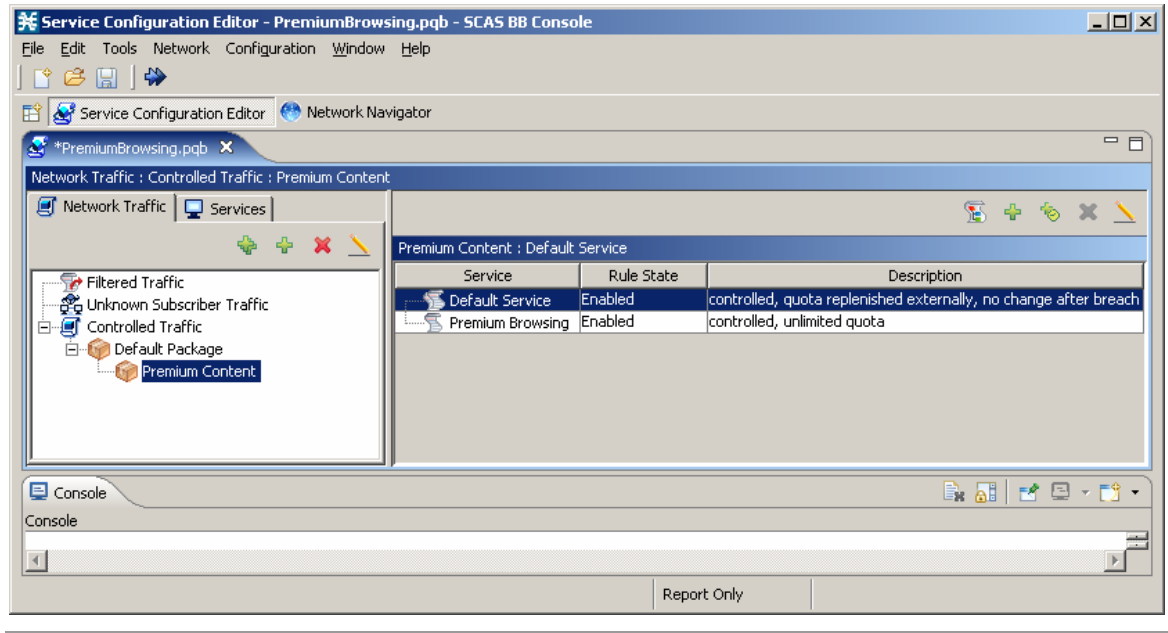
Buckets can normally be used to manage upstream volume, downstream volume, and sessions. This example deals only with volume based quota:

The screenshot shows a dialog box titled "Edit Rule for Service 'Default Service'". It has four tabs: "General", "Control", "Usage Limits", and "Breach Handling". The "Usage Limits" tab is selected. The dialog contains the following text and controls:

- Text: "Set the Quota Buckets that the Service's traffic will consume."
- Label: "Select Quota Bucket for upstream traffic" with a dropdown menu showing "Bucket 1".
- Label: "Select Quota Bucket for downstream traffic" with a dropdown menu showing "Bucket 1".
- Label: "Select Quota Bucket for sessions" with a dropdown menu showing "None (Unlimited)".
- Buttons: "OK" and "Cancel" at the bottom right.

The PremiumBrowsing service is not associated with a quota bucket, and therefore will not be quota limited. Use of this service will still be reflected in the quota usage notifications using the SCE Subscriber API.

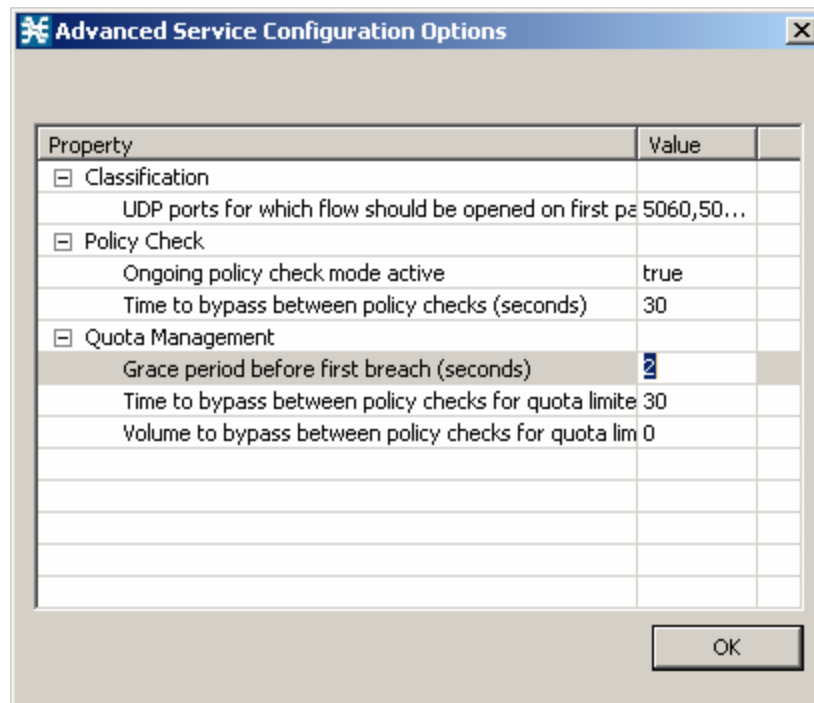
An overview of the monthly quota package is shown in the following figure.



Defining a Grace Period

A grace period can be configured in SCA BB to improve the user-experience for a subscriber accessing a service for the first time. The grace period allows the subscriber to access a service until the initial quota provisioning stage is complete. The grace period should be configured to be relatively short because it allows subscribers to get services regardless of the allocated quota amount even when the subscriber does not have available balance. The grace period reflects the willingness of the provider to credit the subscriber with service assuming that the balance is positive. This behavior is fully configurable and depends on the provider business logic.

Use the Advanced Service Configuration Dialog box to define the grace period.



Defining Quota-RDR Settings

Quota RDRs are the internal triggers for quota notifications that are part of the SCE subscriber API. When using the quota functionality, make sure that all RDRs are enabled.

The period of remaining quota RDRs should be set based on the operator's preferences.

The threshold value for RDR generation should be determined by the operator based on the size of the quota chunks provisioned and the expected bandwidth consumed by the service. Quota threshold notifications are intended to allow the policy server to provision a new quota chunk before an existing quota is depleted, thus enabling service continuity while the subscriber has a positive account balance.

The system must be configured to enable the RPC server and to send RDRs - that will be converted into notifications by the SCE Subscriber API - to the internal RDR listener. Configuration is done through the SCE CLI using the following command:

```
#>RDR-formatter destination 127.0.0.1 port 33001 category number
4 priority 100
```

Defining the Control Scheme

The package BW controllers have to be defined. The total bandwidth allocated to a subscriber will be limited to 1 Mbps.

“Depletion BWC”, designed for limiting the breached service traffic must also be defined (upstream and downstream).

Define the package BW controllers and the Depletion BWC using the Package Settings dialog box.

Package Settings

General | Quota Management | **Subscriber BW Controllers** | Advanced

Subscriber BW Controllers limit the BW of transaction groups and prioritize between transactions of different services for a single subscriber. They are also used for linking services to Global Controllers.

Upstream

Subscriber relative priority (upstream): 1

Name	CIR (Kbps)	PIR (Kbps)	Global Controller	AL
- Primary Upstream BWC	0	Unlimited		
- Default Upstream BWC	0	1000	Default Global Controller	1
- Upstream Depletion	0	64	Default Global Controller	1

Downstream

Subscriber relative priority (downstream): 5

Name	CIR (Kbps)	PIR (Kbps)	Global Controller	AL
- Primary Downstream BWC	0	Unlimited		
- Default Downstream BWC	0	1000	Default Global Controller	1
- Downstream Depletion	0	64	Default Global Controller	1

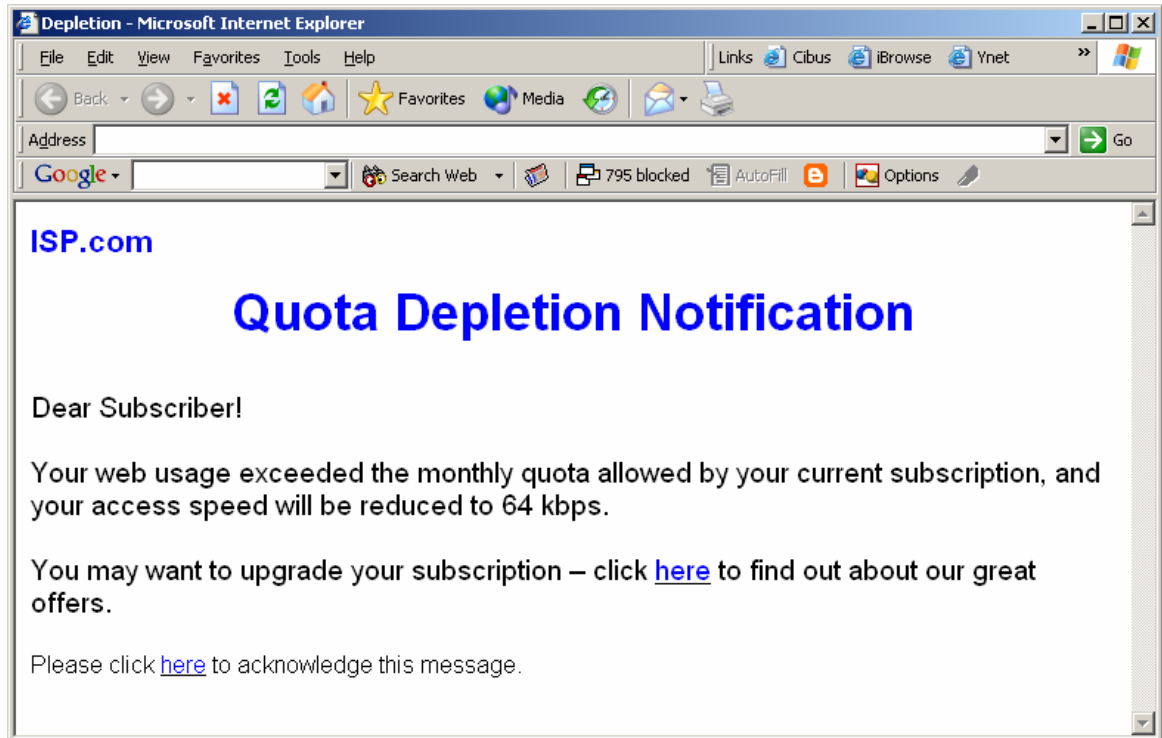
OK Cancel

All services will be placed by default under the total BW controller.

After the General-Internet-Access quota is depleted, this service will be mapped to a subscriber BW controller allowing it to consume up to 64 kbps. The subscriber should be notified that their bandwidth has been reduced due to quota depletion (through subscriber-notification).

Example I: Periodic-Quota Based Services

Using the subscriber notification capability, subscribers can be put automatically into a state where their browsing session is redirected to a predefined web portal. The web portal page informs subscribers that their quota has depleted and therefore their Internet-Access-Speed is reduced.

Step 1 Design an appropriate web page.

Step 2 Define a subscriber notification using the Subscriber Notifications Settings dialog box.

The screenshot shows the 'Subscriber Notification Settings' dialog box. It is divided into two main sections: 'Notifications' and 'Notification Parameters'.

- Notifications:** A list box containing one entry, 'Depletion Notification', with a plus sign and a minus sign to its right.
- Notification Parameters:**
 - Name:** A text field containing 'Depletion Notification'.
 - Destination:**
 - Destination URL:** A text field containing 'http://www.myISP.com/depletion.html'.
 - Append notification parameters to URL
 - Dismissal Method:**
 - Notification is dismissed when:
 - Subscriber browses to the destination URL
 - The condition that activated the notification no longer holds
 - Subscriber browses to the dismissal URL
 - The dismissal URL should be in the format *host-suffix;path-prefix* (for example *.my-host.com;/redir/*)
 - Two text fields for the format: * : /*
 - Allowed URLs:**
 - List of allowed URLs:
 - The dismissal URLs should be in the format *host-suffix;path-prefix* (for example *.my-host.com;/redir/*), Type one URL per line .
 - A text area containing *.myISP.com;/path/ *

A 'Close' button is located at the bottom right of the dialog.

Step 3 The destination URL directs the subscriber to the web portal page created in step 1.

Example I: Periodic-Quota Based Services

- Step 4** Select the action to be taken upon breach. This action maps all the services that consume from the General-Internet-Traffic Quota (bucket 1) to the Depletion Bandwidth Controller. The subscriber notification also needs to be selected for activation.

**Note**

The implementation brought here (using SCA BB breach-handling behavior) is useful for implementing a simplified quota breach behavior. For implementing more complex control logic, the Policy Server can use the quota-depletion-notification as a trigger for changing the subscriber package. This allows the Policy Server a higher flexibility in the nature of control that is enforced over a subscriber upon quota depletion.

Step II: Building the real-time quota provisioning process

The real-time quota provisioning process for this business use case is based on a subscriber balance manager that allocates subscriber quota upon request (through Quota Below Threshold and Quota Depleted notifications), based on quota availability.

To implement this business logic, the Policy Server uses the SCMS SCE Subscriber API in order to receive quota requests and to provision the quota accordingly through the Quota Update method.

There are two main use cases:

- A subscriber logs in with no quota—the Policy Server provisions the quota based on the subscriber's balance in response to a Quota Depleted event that is generated by the SCE. If the Policy Server handles both subscriber mapping and quota provisioning, the quota may be provisioned along with the login operation. The SCE Subscriber API events such as LOGIN-REQUEST event and LOGINPULL-RESPONSE event are optimized to allow sending all the subscriber information to the SCE. It is recommended to use these events for Policy Profile and Quota updates when all parts of the subscriber provisioning including quota provisioning are performed by a single Policy Server.
- Quota chunk allocated to a subscriber is about to run out—the Policy Server provisions quota based on the subscriber's balance and in response to a Quota Below Threshold event generated by the SCE.

Further details on using these operations can be found in the *Cisco SCMS SCE Subscriber API Programmer Guide*.

Step III: Acting upon depletion events

Depletion events are signaled to the Policy Server through the Quota Depleted notification event. The Policy Server is required to receive such notifications to run some predefined logic. In this specific example, where the breach behavior is implemented inside SCA BB, the Policy Server is only required to log the event details.

Handling cases of subscriber log-out

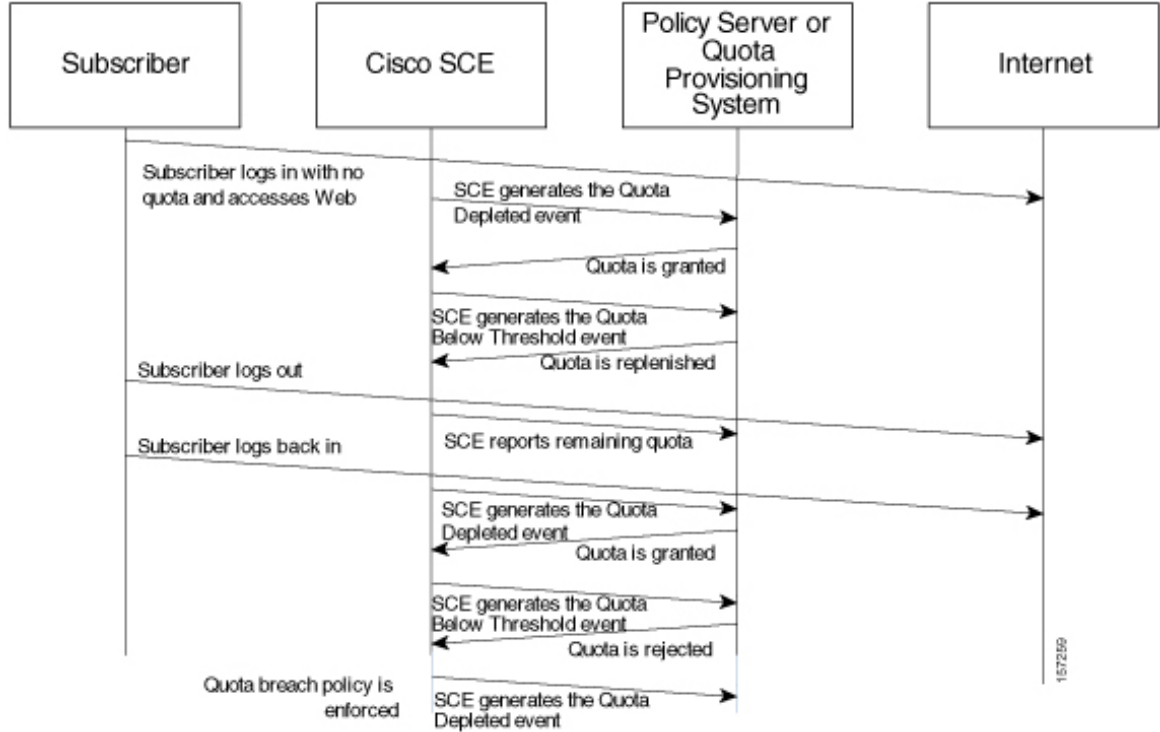
When subscribers log out of the network, either intentionally or implicitly (e.g. due to session expiration), their records are removed from the SCE until they log back in.

In such a case, a notification is triggered. The notification includes the amount of quota left in the subscriber's buckets. This notification allows the Policy Server to add the remaining quota back to the subscriber's balance so that no quota is lost and to process the amount of used quota to prevent revenue leakage.

This sequence of events is shown in the following diagram.

Example II: Turbo Button with "free usage"

Figure 3-2: Log-out handling behavior definition



Example II: Turbo Button with "free usage"

Business Use Case

The business use case is a simplified quota based scenario. A subscriber is assigned a policy that allows for a certain access speed. Usage on all services is consumed from a single quota bucket.

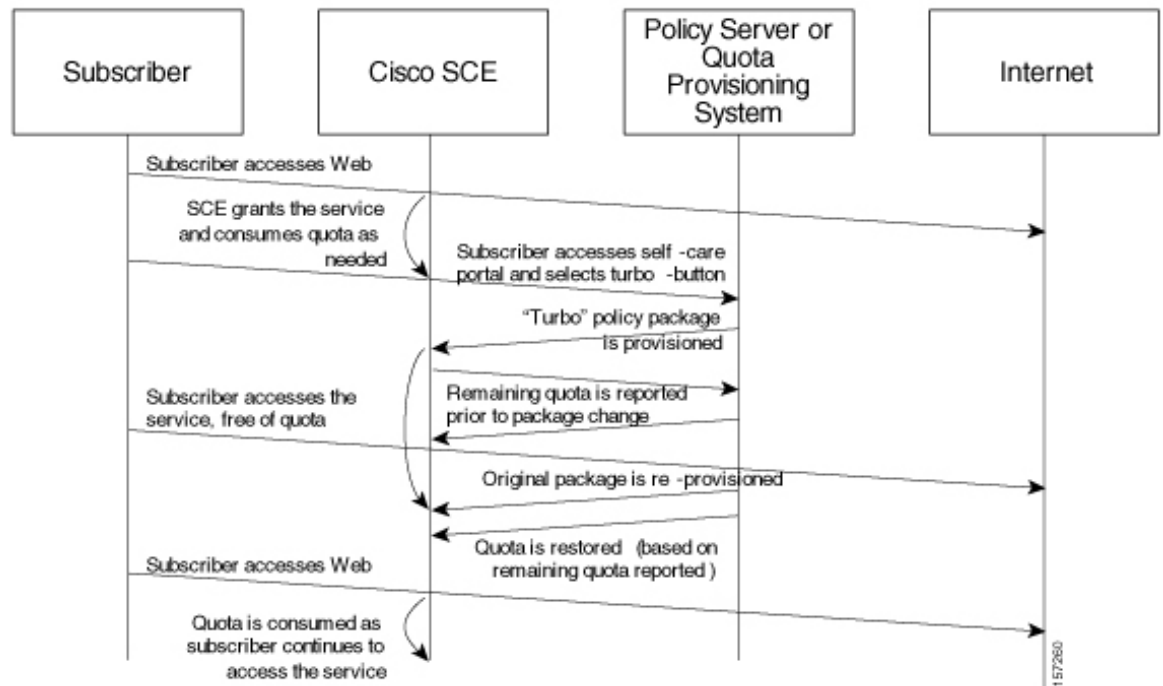
Subscribers can use a web interface to boost their access speed for a limited period of time using a "Turbo Button".

During this period, subscribers are granted an increased-speed, with quota-free access. When the time period is over, subscribers are reassigned their regular access plan, and reassigned their remaining quota.

Overview

The following figure shows an overview of how this business use case is implemented. It is recommended that you return to this section after reading the step-by-step description.

Figure 3-3: Turbo Button - scenario overview



The previous diagram shows the sequence of events when direct integration is used. The policy provisioning can also be provisioned through the SM API in SM deployments.

Step-by-Step Implementation

Step I: Policy configuration

Defining the Quota Based Package

The quota based package is built and managed in a similar manner to the previous example - see [Step II: Building the real-time quota provisioning process](#) (on page 3-15) for details on how to build the quota related portion of this policy.

Defining the "Turbo Button" Package

This package will be provisioned to a subscriber once they select a "Turbo button" (and de-provisioned when the "turbo" period is over). This package will boost the subscriber's total access speed and be free of quota charging. All the services of this package must be defined with "unlimited quota".

Example II: Turbo Button with "free usage"

Define the package BW controllers using the Package Settings dialog box.

Package Settings

General | Quota Management | Subscriber BW Controllers | Advanced

Subscriber BW Controllers limit the BW of transaction groups and prioritize between transactions of different services for a single subscriber. They are also used for linking services to Global Controllers.

Upstream

Subscriber relative priority (upstream): 5

Name	CIR (Kbps)	PIR (Kbps)	Global Controller	AL
-Primary Upstream BWC	0	3000		
Default Upstream BWC	0	3000	Default Global Controller	1

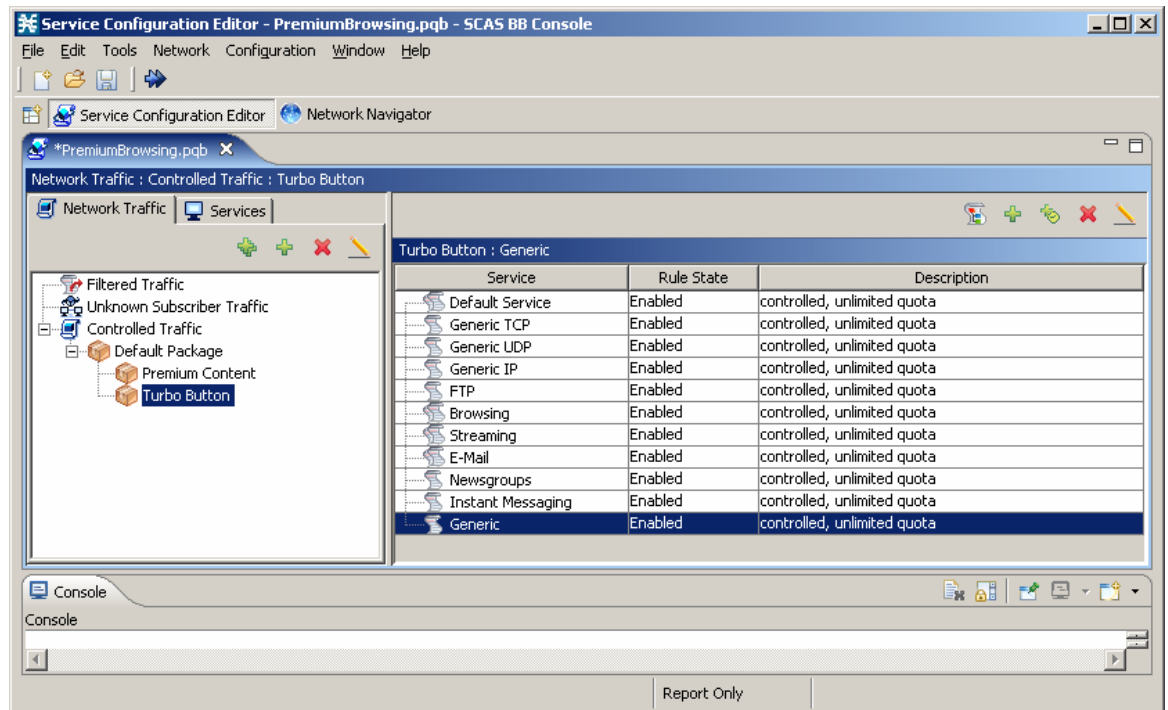
Downstream

Subscriber relative priority (downstream): 5

Name	CIR (Kbps)	PIR (Kbps)	Global Controller	AL
-Primary Downstream BWC	0	3000		
Default Downstream BWC	0	3000	Default Global Controller	1

OK Cancel

The overview of the "Turbo" package is shown in the following figure.



Step II: The real-time provisioning process

This section refers to the logic that must be implemented by the Policy Server - using the SCA BB Subscriber APIs, interfaces, and tools - to support the required business logic.

Quota Provisioning

Quota provisioning in this example is identical to that of the previous use case. However, upon a package change, a remaining-quota-notification is generated by the SCE, reflecting the subscriber's remaining quota.



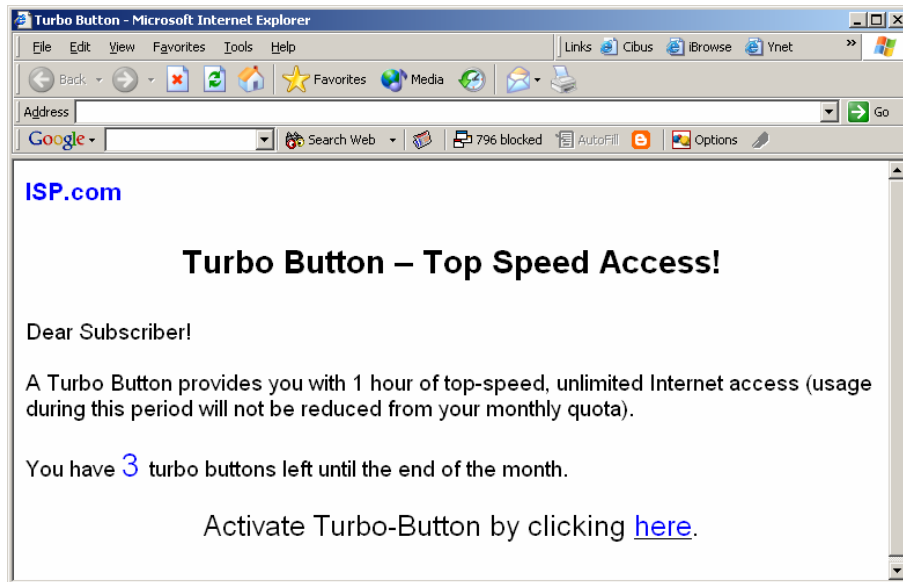
Note

Upon package change, the subscriber's balance is not changed. This means that when the "Turbo time" is over, the quota buckets are in the same state as they were before the "Turbo time".

Turbo Button Activation

The vendor must first build the front end for the activation of the turbo button. For this example, this will be a web page where subscribers can authenticate themselves and select to temporarily upgrade their access package using a turbo button.

Example II: Turbo Button with "free usage"

Step 1 Build the front end for subscriber activation.

Step 2 After the turbo button is selected, the Policy Server should provision the "Turbo Button" package for the subscriber to the SCA BB solution (this is done through the SCE Subscriber API in the case of direct integration, or using the SM-API otherwise).

Turbo Button Deactivation

The Policy Server is responsible for restoring the original package once the accelerated-speed, free usage period allowed by the turbo button is over.

- Step 1** The Policy Server restores the original package. This is done using the SCE Subscriber API in the case of direct integration or using the SM-API otherwise.
- Step 2** The Policy Server re-provisions quota/s when it is needed. Note that during the Turbo Button active period, the quota is not changed; the subscriber has the same amount of quota when the Turbo Button period ends. When the subscriber accesses the service after the Turbo Button period, the quota starts to be consumed as usual and may need to be replenished in the normal way. This is done using the SCE Subscriber API (set primitive) triggered by the Quota Below Threshold or Quota Depleted notification.

Further details can be found in the *Cisco SCSM SCE Subscriber API Programmer Guide*.



Index

A

Assigning Services to Quotas • 3-5
Audience • iii

B

Business Use Case • 3-16
Business use-case • 3-1

C

Cisco SCE Platform • 1-3
Cisco.com • vi
Contacting TAC by Telephone • vii
Contacting TAC by Using the Cisco TAC
Website • vii
Conventions • iv

D

Defining a Grace Period • 3-10
Defining Quota-RDR Settings • 3-10
Defining the • 3-17
Defining the Control Scheme • 3-11
Defining the Premium Content Service • 3-3
Defining the Quota Based Package • 3-17
Document Revision History • iii
Documentation CD-ROM • v
Documentation Feedback • vi

E

Example I
Periodic-Quota Based Services • 3-1
Example II
Turbo Button with • 3-16

H

Handling cases of subscriber log-out • 3-15

N

Network ID association • 2-3

O

Obtaining Documentation • v
Obtaining Technical Assistance • vi
Ordering Documentation • v
Organization • iii
Overview • 3-2, 3-16

P

Policy and Service Configuration • 1-4
Policy Provisioning • 2-3
Preface • iii

Q

Quota Provisioning • 2-4, 3-19

R

Real time subscriber provisioning and
monitoring • 2-2
Real-Time Subscriber Management and
Control • 1-4
Related Documentation • iv
Reports • 1-5

S

SCE Subscriber API • 2-3
Service Configuration • 2-2
Service Creation Integration - Examples • 3-1
Service Creation Integration Model • 2-1
SM-API • 2-2
Solution Overview • 1-1
Step I
Policy configuration • 3-17
Policy Configuration • 3-3

- Step II
 - Building the real-time quota provisioning process • 3-15
 - The real-time provisioning process • 3-19
- Step III
 - Acting upon depletion events • 3-15
- Step-by-Step Implementation • 3-3, 3-17

T

- Technical Assistance Center • vii
- Turbo Button Activation • 3-19
- Turbo Button Deactivation • 3-20

W

- World Wide Web • v