Oracle® Communications Convergent Charging Controller

Concepts

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Preface

This book presents basic Oracle Communications Convergent Charging Controller concepts.

Audience

This document is intended for anyone who uses, configures, or extends Convergent Charging Controller.

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Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

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About Convergent Charging Controller

This chapter provides an overview of Oracle Communications Convergent Charging Controller.

About Convergent Charging Controller

Convergent Charging Controller is an Intelligent Network (IN) based session control and charging application. You use Convergent Charging Controller to:

- Manage mobile and fixed telephony services, messaging services, and offerings such as Friends and Family and call forwarding.

- Control sessions, such as route calls based on least-cost routing.

- Rate sessions and manage subscriber balances. Convergent Charging Controller maintains a record for every subscriber, including their current balance. This enables you to manage calls based on credit; for example, force session termination when credit is exhausted.

Figure 1-1 shows how Convergent Charging Controller works with the network to control voice calls and perform session charging. Convergent Charging Controller also handles SMS, data, and other telecom services. Convergent Charging Controller can integrate with Oracle Billing and Revenue Management (BRM), and with other third-party billing systems to create bills and request payments from customers.

Figure 1-1   Convergent Charging Controller on the Network
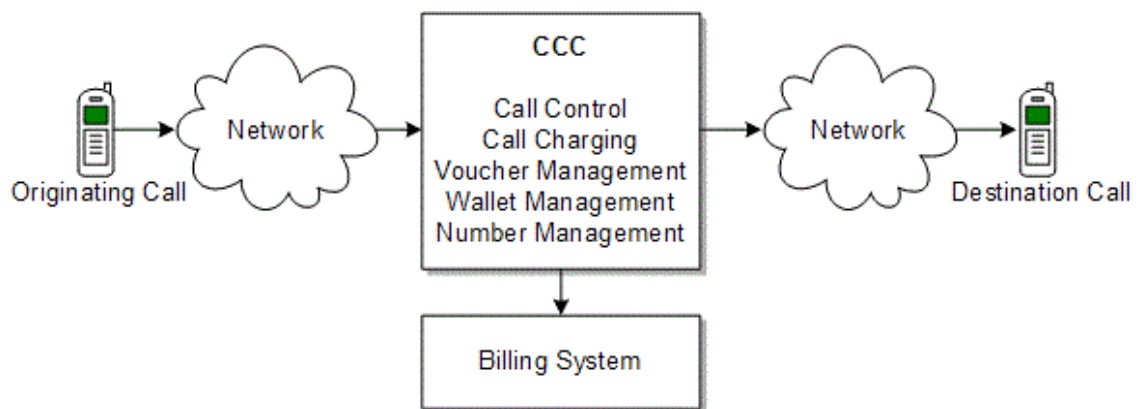
Calls are routed through the Convergent Charging Controller application as follows:

1. A subscriber makes a call, which is routed to Convergent Charging Controller.

2. A Convergent Charging Controller network connectivity agent accepts the call and translates the incoming protocol to an internal signaling protocol.

3. Based on the calling subscriber's telephone number, Convergent Charging Controller identifies the subscriber.

4. Based on the subscriber data, Convergent Charging Controller starts a control plan to manage the call. The *control plan* is a series of steps and decisions implemented as feature nodes. Each feature node performs a specific function; for example, routing the call based on the prefix, or applying an alternate tariff.

5. Based on the control plan and the data stored with the subscriber's account, Convergent Charging Controller routes the call as necessary, and terminates the call.

6. Convergent Charging Controller uses the Voucher and Wallet Server to update the subscriber's balance.

Figure 1-2 shows a high-level view of the Convergent Charging Controller system architecture.

Figure 1-2   Convergent Charging Controller System Architecture
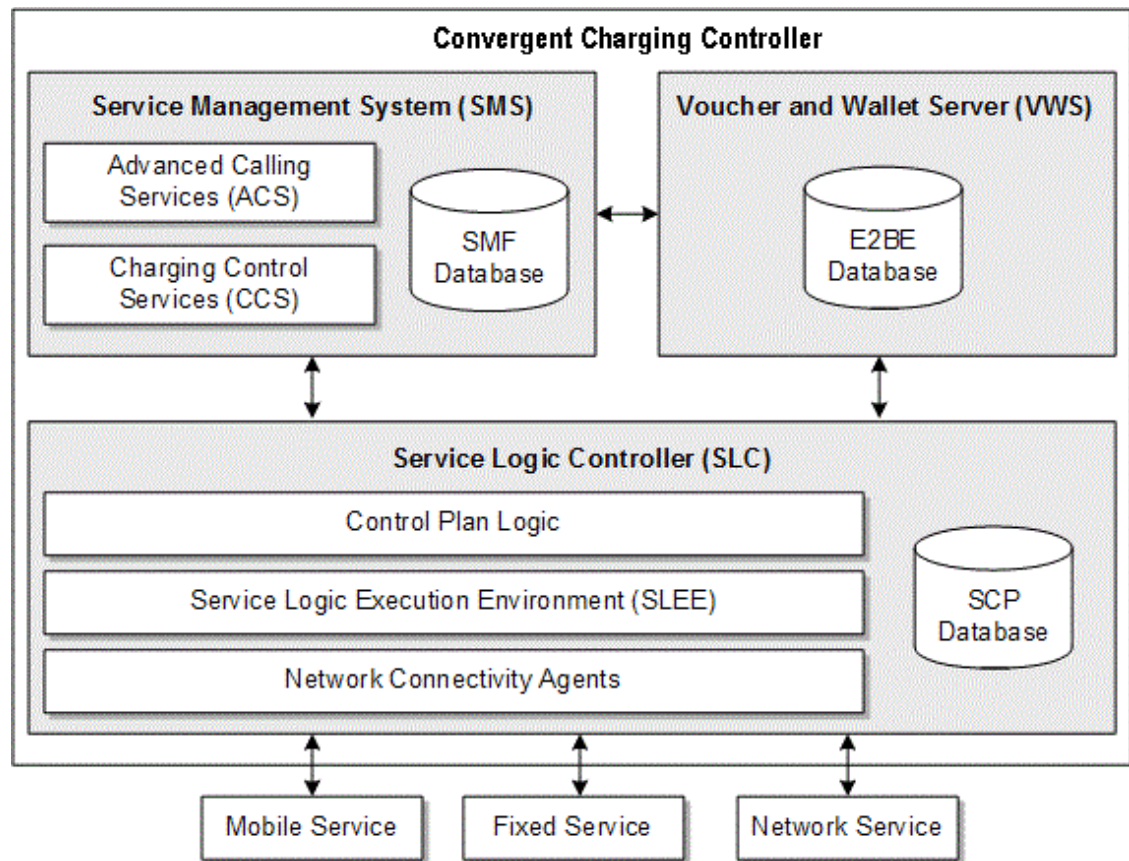
In Figure 1-2:

• The Service Logic Controller (SLC) performs most of the Convergent Charging Controller functionality:

  – Calls, sessions, and messages connect to Convergent Charging Controller network connectivity agents.

  – The Service Logic Execution Environment (SLEE) provides a common execution environment for Convergent Charging Controller applications; for example, Advanced Control Services (ACS) and Charging Control Services (CCS).

  – The control plan logic manages the calls and sessions. For example, a control plan for a Friends and Family service determines if a call is eligible for a discount, and applies the discount.

- The SCP database contains a subset of the data stored in the main Convergent Charging Controller database (the SMF database). The data in the SCP database is subscriber data and control plan data.

- You use the Service Management System (SMS) GUI to configure and manage Convergent Charging Controller. It includes:

  - Advanced Control Services (ACS). You use ACS to create control plans that manage calls; for example, control how calls are routed and terminated.

  - Charging Control Services (CCS). You use CCS to manage how calls are rated, interactions with the Voucher and Wallet Server, and interactions with subscriber data.

  - The SMF database. This database is the main Convergent Charging Controller repository for system data, including subscriber data, rating configuration data, and voucher and wallet data.

- The Voucher and Wallet Server manages charging, vouchers, balances, and subscribers.

  The E2BE database contains voucher, wallet, and reservation details. It also contains a subset of data from the SMF database, such as subscriber data.

About Implementing Convergent Charging Controller

To implement Convergent Charging Controller, you perform the following tasks:

- **Create service providers (customers).** You use Convergent Charging Controller to manage session control and rating for service providers. For example, if you are a mobile network operator (MNO), you can run Convergent Charging Controller to manage call routing and rating for multiple mobile virtual network operators (MVNO). Each service provider has an entry in the SMF database.

- **Configure service provider data.** For example, you can configure:

  - Announcement sets. Announcement sets specify the announcements that a customer can use. You can also configure global announcements that all customers can use.

  - Geography sets. Geography sets specify geographic locations based on telephone prefixes. For example, a geography set can organize prefixes by countries or regions. Geography sets can be used for rating calls by charging different rates based on call origin and call destination. Geography sets are also used for implementing least-cost routing.

  - Holiday sets. Holiday sets specify the holidays for each customer. Holiday sets are used when rating calls; for example, to provide a discount on New Year's Day.

- **Create tariffs and product types to rate sessions.** Tariffs specify how much to charge for a session; for example, 10 cents per minute. Product types include the tariffs to use for rating calls, and the control plans used for controlling calls. You can rate services based on various properties; for example duration of the call and geographic location of the calling number and destination number.

- **Create control plans.** Control plans specify how calls are routed, including service calls that subscribers make to check their balances. Control plans are run based on the product type associated with the caller and service. You can define a set of feature nodes that each customer can use for creating control plans.

  For example, you can use control plans for the following:

  - Configure features such as call forwarding, Friends and Family, and least-cost routing.

  - Configure call controls, such as call screening and call termination.

  - Configure announcements that are played to subscribers during a call.

- **Create subscribers.** Subscribers are the people who purchase and use the services that you offer. You can create subscribers in various ways; for example, by using the SMS GUI or the provisioning interface (PI).

- **Configure subscriber self-care.** For example, you can allow subscribers to add numbers to their Friends and Family service.

To configure Convergent Charging Controller session control and charging, you typically perform three types of tasks:

- Edit configuration files.

- Use the SMS GUI to configure data used by control plans.

- Use the Control Plan Editor (CPE) to create control plans.

For example, when configuring call termination, you do the following:

- Edit the **acs.conf** file to specify how the pending termination number is captured in CDRs.

- Use ACS to specify the default termination number range, and the termination number rage for each service provider.

- Use CPE to configure how calls are terminated in control plans.

As another example, to configure a Friends and Family service, you do the following:

- Use CCS to configure the numbers that qualify for friends and family.

- Use CPE to configure a Friends and Family service in control plans.

About Convergent Charging Controller Components

You do most of your call configuration by using Advanced Control Services (ACS) and Charging Control Services (CCS).

- You use ACS to configure call routing, and to configure and manage many Convergent Charging Controller system-related features. For example, you use ACS to assign resources to service providers, manage passwords, and set up geography sets and holiday sets used by service providers.

- You use CCS for setting up and managing rating, subscriber management, and voucher management.

You open the ACS GUI and the CCS GUI from the Service Management System (SMS) GUI.

Figure 1-3 shows the main SMS window opened to the CCS (**Prepaid Charging**) application menu.

Figure 1-3   SMS GUI with CCS (Prepaid Charging) Menu
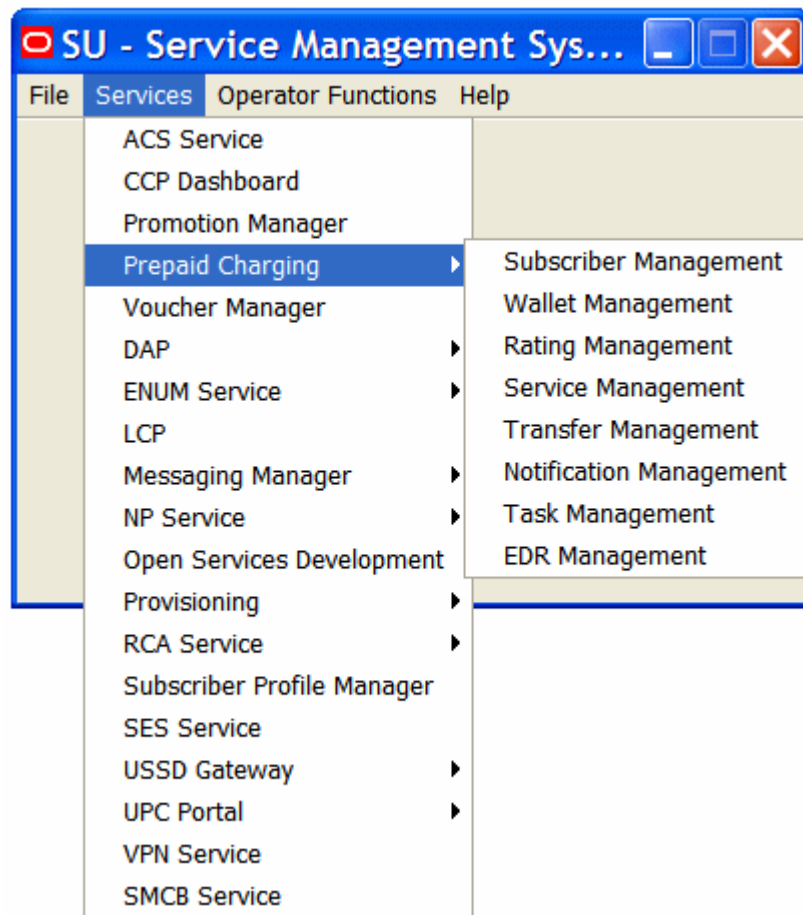
Figure 1-4 shows the ACS window.

Figure 1-4   ACS Window

In addition to ACS and CCS, Convergent Charging Controller includes the following applications:

- Messaging Manager provides a messaging system for mobile networks. Messaging Manager components operating at the network layer can route traffic and perform protocol translation between different services.

- Number Portability Service Pack provides call routing based on number portability. You can configure number portability in control plans.

- Promotion Manager is a Convergent Charging Controller service used for setting up promotions; for example, setting up counters to track subscriber usage.

- Subscriber Event Service (SES) is a Convergent Charging Controller service that enables service providers to send text messages to subscribers who roam in and out of the home network. For example, a service provider greets inbound messages with a welcome message.

Network and Messaging Protocol Support

Convergent Charging Controller includes several components that support various messaging and network protocols:

- CAP3 SMS Gateway translates CAP v3 SMS INAP operations to the CAP v2 equivalent. This application supports charging for SMS messages.

- CDMA (U-CA-IS41) enables the IS-41 protocol to provide phone services to subscribers on CDMA networks.

- Data Access Pack (DAP) is an extension module that you can configure in control plans to communicate with external systems by using SOAP, XML, HPSA, and PIXML.

- Diameter Control Agent (DCA) translates Diameter messages. DCA is the Convergent Charging Controller Diameter south-bound charging interface to network elements, such as SMSC/MMSC and GGSN. Diameter messages are used for authentication, authorization, and accounting (AAA). You use Diameter to control calls based on the caller's balance; for example, to see if there is enough cash balance to make a call.

- Diameter Charging Driver (DCD) supports prepaid charging by managing authentication, authorization, and accounting (AAA). DCD is the Convergent Charging Controller Diameter north-bound charging interface to third-party billing systems. DCD supports the RFC 3588 and RFC 4006 Diameter protocols.

- LDAP Control Agent maps billing requests between LDAP and Convergent Charging Controller.

- Radius Control Agent (RCA) enables integration between a RADIUS server and Convergent Charging Controller.

- Session Control Agent (SCA) is a SIP-transparent back-to-back user agent (B2BUA), redirect server, proxy server, and registrar. It provides support for SIP/SIMPLE messaging and integrated triggering capabilities. The SCA enables real-time charging, instant messaging, and personal mobility in SIP-based next generation networks and in the IP Multimedia Subsystem (such as 3GPP IMS and 3GPP2 MMD).

- SIGTRAN Transaction Capabilities Application Part (TCAP) Interface integrates Convergent Charging Controller with a TCAP stack.

- Short Message Services (SMS) Center enables applications to send messages to an SMS center by using Universal Computer Protocol (UCP).

- Short Message Service Email Interface (SEI) enables sending and receiving email on a mobile phone by using Short Message Service (SMS).

- Universal Call Agent for ISUP provides Intelligent Network functionality by using fixed connections between incoming and outgoing calls. This prevents the need to upgrade or replace non-SS7 capable switches.

- Unstructured Supplementary Service Data (USSD) Gateway enables USSD messages and International Mobile Subscriber Identity (IMSI) management.

- Virtual Private Network (VPN) service enables VPN networks on an IN system.

Convergent Charging Controller Interface Components

Convergent Charging Controller includes the following components to support network interfaces:

- EDR Control Agent (ECA) translates event data records (EDRs) into online session trigger messages, which are sent to a Convergent Charging Controller application. Convergent Charging Controller can use the content of the IDR messages in control plans, and respond to the originator. For example, you can find data about calls, such as the SIM that was used, and process the call differently based on the data.

- ENUM Control Agent uses E.164 Number Mapping (ENUM) to translate numbers from the E.164 standard to a Universal Resource Identifier (URI) or IP address.

- Location Capabilities Pack (LCP) finds the location of the caller. LCP enables a caller to establish a roaming call on a foreign network.

- Open Services Development (OSD) enables control plans to read from WSDL files.

- Short Message Charging Bundle (SMCB) enables billing of SMS messages.

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About Call Routing and Call Management

This chapter provides an overview of Oracle Communications Convergent Charging Controller call routing and call management.

About Controlling Calls

To control phone calls in Convergent Charging Controller, you create control plans. Control plans define how a call is handled from when Convergent Charging Controller receives it until Convergent Charging Controller sends it to its destination. Typical call-control configuration tasks include:

- Configuring number normalization.
- Configuring how to handle responses from the destination number; for example, no answer, number busy, or number not found.
- Configuring call routing; for example:
    - Routing based on geographic location or time of day
    - Least-cost routing
    - Routing based on hunting lists
    - Load balancing
    - Transferring a call from one service to another
- Configuring interactive voice response (IVR); for example, present menu choices to subscribers
- Configuring call completion

About Call Barring

> **Note:**
>
> This section describes call barring in the Prepaid Charging feature. You can also configure call barring by using the USSD Gateway, Messaging Manager, and Virtual Private Network (VPN) Service. See the documentation for those features for more information.

Call barring allows you to restrict incoming and outgoing calls based on a set of phone numbers or prefixes. For example, you can define a list of outgoing numbers (destination numbers) that are barred for each customer or a list of incoming calls that are barred for each subscriber.

To configure call barring, you do the following:

- Create barred and allowed prefixes or numbers; for example, a list of numbers that are barred from calling a subscriber.

- Configure control plans that check the incoming or outgoing calls against the barred and allowed numbers stored in the SMF database, to determine if the call is allowed.

About Creating Barred/Allowed Lists

To create barred/allowed lists, you use the Service Management System (SMS) application, which stores the barred/allowed lists in the SMF database. The numbers in the lists are available to feature nodes in control plans.

You cannot define a list of barred numbers and a list of allowed numbers for the same entity; for example, a subscriber cannot have an allowed list and a barred list.

You can define barred and allowed numbers for the following:

- The system. You can define a system wide barred/allowed list in the Prepaid Charging Service Management configuration.

- Customers. Each customer can have one list of barred or allowed outgoing numbers, and one list of barred or allowed incoming numbers.

- Subscribers. You can define a list of barred or allowed numbers when you create a subscriber. You can also use Customer Care Portal and the Provisioning Interface to add or remove barred and allowed numbers to or from existing subscriber accounts.

- Product types. You can define the outgoing numbers that are allowed or barred for subscribers that use the product type.

- Service numbers. Each service number can have an incoming barred/allowed list. For example, you can restrict who can call the service number.

- CLI numbers. Each CLI number can have an incoming barred/allowed list. For example, you can restrict who can call the CLI number.

About Configuring Call Barring in Control Plans

After you have stored barred and allowed numbers in the database, you can create control plans that use those numbers. The most commonly used feature node for implementing call barring is Prefix Tree Branching.

The Prefix Tree Branching feature node reads a prefix tree, compares some data (for example, the calling number) to the contents of the prefix tree, and exits with either no match, partial match (prefix only), or full number match.

For example, to implement call barring based on a customer's outgoing message barred list:

1. The Prefix Tree Branching feature node reads the customer's outgoing barred numbers list.

2. The Prefix Tree Branching feature node compares the outgoing number to the numbers in the prefix tree.

3. If no match is found, the next feature node continues the call. If a match is found, the control plan is branched into a resolution that might include an announcement feature node, a call termination feature node, or both.

You can also use the following feature nodes to implement call barring:

- Calling Party Category. This feature node routes calls based on custom categories of incoming calls; for example, calls originating in hotels.

- Check Limitations. This feature node performs call barring for Friends and Family, Messaging Manager, and other features.

About Call Forwarding

Convergent Charging Controller includes the following feature nodes that support call forwarding:

- Branch On Call Forwarding Pending. This feature node branches depending on if call forwarding is pending. This feature uses the CAMEL Application Part (CAP) specification callForwardingSS-Pending operation as input. The exits are Pending and Not Pending, based on whether or not the operation occurred.

- Call Forwarded Branching. This feature node branches depending on if a call has been forwarded. This feature node receives input from a Service Switching Point (SSP) using the CAP specification. The exits are Call Forwarded and Call Not Forwarded.

- Branch on ERRB Cause Code. This feature node branches depending on if a call has been forwarded. This feature node receives input from a Request Report Basic Call State Model (BCSM) Event operation. One of the standard exits is Call Forwarded.

Figure 2-1 shows the service logic that plays an announcement if a call is forwarded.

Figure 2-1   Playing a Call Forwarding Announcement

About Configuring Interactive Voice Response

You can configure interactive voice response (IVR) in control plans to collect phone numbers from subscribers, or to create a response-driven series of choices, leading to different call terminations. IVR can be used for subscriber self-care, recharging, or any other functionality that requires input from the subscriber.

IVR requires two elements:

- Announcements to prompt the caller to enter input. See "About Announcements" for information.

- The caller's input, entered by using the keypad. This can be a phone number, or a single digit that transitions the caller to another choice in an IVR process.

The primary feature nodes for configuring IVR are:

- Selection Dependent Routing. You use this feature node to route an IVR session based on single digits entered by the subscriber; for example, "Press 1 to talk to technical support."

- Collect Digits to Pending TN. You use this feature node to get a phone number from a caller.

- Collect Digits to Buffer. You use this feature node to get a phone number or any other numeric data from a caller.

- Collect Digits to Sub-tag. You use this feature node to save the number to a subtag in a profile block. For example, this node adds speed-dial numbers to a subtag in the Speed Dial Block.

About Routing an IVR Session

Use the Selection Dependent Routing feature node to route an IVR session based on single digits entered by the caller. You can configure up to 20 branches. For example, you can configure:

- Pressing star (*) routes to Branch 1.

- Pressing pound (#) routes to Branch 2.

- Pressing 0 routes to Branch 3.

You can configure three types of announcements:

- An announcement that prompts the caller to press a key.

- An announcement that prompts the caller if no input is received after a specific time. This is the timeout announcement.

- An announcement that plays if the caller presses an invalid key.

You can specify the maximum number of times that an announcement is played, and the duration allowed before an announcement is repeated. When an announcement is repeated more than the maximum number of times allowed, the feature node exits as not collected. If the caller hangs up, or there is a network error, the feature node exits as abandoned.

About Collecting Numbers from Callers

To collect numbers from callers, you use the Collect Digits to Pending TN feature node and Collect Digits to Buffer feature node. These feature nodes perform almost the same function. The only difference is that Collect Digits to Pending TN only gets the pending termination number and Collect Digits to Buffer can get any numeric data, including the pending termination number.

Use Collect Digits to Buffer to collect data from a caller and store it for future use. For example, you might offer a prepaid service that prompts the caller to enter the destination phone number.

> **✎ Note:**
>
> Collect Digits to Buffer can store the caller's input in any buffer. Be careful to not choose a buffer that already has data needed by another feature node.

For both feature nodes you configure the following elements:

- Announcements. The main announcement asks the caller to enter a number; for example, "Please enter the international phone number that you wish to call, followed by the pound key." The retry announcement plays if the input is not correct. You can specify the number of retries and timeout value for both messages.

- How to validate the data that the caller enters.

  - You can specify the minimum and maximum number of digits.

  - You can specify a prefix that the user must enter.

  - For telephone numbers, you can specify that the number is within the service provider's termination numbers range.

- A key for the caller to press to cancel the entry, and a key to press after entering the number.

- Where to store the data that is entered. For example, to collect a phone number, you store the data in the CC Pending Termination Field in outgoing session data.

  If you specify CC Pending Termination Number, you need to specify the type of number to collect:

  - Off net

  - On net

  - Speed dial

  - Service number

  - CLI

  The type of number value is copied to the Pending TN Type. This can be used by other feature nodes; for example, the Test Pending TN Type feature node. See "About Termination Number Types" for more information.

If the caller fails to submit a valid number within the allowed number of retries, the feature node exits as not updated. If the caller hangs up or there is a network error, the feature node exits as abandoned.

About Adding a Number to a Subtag

You use the Collect Digits to Sub-tag feature node to add a number to a subtag in a profile block; for example, to add a speed-dial number to the Speed Dial Block.

To use the feature node, you configure the following elements:

- Announcements. The main announcement asks the caller to enter a number; for example, "Please enter the international phone number that you wish to call, followed by the hash or pound key." The retry announcement plays if the input is not correct. You can specify the number of retries and timeout value for both messages.

- The minimum and maximum values that can be entered. For example, if you allow speed-dial numbers 1 through 10, 1 is the minimum and 10 is that maximum.

If the caller fails to submit a valid number within the number of retries, the feature node exits as not updated. If the caller hangs up or there is a network error, the feature node exits as abandoned.

About Terminating Calls

You control how calls are terminated by configuring termination numbers. A termination number is the final number that a call terminates to. You can use termination numbers as follows:

- Specify the number that is being called.
- Configure how to terminate unsuccessful calls.
- Configure toll-free calls.
- Send calls to voice mail.

To configure call termination, you do the following:

- Configure termination number ranges for each customer.
- Configure number termination in control plans.

About Configuring Termination Number Ranges

You configure termination number ranges for each customer. Termination number ranges validate the input of the number being called. For example, a customer might require a range of prefixes; such as 0800 to allow calls to 800 numbers, or 040 to allow calls to terminate to numbers with the 040 prefix.

You can also define a system-wide default termination number range. This range is used in control plans when specifying termination numbers. When assigning resources to a customer, you specify to use one of the following:

- The default termination number range
- The customer's termination number range
- No termination number range; in this case, no validation is performed on termination numbers

You use the SMS application to configure termination number ranges. Customers cannot define or edit their own termination number ranges; only a system administrator can.

> ✏ **Note:**
>
> If you edit a termination number range that is used by a control plan, the control plan is recompiled.

In addition to termination number ranges, you can define a default termination number for each customer. This number is used when no other valid termination number is found in a control plan. The default termination number must be in the customer's termination number range.

About Configuring Number Termination in Control Plans

A call termination numbers is held in the Convergent Charging Controller PendingTN variable. This variable is used by the Terminate to Pending TN feature node to find the number to terminate the call to.

> **Note:**
>
> In the Control Plan Editor GUI, the Pending TN variable is referred to as the CC Pending Termination Number variable.

When a control plan starts, the PendingTN variable is set from a value you specify in the **acs.conf** file; specifically, the pendingTNSourceparameter in a ServiceEntry configuration line. (See "About Setting the PendingTN Variable" for more information.) The control plan feature nodes can modify the PendingTN value, or replace it. If the PendingTN value is not changed by a control plan, it is used to populate the destinationRoutingAddress (DRA) parameter in Connect operations sent to the service switching point (SSP).

When configuring call termination, you can configure to terminate calls conditionally or unconditionally.

- When you configure conditional termination, the feature node includes exits to handle the following conditions:
  - The call is successful.
  - The line is busy.
  - There is no answer. You can set a timer to specify how long to wait before exiting.
  - The caller hangs up.
  - There was a network failure.
  - The network is congested.
- When you configure unconditional termination, there is only one exit.

When you configure conditional termination, you have the following options:

- Most number termination is handled by the Attempt Terminate to Pending TN feature node. This terminates the call to the number currently in the PendingTN variable.

  You can optionally use this feature node to implement least-cost routing. To do so, you enter location data for the number prefix.

- To terminate a call to a number without charging the caller, use the Attempt Terminate to Pending TN with Duration feature node. For example, you could use this feature node to connect to a subscription weather service. You can specify a maximum duration for the call.

- To terminate to a specific number, use the Attempt Termination feature node.

When you configure unconditional termination, you have these options:

- You can terminate the call to the number that was dialed. To do so, use the Terminate Unchanged feature node.

- You can terminate the call to the number currently in the PendingTN variable. To do so, use the Terminate to Pending TN feature node.

- You can terminate the number to a single number. To do so, use the Unconditional Termination feature node.

About Setting the PendingTN Variable

The PendingTN variable is filled in by default, as configured in the **acs.conf** file; specifically, in the pendingTNSource parameter in a ServiceEntry configuration line. You can change the number in the PendingTN variable. For example:

- Use the Collect Digits to Pending TN feature node to get a termination number from a caller who is using the IVR.
- Use the Number Lookup and Translation feature node to replace the PendingTN variable with a previously-stored number, or with a number provided by the caller.
- Use the Set Pending TN from Profile feature node to set the PendingTN variable from another data source.

About Termination Number Types

In addition to the PendingTN variable, Convergent Charging Controller uses the PendingTNType to specify the termination number type. The types are:

- Unknown.
- Public Network Number. This is a number that accesses the PSTN directly (sometimes called an off-net number).
- Private Network Number. This is a number that passes through a private network on its way to the PSTN (sometimes called an on-net number). For example, this number might be used in a "dial 1 to get out" scenario.
- Speed Dial.
- Service Number.
- CLI.

You can use termination number types in feature nodes; for example:

- You can use the Test Pending TN Type feature node to branch a control plan based on the termination number type.
- You can specify the termination number type in the Collect Digits to Buffer feature node, used in IVR scenarios.

About Announcements

You use announcements to communicate with callers; for example, to play messages such as:

- "Please enter the international destination number that you wish to call, then press the hash key."
- "There is insufficient balance in your card for this call. Please purchase another card."

To use announcements, you do the following:

- Create announcements and announcement sets in Advanced Calling Services (ACS).
- Configure announcements in control plans.

You can create variable announcement rules (VARs) that choose from a set of announcements based on conditions. For example, a variable announcement rule might specify to play a different version of an announcement based on the amount of messages in a subscriber's balance.

About Creating Announcements and Announcement Sets

To create announcements, you record the announcements and store them on an intelligent peripheral.

You configure announcement sets in ACS as follows:

- Assign a resource name and resource ID to each announcement. The resource name is the name of the intelligent peripheral that stores the recording. The ID is the number of the audio file that contains the announcement.
- Configure variable announcements. See"About Configuring Variable Announcements" for information.
- Assign each announcement to a language. It is typical to have multiple language versions of the same announcement. All of the versions would have a different resource ID.
- Assign each announcement to an announcement set. You use announcement sets to organize announcements. You can flag an announcement set as public to allow it to be used by any customer.

About Configuring Variable Announcements

To configure variable announcements, you use variable announcement rule sets. Each rule includes a number of conditions that determine the content of the message. After you configure variable announcement rules, you map the rules to an announcement resource name and resource ID.

About Configuring Announcements for Product Types

When you configure product types in CCS, you can specify the following announcements for each product type:

- The announcement that alerts the caller that they have a limited amount of credit remaining.
- The announcement that is played when a subscriber swaps products.

About Setting Announcement Resource Limits

When you configure resource limits for customers, you can specify the maximum number of announcement sets and maximum number of announcements that a customer can use.

About Configuring Languages

Each announcement must be assigned to a language. You need to create announcements in ACS for every language you use. You can also assign a default language for each customer, and a language for each subscriber.

About the Global Toll-Free Beep Announcement

You use ACS to configure global properties, such as the toll-free beep announcement. This announcement must be on a CS2 INMAP capable SSP.

About Using Announcements in Control Plans

There are two feature nodes that have the sole purpose of playing announcements: the Play Announcement feature node and the Play Variable Part Announcement feature node. There are many feature nodes that play announcements as part of their functionality. For example, the PIN Authorization feature node plays an announcement that asks for the subscriber's PIN.

3

About Charging

This chapter provides an overview of Oracle Communications Convergent Charging Controller rating.

About Charging

To charge for services, you use Convergent Charging Controller to rate service usage and determine the charge. A rate is the amount to charge; for example, two cents per minute for voice calls, 20 cents per megabyte for data usage, or 5 cents to send an SMS.

You can use Convergent Charging Controller to rate:

- Voice calls
- Data sessions
- Events, such as SMS messages
- Periodic charges, such as subscription charges

You can configure rating based on:

- Duration; for example, the length of the call
- Volume; for example, the number of bytes downloaded
- Geographic location of where the service originated; for example, where the calling number is located
- Geographic location of the service destination; for example, where the number that was called is located
- Time of day
- Day of the week, and holidays

You can manage rating by specifying:

- Minimum or maximum charge for a call or data transfer
- Announcements to subscribers; for example, a low-credit announcement
- Discounts and free minutes

How Convergent Charging Controller Rates are Defined

In Convergent Charging Controller, rating is performed by assigning a charge to a call, based on the origin and destination of the call; for example, ten cents per minute for a call from London to Paris.

Two elements are needed for rating: a charge period and a Calling Line Identifier (CLI) to Dialled Number (DN) tariff (CLI-DN tariff).

- A *charge period* specifies how much to charge for all or a portion of a call; for example, 10 cents for the first minute of a call, 5 cents for the next five minutes, and so on. You can include up to ten sets of charge periods in a *billing set*.

- *CLI-DN tariffs* use telephone prefixes to identify the call origin and destination. For example, a CLI-DN tariff might be assigned the following origin and destination:

    – Call origin: 3249

    – Call destination: 1440

You rate calls by assigning the charges in charge periods to the origins and destinations defined in CLI-DN tariffs. For example, CLI-DN tariffs might be used to configure the following rates:

CLI (Call Origin)	DN (Call Destination)	Charge Period	Charge
3249	1440	0 to 5 minutes	2 cents per minute
3249	1440	Over 5 minutes	1 cent per minute

> **Note:**
>
> You can also use charge periods to rate by quantity. In that case, the charge periods are sets of data quantity; for example, the first 200 megabytes downloaded, the second 200 megabytes downloaded, and so on.

Figure 3-1 shows part of the dialog box used for defining a CLI-DN tariff. In this figure, the tariff defines a rate for calls originating in the United Kingdom, and terminating in Ipswich. The charge period is assigned to Billing Set 01. In this example, assume that Billing Set 01 includes the following charge periods:

- 0 to 5 minutes: 2 pence per minute

- Over 5 minutes: 1 pence per minute

A six-minute call that used this CLI-DN tariff would have a charge of 11 pence; 10 pence for the first 5 minutes, and 1 pence for the last minute.

Figure 3-1   CLI-DN Tariff Dialog Box

> **Note:**
>
> CLI-DN tariffs are the standard tariffs used by Convergent Charging Controller, but you can override them by creating weekly tariffs and holiday tariffs.

After you have defined CLI-DN rates, you need to configure more rating elements to enable Convergent Charging Controller to find the correct rate to use for a call. You create the following elements:

- Product types
- Tariff plans
- Tariff plan selectors
- Rate tables

- Geography sets

You create those elements to organize rates used for different services, and used by different service providers. Convergent Charging Controller uses them to find the rate as follows:

1. When a subscriber purchases a service, such as a telephone service, the subscriber is assigned a product type.

2. When initiating a call, the service loader uses the customer's phone number to find the product type to use for rating and controlling the call.

3. The product type includes a tariff plan. Convergent Charging Controller uses the tariff plan selector to find the rate table associated with the tariff plan.

4. The rate table includes a set of CLI-DN tariffs that can be used. In Figure 3-1 the rate table is Rate Table 01. Convergent Charging Controller finds the rates to use by looking in the rate table.

5. Convergent Charging Controller uses a geography set to look up the call destination and origin. Figure 3-1 shows the geography set UK, which defines the locations Ipswich (prefix 01473) and UK (prefix 44).

6. Based on the call origin and destination, Convergent Charging Controller uses the appropriate CLI-DN tariff to rate the call.

Figure 3-2 shows a simplified workflow showing how Convergent Charging Controller finds the rate to use for a call.

Figure 3-2   Simplified Workflow for Finding a CLI-DN Tariff

About Configuring Charging

To configure rating, you create the following elements in Convergent Charging Controller:

- **Charge periods and charge period sets**. A charge period specifies how much to charge for the duration of a call, or the volume of data; for example, ten cents per minute. You create charge period sets to apply multiple charge periods to a call; for example, 10 cents per minute for the first five minutes, and three cents per minute for the next 20 minutes. A charge period set can include 10 charge periods.

- **Calling Line Identifier (CLI) to Dialled Number (DN) tariffs (CLI-DN tariffs).** You use CLI-DN tariffs to rate calls according to geographic location, as defined by telephone prefixes.

    CLI-DN tariffs are the tariffs used by Convergent Charging Controller to rate calls, unless overridden by weekly tariffs or holiday tariffs.

    The CLI-DN tariff for a call is always chosen according to the closest matching link across a geography set. You define geographic locations by creating geography sets in the Advanced Control Services (ACS) GUI.

- **Geography sets.** You use geography sets to define the geographic locations used by CLI-DN tariffs. Geography sets are defined by groups of telephone prefixes. For example, you can create a Mobile Belgium geography set that includes the prefixes 3249, 3247, and 3248.

- **Holiday sets.** You can provide discounts based on holidays; for example, a 50% discount on New Year's Day. Holiday sets define the days that you can use as holidays. You configure holiday sets in ACS.

- **Holiday tariffs.** You use holiday tariffs to configure rating according to specific days of the year; for example, to provide a discount on all calls made on New Year's Day.

- **Weekly tariffs.** You use weekly tariffs to define peak and off-peak times for rating. For example, you can specify that all calls from 5:00 p.m. Friday until 6:00 a.m. Monday have a maximum charge of $5.00.

- **Balance type cascades.** A balance type cascade specifies the balance types that are used when rating, and the order in which they are used. For example, you might configure a balance type cascade that first consumes from the Promotional Cash balance type and then from the General Cash balance type.

- **Rate tables.** You use rate tables to organize how you charge for services. Rate tables include:

  - One or more geography sets. Geography sets define the prefixes that can be used for determining rates.

  - One or more holiday sets. Holiday sets define the days of the year that you can assign holiday tariffs to.

  - Whether to rate by duration or volume.

  - A default reservation configuration, to manage reserved credit in the event of a network failure.

- **Tariff plans.** Tariff plans provide a mapping between product types and rate tables. When initiating a call, the service loader finds the product type to use, which points to the *tariff plan selector*, where tariff plans are mapped to rate tables.

- **Discount periods.** You use discount periods to assign discounts, such as 10% off of the calculated rate. The discounts are applied based on the configured charge periods. Discount periods are used by weekly and holiday tariffs.

About Friends and Destinations Discounts and Friends and Family Discounts

This section provides an example of how to use Convergent Charging Controller to configure a customer offering.

Friends and Family discounts and Friends and Destination discounts apply a discounted rate to specified number prefixes (Friends and Destinations) or MSISDN numbers (Friends and Family).

When a subscriber uses a Friends and Destination discount, calls to a specified prefix or group of prefixes are discounted. For example, to set up a discount for all calls within the subscriber's county, you create a group of all the prefixes in that county.

When a subscriber uses a Friends and Family discount, the subscriber defines a list of MSISDN numbers that are discounted. The discount is applied based on how many numbers are on the list. For example, if there is one number on the list, and the discount is 10%, calls to that number are discounted 10%. If there are ten numbers on the list, calls to any of those numbers are discounted by 1%.

To enable Friends and Destination and Friends and Family discounts, you do the following:

- Use the Charging Control Services (CCS) application to configure limitations for the discounts; for example, the percentage discount that can be applied, or a list of prefixes that are allowed for the discount. To do so, you configure properties in Product Types and in Service Providers.

- Configure control plans that enable the discounts for subscribers. The control plans enable subscriber self-care. Subscribers can add numbers and prefixes to specify which destination calls are discounted.

- Subscribers can use the self-care interface to set up their own discounts. You can also use CCS Customer Care Portal to assign the discounts to the subscriber's profile. You can use the Provisioning Interface (PI) commands to add, delete, and change discount numbers and prefixes belonging to a subscriber.

- You can charge customers for changes made to their discount numbers and prefixes. Typically, you allow a specified number of changes for free by giving a discount such as Free Changes. Convergent Charging Controller tracks the number of changes made, and can start charging for each change after the amount in the Free Changes discount has been used up. You can also charge a monthly fee for the discount.

> **Note:**
>
> Convergent Charging Controller creates EDRs for successful and unsuccessful changes to friends and destination prefixes and friends and family numbers.

Convergent Charging Controller includes two service templates that you can use to implement Friends and Destination discounts and Friends and Family Discounts. These service templates include predefined control plans, product types, and notifications that you can modify.

About Configuring Friends and Destination Discounts

To configure Friends and Destination discounts, you configure the following:

- Limitations for each service provider, such as prefixes that cannot be used

- The discount amount for each product type

- How the discount works in control plans

About Configuring Friends and Destination Discounts for Service Providers

In the Charging Control Services application, you can configure the following for each service provider:

- Create black lists of Friends and Destinations prefixes. Those prefixes cannot be used for Friends and Destinations discounts.

- Create prefix groups by mapping prefix numbers to announcements. You can create a maximum of 100 mappings.

You define groups of prefixes by mapping prefixes to an announcement that is played to the caller who is using the Friends and Destination IVP configuration service. For example, you might map prefixes 3215 and 3216 to the announcement named FD Area 1. If the subscriber's Friends and Destination service is configured to use the FD Area 1 announcement, calls to those prefixes are discounted.

> **Note:**
>
> You must create announcements before you map prefixes to them.

About Configuring Friends and Destinations Discounts in Product Types

In the Charging Control Services application, you can configure how the Friends and Destinations discount works for each product type. You can specify:

* The discount amount; for example, 10%.

* The number of times a subscriber can make changes to the Friends and Destinations configuration without getting charged for making the change.

About Configuring Friends and Destinations Discounts in Control Plans

To implement Friends and Destination discounts in a control plan, you use the following feature nodes:

* Friends and Destination Menu. The Friends and Destination Menu feature node provides access to either the Friends and Discounts configuration or the Friends and Family configuration. When activated, the feature node tells the user which discount is active (if any), and asks which discount the subscriber wants to configure.

  When applying a discount to a group of prefixes, the announcement that is configured for Friends and Destinations is the announcement that the prefixes are mapped to.

* Friends and Destination Configuration. The Friends and Destination Configuration feature node enables callers to maintain their Friends and Destination discount prefixes. A caller can activate the discount, add prefixes, delete prefixes, and change existing prefixes.

  In addition, you can configure the following:

  – The maximum number of retries allowed for entering digits

  – The length of time in seconds after the main announcement is played before the call is disconnected

  – Timeout intervals used for prompt announcements, list cycling, and list start

  – Whether to send an SMS text message information about the change and the cost

  – A list of event types that can be billed

  – A list of events for the event types selected

* Friends and Destination Discount. The Friends and Destination Discount feature node enables the Friends and Family discount or Friends and Destination discount. You can specify if the discount applies to the caller's prefix, or to a group of prefixes.

* Check Limitations. The Check Limitations feature node compares the contents of a number profile block against the limitations for a specified limited type.

* Get Destination Prefix. The Get Destination Prefix feature node retrieves the longest matching favorite destination prefix for a provided number.

* Produce Destination Prefix Tree. The Produce Destination Prefix Tree feature node produces a prefix tree from the provided destination prefix. The feature node uses the destination prefix to look up the destination announcement configured in friends and destination. All prefixes mapped to the same announcement as the destination prefix are found. A prefix tree of all the found prefixes is produced (including the destination prefix).

- Play Destination. The Play Destination feature node plays to the caller the destination announcement associated with the provided destination prefix. The feature node uses the destination prefix to look up the destination announcement configured in friends and destination.

About Configuring Friends and Family Discounts

To configure Friends and Family discounts, you configure the following:

- Limitations for each service provider
- The discount amount for each product type
- How the discount works in control plans

About Configuring Friends and Family Discounts for Service Providers

In the Charging Control Services application, you can configure black lists of Friends and Family numbers for each service provider. Those numbers cannot be used for Friends and Family discounts.

About Configuring Friends and Families Discounts in Product Types

In the Charging Control Services application, you can configure how the Friends and Family discount works for each product type. You can specify:

- The discount amount; for example, 10%.
- The number of times a subscriber can make changes to the Friends and Family configuration without getting charged for making the change.
- The maximum number of Friends and Family numbers that the subscriber can add.
- A list of numbers that can be either a list of allowed numbers or a list of numbers that are not allowed for the product type. This list is called the Friends and Family white list.

About Configuring Friends and Family Discounts in Control Plans

To implement Friends and Family discounts in a control plan, you use the following feature nodes:

- Friends and Destination Menu. The Friends and Destination Menu feature node provides access to either the Friends and Discounts configuration or the Friends and Family configuration. When activated, the feature node tells the user which discount is active (if any), and asks which discount the subscriber wants to configure.
- Friends and Family Configuration. The Friends and Family Configuration feature node enables callers to maintain their Friends and Family Service Number List. A caller can activate the discount, review the current list of numbers, add numbers, remove numbers, and edit existing numbers. You can configure announcements to guide the caller through the operations.

  In addition, you can configure the following:

  - The maximum number of times a caller can enter a disallowed number.
  - The length of time in seconds after the main announcement is played before the call is disconnected
  - The length of time in seconds a list announcement is played before the call is disconnected

- Timeout intervals used for prompt announcements, list cycling, and list start

- Whether to send an SMS text message information about the change and the cost

- A list of event types that can be billed

- A list of events for the event types selected

- Check Limitations. The Check Limitations feature node compares the contents of a number profile block against the limitations for a specified limited type.

4

About Managing Subscribers

This chapter describes how to create and manage subscribers in Oracle Communications Convergent Charging Controller.

About Subscribers

A subscriber is a person who has purchased a service, such as a telephone service. Each subscriber has an account in Convergent Charging Controller. Each account includes:

- One of the following:
  - A subscriber ID (an MSISDN, or CLI). When a call is made, Convergent Charging Controller determines which wallet to charge based on the MSISDN or CLI of the caller.
  - A card number. The subscriber has a card printed with the card number, which is used when making a prepaid call.
- At least one wallet (the primary wallet). A wallet stores the balances owned by the subscriber; for example, a balance for cash, and a balance for free SMS messages. A secondary wallet can be used for cases such as shared wallets, or a primary business wallet and a secondary personal wallet.

You can add subscribers by using the following methods:

- Use the Provisioning Interface (PI) to create accounts without having to use a customer service representative (CSR). This method can create accounts in bulk; a much faster method than by creating them individually.
- Use the SMS application to create individual subscribers, or to create a batch of subscribers.

You can manage existing customers by using the following methods:

- The PI
- The SMS GUI
- The Convergent Charging Controller Customer Care Portal (CCP)

About Creating Subscribers

When you create an account, you configure the following attributes:

- Account details:
  - Card number.
  - Subscriber ID.
  - PIN. The PIN is by subscribers to access their account; for example, to see their wallet balance.
  - Language.

- Whether the subscriber's number is visible to other users. You specify this by enabling or disabling the presentation restricted attribute.

- Whether incoming calls are disabled when the subscriber is roaming.

- Whether to disable the subscriber from using the service (blacklisted).

- Whether to allow or block incoming SMS messages.

- Allowed and barred numbers.

- Number translation for short codes; for example, for speed dialing.

- Credit-card information.

- Recharge information; for example, how often to recharge the wallet, and how much to recharge it with.

- Access to the IVR (remote access).

- Friends and Family configuration.

- The closed user groups to which the subscriber belongs.

- The balance topup rules that apply to the subscriber. The rules are used to allocate more items, such as additional notifications, to specified balance types regularly.

After a subscriber is created, you must configure the wallet for that subscriber.

About Creating a Batch of Subscribers

You can use the following methods to create batches of subscriber accounts:

- The **ccsAccount** utility

- The SMS application

- The Provisioning Interface (PI)

When you create accounts by batch, you specify a range of account numbers to create, as well as details about wallets, product types, and PINs.

About Subscriber Self-Care

Subscriber self-care enables subscribers to manage their accounts; for example:

- Get balance status, wallet status, and product information.

- Modify their account; for example, change the product type.

- Recharge their account.

You implement subscriber self-care by creating control plans that manage customer input and play announcements. For example, you can implement subscriber self-care as an interactive voice response (IVR) system.

About Configuring Interactive Voice Response (IVR)

You implement IVR by using control plans. When a subscriber calls a service number, the call is directed to a main menu, from which the subscriber makes choices that determine which functionality is presented. The main menu is implemented by using the Main Menu feature node.

Subscribers can use the IVR to do the following:

- **Get information about new products.** The What's New feature node implements this option. This node can play an announcement about new features, or route the caller to another number, which can supply more information about features.

- **Check account status.** The Account Status feature node implements this option. This node can play announcements for no credit, current balances, and the expiration date for current balances.

- **Change account options and product types.** The Personal Options Menu feature node implements this option. This node allows subscribers to change their account language and swap products.

- **Recharge wallets.** The Recharge Menu feature node implements this option. From the Recharge Menu feature node, the subscriber can recharge by using the following payment types:

  - **Voucher.** The Voucher Recharge feature node implements this option.

  - **Credit Card.** The Credit Card Recharge Menu feature node implements this option. Subscribers can recharge wallets, change their PIN, or change credit card information.

- **Get more information.** The Help Information feature node implements this option. This node plays any announcement you specify.

A subscriber can also exit the IVR by starting a call.

5

About Wallets and Vouchers

This chapter provides an overview of Oracle Communications Convergent Charging Controller wallets and vouchers.

About Wallets and Vouchers

A subscriber's *account* describes the subscriber, or person, who is purchasing services from the telecommunications provider. An account is identified by a Mobile Subscriber Integrated Services Digital Network (MSISDN) number, or more simply, a telephone number. Each account is also associated with at least a primary wallet but can also have a secondary wallet; for example, a primary wallet for the subscriber and a secondary wallet for the family, or a primary wallet for work and a secondary wallet for personal use. Wallets and vouchers are the mechanisms that Convergent Charging Controller uses to manage the financial transactions for a subscriber's account.

About Wallets

A *wallet* is a container or group of account balances and periodic services that belongs to a subscriber and is available to pay for prepaid services that the Convergent Charging Controller platform offers. The wallet determines what services the customer can use.

A subscriber, for example, could have a General Cash balance and a Free Notification balance in his or her wallet. Each balance has its own expiration date and any amount that remains after that date will be removed. A balance can also have one or more buckets, which are specific allocations of the balance that have their own value and, optionally, start and expiration dates. For example, a bucket might be ten cents of General Cash, or 20 megabytes of data, or 10 SMS messages.

A *shared wallet* is a wallet that is associated with a group of subscribers who can charge against it, such as a shared business wallet.

You create a new wallet when you add a new subscriber through the Service Management Service (SMS) **Subscriber Management** windows, through the Provisioning Interface, or through the **ccsAccount** utility. A wallet, too, has an expiration date, after which it is not usable, though it might contain balances that have not yet expired.

A wallet resides on a single Voucher and Wallet Server (VWS) pair, or domain.

A wallet has a life cycle that traditionally consists of the following states:

- Pre-use

  The initial state of a wallet after it is created.

- Active

  When a subscriber uses his or her account for any paid service for the first time, the wallet moves from the pre-use state into the active state. The initial expiration dates for the balances and the wallet are set when the wallet is activated. All services can be used in the active state.

- Dormant

If the subscriber does not use any services for a configurable period of time, the wallet is put in the dormant state. The dormant state is useful for reporting inactive subscribers. All services are still accessible to the subscriber.

- Frozen

  If fraudulent activity is detected on the subscriber account, the subscriber's wallet is placed into the frozen state. All services are disabled until an administrator manually intervenes.

- Suspended

  A subscriber's wallet is placed in the suspended state when an administrator temporarily disables it.

- Terminated

  When a wallet reaches its expiration date, it is placed in the terminated state. All services, except for customer care services, are disabled. Wallets may also be affected by bucket expiration dates. For more information about wallet and bucket expiration, see the discussion on wallet and bucket expiry in *Voucher and Wallet Server Technical Guide*.

You can also define your own flexible wallet life cycle and specify the duration of the life cycle periods and the services that are available during each period. For example, services could include sending notifications, adding service logic, and adding charge restrictions, as well as others.

About Balances

A subscriber's *balance* is the amount or value that the subscriber has available in the wallet to pay for services. Balances can have different sorts of values, which are described by *balance types*. Examples of balance types could be cash, free minutes, free text messages, a data allowance, and so on. You must associate each balance type with the specific services for which it can be used.

Each balance type is also associated with a *balance unit* that specifies the type of currency, or value, that is used for that balance type. Balance units can be either cash or non-cash. For example, a balance type of free text messages could be associated with a balance unit of SMS (Short Message Service) messages or a balance type of free minutes could have a balance unit of time.

If a balance has an expiration date, any available credit is lost after that date.

About Recharging

Subscribers can recharge their balances in the following ways:

- Through a voucher, using either interactive voice response (IVR), an SMS message, or direct dial

- Through a provisioning interface (PI) with an external mechanism such as an ATM, a credit card, or a web application

- Through a payment gateway that can be integrated through web services with the Convergent Charging Controller SLC

A recharge extends the expiration date of a balance and wallet by the amount of time specified in the voucher, unless the current expiration date is later than the end of the extended period.

To help prevent the fraudulent use of vouchers, you can specify a maximum number of failed recharge attempts to allow within a twenty-four hour period. If the maximum is exceeded, the subscriber's account is placed in the frozen state.

About Vouchers

A *voucher* is a credit coupon that adds value to a wallet balance. (A *scratch card* is an older form of a voucher that requires the subscriber to enter a serial number.)

You can create vouchers either by running **ccsVoucher** scripts or by using the Voucher Manager windows in the SMS GUI. You can also create batches of vouchers through the Voucher Batches tab by specifying starting and ending numbers.

A voucher specifies the product type for which it can be used and the balance type and amount to be credited. It also specifies a period during which it must be used and a point after first use at which any remaining credit expires.

A voucher or a batch of vouchers can have the following states:

- Created

  The voucher has been created but not activated.

- Active

  The voucher has been activated and is available to add value to a wallet.

- Frozen

  The voucher is no longer available for use although this state can be reversed by an operator.

- Locked

  An irreversible state in which the voucher is no longer available for use.

Redeeming a voucher *recharges* or adds value to the subscriber's wallet.A subscriber can redeem a voucher in a number of ways, depending on what self-care channels the operator has defined and configured. Possible channels could include an interactive voice response (IVR) menu in a control plan, through USSD, an SMS message, or a web application. A subscriber could also call a customer service representative who uses the Voucher Recharge tab in the Voucher Manager screens of the Service Management System.

Convergent Charging Controller does not address the logistics of voucher distribution. It simply allows you to produce an encrypted voucher batch file that you can send to a print shop.

About Managing Wallets and Vouchers

The Voucher and Wallet Server (VWS) manages all of the charging information associated with call processing, including processing of requests that affect wallets and vouchers.

The Voucher and Wallet Server performs the following management tasks:

- Manages subscriber accounts
- Manages multiple wallets and balance types
- Rates services in real-time
- Provides structure for tariffs on transactions
- Processes reservation, debit, and credit requests
- Manages vouchers, including
  - Voucher query and redemption requests
  - Failover and machine redundancy

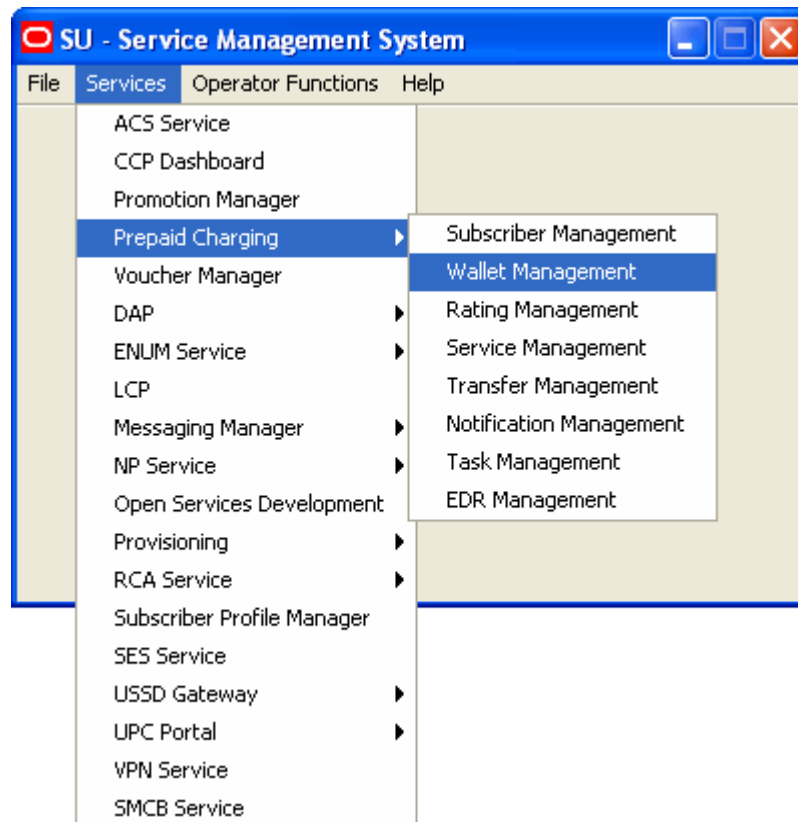– Event detail record (EDR) processing and archiving

For more information on the Voucher and Wallet Server, see "About the Voucher and Wallet Server".

About Wallet Management

Wallet management services are available from the **Services** menu in the SMS GUI.
Figure 5-1 shows the **Wallet Management** menu item:

Figure 5-1   Wallet Management Menu Item in SMS

Wallet management services provide the ability to perform the following tasks:

*   Add, edit, or delete tracker plans

    Tracker plans allow you to define counters that track a subscriber's usage or expenditure within a configured promotion period, or to reward a subscriber for expenditure either in real time or at the end of a period.

*   Add, edit, or delete balance units

*   Add, edit, or delete balance translations

   When Convergent Charging Controller is integrated with an external online charging system (OCS), balance translations allow you to associate Convergent Charging Controller balance type names with the names that are used by the external system. For example, you might associate an Convergent Charging Controller balance type of General Cash with the translation name of Cash Balance, which is used by the external system.

- Add, edit, or delete reward product translations

  Reward product translations allow a service provider to transfer a subscriber from one product type to another based on a reward.

- Add, edit, or delete wallet name translations

  Wallet name translation allows you to translate the wallet type name to the specified language.

- Add, edit, or delete real-time notifications

  Real-time notifications allow you to send notifications to a subscriber, or an external or Convergent Charging Controller-based web service, or an application service provider (ASP) via DAP, for example, based on a wallet event such as a low or expired balance.

- Perform a free-form recharge

  A free-form recharge allows you to recharge a subscriber's wallets when the subscriber has experienced problems with a voucher or credit card recharge.

- Associate a wallet life cycle with a subscriber

  A wallet life cycle provides additional flexibility for the operator to define states around the wallet expiry date. A wallet life-cycle plan is linked with a single subscriber wallet.

- Add, edit, or delete bonus values

  Bonus types use bonus values to define the amount that triggers the award, the value of the award, and the balance that must be recharged to qualify for the reward.

- Add, edit, or delete, cumulative balance plans

  A cumulative balance plan allows you to assign balance categories to your plan and assign balance types to the balance categories.

- Add, edit, or delete periodic charge groups

  Periodic charge groups control which periodic charges a subscriber can transfer between using either the Periodic Charge Transfer feature node or the Charging Control Services (CCS) Customer Care Portal (CCP) GUI.

About Voucher Management

Voucher management services are available through the Voucher Manager item in the Services menu in the SMS GUI. Figure 5-2 shows the **Voucher Manager** menu item:

Figure 5-2   The Voucher Manager Item on the Services Menu of the SMS GUI
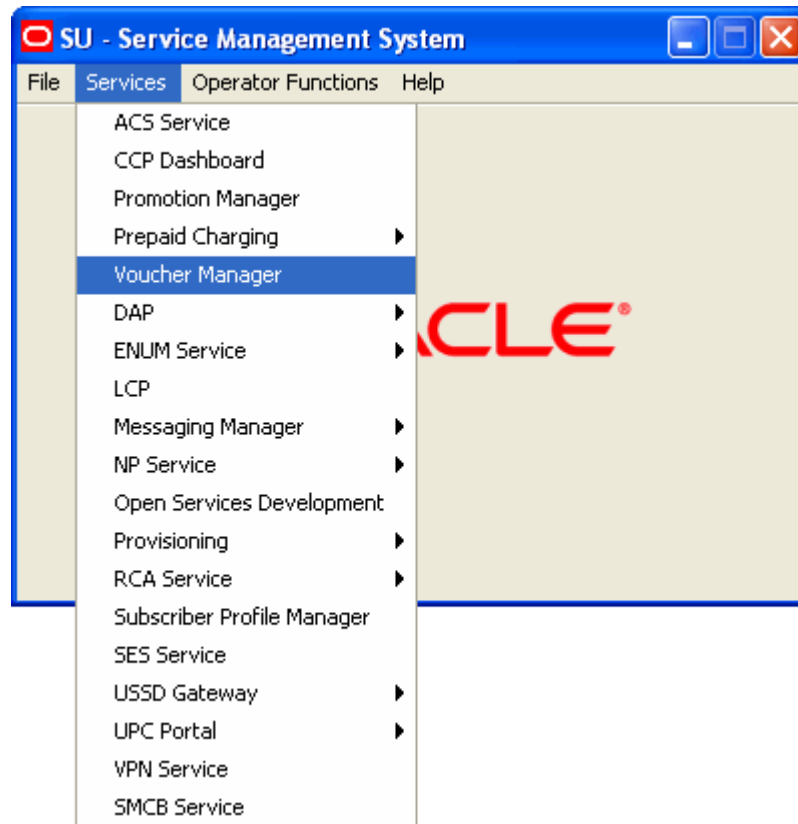
The tabs on the Voucher Manager screen enable you to perform the following tasks:

- Add, edit, or delete voucher types

  The voucher type definition specifies affected product types, expiration dates, restrictions for recharging, affected balance types and tax plans, and so on.

- Create, edit, search, or delete voucher batches for a specified service provider

  When you create a batch of vouchers, you specify an authentication rule and a GPG (GNU Privacy Guard) key, the voucher type and initial state, the start and end voucher numbers, and the name of a remote file where details about the generated vouchers are written.

  You can create batches of up to 10,000 vouchers.

- Change the state of a particular voucher for the specified service provider

- Test the validity of a particular voucher for the specified service provider

- Recharge a subscriber's wallet with a specified voucher

  The Voucher Recharge tab requires you to specify the service provider, the subscriber's ID, a description, a scenario, and the wallet type (primary or secondary) to be affected.

- Change the state of a range of vouchers

  You must enter a batch number, the new state, and the starting and ending serial numbers to specify the range of vouchers to be changed.

- Import, verify, or delete public GPG keys

  GPG public keys are used for encryption when creating a batch of vouchers.

- Configure automatic voucher deletion

  You can specify the configuration that will be used across all VWS domains for automatic archiving and voucher deletion, which are done at regular intervals by the **ccsBeAvd** utility.

6

About the Convergent Charging Controller System Architecture

This chapter provides an overview of the Convergent Charging Controller system architecture.

About the Convergent Charging Controller System Architecture

Figure 6-1 depicts the main components of the Convergent Charging Controller system architecture.

Figure 6-1   Main components of the Convergent Charging Controller system architecture
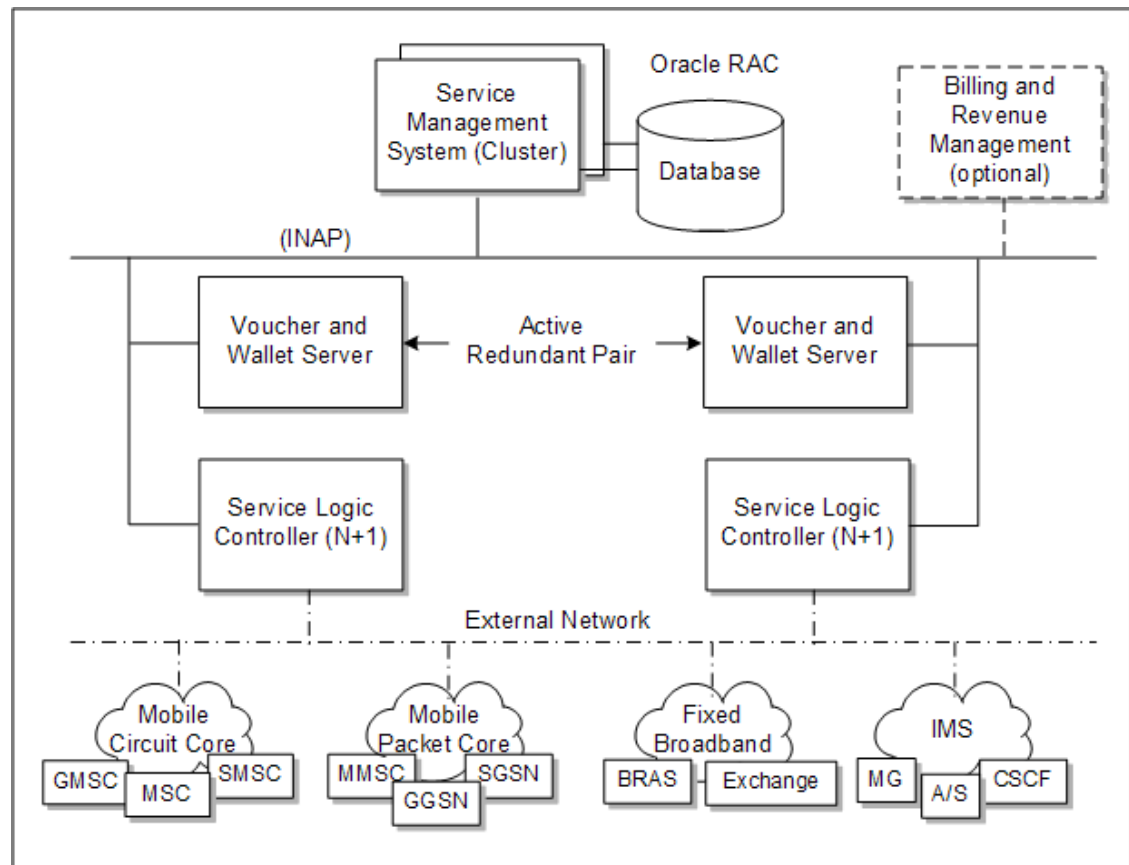
These components perform the following tasks in the Convergent Charging Controller application:

* Service Logic Controller (SLC)
    – Service processing for voice calls, SMS text messaging, and data content

- – Network communication
- Voucher and Wallet Server (VWS)
  - – Prepaid rating
  - – Balance management
  - – Voucher management
  - – Promotion tracking
  - – Synchronization with a secondary VWS server in a VWS domain
- Service Management System (SMS)
  - – Data storage
  - – Data replication
  - – System administration
- Oracle's Billing and Revenue Management system or a 3rd party billing system

  Tasks that an external billing and revenue management system can perform include:
  - – Voucher management, and other features that overlap with VWS

    VWS might not be needed with a 3rd party billing system.
  - – Customer management
  - – Creation of price lists for services
  - – Rating and calculation of charges
  - – Billing, payment management, and accounts receivable

The following sections describe these components in more detail.

About the Service Logic Controller

Figure 6-2 depicts the Convergent Charging Controller Service Logic Controller.

Figure 6-2   The Service Logic Controller
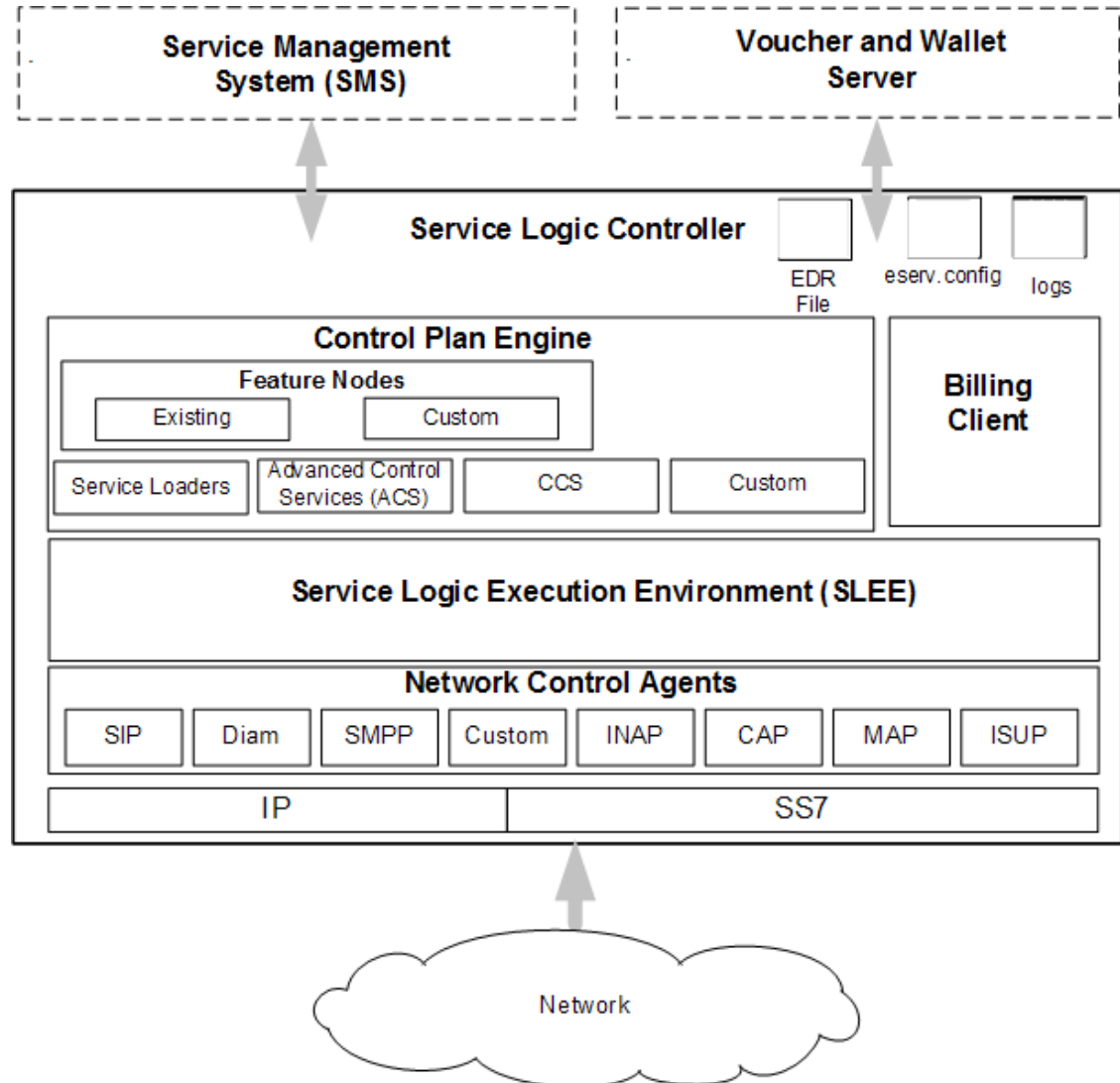
The Service Logic Controller (SLC) has the following components:

* Service Logic Execution Environment (SLEE)

  Routes calls to Advanced Control Services (ACS) and to the appropriate Convergent Charging Controller components by way of the SLEE interfaces (Transaction Capabilities Application Part (TCAP) and Billing Client).

  The main SLEE process, which handles requests between the network and the SLEE, is the slee_acs process.

* Charging Control Services (CCS)

  Provides the charging control logic and tools.

* Advanced Control Services (ACS)

  Provides the real-time engine for control plan execution, which is effectively the call processing engine.

* Network connectivity agents (NCAs)

NCAs provide interfaces for slee_acs and the rest of the SLEE for the various protocols running on the network. NCAs translate the particular network protocol to the Intelligent Network Application Part (INAP) protocol, which is the internal protocol used by slee_acs.

- Billing Client

  Provides the interface that processes requests from the call processing engine to the Voucher and Wallet Server or an external billing system.

About SLEE

The Service Logic Execution Environment (SLEE) provides a common run-time environment for various service logic applications that communicate with each other through events and interface with external networks and applications. The SLEE manages components on both the SLC and VWS servers.

At a high level, the SLEE considers any voice or data call, SMS text message, or type of business logic as a call instance having source and destination addresses for a communication channel, which it uses to pass data or events back and forth and to other Convergent Charging Controller applications. The SLEE routes calls to Advanced Control Services (ACS) and to other machines through the TCAP and Billing Client interfaces.

About Charging Control Services

Charging Control Services (CCS) is effectively the Convergent Charging Controller prepaid charging component that allows you to create the following entities:

- Subscriber accounts and wallets
- Product types to be associated with the subscriber wallet

CCS allows you to customize call processing based on factors such as:

- Geography
- Demographics
- Resources
- User preference

CCS is installed on all three Convergent Charging Controller servers: SLC, SMS, and VWS.

About Advanced Control Services

Advanced Control Services enables you to configure processing and routing for calls to or from a specific number or for calls triggered for a specified INAP service key. You configure call processing and routing through a control plan. Essentially, ACS is the real-time engine for executing a control plan.

You create control plans by using the Control Plan Editor (CPE), which is a graphical user interface that allows you to diagram the flow of a call through a series of feature nodes. A feature node defines a possible action related to call processing such as determining the rate based on the day of the week or time of day, or playing an announcement, or forwarding a call to a different number. The CPE provides a rich variety of feature nodes on a feature palette. From the feature palette, you select the icons for the feature nodes that you want to use to implement in the control plan. Each feature node has a single entry point and one or more possible exits. Each exit can lead to another feature node in the control plan until the end feature node is reached.

About Network Connectivity Agents

Table 6-1 shows a sample of network connectivity agents, listing the name of the connectivity agent, the network protocol that the agent handles, and the type of communication that the agent handles.

Table 6-1   Network Connectivity Agents

NCA	Protocol	Type of Communication
DCD	Diameter (out)	Used for processing of Diameter-based billing requests. Supports RFC-3588 and RFC-4006 protocols. Acts as Diameter client.
DCA	Diameter (in)	Used for processing of Diameter-based billing requests. Interfaces with MMSC/SMSC/GGSN. Provides an interface to Prepaid Charging. Acts as a Diameter server.
Messaging Manager	MAP (Mobile Application Part protocol)	Supports roaming, authentication, subscriber tracing, and so on.
SCA	SIP (Session Initiation Protocol)	Used for real-time charging, instant messaging and personal mobility in SIP-based Next Generation Networks (IETF/ETSI NGNs) and in the IP Multimedia Subsystem (3GPP IMS, 3GPP2 MMD).
Messaging Manager	SMPP (Short Message Peer to Peer)	Used for sending SMS messages between peer SMS entities and message centers.
SIGTRAN	SIGTRAN	Used for converting messages arriving from the TCAP protocol stack into SLEE events.
TCAP_IF	XML/TCAP (Extensible Markup Language/ Transaction Capabilities Application Part)	Supports multiple concurrent dialogs between SLEE, ACS, and other servers.
UIS	USSD (Unstructured Supplementary Service Data)	Supports USSD messages between mobile devices and Convergent Charging Controller; supports menu-driven and interactive services.
OSD	SOAP/XML (Simple Object Access Protocol)	Supports exchange of messages in XML format between web services.
IS41	IS41 (Interim Standard 41, also known as ANSI 41)	Supports interoperability between differing mobile telephony networks, providing capabilities for intersystem handover, subscriber detection and authentication, and so on.

About the Service Management System

Figure 6-3 depicts the Service Management System.

Figure 6-3   Service Management System
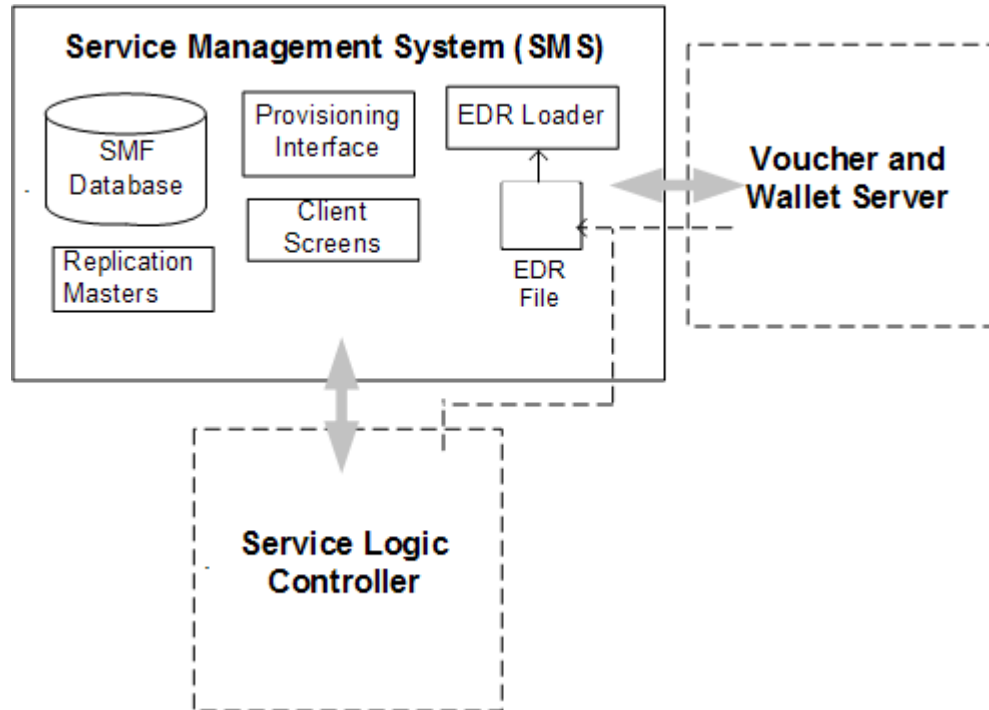
The Service Management System (SMS) server is primarily the repository for the SMF database, which provides centralized storage for customer data, logs, alarms, and statistics. The SMS replicates data that is needed by the SLC and VWS servers, such as subscriber and wallet data and tariff and rate tables.

The SMS also provides a built-in customer relationship management (CRM) system that you can provision directly or through an external provisioning interface. It also includes a graphical user interface that provides you with access to data that the service logic applications use.

Figure 6-4 shows the SMS **Services** menu in the SMS GUI, which lists the services that SMS makes available:
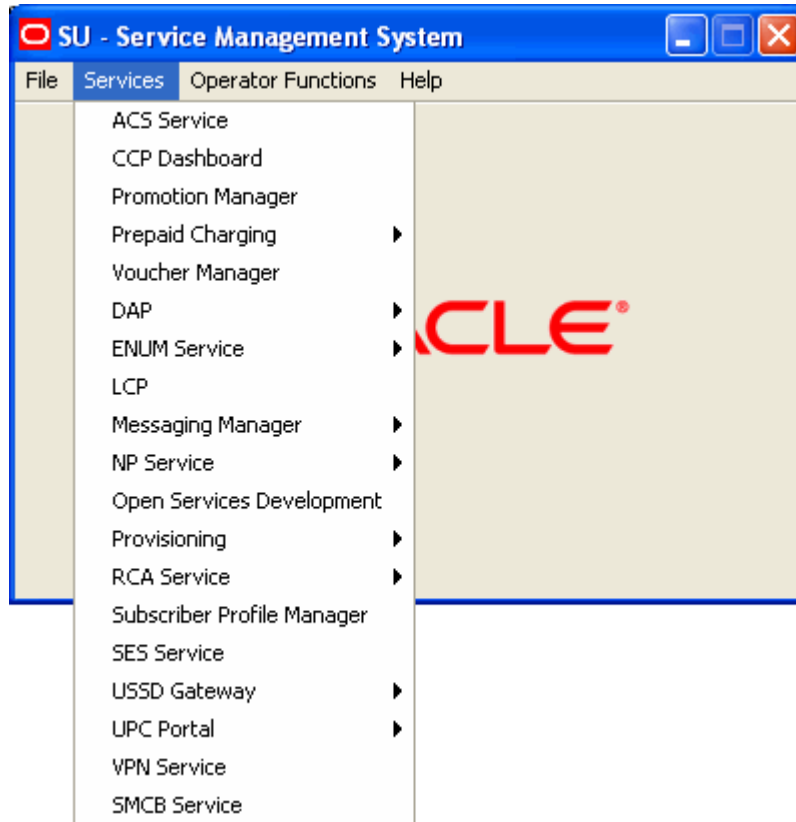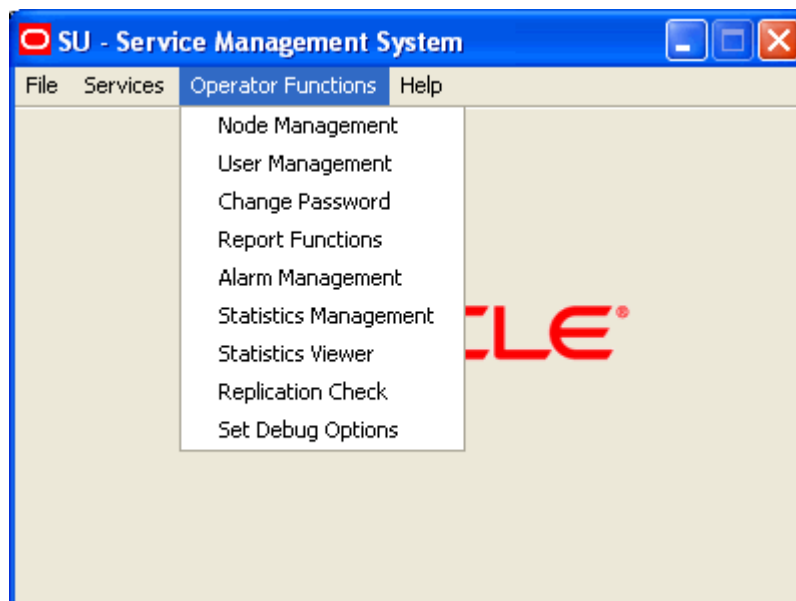
Figure 6-4   SMS Services Menu

Figure 6-5 shows the Operator Functions menu in the SMS GUI, which lists the types of operator functions that SMS makes available:

**Figure 6-5   SMS Operator Functions menu**

About the Voucher and Wallet Server

In a redundant configuration, two Voucher and Wallet Servers, a primary and a secondary, make up a VWS *domain*. In normal conditions, the primary VWS performs all subscriber account, wallet, and balance actions for the pair and the secondary VWS maintains a duplicate set of data.

Figure 6-6 illustrates the data flow in a VWS domain.

Figure 6-6   Data Flow in a Wallet and Voucher Domain
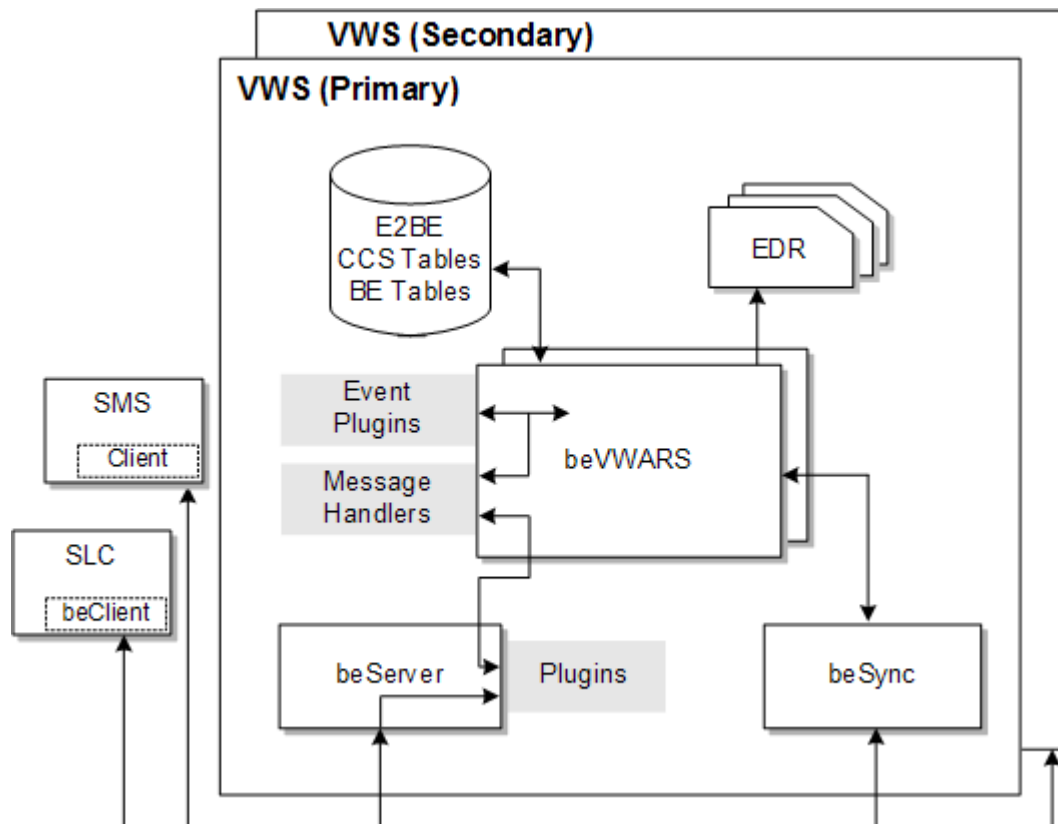
The following components play roles in processing requests from the Voucher and Wallet Server.

- BeClient

  The BeClient process is any process that uses the libBeClientIF library to connect to the beServer.

  The main BeClient process is the one provided for the SLC.

- beServer

  Handles all requests from the SMS and SLC servers and can be extended with plug-ins. Handles connections from client processes (including BeClient processes) and controls routing to beVWARS processes.

- beVWARS

The beVWARS process is the engine of the VWS. Usually, more than one beVWARS process runs on a VWS. It reads and caches wallet and voucher information from the E2BE database and manages all queries, reservations, and updates against wallets. It also manages all queries, redemptions, and state changes for vouchers. It initiates data synchronization with a secondary VWS and writes event detail records (EDRs).

- beVWARS handlers

    Perform business-case specific operations on wallets and vouchers. For example, CCS handlers manage monthly spend accumulation and upgrade, and account activation. Some handlers are provided by VWS, but other applications can extend VWS logic by providing additional plug-ins.

- beSync

    Synchronizes data between the Voucher and Wallet Servers in a VWS pair.

- E2BE database

    The databases on the VWSs, which also hold a subset of the data from the SMF.

Other applications may provide other processes to handle other activities, such as ccsBeOrb, which handles interaction between the SMS screens and the Voucher and Wallet Servers.