COMVERSE

ComverseONE™

3.5 RT TR 2.0

Product Catalog Overview

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Notice

Corporate Headquarters
200 Quannapowitt Parkway
Wakefield, MA 01880 USA
Tel: (781) 246-9000
Fax: (781) 224-8143
www.comverse.com

Revision History

The following table lists the document changes since the initial publication:

Date	Chapter	Description
09-30-2011		Initial publication of 3.5 RT TR 2.0

Contents

Figures

Tables

Notational Conventions

Useful information appears in this format.

Provides direction to important information

Important information appears in this format.

Indicates possible risk of damage to data, software, or hardware.

Indicates serious risk of damage to data, software, or hardware.

Table 1 Notational Conventions

Notation	Explanation of Convention
References to printed documents	*Helvetica italic* **Example:** See *Database Reference Volume 2*.
<KEYS>	UPPERCASE HELVETICA, in angle brackets **Example:** Press <CTRL><Q><SHIFT><P> to create an em dash.
`User-entered text`	**`Courier bold`** **Example:** Enter **`Total Charges`** in the field.
`Placeholders for user-determined text`	*`Courier italic`*, in angle brackets **Example:** Enter your *<password>*.
`Code samples, TABLE_NAMES, field_names, file and directory names, file contents, user names, passwords, UNIX ENVIRONMENT_VARIABLES`	`Courier`
Placeholders for system-generated text	*Helvetica italic* **Example:** Messages appear in this form: *timestamp messageID >> text.*
Buttons, Icon Names, and Menu items	**Helvetica bold** **Example:** Choose **Reports** from the main menu.

Special Markers

The Comverse ONE Billing and Active Customer Management solution has the three derivatives shown in Table 2, "Labels in Markers." For user convenience, any content that is specifically included in a derivative is highlighted with special markers so that it can readily be distinguished.

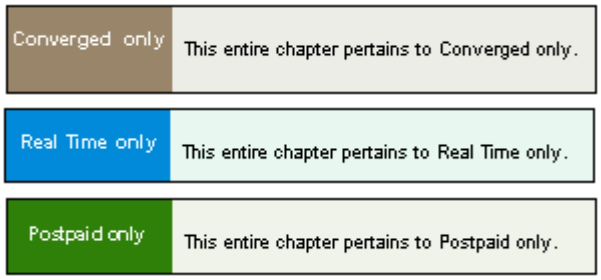
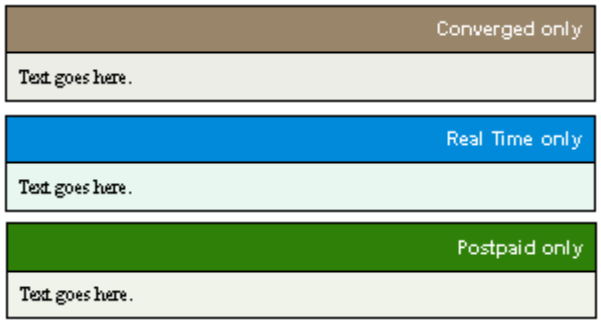
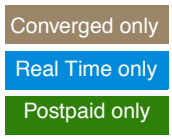
Table 2 Labels in Markers

Derivative	Label Shown in Markers
Comverse ONE Converged Billing derivative	**Converged only**
Comverse ONE Real-Time Charging derivative	**Real Time only**
Comverse ONE Postpaid Billing derivative	**Postpaid only**

Each derivative has a set of three color-coded markers, as shown in Table 3, "Types of Markers." The markers are used individually or in combination to highlight derivative-specific content by:

- Entire chapters
- Selected portions of chapters
- Tables, either entire or partial

Table 3 Types of Markers

Marker	Example	Description
Alert		■ Placed at the beginning of an entire chapter that pertains only to a specific derivative. ■ Placed just before a table that partially or entirely pertains only to a specific derivative.
Block		A shaded box that encloses sections of documentation that pertain only to a specific derivative.
Flag		■ Designates a shaded table row whose contents pertain only to a specific derivative. ■ In a bulleted list, designates an item that pertains only to a specific derivative.

Comverse ONE Documentation List

this is a comprehensive list. As such, it may include documentation for products which you have not licensed.

The documents described below reference the Comverse ONE solution products. All documentation available with the Comverse ONE solution is described in the following pages, organized by the following categories:

- Infrastructure Domain
- Rating, Charging, and Promotions Domain
- Billing and Financials Domain (Converged only)
- Customer and Order Management Domain (Converged only)
- Mediation and Roaming Solutions Domain
- Self-Service Solutions Domain

Read the relevant Solution Description first to get an overview of *your* Comverse ONE solution. It gives an overview of the functionality in each product domain and also includes cross-references to the user documentation that provides more detailed information about the functionality.
There are three such documents and they are listed under the Infrastructure Domain heading below.

- Converged *Billing & Active Customer Management Solution Description*
- Postpaid *Billing & Active Customer Management Solution Description*
- Real-Time *Billing & Active Customer Management Solution Description*

Infrastructure Domain

Download every document in the Infrastructure domain if you purchase the Comverse ONE solution. Documentation for this domain includes the following (in alphabetical order):

- *Alarms Reference*
  Contains tables of alarm IDs, descriptions, likely causes, and recommended resolutions for systems and components.
- *Back Office Administration GUI Guide*
  Provides information about the BackOffice subsystems for Inventory Administration, Address Management and Bulk Operations.
- Converged *Billing & Active Customer Management Solution Description*
  General overview of the Comverse ONE Converged Offer and the functionality available in each domain.

- *Database Reference*
  Describes all database tables and fields in detail.
- *Disaster Recovery Operations Guide* (Optional Module)
  The Disaster Recovery Operations Guide serves as both a technical overview of the optional Disaster Recovery solution and as a guide which details the operational procedures for failover, switchover and switchback provided by the solution.
- *Glossary*
  Provides a list of terms used specifically for the Comverse ONE solution
- *Investigation Units and Financial GUIs Guide*
  Describes the GUI-based tools used for investigating and troubleshooting various financials related processes: payments, bill invoices, refunds, and incomplete data work entries
- *Operation Reference*
  Describes the processes in the Comverse ONE solution.
- *Platform Operations Guide*
  Describes the back-end operations and maintenance functionality of the core Comverse ONE solution components. Includes AIX/HACMP platform and cluster operations, Linux/Veritas platform and cluster operations, backup/recovery, shared storage and fiber switch operations, and tape backup operations.
- Postpaid *Billing & Active Customer Management Description*
  General overview of the Comverse ONE Postpaid Offer and the functionality available in each domain.
- *Product Catalog Overview*
  Provides a high-level description of the Comverse ONE solution Product Catalog, which is the primary mechanism for creating, configuring, managing, and propagating Product Catalog versions.
- *Product Catalog User Guide*
  Instructions on using the Product Catalog application to define and manage all aspects of Service provisioning.
- Real-Time *Billing & Active Customer Management Description*
  General overview of the Comverse ONE Real-Time Offer and the functionality available in each domain.
- *Schedulable Entity Reference Manual*
  Documents all the jobs, monitors, and workflows, for each component.
- *Security Platform Operations Guide*
  Technical overview of the security platform and information on how to provision and administer the platform.
- *Security Server API Guide*
  Provides an overview of the interfaces exposed by the Java-based Security SDK API, which client applications can leverage to access various security services, such as authentication, authorization, auditing, key management, and credentials management. Also provides information on the Security Web Services API, which provides interfaces to a subset of Security Server commands (Identity Management commands).
- *Signaling Gateway Unit Guide*
  Describes the hardware, installation, configuration, and maintenance of the Signaling Gateway Unit (SGU) used to connect Comverse real-time systems to the SS7 signaling network using either traditional SS7 protocols or Sigtran (SS7 over IP).
- *System Measurements Guide*
  The Comverse ONE Solution automatically collects statistical data from the Service Logic Unit (SLU) and the Service Gateway Unit (SGU). This includes service statistics on the SLF layer and platform data on the IPF layer.
  This guide describes the format and location of this measurement information and provides

a description of the meaning of the data.The measurement data can be used to create reports. It can also be imported into other applications (such as Excel) to be viewed.

- *System Parameters Guide*
  Describes the various system parameters used in Comverse ONE.
- *System Validation Check Reference*
  Details all the system validation checks performed by the Comverse ONE Unified Platform on its components.
- *Unified API Guide*
  General overview of the Unified API, a brief description of its architecture, and information about:
  - Framework classes and the functionality they provide
  - Two standard interfaces provided with the Unified API (client SDK and web services)
  - A subset of Unified API business methods most commonly used
- *Unified Platform Guide*
  Technical overview of the Unified Platform and information on the procedures to manage core systems operations in the Comverse ONE solution.

Rating, Charging, and Promotions Domain

Documentation for this domain includes the following (in alphabetical order):

- *Bulk Provisioning Guide*
  - The *CC Batch* utility enables bulk creation of recharge vouchers and subscribers.
  - The *Bulk Provisioning* Utility enables bulk creation of anonymous accounts to support the pre-activation of pre-paid SIM cards.
- *Charging Interfaces Guide*
  Describes the four interfaces that enable external services to support real-time authorization, rating, and charging for transactional usage: (1) the Event Charging Interface, a simple TCP/IP-based interface, (2) Open Services Access (OSA), (3) a Diameter-based interface version enhanced to take advantage of features of the Comverse ONE solution, and (4) a Diameter-based interface packet-switched version.
- *Customer Care Client Provisioning Guide* — Real-Time
  Detailed task-oriented instructions for using Customer Care Client.
- *Diameter Gateway Unit Guide*
  Describes the hardware, installation, configuration and maintenance of the Diameter Gateway Unit (DGU) used to connect Comverse real-time systems to external services, using the diameter protocol over IP.
- *IVR Call Flows Reference*
  These call flows detail the logic flow of specific scenarios. Multiple access numbers can map to the same call flow. Different resellers have the option to publish different numbers but share the same logic.
- *Network Interfaces and Notifications Guide*
  Describes the operation, features, and provisioning of notifications, CAMEL-enabled services, and USSD-enabled services.
- *Network Self-Care Guide*
  Describes the configuration, structure, and features.
- *Operational Reports and Data Warehouse Utility Guide*
  Describes the real-time Operational Reports Interface (ORI) and the Data Warehouse Extract Utility.

- *Rating Technical Reference*
  Describes the Unified Rating Engine, which is the subsystem responsible for gathering incoming CDRs and processing them for billing.
- *Recurring–Non-Recurring Charges Server Guide*
  Describes all processes commonly available through the Recurring —Non-Recurring Charges Server.
- *Voucher and Recharge Guide*
  Describes the process by which subscribers add funds to accounts using recharge vouchers through IVR, interaction with Customer Service, and other methods. Provides details of the Recharge Control Table, which allows resellers to provision the effects of recharges so that bonuses, discounts, and other changes to offers can result from a successful recharge. Also describes the Card Generator software used to create batches of recharge vouchers.

Billing and Financials Domain (*Converged* only)

Documentation for this domain includes the following (in alphabetical order):

- *Advanced Invoice Numbering Guide*
  Describes how to configure and use Advanced Invoice Numbering.
- *Billing Reports and File Layouts User Guide*
  Describes control reports and other file formats.
- *Billing Technical Reference*
  High-level descriptions of billing architecture, administration, bill generation and formatting, and system parameters
- *Collections Guide*
  Contains information on configuring Collections database tables, running the Collections module, and using the Collections interface.
- *Invoice Designer Strings and Filters Reference*
  Describes the static strings, dynamic strings, and filters in the Invoice Designer.
- *Invoice Designer Technical Reference*
  Describes how to configure and run Invoice Designer.
- *Invoice Designer User Guide*
  Describes the Invoice Designer and how to perform the tasks needed to create an invoice template.
- *Journals Guide*
  Describes the theory, configuration, and running of Journals processes.
- *Miscellaneous Configurable Entities*
  Instructions for configuring late fees, adjustments, and several other database entities used in postpaid and converged billing.
- *Process Workflow Orchestration Guide*
  Describes the command-line entries and the default queries for running billing-related processes via the Unified Platform.
- *Taxation Guide*
  Describes the configuration, operation, structure, and features of Taxation.

Customer and Order Management Domain (*Converged* only)

Documentation for this domain includes the following (in alphabetical order):

- *Application Integrator Operator Guide*

  Describes the commands that operate the Application Integrator at creation and runtime.
- *Application Integrator System Administrator Guide*

  Outlines installation, sizing, operation, and administration of the Application Integrator and logging. Describes configuration of the user environment and commands for creation and operation of the Application Integrator.
- *Application Integrator User Guide*

  Describes creating integration specifications, creating instances of the Application Integrator, and commands for operation of the Application Integrator. Provides a complete user guide for the iMaker compiler.
- *Application Integrator File Adapter User Guide*

  Describes the configuration process and rules for the file adapter.
- *Customer Center User Guide*
  Detailed task-oriented instructions for using Customer Center.
- *Inventory Guide*
  Describes the configuration, operation, structure, and features of Inventory.
- *Inventory Replenishment Guide*
  Describes the operation, structure, and features of Inventory Replenishment.
- *Orders Services Guide*
  Describes the structure and features of Orders Services.
- *Request Handling and Tracking and Service Fulfillment User Guide*
  Describes the configuration, operation, structure and features of Request Handling and Tracking and Service Fulfillment.
- *Workflow Developers Guide*
  Helps new users understand the rules-based business process management system so users can create solutions and integrate Workpoint within those solutions.
- *Workflow User Guide*
  Describes the configuration, operation, structure, and features of Workpoint.

Customer Relationship Management

- *Campaign Management Data Mapping Reference*
  Describes how the data in DataMart is mapped to information in the Comverse ONE Customer database, the Comverse ONE ODS, and the Comverse ONE Sales and Service database.
- *Campaign Management DataMart Implementation Guide*
  Contains in-depth technical information on how to configure and populate the data mart used by all Campaign Management applications.
- *Campaign Management Outbound Marketing Manager Reference*
  Describes how to use the Campaign Management Outbound Marketing Manager features and guides you through the program's basic functionality.
- *Campaign Management Quick Implementation Guide*
  Helps novice users get started with implementing Campaign Management. It contains an overview of the product architecture, information on data mart design and creation, an explanation of how extraction works, and procedures for creating web pages, reports, lists, and campaigns.
- *Campaign Management Topic Implementation Guide*
  Provides information for implementers and professional services personnel who are creating applications that will run on an Campaign Management EpiCenter. Summarizes the Campaign Management functionality, architecture, and administration and contains in-depth technical information for configuring the Campaign Management topics required for Campaign Management and analysis.
- *Campaign Management User Guide*
  Provides you with basic information about the Campaign Management applications.
- *Case Management User and Administration Guide*
  Contains detailed information about GUI screens and form fields that appear in the Case Management application. Also provides information on performing general procedures in the GUI and administrative tasks.
- *Customer Center User Guide*
  Detailed task-oriented instructions for using Customer Center.
- *Sales and Service Admin Console User Guide*
  Provides supervisors, managers, and executives with the information to use the Case Management and Sales Force Automation Admin Console application.
- *Sales and Service Application Reference*
  Contains technical reference information relevant to implementers involved in implementing and customizing CRM applications at customer sites. This book provides the reference context for the procedural information available in the Implementation Guide.
- *Sales and Service Architecture Reference*
  Provides technical information relevant to individuals involved in implementing the Open Architecture and the applications built on the architecture
- *Sales and Service Data Dictionary Reference*
  Includes a listing and description of the tables and columns used to store CRM operational business data. It also includes a description of the naming conventions for the tables. The target audience includes database administrators, application developers, and implementers.
- *Sales and Service Dialog Designer User Guide*
  Describes the Sales & Service Dialog Designer, a web-based graphical application for defining and editing dialogs. Includes procedures for using it.
- *Sales and Service IBR Designer User Guide*
  Describes how to use the IBR Designer to create Intelligent Business Rules, which can be used to implement rule-based behavior within your CRM applications.

- *Sales and Service Implementation Guide*
  Provides procedural information relevant to individuals involved in implementing and customizing the core and the Sales and Service applications built on the core.
- *Sales and Service Integration Guide*
  Provides overview and configuration information for the set of tools used to exchange data with a variety of back-end data sources, including generic SQL sources, Java and EJB-based sources, Web services, and other database types.
- *Sales and Service Workflow Designer*
  Explains how to use Workflow Designer, a web-based graphical tool for defining and editing workflows
- *Sales Force Automation User and Administration Guide*
  Contains detailed information about GUI screens and form fields that appear in the Sales Force Automation application. Also provides information on performing general procedures in the GUI and administrative tasks.

Mediation and Roaming Solutions Domain

Documentation for this domain is subdivided into Mediation/Roaming and Revenue Settlements.

Mediation and Roaming

Mediation and Roaming documentation includes the following (in alphabetical order):

- *API Guide*
  Provides the concepts and functions for the Collection Application Programming Interface (CAPI), Mediation API, and Socket-Based Transmission API.
- *Data Manager GUI Reference*
  Contains detailed information about GUI screens and form fields that appear in the Data Manager interface
- *GRID Mapping Language Developer Guide*
  Describes the mediation feature components, semantics, and general syntax of the GRID Mapping Language (GML).
- *Installation Guide for HP*
  Describes how to install and configure the application, components, and some third-party applications associated with the HP platform.
- *Installation Guide for HP Itanium*
  Describes how to install and configure the application, components, and some third-party applications associated with the HP Itanium platform.
- *Installation Guide for HP PA-RISC*
  Describes how to install and configure the application, components, and some third-party applications associated with the HP PA-RISC platform.
- *Installation Guide for IBM*
  Describes how to install and configure the application, components, and some third-party applications associated with the IBM platform.
- *Installation Guide for SUN*
  Describes how to install and configure the application, components, and some third-party applications associated with the SUN platform.
- *Mediation and Roaming User Guide*
  Provides information on how to use the GUI interface, including information on using the Data System Manager application pages.
- *Roaming Database Reference*
  Provides reference information on the Roaming database.

- *Roaming Setup Guide*
  Describes how to configure the Roaming Setup application pages. It also provides information on working with TAP, RAP, and CIBER statistics.
- *Scripts Guide*
  Provides information on script files, which contain additional instructions on functions for data collection and transmission.
- *System Manager GUI Reference*
  Contains detailed information about GUI screens and form fields that appear in the System Manager interface
- *Variable-Length GRID Guide*
  Provides information on how to configure the control files for variable-length GRID.

Revenue Settlements

Revenue Settlements documentation includes the following (in alphabetical order):

- *Comverse Revenue Settlements Billing System Adapter Guide*
  Describes the configuration, operation, and installation for the Billing System adapter.
- *Comverse Revenue Settlements Data Model Guide*
  Overview of data model entities (such as partners, accounts, revenue sharing, and rate schedules) and how to configure them in the database.
- *Comverse Revenue Settlements Database Reference*
  Detailed descriptions of fields and tables in the database.
- *Comverse Revenue Settlements Technical Reference*
  Instructions for installing and operating Revenue Settlements. Also contains processing descriptions.
- *Comverse Revenue Settlements User Guide*
  Instructions for using the Revenue Settlements GUI.

Self-Service Solutions Domain

The Comverse ONE Self-Service Solutions domain consists of the core products plus the optional separately licensed premium products. The core products consist of the following:

- Self-Service Solutions Platform
- Self-Service Solutions Applications

Self-Service Solutions Platform Documentation

The Self-Service Solutions Platform has a comprehensive set of documentation covering the installation, configuration, and use of our products. The documentation set is divided into the following categories:

- **Manuals**: These manuals cover installing and using the platform.
- **Reference**: These reference documents contain information about APIs, databases, configuration files, and so on. These documents are delivered in HTML.

Self-Service Solutions Platform Manuals

Self-Service Solutions Platform manuals include the following (in alphabetical order):

- *Self-Service Platform Administration Guide*
  Provides operations and maintenance instructions for Web applications using the Self-Service Solutions Platform.

- *Self-Service Platform Catalog Loader Reference*
  Provides information about the Catalog Loader, including a functional description as well as installation, configuration, and use instructions.
- *Self-Service Platform Communications Billing and Usage Reference*
  Provides detailed descriptions of the data models and structure of the Self-Service Solutions Platform Communications Billing and Usage (CBU) database.
- *Self-Service Platform Connectors Development Guide*
  Provides instructions for developing and customizing Connectors of the Self-Service Solutions Platform.
- *Self-Service Platform Core Module Development Guide*
  Provides instructions for configuring and developing features of the core module of the Self-Service Solutions Platform.
- *Self-Service Platform Customer Interaction Datastore Reference*
  Provides detailed descriptions of the data models and the structure of the Self-Service Solutions Platform Customer Interaction Datastore (CID).
- *Self-Service Platform Database Modules Development Guide*
  Provides instructions for configuring, customizing, and developing features of the database module of the Self-Service Solutions Platform.
- *Self-Service Platform Installation Guide*
  Provides installation and configuration instructions for the Self-Service Solutions Platform.
- *Self-Service Platform Services Guide*
  Provides instructions for configuring, customizing, and developing features that use the services provided by the Self-Service Solutions Platform.
- *Self-Service Platform Processors Development Guide*
  Provides instructions for developing and customizing Processors of the Self-Service Solutions Platform.
- *Self-Service Platform Reports Development Guide*
  Provides instructions for developing and customizing Reports of the Self-Service Solutions Platform.
- *Self-Service Platform Web Applications Development Guide*
  Provides instructions for configuring, developing, and deploying Web applications that use the Self-Service Solutions Platform.
- *Self-Service Solutions Overview Guide*
  Provides a high-level architectural and functional description of the Comverse ONE Self-Service Solutions. It also includes a detailed description of the concepts and development process to create and deploy Self-Service Solutions.

Self-Service Solutions Platform Reference

Self-Service Solutions Platform reference documentation includes the following (in alphabetical order):

- *Base Logic Manager Reference*
  Describes usage syntax and configuration files for the Base Logic Manager (BLM) APIs. These APIs are the core services of the Self-Service Solutions Platform.
- *CID2CBU Object Mapping Reference*
  Describes the default mapping of Customer Interaction Datastore (CID) and Communications Billing and Usage (CBU) objects.
- *Communications Billing and Usage Reference*
  Provides detailed descriptions of fields and tables in the Communications Billing and Usage (CBU) database.

- *Customer Interaction Datastore Reference*
  Provides detailed descriptions of fields and tables in the Customer Interaction Datastore (CID).
- *Integration Services Framework API Reference*
  Describes usage syntax of the set of APIs to program connectors and other components of the Intelligent Synchronization Framework (ISF).
- *Integration Services Framework Message Cache Reference*
  Provides detailed descriptions of fields and tables in the Intelligent Synchronization Framework (ISF) Message Cache.
- *Integration Services Framework Script API Reference*
  Describes usage syntax of the Intelligent Synchronization Framework (ISF) script APIs to program the ISF connectors.
- *JavaServer Page Framework for Internet Application API Reference*
  Describes usage syntax for the JavaServer Page Framework for Internet Application (JFN) APIs. These APIs are used to build JSPs using the JFN. This framework provides basic application functions and services as the foundation of user interfaces.
- *Logger Message Reference*
  Provides detailed descriptions of the Self-Service Solutions Platform log messages.
- *QRA API Reference*
  Describes usage syntax for the Query, Reporting, and Analysis (QRA) Engine APIs. These APIs are used to build reports.
- *UTIL API Reference*
  Describes usage syntax for the UTIL package used by different components of the Self-Service Solutions Platform. This package contains a set of utilities including the logger.

Self-Service Solutions Applications Documentation

Each Self-Service Solutions Application comes with a comprehensive set of documentation covering the installation, configuration, and use of the product. The application documentation expands and complements the Self-Service Solutions Platform documentation.

The documentation set is divided into the following categories:

- **Manuals**: These manuals cover installing and using the application.
- **Reference**: These reference documents contain information about APIs, databases, configuration files, and so on. These documents are delivered in HTML.

Self-Service Solutions Application Manuals

A full set of these manuals is available for each Self-Service Solutions Application (Business, Channel, Consumer, andCSR Portal). The documentation set includes the following (in alphabetical order):

- *Business Objects Model Reference*
  Provides a detailed description of the models and entities that make up the Self-Service Solutions Application.
- *Configuration and Development Guide*
  Provides instructions for configuring and developing Self-Service Solutions Application features.
- *Introduction*
  Provides a high-level architectural and functional description of the Self-Service Solutions Application. It covers common features, order management, account management, and bill presentment.

- *Feature Reference*
  Describes the logic and provides use cases for the functional domains of the application.
- *Out-of-the-Box Reference Guide*
  Describes the Self-Service Solutions Application Out-of-the-Box release.
- *Self-Service Installation Guide for Comverse ONE*
  Provides detailed installation, configuration, and deployment instructions for the Self-Service Solutions Application alongside other elements of the Comverse ONE solution.
- *Self-Service Installation and Deployment Guide*
  Provides detailed installation, configuration, and deployment instructions for the Self-Service Solutions Application.
- *User Guide*
  Provides instructions for navigating and using the Self-Service web application. For Business Self-Service and CSR Portal only.

Self-Service Solutions Application References

A full set of these references is available for each Self-Service Solutions Application.The reference documentation set includes the following (in alphabetical order):

- *API Reference*
  Describes usage syntax for the Self-Service Solutions Application APIs. These APIs are used to program the user interface and manage data.
- *Invoice Schema Reference*
  Describes the invoice schema reference of the Self-Service Solutions Application.
- *Presentation Layer Page Flow Reference*
  Describes the page flows of the Self-Service Solutions Application.
- *Specification Entity Relationship Diagrams*
  Provides diagrams describing the actors, use cases, user activity, and storyboard in IBM Rational Rose format.

Self-Service Solutions - Separately Licensed Products

Documentation available with optional, separately-licensed premium products in the Comverse Self-Service Solutions is listed below.

Online Catalog Manager

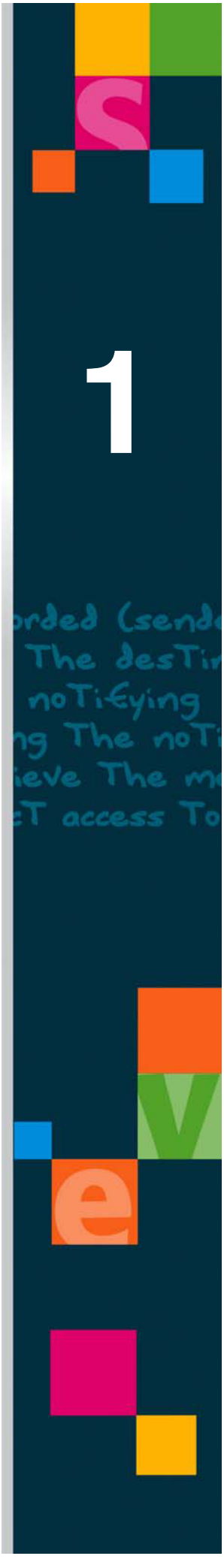
Online Catalog Manager (OCM) documentation includes the following (in alphabetical order):

- *Introduction to the Online Catalog Manager*
  Provides a high-level architectural and functional description of the Online Catalog Manager.
- *Online Catalog Manager Getting Started Guide*
  Describes the best way to build product catalogs in the Online Catalog Manager. This manual is a template for creating end-user documentation.
- *Online Catalog Manager Installation and Configuration Guide*
  Provides installation and configuration instructions for the Online Catalog Manager.
- *Online Catalog Manager User Documentation Template*
  Describes the use of the Online Catalog Manager. This manual is a template for creating end-user documentation. This manual covers many common concepts and procedures of the OCM.
- *Online Catalog Manager User Guide*
  Provides a detailed description of the concepts and use of the Online Catalog Manager. The topics include:

- Managing Media Files
- Managing Offers
- Managing Prices
- Managing Products
- Managing Properties
- Managing Reference Data
- Publishing

Chapter 1

Introduction



Welcome

Welcome to the Comverse ONE Billing and Active Customer Management *Product Catalog Overview* manual. This guide provides a high-level description of the Comverse ONE Product Catalog. It is intended for consultants, operators, and integrators.

Product Catalog is the primary mechanism for creating, configuring, managing, and propagating Product Catalog versions. The Product Catalog GUI determines the current deployment mode and populates the GUI with the items that are appropriate to your deployment.

Detailed step-by-step instructions for implementing the entities described in this overview are located in the *Product Catalog User Guide*.

New Features for This Release

- Number Portability

  See "Number Portability," on page 137.
- Service Provider Support.

  See "Market Offer Group Eligibility Rule," on page 30.
- Porting CV balances to RT.

  See "Payment Modes for Offers," on page 27

Product Catalog — A Single Point Interface

The Product Catalog acts as a single interface for configuring the business offerings that are ultimately provisioned and managed across the Comverse ONE solution, thus enhancing the operator's efficiency. It enables quick and accurate creation and management of offers, bundles, plans, and terms, as well as all underlying data that is ultimately involved in the operator's configuration and provisioning of service. In addition to enabling the configuration of entities, Product Catalog is the single point access for managing all data versions. Product Catalog provides a holistic view of all relevant data and enables marketing-offer personalization and segmentation. Dramatic reductions in operator product-development cycles can be realized.

Not only does Product Catalog eliminate duplication of efforts, it also facilitates coherence and enhances lifecycle management and eases operational constraints. Its easy-to-use object oriented interface, enables you to achieve faster turn-around time from product conception to market availability.

In addition, all prepaid and postpaid offers are managed via a single interface, and multiple service categories (wireline, mobile, cable, and so forth) can be bundled together. Product Catalog also provides extensive capabilities for market segmentation, offer profiling, and inter-product rules. This enables operators to support brand and dealer offer segmentation. Data sets are versioned and are propagated in a coordinated manner.

Product Catalog supports an operator's evolution from prepaid or postpaid to converged (for those cases in which the operator moves to the Comverse ONE Converged Billing derivative), along with single service to multiplay evolution. This centralized management of rating and billing definitions improves accuracy of configuration and reduces revenue leakage. Multilingual and multicurrency product, billing, rating, and charging definitions are supported.

Product Catalog are available for retrieving marketing offers and bundles and for loading basic rating and charging data.

High-Level Functionality of Product Catalog

Product Catalog enables coherent and flexible service configuring in the Comverse ONE solution via a single easy-to-use interface. It is organized into logical layers corresponding to different operational domains and user groups:

- **Basic System Infrastructure Layer**: For configuration of basic system data such as units and currencies
- **Service Layer**: For defining usage activities and service-related details such as notifications and access numbers
- **Rating and Billing Definition Layer**: For setting up rates, balances, accumulators, and promotions
- **Marketing/Packaging Layer**: For configuring customer-facing market offers

Using these logical layers eases configuration of products and services. For example, the Marketing/Packaging layer, with its drag-and-drop capabilities and user-friendly format, presents the building blocks a the marketing user selects when creating new bundles and offers, resulting in reduced time to market.

To allow for flexible marketing logic, Product Catalog supports various configurable methods for product organization, filtering, and marketing:

- By using segmentation keys and product rules, operators target products based on customer profiles
- Market-driven rules for product sales and ordering can be defined to identify required, optional, and compatible product associations
- With Product Catalog's support for plan transitions (for example, 2G Mobile plan to 3G Mobile plan), operators avoid having to do a plan cancel and replace.
- Support for multiple lines of business enables cross-product and cross-market bundling of offers
- Multiple distinct brands can be managed within Product Catalog
- Multicurrency and multilanguage support
- Regional distribution of products can be managed, for example in deployment scenarios involving a single instance of Product Catalog with multiple instances of the Comverse ONE solution

Product Catalog also provides comprehensive product lifecycle management:

- Information is edited and validated within an offline catalog before being propagated
- Multiple users edit Product Catalog information simultaneously without risk of corruption or confusion by using the lock and unlock options
- Data to be propagated to target systems is clearly segregated into versions: timestamped sets of service provisioning information that become the live data at the appropriate times
- A full audit trail is maintained of all data changes and propagation operations
- Product Catalog supports propagation of versions to multiple test and production environments
- Future-dated versions enable an operator to preprogram product deployment and to profile market offerings over time
- Multiple future-dated versions can be propagated to and stored in the catalog
- Version activation and expiration is managed automatically by the online environment

In addition, dates and durations within a version give fine-grain control of entity lifecycle and provides marketing flexibility to support use cases such as the following examples:

- Based on the quantity of recharges in the month, award 50 SMS to be consumed within 15 days
- All new Premium Plan prepaid customers activated before June 30 receive free access to Sports News services for the first three months

Operators can define multiple reseller-specific market offers and propagate reseller versions independently. The reseller concept enables:

- Security and scope configuration: Product Catalog user access can be limited to one or more resellers
- Regional product variations for geographically-dispersed operators: resellers can be associated with regions
- The dealer concept enables further product distribution flexibility. A Reseller has one or more dealers and can group them together and associate them with a subset of the reseller market offering.
- The combination of reseller, dealer, region, and product groups for dealers provides robust and flexible support for different business models and deployment choices.

  The Comverse ONE solution offers ease and flexibility for operators wishing to transition from a prepaid-only or postpaid-only environment to converged products. Product Catalog facilitates this by adapting automatically to the Comverse ONE solution environment and requires no additional configuration when an operator moves from prepaid-only or postpaid-only products to a converged market offering. An operator can therefore migrate to Comverse ONE CV Converged Billing derivative with a prepaid-only or postpaid-only market offering and progressively introduce convergent offerings.

Product Catalog Model

A Product Catalog user manages information in the Offline Catalog within the context of a reseller version and associated service version. The currently selected versions identify the information that is shown via the layers. Details of what the user can see and depend on authorized roles and scopes.

Marketing/Packaging Layer

All information in this layer is reseller-specific. This is where market offerings are defined.

See chapter 2, “Offers and Bundles.”

Offers

Offers are composed from plans, terms, balances, accumulators, templates, and rules that have been defined in other lower layers. There are three types of offers:

- **Primary Offers**: Every subscriber must have one primary offer. A primary offer defines the core aspects of the subscriber from a service-provisioning perspective
- **Supplementary Offers**: Apply to subscribers. Depending on their composition, they can extend service provisioning aspects of the subscriber (for example, access to data services) or impact usage rating (for example, unlimited weekend SMS for $5/month)
- **Account Offers**: Apply to accounts, typically associating balance and accumulator definitions

Bundles

Bundles are composed from offers. Offers are mandatory or optional within a bundle.

- Subscriber bundles apply to subscribers and must contain one primary offer and contain any number of supplementary offers

- Account bundles apply to accounts and contain account offers and subscriber bundles. Subscriber bundles are defined as mandatory within an account bundle, provided that a subscriber associated with an account having this account bundle has the mandatory subscriber bundle.
- Recurring charge (RC) terms, non-recurring charge (NRC) terms, and contract duration terms can be associated with bundles and offers. When bundle terms are configured such that they override offer terms; the relevant offer terms are ignored and only the terms on the bundle are considered.
- Various prerequisite and inclusion and exclusion rules can be configured for market-driven product compatibility and availability
- Templates can be configured to drive product-related account management activities. For example, a plan override template drives actions that result in the subscriber changing from one offer to another
- Recharge control provides flexible management of how a recharge impacts the subscriber's balances and offers

Rating and Billing Definition Layer

This layer contains the main, reseller-specific building blocks from which marketing offers are composed.

Plans of various types define the base characteristics of offers.

- **Usage Plans**: Group together usage items that associate usage activity to tariff plans. For example, the tariff "12 cents per SMS" for an offer is configured via a usage plan.
- **Service Plans**: Contain service provisioning information. For example, a service plan defines how to enable a subscriber on the GSM network and can non-usage service items such as having a mailbox or call forwarding.
- **Rating Time Promotion Plans**: Define awards and discounts to be applied at rating time, depending on thresholds applied to accumulators.
- **Tariff Plans**: Define charging conditions

  Balance and accumulator definitions are associated to offers and indicate how and what balances and accumulators to instantiate when the offer is subscribed.

Service Layer

This layer primarily contains reseller-specific service provisioning information, although some global (that is, service-versioned) information is included here for ease of use. For example, initial Activity Usage Types (AUTs) which are global, and final AUTs which are reseller-specific, are managed together. The basic definition of usage, activities, and services are global to the operator.

Basic System Infrastructure Layer

This layer contains global system data definitions.

Key Capabilities

Product Catalog features the following key capabilities.:

- Single Easy-to-Use GUI
- Product Segmentation and Market Distribution
- Versioning Life Cycle Management and Data Distribution
- Business Logic for Bundles and Offers
- Bundle-level Pricing and Mandatory, Selective, and Optional Offers
- Keyword-Based Search Capability Across Product Catalog Entities

- Application Interfaces
- Multilingual Support
- Basic Security, Auditing, and Extensibility

Single Easy-to-Use GUI

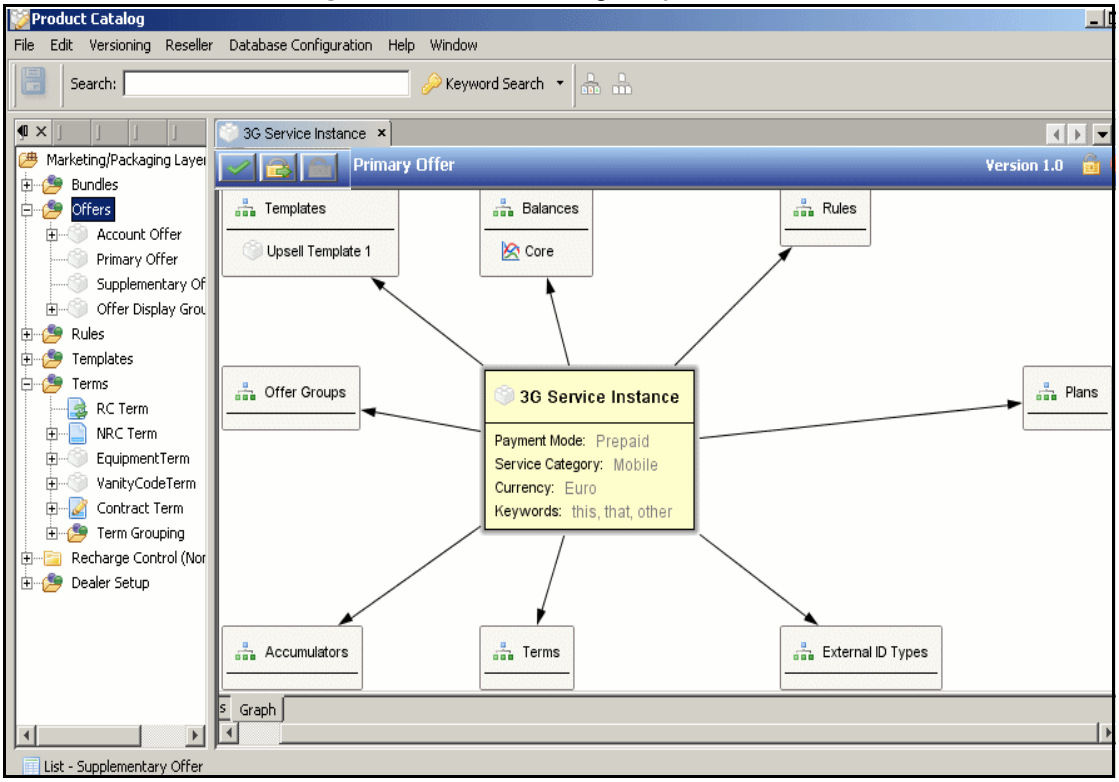
The Product Catalog is accessed via a single easy-to-use GUI that supports bundled pricing that overrides the price of individual offers and enables operators and administrators to manage various components.

The Product Catalog GUI enables operators to configure catalog entities and low-level entities close to system parameters. In general, a deployment is served by a single Product Catalog instance that masters all the data for all target systems (test, pre-production, and production).

See also the *Catalog User Guide* which provides detailed instructions on using the Product Catalog GUI to add, delete, change, and maintain data for the various layers.

The Product Catalog GUI uses standard visual interface patterns as shown figure 1, "Product Catalog Easy-to-Use GUI".

Figure 1 Product Catalog Easy-to-Use GUI

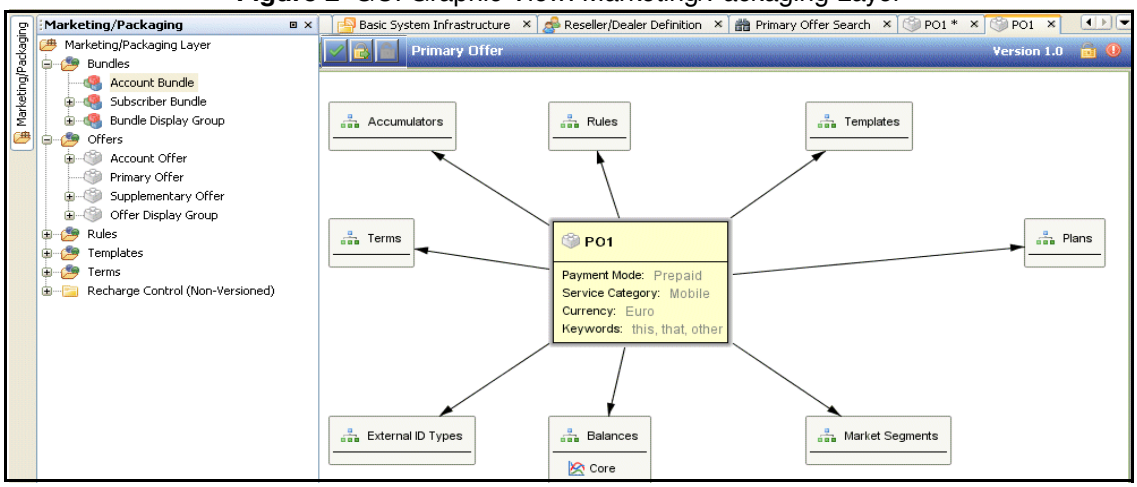


Users familiar with typical business applications quickly become accustomed to the GUI. Navigation within layers is on the left, menu and toolbars at the top, and the rest of the workspace is subdivided as necessary, depending on the entity being managed.

In addition to the above view, the Marketing/Packaging layer incorporates a graphic marketing view, allowing bundle and offer composition to be rapidly viewed and easily managed with drag-and-drop actions, as shown in figure 2, "GUI Graphic View: Marketing/Packaging Layer":

- Associate building blocks from the tree on the left by dragging and dropping them in the graphic view.
- Select an entity on the graphic map to navigate the tree view on the left.
- Right-click on an entity to bring up an action menu.

Figure 2 GUI Graphic View: Marketing/Packaging Layer

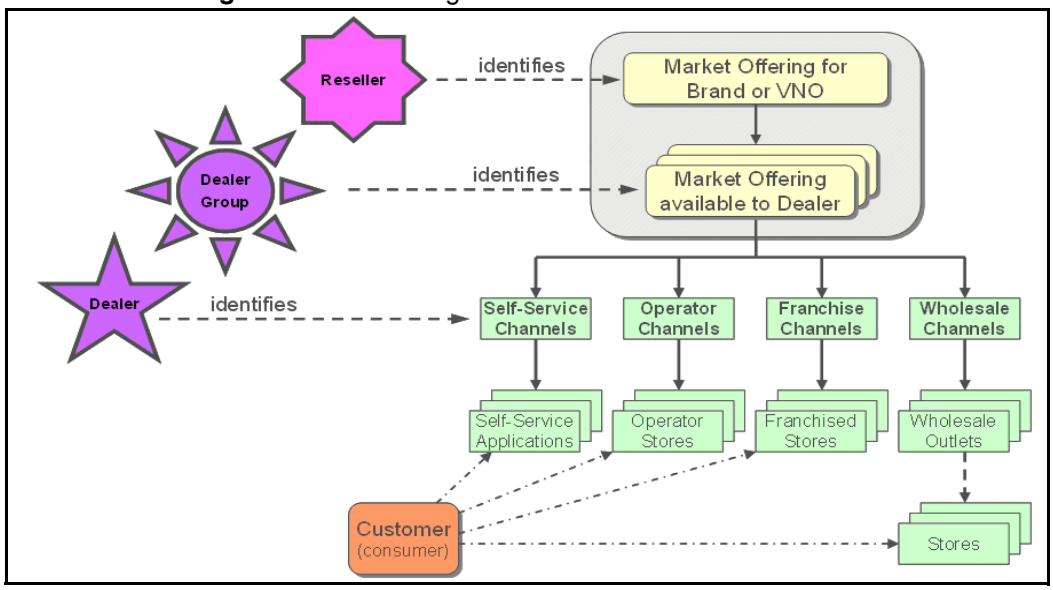


Product Segmentation and Market Distribution

Product segmentation and distribution is structured through Product Catalog via a number of concepts:

- **Resellers**: Enable you to manage different market segments, since bundles and offers are not shared across resellers. This concept is used for VNOs
- **Product Group for Dealers**: These are specific to each reseller. Bundles and offers are assigned to a product group for dealers, enabling the sale of these products by dealers assigned to the group. Note that a dealer is more generically a distribution channel and the exact meaning depends on the operator's requirements. For example, the Comverse ONE solution Self Service component is identified as a dealer, thus allowing the choice of products available via this channel to be controllable from Product Catalog.

Figure 3 Product Segmentation and Market Distribution



- **Regions**: Also called business domains, regions are intended to drive physical distribution of information within a Comverse ONE solution deployment that has multiple instances:
  - Each Comverse ONE solution instance is associated with a region
  - Resellers, product groups for dealers, and dealers can be available to all regions or specifically associated with individual regions
  - Bundles and offers can be available to all regions or specifically associated with individual regions
    - Comverse ONE solution instances only take into consideration provisioning information for resellers, product groups for dealers, offers, and bundles that are available to their region
    - Only dealers within a corresponding region can access that Comverse ONE solution instance

Versioning Life Cycle Management and Data Distribution

Product Catalog versioning life cycle management and data distribution have the following characteristics:

- A Single Product Catalog instance supports multiple environments and sites (systems).
- Each instance enables viewing of all global offers plus those available for the current region.
- Element-level versioning occurs via the lock and unlock options.
- A complete history of each element version is available.

SEE See also chapter 3, “Versions, Lifecycle, and Propagation.”

Business Logic for Bundles and Offers

The Product Catalog enables the following business logic rules for bundles and offers:

- **Subscriber and Account Prerequisite Rule**: enables targeting specific customer segments; for example, VIP and business
- **Bundles and Offers Prerequisite Rule**: enables the listing of one or more prerequisite bundles and offers; for example, must have x offer to get y offer

- **Equipment Prerequisite Rule**: enables the listing of one or more dependent equipment (physical inventory)
- **Exclusion Rule**: enables the listing of one or more non-compatible offers or bundles
- **Transition Rule:** enables the listing of one or more primary offers to which transition is allowed

Bundle-Level Pricing and Mandatory, Selective, and Optional Offers

In the Product Catalog, bundle-level pricing and offers have the following characteristics:

- **Bundle price**: overrides the price of individual offers
- **Mandatory Offer**: always subscribed with bundles; the Offer price is included in the Bundle level price
- **Selective Offer**: provides a choice (for example, buy 2 out of 3); for selected offers the price is included in the bundle level price
- **Optional Offer**: additional offer that a subscriber chooses to buy; price is *not* included in the bundle level price.

Keyword-Based Search Capability across Entities

Product Catalog enables keyword based searches across Product Catalog offer and bundles entities. The keyword table associates keywords with all related entities.

Use keyword functionality to associate searchable keywords with certain entities in the Marketing/Packaging layer. Choose keywords from the drop-down menu or type them in the text box. For example, enter Moto Razr; a list of all offers associated with that phone are returned.

Also, keywords can be used as an input parameter for filtering and retrieving bundles and offers in the Unified API. Refer to the Unified API Guide for information on the API objects `bundleFindByRules` and `offerFindByRules`.

Within the Product Catalog GUI Marketing/Packaging Layer keyword filtering applies to all entities.

Application Interfaces

There is an Online Catalog API which is part of the Unified API. This online Catalog API enables reading catalog data (filtering, and so forth). For detailed information see the *Unified API Guide*.

Multilingual Support

Multilingual support enables internationalization and localization.

Basic Security, and Auditing

- **Auditing**: Basic auditing capabilities are provided for all Product Catalog operations that change data and Product Catalog version states. An audit trail is generated and retained in the system to record all such operations.

See also “Audits and Security,” on page 157.

- **Security**: Security is achieved primarily through an interface to the Security Server. The Security Server acts as the repository and authoritative source for all users, principals,

resources, roles, and permissions. It performs user and operation authentication. Oracle security is used at the database level. See also "Audits and Security," on page 157.

See also "External Interfaces," starting on page 78.

Bulk Load

Bulk loading accomplished via the selection and editing of the appropriate bulk data template and the use of the Load Bulk Data File. Detailed descriptions of the bulk load templates and the associated data are located in Chapter 3, "Database Configuration" in the *Product Catalog User Guide*.

You can load configuration in bulk into the Product Catalog offline database. Doing so enables you to load a great volume of data quickly, without the need to configure each entity individually in the Product Catalog GUI. When you upload bulk data, Product Catalog performs the same data validations used when you provision individual entities in the UI.

Bulk load functionality is only available to users who have the correct security roles. Security roles are managed in the Security Platform. See the *Security Platform Operations Guide* for information on managing and assigning security roles. See chapter 11, "Audits and Security." for a list of security roles that are pre-configured for Product Catalog.

Cloned Entities

You can clone Product Catalog entities. You must be logged into Product Catalog, have selected a reseller and service version in the design state and have permission to add new entities for the given entity type.

The new entity is saved successfully to the database with a new ID and display value but with the same version ID and other attributes as the entity selected in the list. Any embedded data is also copied.

Cloning is supported for the entities listed below:

- Offers
  - ACCOUNT_LIFE_CYCLE
  - BALANCE_EXCLUSION_INCLUSION
  - OFFER_ACCUMULATOR_MAP
  - OFFER_BALANCE_MAP
  - OFFER_BRAND_ANNC
  - OFFER_EXT_ID_COREQ
  - OFFER_GEO_REGION_MAP
  - OFFER_MARKETING_SEGMENT_MAP
  - OFFER_MIND_THRESHOLD
  - OFFER_NRC_TERM_MAP
  - OFFER_RC_TERM_MAP
  - OFFER_PRE_THRESHOLD
  - OFFER_RC_AWARD_MAP
  - OFFER_RT_PROMO_PLAN_MAP

- OFFER_SERVICE_PLAN_MAP
- OFFER_UNIT_CHARGE_SIZE
- OFFER_USAGE_PLAN_MAP
- OFFER_USSD_RESPONSE
- OFFER_FA_LIST_TEMPLATE_MAP
- OFFER_FF_LIST_TEMPLATE_MAP
- RATE_RC
- RATE_NRC
- OFFER_NOTIFICATION_KEY/REF/VALUES

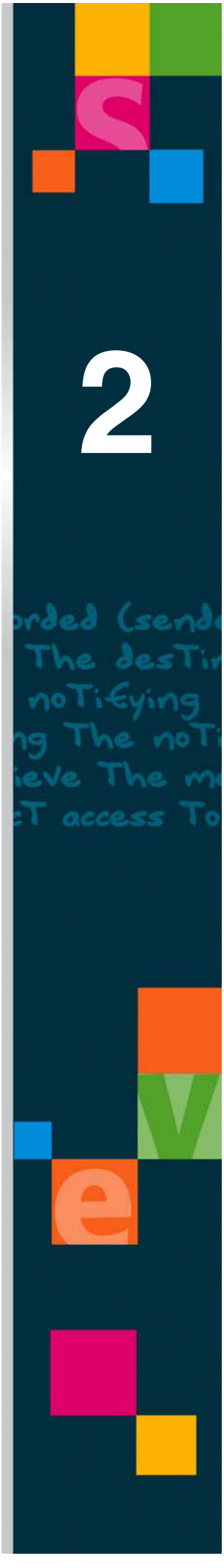
- Bundles
  - BUNDLE_MEMBER_MAP
  - BUNDLE_RC_TERM_MAP
  - BUNDLE_NRC_TERM_MAP
  - BUNDLE_RC_AWARD_MAP
- Rating-Time Bonus Items
  - BONUS_THRESHOLD_KEY/REF/VALUES
- Rating-Time Discounts
  - RT_DISCOUNT_ITEM_KEY/REF/VALUES
  - DISCOUNT_AWARD_KEY/REF/VALUES
  - DISCOUNT_EXCLUSION
- Rating-Time Discount Items
- RC Terms
  - RATE_RC
  - EQUIP_CHARGE_CODE_RC_TERM_MAP
- VANITY_CODE_RC_TERM_MAP
- NRC Terms
  - RATE_NRC
  - EQUIP_CHARGE_CODE_NRC_TERM_MAP
  - VANITY_CODE_NRC_TERM_MAP
- Recharge Controls
  - RECHARGE_CONTROL_OFFER
- Subscriber/Account Prerequisite Rules
  - ELIGIBILITY_RULE_MEMBER
- Final AUTs
  - UNIT_CR_RATE_LIMIT
  - UNIT_CR_RATE_LIMIT_KEYS
- Calendars
  - CALENDAR_EXCEPTION
- Accumulators
  - ACCUMULTR_EXCLUSION_INCLUSION
- Rating Time Promotion Plans
  - RT_PROMOTION_PLAN_ITEM_MAP
- Usage Plans
  - USAGE_PLAN_ITEM_MAP

- Liability Redirection Rules
  - LIABILITY_RULE_AUT_EXCLUSION
  - LIABILITY_RULE_AUT_INCLUSION
  - LIABILITY_RULE_AUT_GROUP_MAP
  - LIABILITY_RULE_NRC_MAP
  - LIABILITY_RULE_RC_MAP
- Liability Redirection Templates
  - LIABILITY_TEMPLATE_MAPPING
- Bill-Time Promotion Plans
  - BT_PROMOTION_PLAN_ITEM_MAP
  - Bill-Time Discount Items
  - RATE_DISCOUNT
  - BT_DISC_ITEM_BAL_TEMPLT_MAP
  - BT_DISCOUNT_RESTRICTIONS
  - BT_DISCOUNT_TARGETS
- Bill-Time Unit Credits
  - RATE_UNIT_CR
  - UNIT_CR_RESTRICTIONS

The cloned entity must be given a new name. See also the *Product Catalog User Guide*.

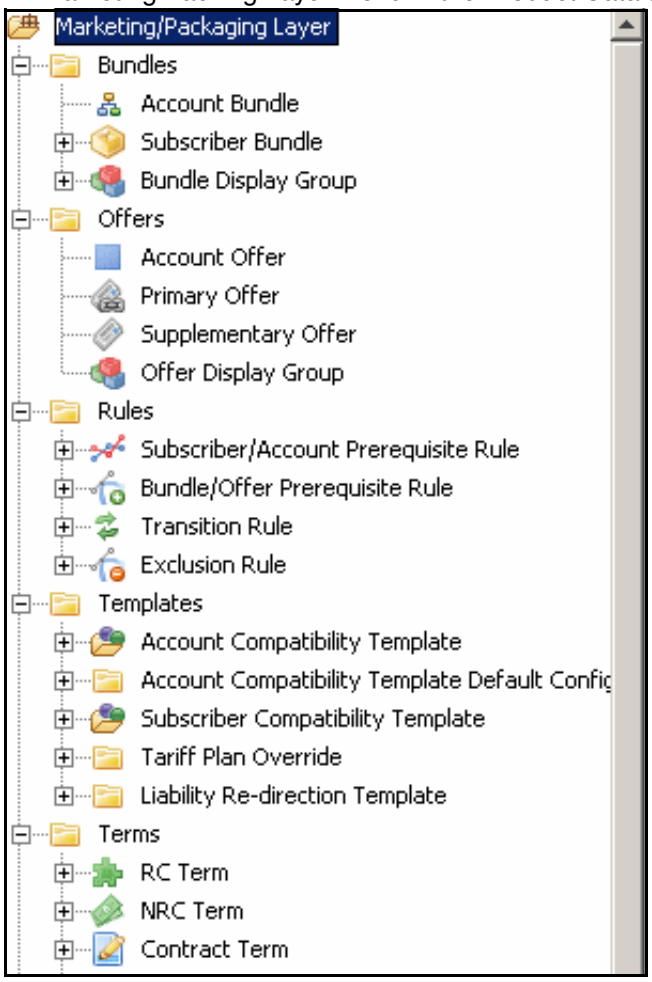
Chapter 2

Offers and Bundles



This chapter describes offers, bundles, and related entities that are accessed and defined via the Product Catalog GUI Marketing/Packaging Layer menu shown in figure 4.

Figure 4 Marketing/Packing Layer Menu in the Product Catalog GUI



See the *Product Catalog User Guide* for step-by-step directions on setting up bundles, offers, and related entities.

Offers

An offer is the minimum sellable entity delivered to a subscriber for the consumption of service. Offers enable operators to manage subscriber and consumer services. In the Product Catalog an offer is built upon reusable objects that model its activity type, usage, service, price, eligibility and dependencies with other offers, subscription conditions, service payments, and consumed credits. It includes various rules, templates, contract terms, RC terms, NRC terms, balances, and accumulators.

All data managed by Product Catalog, is reseller based *except* the low level configuration data in the basic system and operator level. See also chapter 12, “Operators, Resellers, and Dealers”.

Offers are classified as follows:

- **Primary Offer**: A primary offer is a basic entity used by subscribers and constitutes a major part of the service data. Primary offers are absolutely necessary for live subscribers to exist in the system. A subscriber cannot be provisioned without a primary offer.
- **Account Offer**: an optional service offer associated to an account
- **Supplementary Offer**: manages additional service capabilities to subscribers.

Refer to the *Customer Center Guide* for detailed information on managing accounts and subscribers.

Primary Offers

A primary offer is mandatory and is provisioned to a subscriber to enable it to receive and consume services. Without a primary offer a subscriber cannot exist in the system. Primary offers include a large number of configurable options.

Most of the service behavior, including the billable activities, tariff structure, account balances, promotion plans, enabled dialed numbers, and the number of phone book entries enabled for a subscriber in the friends and family feature are defined as part of the primary offer. Additionally the primary offer includes contract terms, RC terms, NRC terms, external ID types entities that guide usage events, balances, and accumulators.

Each subscriber is assigned to one and only one primary offer. A subscriber bundle contains only one primary offer.

Overall, the behavior of the service for a given subscriber is determined by the primary offer. The subscriber primary offer name is listed in the subscriber record and is read whenever the service processes the subscriber.

Only a few personal configuration attributes (such as the subscriber's default language) are kept in the subscriber records; the rest are defined in the subscriber primary offer and are shared by all the subscribers assigned to it.

Multiple service packages are supported.

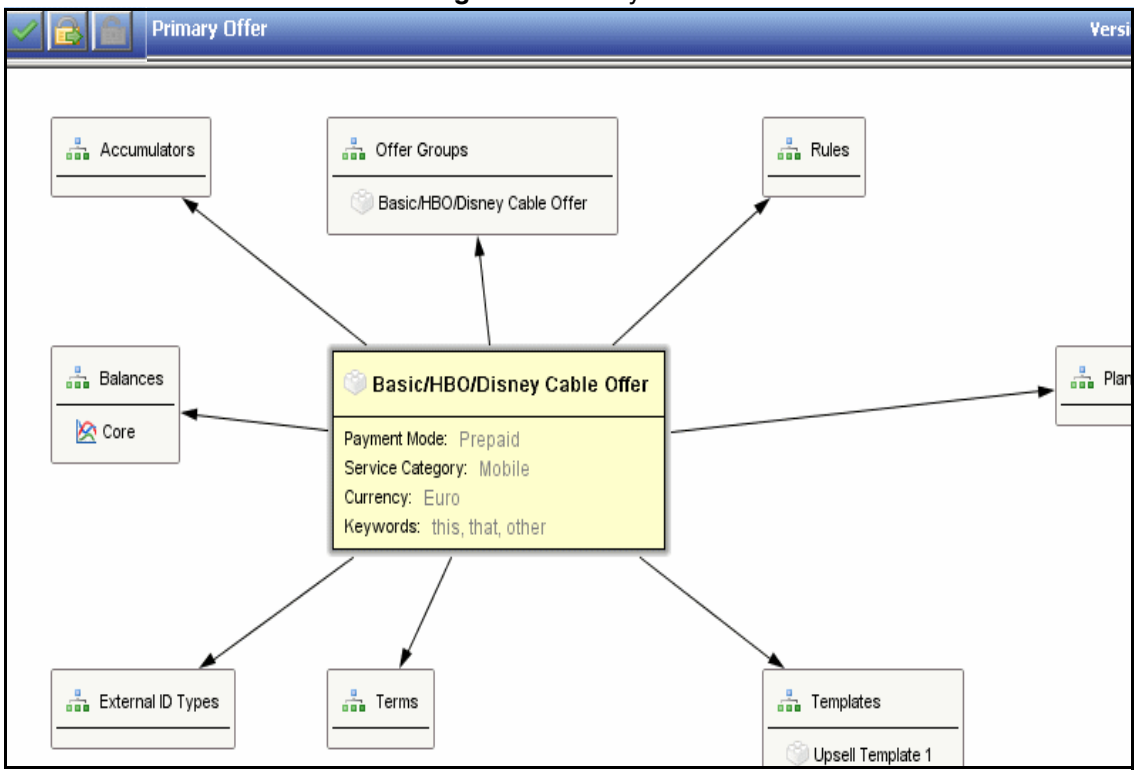
Primary offers contain the following:

- 0 or more usage, service, and promotion plans
  Plans are grouped into offers, which in turn can be grouped into bundles. A usage plan defines available and permitted usage activities and their associated rates thus it consists of one or more usage items.
- at least 1 usage item in the real-time standalone deployment mode
- 0 or 1 of each of subscriber, compatibility, and plan override template
- 0 or 1 of each subscriber/account prerequisite, bundle/offer prerequisite, exclusion, and transition rule

Once they are subscribed Primary Offers never expire.

Figure 5, “Primary Offer” shows a prepaid primary offer in the Product Catalog GUI Primary Offer window.

Figure 5 Primary Offer



See the *Customer Center Guide* for rules affecting primary offer change restrictions.

Account Offer

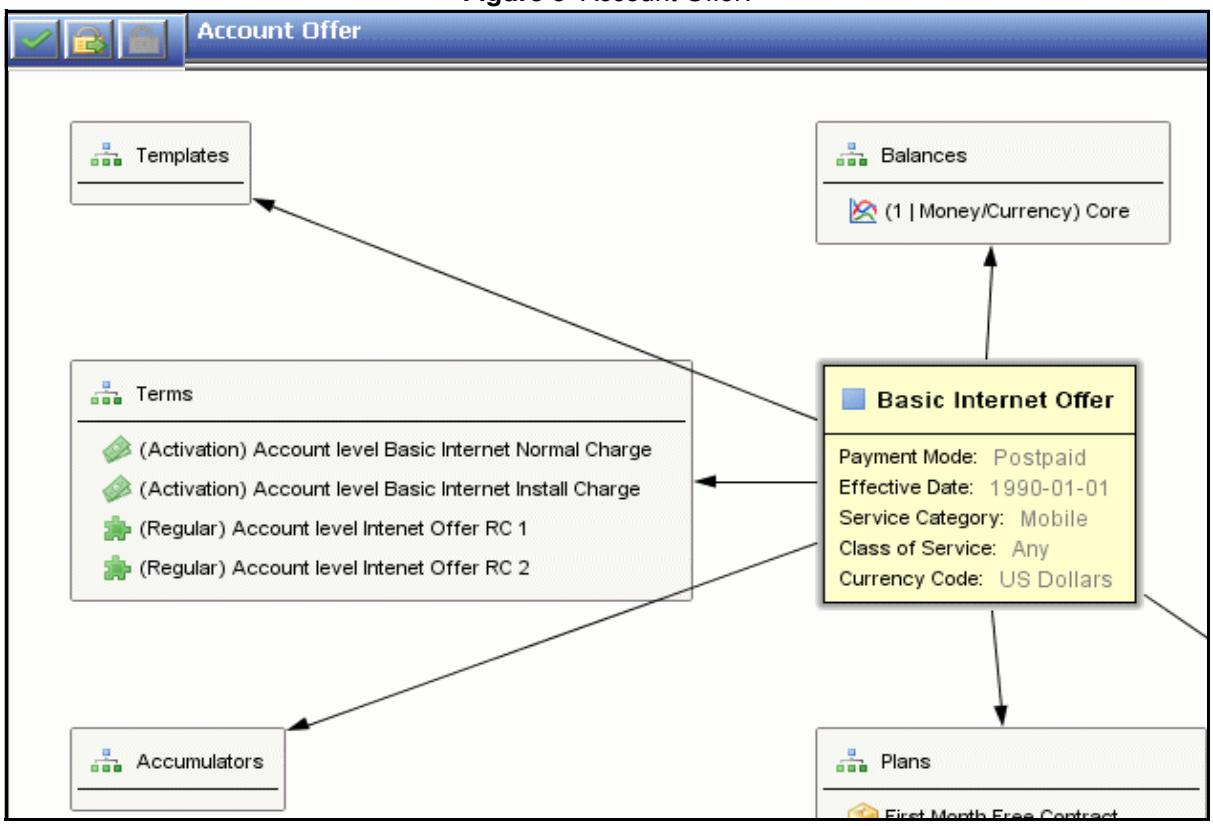
An account offer models service that is consumed at the account level. Unlike a primary offer, an account offer is optional.

An account offer is composed of zero or more services or promotions. It is driven by rules, contract, RC terms, NRC terms, and accumulators. An account offer cannot contain a usage item.

An account offer has effective and expiration dates:

- **Sales effective date**: a free date-type attribute that controls the availability of the offer for subscription
- **Sales expiration date**: a free date-type attribute that controls the expiration date on which the offer is no longer available for subscription.
- **Automatic expiration**: Either a fixed Date or a Duration with
  - A value
  - A unit as a choice from (minutes, hours, days, weeks, months, years)

Figure 6 Account Offer:



Supplementary Offer

Support of several active instances of a Supplementary Offer.

A supplementary offer enables subscribers to consume services in addition to those associated with the primary offer. Supplementary offers have the following characteristics:

- Composed of 0 or more usage, service, and promotion plans
- Associated with zero or 1 template of each the following types: plan override template
- Associated with zero or 1 rule of each of the following types: subscriber/account prerequisite rule, bundle/offer prerequisite rule, exclusion Rule
- Configured for sale outside of primary offer compatibility templates
- Supplementary offers can also be associated with contract terms, RC terms, NRC Terms, balances and accumulators.
- Can be configured for sale outside of Primary Offer Compatibility Templates

Supplementary offers have a the following dates:

- **Sales effective date**: a free date-type attribute that controls the availability of the offer for subscription
- **Sales expiration date**: a free date-type attribute that controls the expiration date on which the offer is no longer available for subscription.
- **Automatic expiration**: controls the duration of the Supplementary Offer; Either a fixed Date or a Duration with
  - A value

- A unit as a choice from (minutes, hours, days, weeks, months, years)

Note: A supplementary offer is always associated with a subscriber and not with an account.

Balances

A balance is a container or bucket for monetary or non-monetary funds that pay for usage or services.

See the *Rating Technical Reference Guide*.

Accumulators and Promotions

Rating time and billing time promotions are also a key aspect of the offer definition. Promotion plans define how bonuses or discounts apply to a subscriber who has subscribed the offer, based on accumulators and impacting balances.

See Chapter 8, “Rating-Time Promotions,” and chapter 7, “Bill-Time Promotions (CV).”

Rules

Several types of rules drive the way offers are subscribed. Only one rule of each type can be associated to an offer. The rules exist as separate entities within the Product Catalog.

- The account/subscriber prerequisite rule is an expression based on account or subscriber attributes
- The bundle/offer prerequisite rule defines a list of bundles or offers that must be already subscribed in order to be able to get the concerned offer
- The exclusion rule defines bundles or offers that are defined as incompatible with the concerned offer
- The transition rule is a collection of primary offers that could act as possible targets when swapping primary offer. This rule only applies to primary offers.

See “Rules,” starting on page 28.

Key Offer Related Attributes

Key offer attributes are set via the related General Tab field that is part of the offer configuration window.

General Settings

General settings include, but are not limited to, the following:

- **Service Category**: The service category defines the service to which the offer is applied. Service categories are defined operator-wide in the Product Catalog. Examples include

- fixed telephony
- DSL + TV
- IP
- cable
- energy and so forth

There is one service category per offer.

- **Payment Mode**: Defines whether the offer is prepaid, postpaid, either-default, or a combination of prepaid and postpaid.
  - **Prepaid**: The payment mode is defined as prepaid at offer level and thus every balance of the offer is prepaid
  - **Postpaid**: The payment mode is defined as postpaid at offer level and thus every balance of the offer is postpaid
  - **Either-default prepaid**: By default, the offer is instantiated as prepaid and every balance of the offer is prepaid.

    However, the CSR can decide to change the payment mode at balance level, for each balance of the offer; for example, get one balance prepaid and the other postpaid, equivalent to a hybrid (combination of prepaid and postpaid) offer.
  - **Either-default postpaid**

    By default, the offer is instantiated as postpaid and every balance of the offer is postpaid.

    However, the CSR can decide to change the payment mode at balance level, for each balance of the offer; for example, get one balance prepaid and the other postpaid, equivalent to a hybrid (combination of prepaid and postpaid) offer.
  - **Combination of prepaid and postpaid**

    The payment mode is *not* defined at offer level. Rather, the payment mode is defined for each balance of the offer. Each balance is instantiated with defined payment mode.The CSR is not allowed to change the payment mode of balances at instantiation.

The capability of the CSR to change balance payment mode is limited to cases where this change does not contradict the current configuration of the subscriber or account.
For example, if the concerned balance is already instantiated as prepaid to the customer entity because of another offer, the CSR cannot select postpaid while managing the new offer to be subscribed.

- **Currency**: Defines the offer's specific currency.
- **Sales Active and Inactive Dates:** Sales active and inactive dates are free date-type attributes that control the availability of the offer to subscribers.
- **Region**: Regions enable the segmentation of offers. An offer can be assigned to either one region or to all regions (global offer).

- **Pricing**: Pricing is achieved by the association of Recurring Charge (RC) and Non-Recurring Charge (NRC) terms that model the price paid for subscribing to an offer. A contract term is also available to model commitments applicable to the offer.

See also "Terms," starting on page 32

Advanced Settings

Various attributes and items are set via the Offer window Advanced Settings tab list. These include segmentation, announcements, balance rules, call forwarding, co-requisite rules, feature requests, notifications, PINS, recharge, usage processing, USSD, and USSD callback.

For example, the Core Balance Expiration Method is set in the Primary Offer Advanced Settings tab Balance Rules selection. It controls the way the core balance expires with the primary offer.

The auto-extension control attribute controls how the core balance is auto-extended for each expiration method attribute.

- **None**: the auto-extension control does not apply
- **Fixed**: the auto-extension control always applies
- **Dynamic**:
  - never extend
  - extend every recharge or billable call
  - extend every recharge

Likewise, a Personal Identification Number (PIN, called a password) can be defined for each prepaid account. When the user initiates the service, they are prompted for the PIN.

PIN usage for a primary offer is defined as follows:

- **No PIN**: Subscribers have no PIN in their account.
- **PIN Required**: Subscribers must have a valid PIN defined in their account.

Bundles

Subscriber bundles can be synchronized with Infor. Account bundles cannot. See also "Offers and Subscriber Bundles Synchronized With Infor," starting on page 26.

A bundle is a collection of offers or bundles that are provisioned to, or consumed by, a subscription or an account. Bundles have several advantages:

- Give operators flexibility in defining offers and pricing options.
- Enable the bundling of offers together for marketing and commercial purposes.
- Are sellable entities.
- Enable the packaging of offers as a consistent commercial set and support multi-play subscription or multi-subscriber activation under the same account.

Bundle Attributes

The following bundle attributes are part of Offer Management.

- Account Bundle Attributes
  - **Sales Effective and Expiration Dates**: Define the date ranged in which the bundle can be subscribed.
  - **Region**: Regions enable the segmentation of offers. A bundle can be assigned to either one region or to all regions (global bundle).
  - **Required Number of Selective Account Offers**: Refers to the association of selective items to define the number of items to be picked up from the whole set of selective items when the bundle is subscribed.
  - **Required Number of Selective Subscriber Bundles**
- Subscriber Bundle Attributes
  - **Sales Effective and Expiration Dates**: Define the date range in which the bundle can be subscribed.
  - **Region**: Regions enable the segmentation of offers. A bundle can be assigned to either one region or to all regions (global bundle).
  - **Required Number of Selective Offers**

Account and subscriber bundles do not have auto-expiration dates.

Bundle Modification

All validations and restrictions as applicable when defining a bundle must be applied when modifying a bundle (for example, mandatory attributes). All existing subscribers and accounts are impacted if they have purchased a bundle that is modified. In order to avoid impacting existing subscribers, a new bundle must be created.

Provisioning related changes made to a bundle are not automatically propagated to existing subscribers who have purchased the bundle.

Any bundle that is currently associated to a subscriber or is referenced anywhere in the system cannot be deleted.

Bundle Types

The Product Catalog manages two types of bundles:

- **Account Bundle**: includes account offers and subscriber bundles. Assigning an account bundle to an account affects the instantiation of some subscribers attached to the account, based on subscriber bundles included in the account bundle.
- **Subscriber Bundle**: A subscriber bundle includes a unique and mandatory primary offer and some supplementary offers.

Account Bundle

Account bundles contain account offers and subscriber bundles. The account offers and subscriber bundles within an account bundle are either mandatory, optional, selective, or hybrid.

- **mandatory**: must be included
- **optional**: subscribed or not
- **selective**: selected from a total of offers marked as selective
  Two attributes drive selective account offers and subscriber bundles:
  - required number of selective account offers in the account bundle

- required number of selective subscriber bundles in the account bundle

If the offer is not acquired as selective, it is optional.

- **hybrid**: optional AND selective.

Account offers within the account bundle are associated to the corresponding account only.

Subscriber Bundle

Because a subscriber has only one primary offer, only one bundle can be associated to the subscriber. Subscriber bundles include the following:

- 1 and only one primary offer
- 0 or more supplementary offers (a subscriber-level offer)

Supplementary offers are included as either:

- **mandatory**: subscribed with the bundle with no choice
- **optional**: can be subscribed or not

A bundle can contain a number of selective offers. The general subscriber bundle configuration sets the required number of selective offers to be chosen. Typically, the cost of selective offers is included within the bundle RC terms and NRC terms. This supports the business case: select 2 out of 4 included in the offer price.

The subscriber bundle is always associated to a subscriber and *not* to an account.

Triple Play Example

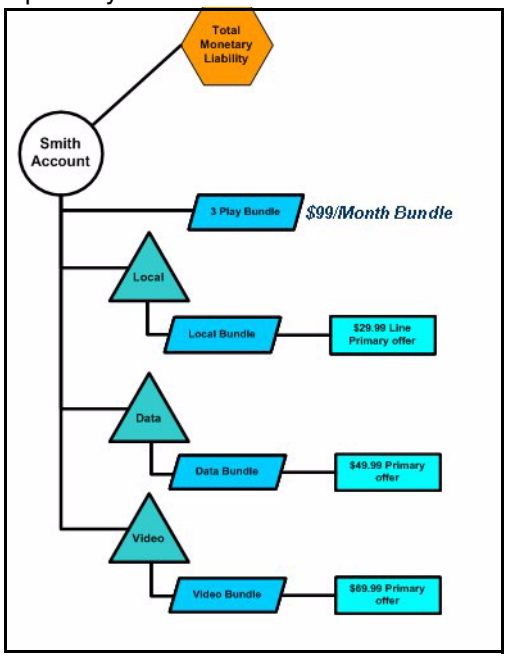
This section describes a triple play subscriber level bundle consisting of a grouping of three offers that deliver three services at a single price: Local Voice, Data (high-speed internet) and Video (IPTV). Each service is delivered/recognized via a different delivery point: Telephone Number (N), MAC address, and IP set-top box address.

Various other Bundle configurations are possible.

Offers are associated across the family account as follows:

- Account-level Bundle at $99 per month.
- Selected account-level bundle includes 3 subscriber bundles that are assigned to deliver appropriate service-level offers.

Figure 7 Triple Play Bundle and Offer Associated With Account



Offers and Subscriber Bundles Synchronized With Infor

Product Catalog provides a means to synchronize flagged offers and bundles to the Infor Sales Product schema as well as a means within the Infor system to request new products.

The following limitations for offers and bundles synchronized with the Infor system:

- Primary, supplementary, and account offers

  All RC and NRC terms included in the offer must be expressed in the same currency as the offer, and all RC terms must have the same system-level Infor Sales RC frequency (defined by the `CRM.SFA_RC_PERIOD` system parameter). The terms can contain rates in other currencies, but if a rate is the default rate, it renders the resulting product non-standard.

  The synchronization process is responsible for properly pricing a product record on the Infor side for the given offer. However, if the pricing is not successful the synchronization process flags the product as non-standard; thus the user is alerted that there is an issue with determining the price.

- Subscriber bundle

  A subscriber bundle cannot contain any selective offers that have RC or NRC terms attached to them It can contain selective offers; however, the resulting product on the Infor side will be marked as non-standard.

  All RC and NRC terms included in the bundle must be expressed in the same currency as the bundle, and all RC terms must have the same system-level Infor Sales RC frequency (defined by the `CRM.SFA_RC_PERIOD` system parameter). The terms can contain rates in other currencies, but if a rate is the default rate, it renders the resulting product non-standard.

Payment Modes for Offers

In real-time billing Comverse ONE supports the following payment modes for all offers, including account, subscriber primary, and supplementary offers:

- Prepaid (previously supported in real-time billing)
- Postpaid
- Either (default is prepaid)
- Either (default is postpaid)
- Hybrid: A combination of prepaid and postpaid, some balances are prepaid and some balances are postpaid.

See also the *Product Catalog User Guide* and the *Recurring—Non-Recurring Charges User Guide* for related information.

Display Groups

Product Catalog enables the grouping of bundles and offers for display purposes to support the Customer Center and facilitate the selection of bundles and offers by CSRs. Bundle and Offer Display Groups are managed via the Product Catalog GUI Marketing Layer.

Bundle Display Group

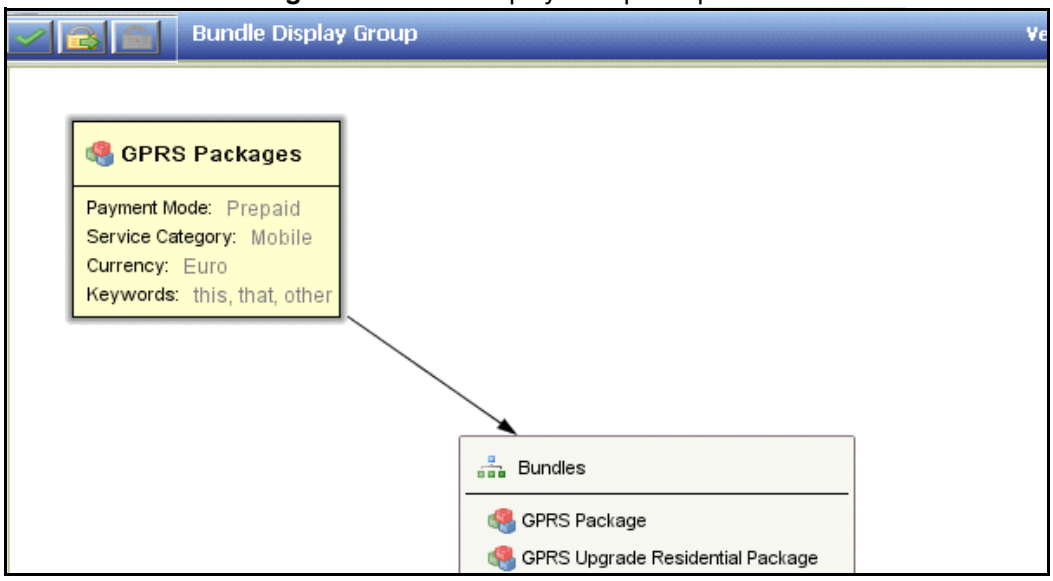
A Bundle can be part of 0 or more Bundle Display Groups. Bundle Display Groups are not arranged in any hierarchy pattern but are managed as a flat set of entities.

The following entities support the bundle display group:

- **Bundle Display Group**: a name that supports localization. Bundle Display Groups are reseller specific.
- **Display Order**: a free numeric field which determines the order in which the bundles are displayed.

Bundle grouping is accomplished from the bundle entity itself and not from the Bundle Display Group screen.

Figure 8 Bundle Display Group: Graph View



Offer Display Group

An offer can be part of 0 or more Offer Display Groups. Offer Display Groups are not arranged in any hierarchy pattern but are managed as a flat set of entities. They are reseller specific.

The following entities support the offer display group.

- **Offer Display Group**: a name that supports localization.
- **Display Order**: a free numeric field that determines the order in which the offers are displayed.

Offer grouping is accomplished from the offer entity itself and not from the Offer Display Group screen.

Do not confuse Bundle Group and Offer Group with Product Group and Product Line.

Rules

A rule represents a condition or constraint for delivering a bundle and offer. Rule types include pre-requisite, transition, and exclusion. Rules are reusable objects and attached to entities as appropriate.

An offer or bundle that does not have an attached rule is marked as “Generally Available.”

Prerequisite Rules

Prerequisite rules include:

- Subscriber/Account
- Bundle/Offer

Subscriber/Account Prerequisite Rule

Subscriber/account prerequisite rules enable the assignment of filtering criteria to bundles or offers. This criteria involves account attributes and the exact set of attributes for these rules is configured in the Product Catalog (basic layer). These rules constrain the delivery of bundles or offers based on characteristics of an account or subscriber. They are compound expressions, are reusable, and are defined as entities and then attached to the appropriate bundle or offer.

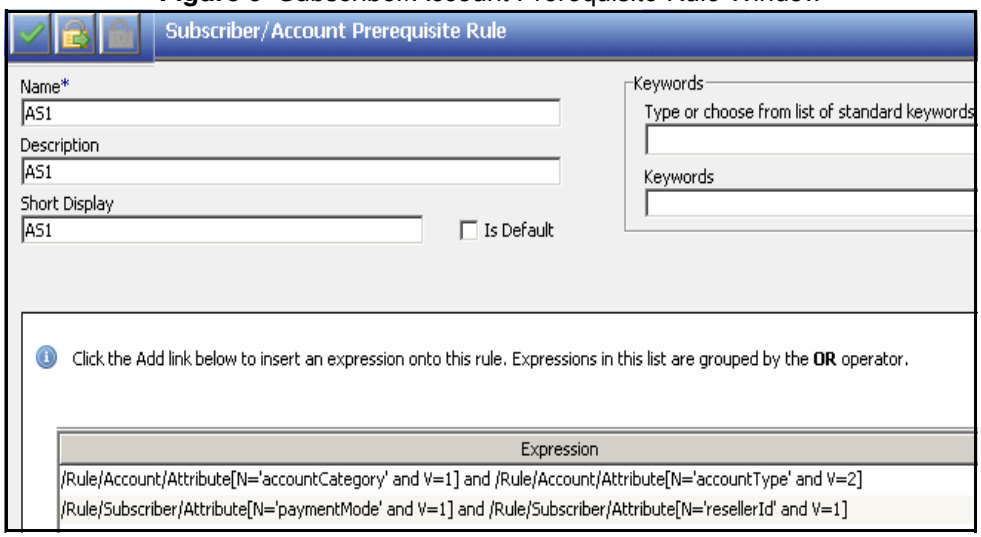
Subscriber/account rules are applicable to bundles and offers of all types (only one per bundle or offer). They enable the targeting of specific customer segments; for example, VIP, business, and so forth.

In both subscriber and account prerequisite cases, each rule consists of a subject (account or subscriber attribute), a property of the subject, and a constant expression (such as ' = "SA" ' or ' >= 2000 ').

Table 4 Account Prerequisite Rules

Rule Name	Attributes
Account Prerequisite 1	default currency = 1
Account Prerequisite 2	AccountCategory= b business and currency = US Dollar
Account Prerequisite 3	Rate class > 1 or VIP code <=2
Account Prerequisite 4	Regulatory ID = 2
Account Prerequisite 5	VIP Code= 1 or Market Code> 1
Account Prerequisite 6	default currency!= 2 and Regulatory ID < 2

Figure 9 Subscriber/Account Prerequisite Rule Window



See also the Product Catalog User Guide.

Market Offer Group Eligibility Rule

Comverse ONE supports the upgrade of certain Comverse clients who currently are using service provider pre-MVNO in distinct ways that were not previously implemented, specifically Market Offer Groups. The Market Offer Group Eligibility Rule supports the Market Groups functionality.

Market Offer Groups are created within the selected reseller version. Detailed instructions are available in Product Catalog User Guide.
Descriptions of the associated tables MARKET_OFFER_GROUP_KEY,

MARKET_OFFER_GROUP_REF, and MARKET_OFFER_GROUP_VALUES are available in the Database Reference.

Market Offer groups functionality includes the mog_id attribute; example, Marketing Campaign 1 (mog_id=1), Marketing campaign 2 (mog_id=2), and Marketing Campaign 3 (mog_id=3)

Bundle and Offer Prerequisite Rules

A bundle or offer prerequisite rule is a list of bundles or offers. The rule is attached to other bundles or offers to constrain its subscription upon subscription activation.

The bundle or offer prerequisite rule changes as eligibility is defined upon some specific keys.

- Only one (0 or 1) bundle or offer prerequisite rule can be associated to each bundle or offer. This is true at both account or subscriber levels (account or subscriber bundle, account or subscriber offer).
- Each bundle or offer associated to the bundle/offer prerequisite rule is associated only once.
- It is not possible to associate account-level entities and subscriber-level entities inside the same bundle or offer prerequisite rule.
- The level is defined explicitly from the rule configuration screen.
- Once defined, the level of the rule drives all further associations.

The logical operator between items listed as part of the rule is OR. Thus, when the system evaluates the bundle or offer prerequisite rule of an offer or bundle to check if it can be instantiated, only one of the listed items is required and not all of them need to satisfy the rule.

Account or subscriber level entities can be associated as part of a bundle or offer prerequisite rule.

The level is a flag to identify whether it is account-level or subscriber-level prerequisite rule. The first entity attached to the rule defines the level of the rule and therefore other entities grouped into the rule. The level also drives the association of the rule to offers or bundles (bundle/offer configuration.) This ensures that the system does not need to check the rule contexts.

Transition Rule

A transition rule specifies the available bundles or offers to which the primary offer or subscriber bundle associated with the rule can be switched. Transition rules are created, managed, and associated with bundles or offers via the Product Catalog Marketing/Packaging Layer.

The logical operator between items listed as part of a transition rule is OR. The collection is explicit. Any item listed as part of it is considered as a valid target for transitioning. However, transitioning to primary offer 1 for example does NOT imply that you can also transition to any bundle containing primary offer 1.

Only one (0 or 1) transition rule can be associated to each bundle or offer. This association is valid only at subscriber levels (subscriber bundle, primary offer).

The rule logic is as follows:

- The rule specifies the available bundles or offers that can be switched to from the primary offer or subscriber bundle to which the rule is attached.
- If a transition rule is defined on both the primary offer and the subscriber bundle containing the primary offer, then the bundle rule takes precedence and the primary offer rule is ignored.
- It is assumed that specific business logic is applied when transitioning from one primary offer to another

Exclusion Rule

An exclusion rule is a reusable entity consisting of a collection of bundles and offers. Once associated to an offer or bundle this collection is the set of items incompatible with that offer or bundle.

The exclusion rule takes precedence over any other rule or offer compatibility template.

Only one exclusion rule can be defined per bundle or offer.

The rule evaluates to FALSE if at least one of the listed bundles or offers is already subscribed (or already selected to be subscribed, in the case of a transaction covering multiple subscriptions).

In a prepaid only offer, a postpaid subscriber converged multiple offer can be contained in an exclusion rule associated with the prepaid offer. Or, a converged offer can be associated with an exclusion rule that contains a prepaid only offer.

Configuring Rules for Bundles and Offers

Rules Example

Here is an example of rules applied at the subscriber and bundle level:

The following rules apply:

- **Subscriber-level**: Only one instance of Service Plan A can exist.
- **Bundle level**: For Bundle A, either Offer 1 or Offer 2 exists. (Selective items also are involved in this bundle level example).

Bundles and Rules

Bundles support the same types of rules as offers. However, there are differences:

- The Transition rule only applies to a subscriber bundle and is equivalent to the transition rule on primary offer (because a subscriber bundle always includes a primary offer).
- The ruling defined on the bundle overrides (replaces) the ruling applicable to bundle items. Thus,
  - Any rule applicable to an offer does not apply when this offer is handled in the context of a bundle This statement also applies to subscriber bundle in the context of account bundle This statement is true even if the container bundle does not have any rule assigned to it.
  - As a summary, only bundle rules apply.

Terms

Term information is handled as a text attribute on offer and bundle entities.

You can define the following term types via the Product Catalog GUI:

- Recurring charge term (RC term)/ non-recurring charge term (NRC term)
- Contract Terms

Recurring Charge Term

An RC term is a collection of recurring rate charge definitions that are assessed through bundles and offers at specified intervals such as daily, weekly, monthly, yearly, bill cycle, or a specified number of days. Rate charge definitions are differentiated by rate keys. Rate keys are configured per RC term.

An RC term can be prorated, charged in advance or in arrears, consumed from multiple balances, and awarded units. Conditionally, liability for a RC term can be re-directed within or across account hierarchy nodes. RC terms can be part of the same single charge, or multiple charges.

An RC term has two components, a charge component and reward/update component. The charge component is configured globally and is always applied to the core balance of the subscriber.

The reward/update component enables changes (positive, negative or fixed value setting) to the other balances in the account. Once associated with any offer or bundle, a RC term can be assigned to a subscriber.

Three RC term types are supported based on association:

- Normal RC term: associated with a contract or offer. Within an offer all RC terms are normal.
- Contract RC term.
- Commitment RC term.

Non-Recurring Charge Term

A NRC term defines the characteristics of the NRCs (for example, one-time charges) assessed through a bundle and offer. RC term types include activation, early termination, commitment, subscription, reactivation, refinance, late fees, and so forth.

Terms can be set as overriding which means that any other term of the same type assigned to a bundle item is ignored. Overriding of terms applies to mandatory and selective bundle items and NOT to optional items.

Non-Recurring Charge Types

NRC term types are internally categorized as follows:

- **System NRC terms**: This category cannot be associated via an offer in Product Catalog. The category includes: Late fee NRC terms and deferred rounding NRC terms s. Only one term of each must be defined system wide.

  System NRC terms have no rates provisioned in the Product Catalog and cannot be associated with an offer or contract.
- **Product Catalog NRC terms**: This category can only be provisioned via an offer or contract. NRC terms in this category include activation, commitment, termination and so forth and cannot be provisioned outside an offer.

Multiple NRC terms of each type can be configured.

Association of Non-Recurring Charge Terms to Offer or Bundle Association Type

The following association types are supported between the NRC term and an offer or bundle: Subscription, Termination, Activation, Reactivation, Equipment, Commitment, and One time charge.

See also the *Recurring — Non-Recurring Charges Server Guide*.

While vanity codes and equipment charge codes are managed via the Inventory GUI, mapping of these entities with RC s and NRCs is managed via the Product Catalog GUI.

Awards, RCs/NRCs, and Bill Cycles

When the RC schedule aligns with the bill cycle and the RC includes awards, Product Catalog permits the user to set awards for the supported account bill cycles via OFFER/BUNDLE_RC_AWARD_MAP. Multiple awards can be configured by the user.

NRCs and Chargeable Events

It is possible to add a chargeable event NRC. This option is listed in the Product Catalog GUI as an option under NRC Type as described in the *Product Catalog User Guide*. Chargeable events are listed in table 5, "Chargeable Events" below.

Table 5 Chargeable Events

Event	Comments
Acquire New Child Account	This event occurs whether this is done as part of creating the child account or updating the parent account on an existing account. The charge is applied to the new parent account.
Add Fiends and Family phone book entry	Add a new entry to the list.
Add Favorite Area (for example, home zone)	Add a new entry to the list.
Add Favorite Destination	Since this is a single value field, "adding" it occurs when the initial value is set.
Add Happy Hour	This is the initial setting for the field.
Add Special Day	This is the initial setting for the field.
Add Subscriber to Account	A subscriber is added to an account when a new subscriber is created for an existing account. This event does not occur when a new account and new subscriber are created at the same time.
Bill Resend/Reissue Invoice	
Modify Favorite Destination (the favorite area field)	Change the existing value to another value.
Modify Happy Hour	Modification of Happy Hour occurs when the existing value is changed to another value.
Modify Special Day	Currently, the "special day" functionality consists of two subscriber level fields – birthday and anniversary. The operator should be able to charge for changing each field. This event happens when the existing value for either field is changed to another value.
Remove Friends and Family phone book entry.	Remove an existing entry from the list.

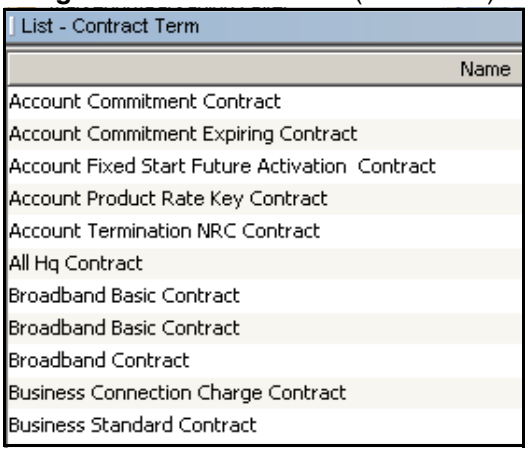
Table 5 Chargeable Events (Continued)

Event	Comments
Remove Favorite Area (home zone)	Remove an existing entry from the list.
Update Friends and Family phone book entry	Modify an existing entry in the list.
Update/Replace Favorite Area (for example, home zone)	Modify an existing entry in the list.

Contract Terms

Contract terms define the duration of the commitment to the details of an offer or bundle.

Figure 10 Contract Terms (Partial List)



Recharge Control

The Recharge Control Table (RCT) is used to modify and extend recharge actions. It is the basic mechanism for allowing a recharge to affect more than just the core balance, and thus affect non-monetary balances.

This is achieved by defining table entries for the adjustment and matching criteria (to identify if the recharge is subject to any adjustment).

Every recharge accesses the RCT table.

- If a match is found, the RCT table parameters are used to adjust the recharge.
- If no match is found, the recharge is attempted without any RTC table adjustments,

  Finding a match is based on 1st match algorithm; the first match found causes the search to stop,

  Matching criteria includes the date window in which the recharge is performed (start and end), the amount window (high and low), the recharge method, and the primary offer,

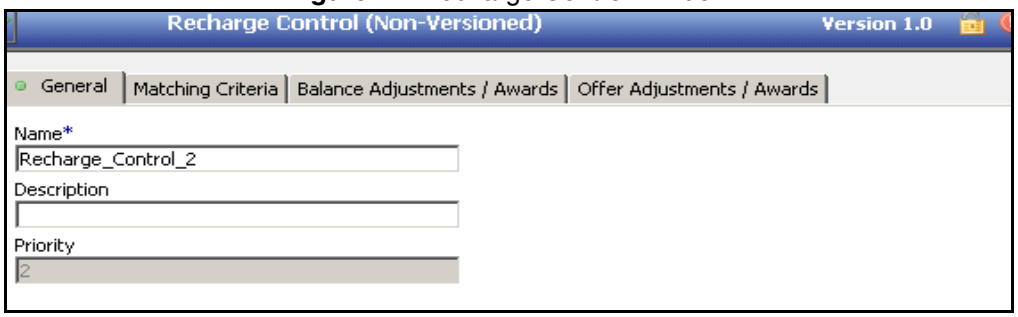
Adjustments include: Balance Id, Balance Amount, and Date activation/expiration for the adjustment; these affect each non-core balance, and determine how to adjust the face value to the core balance.

As offer change is either a swap of primary offer or addition of supplementary offer, and date activation/expiration of the adjustment.

IMPORTANT Recharge control is configured per reseller (data segmentation), but it is not subject to versioning.

Recharge control is accomplished via the Recharge Control (Non-Versioned) Window as shown if Figure 11, “Recharge Control Window”.

Figure 11 Recharge Control Window



SEE See also “Recharge Control,” starting on page 67.

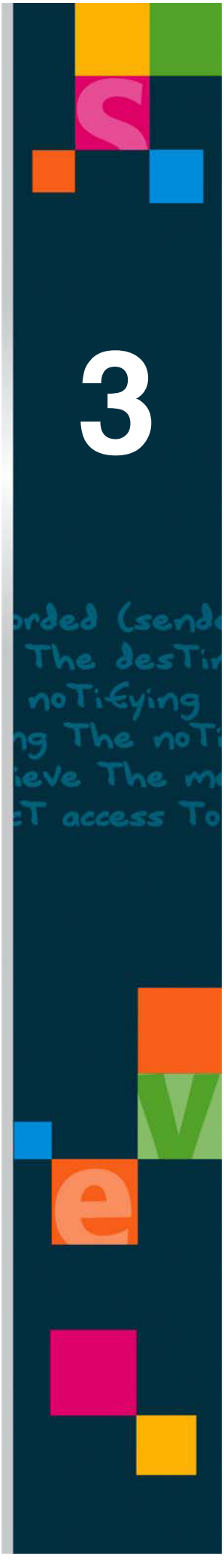
Primary Offer Swap

In a primary offer swap, containing both disconnects and connects, it is possible to charge disconnect terms to old balances. These charges can than then be processed as part of the new balance.

SEE See also the *Unified API Guide* and the *Recurring—Non-Recurring Charges Server Guide*.

Chapter 3

Versions, Lifecycle, and Propagation



Product Catalog versioning involves the segmentation of datasets to facilitate propagation and thus control the release of data to test, production, and other systems.

Operators manage the Product Catalog network data layer and various entities that are used for core system provisioning.

Resellers and Virtual Network Operators (VNOs) have their own Product Catalog datasets. Data is segmented and maintained by the resellers in separate partitions. Resellers can version their own datasets but have no access to the datasets of other resellers.

When describing versions and versioning this chapter distinquishes between datasets and time stamped data. A dataset is the underlying data in either a service or reseller version. Product Catalog versions are propagated to target systems and are effective on a specified date.

See also chapter 12, “Operators, Resellers, and Dealers.”

Product Catalog data is made available to test, development, and production systems via the propagation process. Propagation enables consistency and association of reseller data with system information data with regards to segmentation, dependency and versioning. Market offers are reseller-specific as part of a version.

Datasets

The Product Catalog contains service and reseller datasets.

- **Service dataset**: corresponds to operator-wide configuration information that is shared by and common to all resellers.
- **Reseller dataset**: corresponds to the information that is specific to the reseller and not shared with other resellers.

Different versions of datasets, corresponding to different time periods, can be propagated to target systems.

Multi-User Editing

Multiple Product Catalog users can work on different elements within the same checked-out dataset version. However, an element within the dataset can only be locked and edited by a single user. A dataset version can only be unlocked if there are no locked elements within the dataset.

Initial Product Catalog Data

You can install Comverse ONE without the example data contained in the initialization data. The following options are available:

- **Install static data only**: Static data is the complete and standard data suitable for turnkey use by the target customer. Examples of static data include: unit types, currencies, country codes, and time zones
- **Install business data**: General business data is typical or generic data that would be common across many target customers, suitable for use with minor modifications by the target customer. Examples of general business data include: AUTs, calendars, subscriber types, charge types, adjustments
- **Install example data**

Versions

This section describes the management of Product Catalog versions.

Propagating a Version

A Product Catalog version includes all versioned data global to the deployment, operator, and reseller data.

These transactions are involved in propagating a version:

- Data is propagated to the target database via propagate.ksh.

  Propagation occurs for each database independently. For example, it is possible for propagation to the cust 1 database to commit while propagation to cust 2 rolls back.
- If all propagation commit successfully, workflow creates a distributed transaction to flip the `PC/SERVICE/RESELLER_VERSION.inactive_date` and `SERVICE/RESELLER_VERSION.status=3` on all blocking target databases. If the target group is a production system, it includes the offline Product Catalog in the distributed transaction.

  If the propagation fails via propagate.ksh the workflow stops and does not continue.

  At the time of the Product Catalog version's active_date (it can be a future date), its status is set to `PC_VERSION.propagation_status=4` [live].

  Blocking databases are handled first and then non-blocking targets if none of the blocking targets has failed.

  - For blocking databases, a distributed transaction is created to update all blocking databases Product Catalog version status. In a production system, the offline Product Catalog is included in this distributed transaction.
  - For each non-blocking database, a local transaction is created against this non-blocking target database and it's Product Catalog version status is set to `PC_VERSION.propagation_status=4`.
  - If the propagation completes successfully and the target database is CSS, then CSS's notification web service is invoked to notify CSS that a new version has arrived. The workflow process waits until CSS finishes its import. The CSS web service alerts the notification process that the import is complete.

A new minor service version is based on any prior existing major service version.

When a new service version is created the operator must create a new reseller version that links to the new service version to ensure compatibility between the two versions.

When a new service version is created the following rules apply when it is propagated to a reseller version:

- Reseller version must not have been in any Product Catalog Version
- A major reseller version cannot link to minor service version.
- A reseller version cannot be linked to a service version which predates the service version on which it was originally based.

Check the version's state/active_date/inactive_date to determine which version must be used.

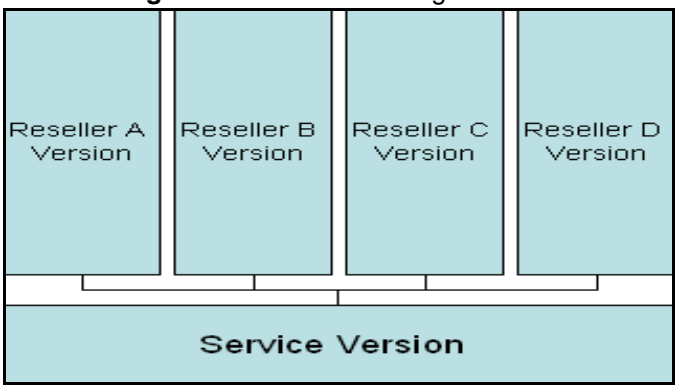
Reseller Version

A Product Catalog reseller version contains data specific to a reseller. The reseller version contains all Product Catalog versioned entities as defined via the Product Catalog Service Layer.

A reseller version is always based on the service version because reseller data relies on operator specific lower level data that is managed through the service version.

One service version is shared across all resellers as shown in figure 12, “Product Catalog Versions.”

Figure 12 Product Catalog Versions



Resellers and VNOs maintain their Product Catalog data via the Product Catalog GUI separately and have no access to the Product Catalog data of other resellers and VNOs.

When a reseller Product Catalog version is propagated any existing live or current reseller version for the operator (the root node of the reseller hierarchy) or the reseller (if reseller based partitioning is in use) has it state changed to superseded or history.

Before you can perform a propagation operation, you must validate the reseller version and check in all locked entities. Each user should check the entities they have locked, to ensure that all configuration operations have been completed. However, if you need to propagate a dataset and there are still locked entities in the system, you can use force them to be checked in. See the *Product Catalog User Guide* for specific instructions.

SEE See also “State Transition Processes,” starting on page 49.

Reseller Version Lifecycle Management

Reseller versions are created, changed, and managed via the Versioning menu.

The following processes are available to manage a reseller version lifecycle:

- **Create**

  `RESELLER_VERSION.status =1 (Design)`

  You can create new major reseller versions based on any existing major version that is in one of the following states:

  - Live
  - Future-Live
  - Ready to Propagate
  - Checked-in/Validated

You cannot base a new major version on a previous version that is in the Design, History, or Rejected state.

For the purposes of this functionally, a reseller version is regarded as being in the History state only when every Product Catalog version that contains it have themselves become History.

- **Validate Reseller Version**: During validation, the version is moved to a validating status, at which time no changes can be made to any entities across the reseller version. All entities must be checked in prior to validation. A successful validation moves the version into a validated state; the version is locked from editing in this state. The version status values are: 5 = validating; 6 = validated.

All entities must be unlocked before a reseller version is validated.

- **Unlock Validated Version**: Moves the version back into design status so entities can be edited again. `RESELLER_VERSION.status =1 (Design)`
- **Synchronize Corequisite Rules** (optional): Automatically adds or deletes usage-based offer corequisite rules.
- **Generate Default Final AUTs** (optional): Automatically generates final AUTs for any initial AUTs that do not have final AUTs.
- **Check-in the Reseller Version**: Checks in the reseller version, sychronizes co-requisite rules, and generates default final AUTs; these can also be generated via separate manual steps. A version cannot be checked in until it is validated.
  `RESELLER_VERSION.status =2 (Ready to Propagate)`
- **Check-out Reseller Version**: Moves the version back to the design state so it can be edited. Checkout from the ready to propagate or rejected status.
  `RESELLER_VERSION.status =1 (Design)`
- **Reject:**
  `RESELLER_VERSION.status =4 (Reject)`
- **Propagate**:
  Propagate from the ready to propagate status; the corresponding Product Catalog version must also ready to propagate. `RESELLER_VERSION.status =3 (Propagated)`

Only certain actions are permissible at certain times (for example, a user cannot check-in a reseller version until it has been validated). A progress bar and an hourglass icon is displayed when a long-running task is being performed.

Major and Minor Versions

For data continuity and consistency Product Catalog supports the concept of major and minor versions for both service and reseller version.

A new major reseller version is based on the previous major reseller version. All entities from the previous major reseller version are copied into the new reseller version.

A new minor reseller version is based on any existing major reseller version and corresponds to a set of corrective changes to be applied to the major version.

Major Version

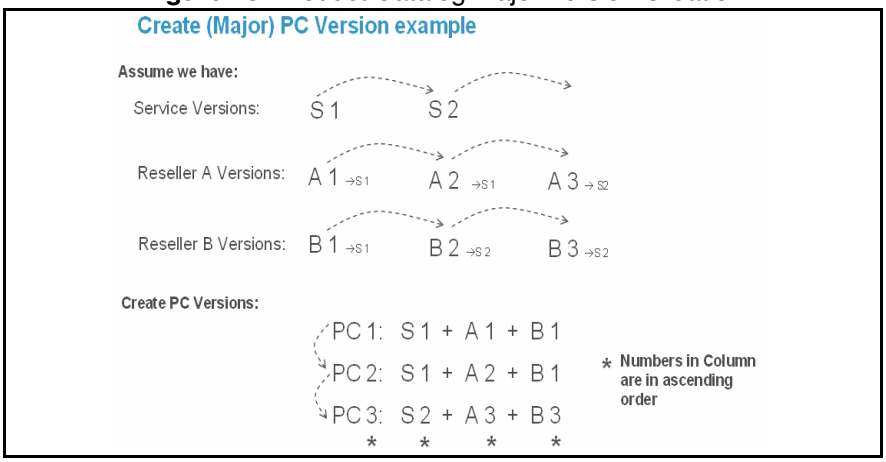
A major version is intended to handle any addition or modification of Product Catalog entities and the underlying dataset.

A major version contains up to one major service version and one major reseller version for each reseller. Major versions enable the configuration of new entities; for example, offers and balances. A major version is published with a specified start date.

The end of a major version is automatically derived from the start date of the next major version.

Multiple Product Catalog versions can be created based on the same major service version. Figure 13, “Product Catalog Major Version Creation” illustrates how major product catalog version can be created by combining a service version and selected reseller versions.

Figure 13 Product Catalog Major Version Creation



Major product Catalog versions are contiguous; data is incremental on the timeline as shown in figure 14, “Major Versions Active for Specific Time Period.”

Figure 14 Major Versions Active for Specific Time Period

Reseller A	1/1 - 2/7 Version 1	2/7 - 5/1 Version 2			
Reseller B	1/1 - 1/22 Version 1	1/22 - 2/26 Version 2	2/26 - 3/23 Version 3	3/23 - 4/4 Version 4	4/4 - 5/1 Version 5
Reseller C	1/1 - 1/31 Version 1	1/31 - 3/16 Version 2	3/16 - 5/1 Version 3		

Minor Version

A minor Product Catalog version is based on a major version. A minor version enables the correction of data affecting offline rating and billing processes for the purpose of rerating; for example changes to rate settings. Minor versions cannot include new entities or changes to bundle/offer association. Both active and inactive dates are specified for a minor version. Multiple minor Product Catalog versions can be created for a major version. When propagated, a minor version is used by the rating engine and works together with the major version on the target system. It enables quick and easy republishing of corrected data when some rates are in error.

A minor version can overlap a major version except when the corrected version is the one immediately previous to the current live version.

The essence of a minor version is to enable the correction of rate data for the purpose of re-rating. If a single rate is changed, only that single rate row exists in the minor version; a full copy is not performed. For the duration of the minor version, the changed rate overrides any other rate that might exist in a major version. The rating engines overlay minor versions in order of the release date of the correction.

A minor version cannot be used to modify a major version that is live; in such a case, the major version must be in a history state.

Major and minor versions apply to the reseller version.

See also “State Transition Processes,” starting on page 49.

Version Comparison

You can compare Service Versions or Reseller Versions by selecting Versions - > Compare Versions in the Product Catalog GUI.

This generates a difference report summary, detailed by Product Catalog layer.

Version History

A full version history of all Product Catalog data is kept in the Product Catalog repository. It includes all changes to data propagation details.

History and Logs

Log entries are handled as follows:

- **Checkout**: When a new entity is created, Product Catalog creates a log entry; otherwise the existing log entry is updated with information about the lock user. To cancel a checkout the entity is saved without checking it in.
- **Checkin**: When a new or changed entity is checked in, the log entry is updated and the lock released.

Versions Based on Previous Versions

Create Major Versions Based on Any Previous Version

In previous releases, when you created a new major service or reseller version, Product Catalog required you to base it on the major version that immediately preceded it. If you had versions 1, 2

and 3 in your system, the next version had to be based on version 3 — there was no way to use version 1 or 2 as the base version.

In this release, you can create new major service or reseller versions based on any existing major version that is in one of the following states:

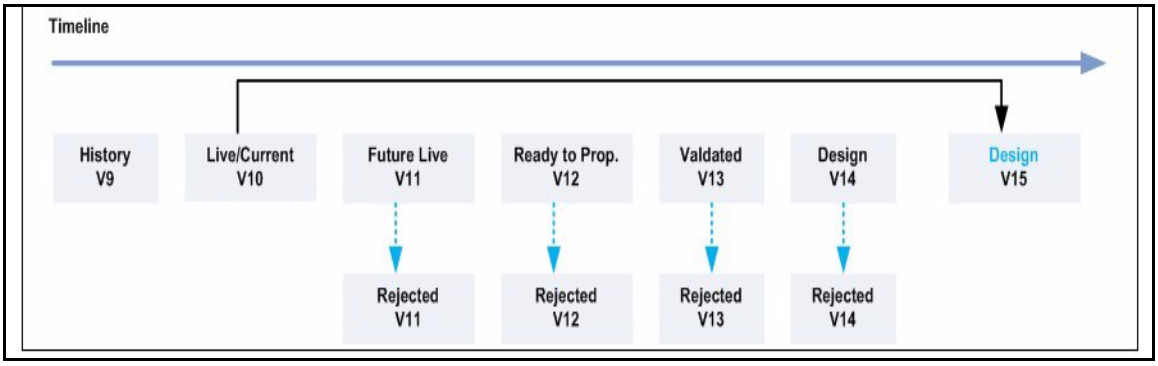
- Live
- Future-Live
- Ready to Propagate
- Checked-in/Validated

You cannot base a new version on a previous version that is in the Design, History, or Rejected state.

When you create a service or reseller version that is not based on the immediately previous version, Product Catalog changes every version between the base version and the new version to the Rejected state.

For example, if you create version 15 based on version 10 that is live in the online system, the intervening versions 11–14 are changed to Rejected in the offline system, as shown in the figure below.

Figure 15 New Version Supersedes Intervening Versions



In general, you cannot base a new version on an existing version that is in the Rejected state.
However, versions that are in the Rejected state because they have been automatically superseded by a new version *can* be used as the basis for a new version. So in the figure above, versions 11 through 14 can be used as the basis for new versions even though they are flagged as Rejected. Use the Merge Versions function to create a new version based on one of these rejected versions. See “Merge Versions,” starting on page 46 for more information.

Also, every Product Catalog version that contains one of these rejected service or reseller versions is also moved to the Rejected state, and Product Catalog generates a new PC version based on the latest PC version that contained the base service or reseller version. This new PC version applies only to the reseller affected by the change — all other resellers keep their existing PC versions, so their data remains consistent.

By default, new service and reseller versions are still created based on the immediately previous version. To override this setting, click the **Create from a Previous Base Version** button in the

Create Service Version or Create Reseller Version windows. See the *Product Catalog User Guide* for instructions.

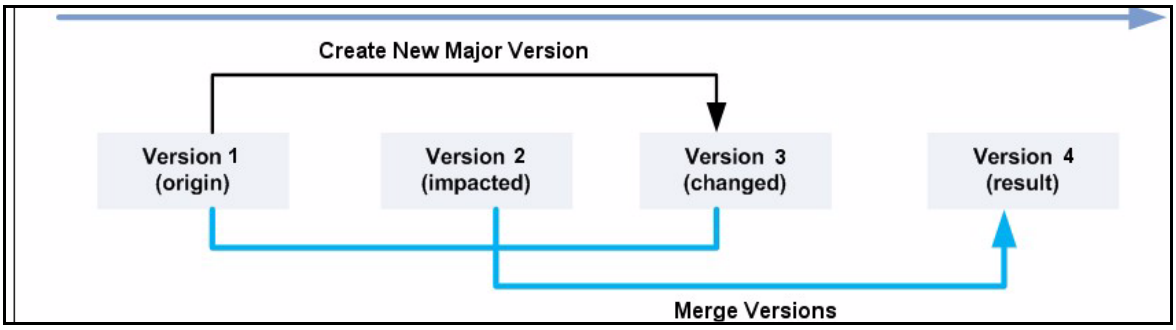
Merge Versions

When you create a new major service or reseller version that is not based on the immediately previous version, you can use this capability to apply the changes to the intervening versions as well. For example, if you create version 3 to make changes to base version 1, you can later apply those changes to version 2.

This ensures that if, in the future, you need to create a new major version based on version 2, the changes you made in version 3 can be reflected in the new version. The Merge Versions function captures the information in the base version (version 1) and the changes made in the new version (version 3), and applies them to the intervening version (version 2). The product of this merger is saved as a new version, and is automatically assigned the next available version number in the sequence (4 in this example).

The image below illustrates this process. Version 3 was created based on version 1, with the result that version 2 was rejected. Here, version 2 is merged with the base data in version 1 and the changes that were made in version 3. A new version, version 4, is created as the product of this merger.

Figure 16 Merge Version



.Use the new Merge Service Versions and Merge Reseller Versions screens to apply changes to intervening versions. See the *Product Catalog User Guide* for instructions.

NOTE

Any changes you make are reflected the new version, not in the base version. Therefore this feature does not work in situations in which the new version includes some disconnects compared to the base version. For example:

- One or more entities included in the base version are not included in the new version.
- One or more entities included in the new version are checked out and therefore cannot be validated.
- Problems exist in the new version that would cause it to fail validation if it were in the Design state.

Cancel (Stop the Activation) of a PC Version

In previous releases, a Product Catalog version that was in the future-live state could not be cancelled. If you discovered problems in the dataset, it was not possible to block activation of the PC version — instead, you had to create a new PC version and schedule it to replace the flawed version.

In this release you can cancel a PC version that has been propagated and is in the future-live state. Cancelling a PC version moves it to the rejected state.

When a PC version is cancelled, Product Catalog manages the datasets it contains as follows:

- Every reseller or service version that is already Live remains Live
- Every reseller or service version that is Future-Live is changed to Rejected

Use the Reject PC Version screen to cancel a PC Version. See the *Product Catalog User Guide* for instructions.

Merge Service and Reseller Versions

Use the new Merge Versions screens to apply changes to intervening versions.

See the *Product Catalog User Guide* for step-by-step instructions on merging service and reseller versions.

Merging a version may take some time to complete. Do not exit Product Catalog until the operation is finished.

Entity Management

Product Catalog bundles, offers, plans, items, rules, templates and so forth are defined via the following Product Catalog layers:

- **Marketing Layer**: Bundles, Offers, Rules, Template, Terms, Recharge Control, Dealer Setup
- **Rating and Billing Layer**: Usage Plan Configuration, Service Plan Configuration, Rating-Time Promotions, Rating, Bill-Time Promotions, Bill-Time Discounts, Tariff Configuration, Charge Codes, Taxes, Billing Periods and Cycles.
- **Service Layer**: Service Provides (GSM Provider Definition), Activity and Usage, Calendars and Rate Time Periods, Rating Segmentation Key, Markup Rating, Balances, External Network Resources, Notification Management, Telephony Service Parameter, General Service Configuration, TmlDefaultLimit, Open Item IDs, Call Circles and Private Groups

Offers and bundles, plans and other entities can be locked updated, and changed.

- Other users can identify who has locked an entity.
- More than one user can work on the same Product Catalog version but *not* on the same entity at any point of time. This is enforced by the lock and unlock procedures.
- Product Catalog retains a complete history of the changes to each entity.

New and Modified Entities

Typically, a Product Catalog users creates a copy of an existing Product Catalog version, and makes changes to entities within the copy. You create a copy of the version via Versioning — > Create PC Version.

Two different user cannot modify the same entity in a version at the same time. For example, user 1 and user 2 cannot modify Offer A at the same time. However, they can work on different entities at the same time.

New (incremented) entity versions are produced as follows:

- The user locks an entity within a Product Catalog version.
- The user edits the entity and saves changes. Such changes are not visible to other users.
- The user unlocks the updated entity.

  When an entity is saved, all validations corresponding to it are performed. If all validations are successful, the entity is checked-in. Otherwise, its state is changed to invalid.

  Once checked in, changes to the entity are visible to other users; and the new entity version cannot be changed. Any further changes must be made by a new checkout. Cancellation of checkouts is permitted.

Entity References in Versions

Entities in a reseller version reference those that are in a specific service version.

For example, a usage item in reseller version 2 may reference an activity type in a service version 1. Thus, reseller version 2 depends on service version 1. Specific rules controlling dependencies between Product Catalog versions prevent data inconsistencies.

Lock and Unlock

To view the entities in a version the user selects the appropriate service or reseller version. If the version is in the design state it can be modified. Otherwise, the version must be unlocked. Once unlocked, the version is moved to the design state so that a user can modify its elements.

Version State Transitions

Table 6 below shows version states applicable to a Product Catalog version. These states are applicable to every type of version, only the Design state allows changes to occur in the concerned data set.

Version States Applicable to all Versions

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Table 6 Product Catalog Version States Applicable to All Versions

Status Name	Internal Value	Description
Design	1	A version in this state can be edited, checked in/out, and deleted. New entities can be added to or removed from it. An entity can be checked in to the version when all validations corresponding to it are successful. If the validation fails, the entity state is set to invalid. Some additional validations are performed when you promote the version to the Validated state.
Validated	2	A version in this state cannot be changed, checked out, or deleted ó if you need to make changes, you must demote it back to the Design state. Once a version has been validated it can be propagated to the target systems.

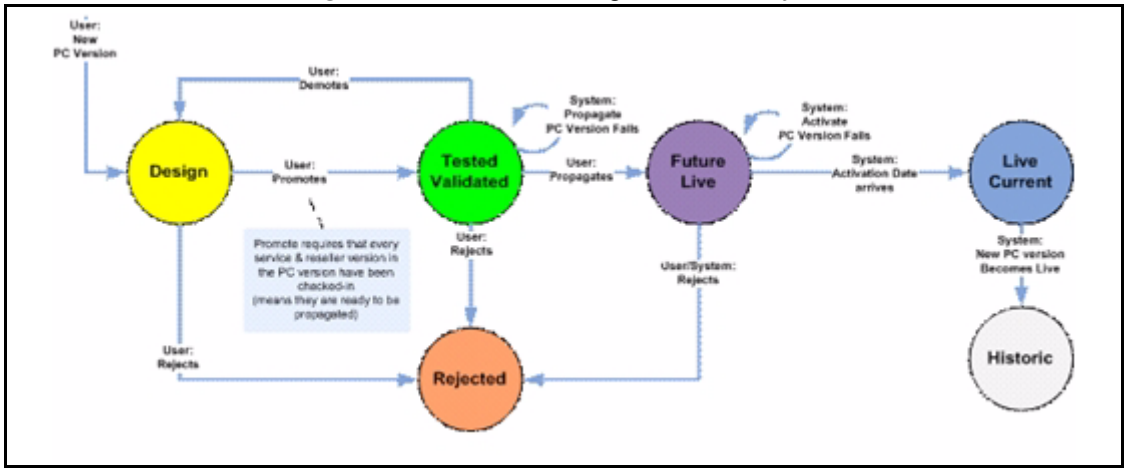
Table 6 Product Catalog Version States Applicable to All Versions (Continued)

Future Live	3	When a Validated version is propagated to target systems it enters the Future Live state. A Future Live state enables proactive propagation of future date changes prior to the effective date of the change. The version automatically becomes live at the specified active date
Live	4	Versions in this state are in use by the target systems and cannot be changed. At any given time, there can be only one Live version in each of the development, test, and production environments. If an error is detected in the Live version the previous Live version can be restored.
Historic	5	Live versions enter this state when they are replaced by a new version in all target systems. They can be retained for future queries and used as a fallback option when an error is found in the Live version. No changes can be made to a version in this state. However, Historic versions can be purged from the online database.
Rejected	7	A final state; no further transitions are possible for a rejected version.

NOTE A major current version is a propagated version and its active date is in effect. A version is history if its inactive date is prior to the current date.
To reject (invalidate) a major version set its active date equal to its inactive date. This ensures that it will not be used.

Figure 17, "Product Catalog Version Lifecycle" below shows the Product Catalog lifecycle applicable to every type of version. Only the design state allows changes to occur in the concerned data set.

Figure 17 Product Catalog Version Lifecycle



State Transition Processes

The Product Catalog is changed from one state to another via the following processes:

- **Create**: defines a version
- **Create based upon a previous version**: Comverse ONE enables the creation of a new service or reseller version based on a previous version.

  By default, new major reseller versions are created based on the immediately previous version. But you can create new major reseller versions based on any existing previous major version that is in one of the following states: Live, Future Live, Ready to Propagate, Validated.
  You cannot base a new major version on a previous version that is in the Design, Historic, or Rejected State.
- **Promote**: performs a validation process then change the state of the Product Catalog version from design to validated.

If any validation fails while a Product Catalog version is being promoted, the version state is automatically changed to rejected.

- **Publish/Propagate**: starts propagation. All information from the datasets contained in the Product Catalog version is propagated in a transactional manner to real-time, postpaid, online, and customer management databases. If the propagation is successful, the version is moved to the future live state and is propagated on the specified active date.

See also “Propagation,” starting on page 53

- **Demote**: changes the version state from tested/validated to design so that the user is able to modify/correct entities within the version.
- **Reject**: moves the state of the version from design or validated to rejected.
- **Correct**: changes the state of the Product Catalog version from rejected to design in order to make corrections.
- **Sync Target Database:** run propagation SYNC via the GUI; aligns the online Product Catalog with the offline Product Catalog.

For security purposes, Product Catalog requires users making state changes to have the appropriate roles and privileges. See also chapter 11, “Audits and Security.”

- **Merge**: Changes made in one version are reflected in future versions.
  - Only versioned entities are merged.
  - Merging occurs at the entity level, not at the field level.
  - Merging is an all or none operation. That is, the user cannot select which entities to merge and which not to merge.
  - Inserts and updates only are merged (no deletes).
  - Once the merge process is complete the user can validate, propagate, and perform other tasks related to the version.

The process for merging service or reseller versions is identical except that when merging a service version the user does not choose a reseller.
See also “Merge Versions,” starting on page 46.

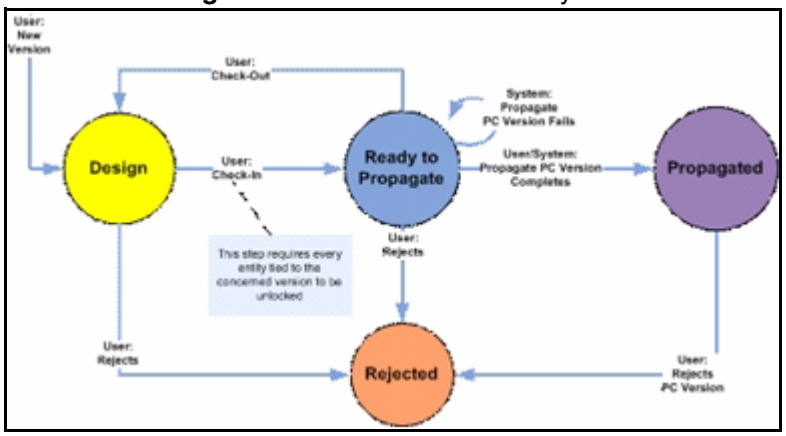
Service Version States

Table 7 shows life cycle states applicable to service versions.

Table 7 Service Version States

Status Name	Internal Value	Description
Design	1	The initial stage. You can make any change you want to a service version in the Design state, provided that those changes don’t affect entities that have been part of aversion propagated live.
Ready to be Propagated	2	A service version moves from the Design state to this state when the Product Catalog version that contains it is promoted to the Validated state. The service version is validated during this process and is ready to propagate to target systems as part of a Product Catalog version. You cannot make any changes
Propagated	3	The service version has been propagated to target systems as part of a Product Catalog version. You cannot make any changes to a service version in this state.
Rejected	4	The user can manually reject a service version that is in the Design or Ready to Propagate states. Rejected versions are closed permanently — no further state transitions are possible once a version has been rejected. When a service version is rejected, all reseller versions linked to it are also rejected.

Figure 18 Service Version Lifecycle



Reseller Version States

Table shows life cycle states applicable to reseller version. Each reseller version exists in one of these states.

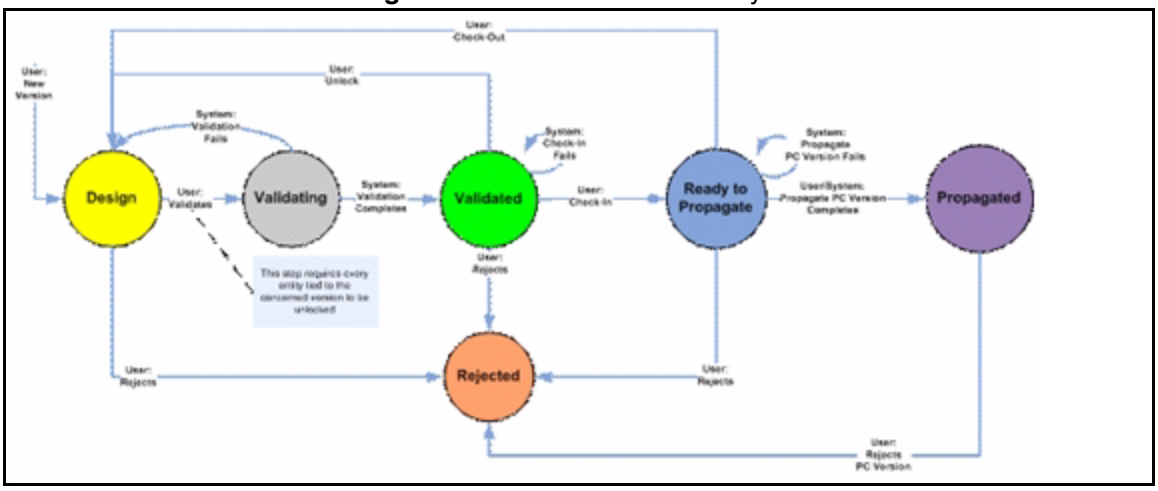
Table 8 Reseller Version States

Status Name	Internal Value	Description
Design	1	The initial stage. You can make any change you want to a reseller version in the Design state, provided that those changes do not affect entities that have been part of a version propagated live.
Ready to be Propagated	2	Before validation can proceed, all entities in the reseller version must be checked in. During validation, the reseller version is locked and no changes can be made to any entities in it. If validation succeeds, the status of the version is set toValidated.
Propagated	3	The reseller version has been propagated to target systems as part of a Product Catalog version. You cannot make any changes to a reseller version in this state.

Table 8 Reseller Version States (Continued)

Rejected	4	The user can manually reject a reseller version that is in the Design, Validated, or Ready to Propagate states. Rejected versions are closed permanently — no further state transitions are possible once a version has been rejected.
Validating	5	Before validation can proceed, all entities in the reseller version must be checked in. During validation, the reseller version is locked and no changes can be made to any entities in it. If validation succeeds, the status of the version is set to Validated.
Validated	6	The reseller version is ready to be included in a Product Catalog version and proceed to propagation. The reseller version remains locked in this state. If necessary, you can use the Manage Reseller Version Lifecycle screen to unlock the reseller version and return it to the Design state.

Figure 19 Reseller Version Lifecycle



Service and Reseller versions are timestamped datasets. A Product Catalog version acts as a container for propagation management; it indicates which service and reseller versions must be propagated together as a coherent set.

Propagation

Before propagation and versioning can take place specific initial deployment tasks must be completed:

- Configuration of regions, target groups and databases

  During initial system deployment the user must define, within the Product Catalog GUI, all databases and create the hierarchy of regions, target groups and individual databases. This is accomplished as follows:

  - All the regions are designed that comprise the system.

- Each region is externally identified with a name, and internally with an ID.
- Next, the user defines the target groups in the system, and assigns each new target group to a region.
  As part of defining the target group, a type is assigned. The type can be development, test, or production which only controls the propagation configuration and behavior. It has no impact on validation of the hierarchy creation at this stage.
- Finally, the user defines the various databases in the system, and assigns each database to a particular target group. A database belongs to one and only one target group.

- Configuration of Propagation Targets via Product Catalog

  Once a hierarchy has been defined, it can be configured for propagation. The user selects the type of target group(s) to be propagated.

All production target groups must be propagated at the same time, while test or development target groups can be propagated individually.

- The user first selects the type of target group to be propagated.
  If the selected type is production, this part of the process is complete (and all production target groups are automatically selected). If the user selects test or development, then the user has the option of selecting individual target groups with this type. Another way to conceptualize this is that a single Product Catalog supports one virtual production target group (all production target groups as a unit), and zero or more development and test target groups.
  Once the target groups have been identified, the user can select individual databases within the target group.
- The user has the option to select a combination of blocking or non-blocking databases (defined as whether a failure to propagate to an individual database should fail the entire process). A user can select all or none of the blocking databases in the target group, and can also select zero or more non-blocking target database.
  With the target databases identified, propagation is ready to begin.

If the start at scheduled time mode is selected, the Product Catalog version that is to be propagated must already be checked in. Additionally, the version should not be demoted (checked out) until the propagation is completed. See the *Product Catalog User Guide* for detailed information regarding propagation.

Product Catalog Version

A Product Catalog version consists of a service version and multiple reseller versions grouped together and propagated as a unit. Corrective versioning, change history logging, record level locking, and auditing and security are supported.

Product Catalog data is propagated in a transactional manner to support rating and billing in development, test, and production database targets as shown in Figure 10.

Propagation is accomplished via the Versioning menu.

In order to propagate a user specifies the following:

- **General**: Major/Minor Version, PC Version, Current Live PC Version, Target System Type, Target Group, Start Mode, Start Date, Work Type

- **Product Catalog Version**: Reseller, Major #, Minor #, Active Date (a service version's active date must be the same or earlier than the reseller version's date)
- **Target**: Target Database ID

.The following apply to propagated Product Catalog versions:

- Major versions consist of a service version and a collection of reseller versions. All the reseller versions link to the service version.
- Propagated minor versions must contain one version of the following type:
  - zero or one minor service version or
  - zero or one or more minor reseller versions
- Each database is assigned to a particular target group. A database belongs to one and only one target group.
- Each target group belongs to one and only one region.
- Resellers are associated with a set of regions. Offers and bundles within a reseller version can be either global to all regions, or specifically assigned to an individual region.
- Dealers and product groups for dealers are not associated with regions
- A target group is physically equivalent to a Comverse ONE solution instance. You can have several of these in the same region. For example, region A could include a test system and a production system.
- Regions are defined before and outside of propagation. Propagation does not add or remove any regions.
- Propagation picks up different source tables based on the Comverse ONE solution configuration.
- A reseller version is always validated along with the service version to which it is linked.

Product Catalog keeps a history of the previous and currently published versions for each target database environment (development/test/production system and so forth). Using this history, it compares the new version with the currently published version to determine differences between the two. It is possible to roll back to previously published versions.

Validation

A Product Catalog version is validated automatically whenever a request is made via the Product Catalog GUI to do the following:

- Promote the Product Catalog version, change the state of Product Catalog version from design to tested/validated
- Propagate the Product Catalog version, change the state of Product Catalog version from tested/validated to live/current at the designated active date.

In addition, validations are allowed at any time as a separate process to determine that changes made have not affected data integrity.

The validation is confirmed in an output window.

When the Product Catalog version is validated referential integrity checks are made within the Product Catalog version and linked service and data versions.

Examples:

- If an offer/bundle in reseller version ABC refers to a usage item or bill time discount item, the corresponding items must exist in the same reseller version ABC.
- If a usage item in ABC refers to an activity XYZ, the activity XYZ must exist in the service version to which the reseller version has been associated.

If any of the entities in the Product Catalog version are invalid, the validation fails. Locked entities are not validated and are not propagated in the underlying data model.

A report of consisting of all the validation errors is generated.

Error Resolution

If any error is detected (for example, incorrect rating or billing behavior), after the Product Catalog version is successfully propagated the previous live/current Product Catalog version in the corresponding operating environment is restorable.

If propagation fails because of database trigger errors, referential integrity violation errors, database errors, operating system errors, and so forth the following options are available:

- **Reject a Version**: Changes the state of the Product Catalog version to rejected. The user can manually reject a service version that is in the Design or Ready to Propagate states.
  If the rejected Product Catalog version is a service version, all the linked reseller versions state are also rejected and their status is changed to rejected.
- **Demote a Version**: changes the state of the Product Catalog version to the design state so the Product Catalog user can resolve the validation problem. If the demoted Product Catalog version is service version data, all the linked reseller versions states are also demoted and their status changed to design.

Related Database Tables

Product Catalog database tables fall into one of three versioning schemes.

- **Service Data**: These tables are maintained and by the operator and versioned as changes are made.
- **Reseller Data**: These tables are segmented by reseller. Each reseller maintains their own dataset. Reseller versioned data is linked to a specific operator version. The creation of a new service version requires each reseller to produce a new version to ensure that all of their data is compatible with service version changes.

  All reseller data is segmented; nothing is global across resellers outside of the service layer. Bundles and offers are configured in the reseller version.
- **Non-Versioned Data**: These tables are not versioned. Such tables either do not require versioning (for example, language codes), are too large to be versioned (for example, usage points), or are modified so frequently that versioning is not practical (for example, currency exchange rates).

See the *Database Reference Guide* for a detailed description of underlying databases.
See the *Product Catalog User Guide* for detailed step-by-step instructions for using the Product Catalog.

Propagation of Campaign Related Information

Product Catalog propagation includes the ability to update Infor product -related information using the latest offer, bundle, and equipment data.

Campaigns as entities can be defined in the Product Catalog in addition to be defined in Infor so they can be associated with bundles and offers.

Additional offer, bundle, bundle offer map, and inventory type table attributes support forecasting

.

See also“Offers and Subscriber Bundles Synchronized With Infor,” starting on page 26 and the *Product Catalog User Guide*.

Fast PC Version Fallback

Revert PC Version

Use this functionality to perform an emergency PC version fallback. This functionality is designed to address an emergency situation in which configuration errors or corrupt data in the Live/Current PC version are so severe that an immediate reversion to a previous PC version is necessary. In this case you can revert the online system to a previous PC version that you know to be in good working order.

Emergency fallback is limited to the five most recent PC versions that exist in the History state.

See the *Product Catalog User Guide* for instructions on performing an emergency PC version fallback.

The following operations can result in major loss of data and therefore are not supported:

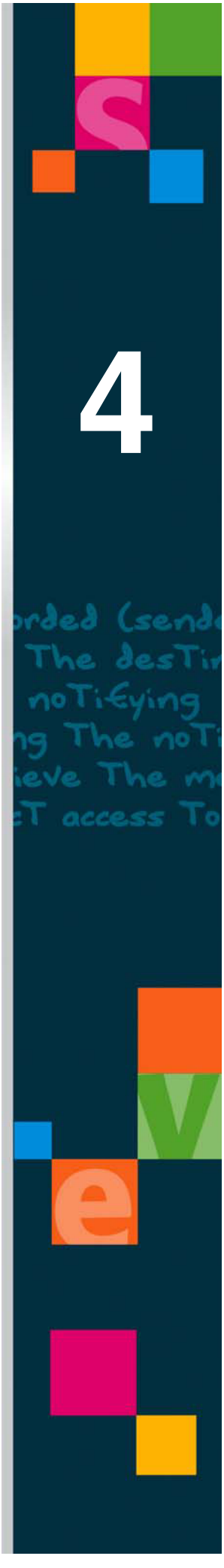
- Reverting to a major version that has a minor version associated to it.
- Cascading reversions (for example, reverting from version 3 to version 2, and then from version 2 to version 1).

The revert operation has no effect on instantiated entities or other data in the customer database. Therefore, reverting to a previous PC version can cause data inconsistencies in the live system, potentially resulting in dead or orphaned subscriptions and usage records. Therefore this functionality should only be used when problems with the newly propagated PC version are so critical that there is no alternative but reverting to a previous version that is known to function correctly.

Also, the emergency fallback procedure does not revert non-versioned data. If the data corruption that is causing the problem comes from the non-versioned data, this functionality will not correct it.

Chapter 4

Rating-Related Entities



Rating Segmentation Keys

Rating segmentation keys are used to configure the rating capability dependent upon some specific context and the key definitions. They include: account, location, market, subscriber, access method, offline and online rating.

Rating segmentation keys are defined via Product Catalog Service Layer -> Rating Segmentation Key.

- **Access Method Segmentation Key**: Consists of existing system parameter: Calling Card.
- **Location Segmentation Key**: A compound expression consisting of a Location Relationship (Point Class Origin, Point Class Target), Distance Band ID, Zone Class
- **Account Segmentation Key**: Consists of compound expression defined via a combination of one or more account parameters that have been marked as applicable for the account rating segmentation key: Account Category, Regulatory ID, VIP Code
- **Subscriber Segmentation Key**: Consists of compound expression defined via a combination of one or more subscriber/service parameters that has been marked as applicable for subscriber rating segmentation key: Class of Service, Subscriber Class, Subscriber Type.
- **Market Segmentation Key**: Consists of a compound expression defined via a combination of one or more market parameters: Market Code, Provider Class.
- **Special Feature Segmentation Key**: Consists of an existing system parameter for friends and family and calling circles and so forth.
- **Offline Segmentation Key**: Offline segmentation keys consist of compound expressions defined via a combination of one or more offline rating parameters defined in the Product Catalog; for example, Bill Class.

Activity Usage Types (AUTs)

Detailed information on Activity Usage Types is available in the *Rating Technical Reference*.

An Activity Usage Type (AUT) specifies, for each record, the key that identifies a usage event type (for example, long distance phone calls, direct dial phone calls, network logins, and file downloads).

AUTs define and rate usage activity. An initial AUT defines a particular usage type and identifies which segmentation keys to use to guide and rate it. When a usage record enters the system, the rating engine checks the segmentation keys specified by the initial AUT. It looks up values for the segmentation keys and assigns those values to the record.

The record is then mapped to a ratable AUT, a final AUT, in a process called AUT translation. The translated record is ready to be rated and assigned to the correct balance.

See also the *Rating Technical Reference*.

Offline Usage

When a customer uses a usage-based service (for example, makes a phone call, views a pay-per-view movie, or sends a text message), the network creates a usage record (sometimes called a message) representing the usage event.

Every usage record created by your network must contain a valid AUT for an event. You must define a row in the appropriate table for every AUT that your network might include in a usage record. If the system attempts to process a record for a non defined usage event an error occurs and the record is not processed.

Initial and Final AUTs

Initial AUTs are the same throughout the system, whereas final AUTs are defined for each reseller. An AUT identifies which keys drive identification of the final AUT used for rating purposes. Initial AUTs define usage types as the operator needs them defined, taking into account network constraints and other factors particular to the deployment. For this reason, provisioning factors (the segmentation keys) are defined at the initial AUT level. On the other hand, guiding and deriving (the translation factors) are reseller-specific, and therefore are defined at the final AUT level.

An option is available to associate zero or one provisioning items to an initial AUT. A list of all provisioning items defined in the system must be available for selection.

If applicable, configure the following entities for each new AUT:

- adjustments that apply to this AUT
- tax package instance properties, through a variety of tables

See also the *Rating Technical Reference Guide*, and the *Database Reference Guide*.

You do not have to define every property for every AUT. Some properties are optional, and others are used only in special cases.

Defining AUT controls how the type's associated records are processed. For example, a AUT is configured such that its events are:

- charged differently depending on the customer's rate class, service provider, or other customer properties
- not charged at all, but a free usage event
- charged an amount calculated outside of the Billing Solution
- charged to the destination point rather than the origin point, such as a toll-free telephone call
- guided to a local or foreign mobile operator (GSM or CIBER)
- charged based on the customer and the location of the origin and destination points
- charged based on the time of day
- charged based on whether the event originates in a home zone, a business zone, or other defined zone
- sent to an external clearinghouse for further processing

Processing types can be combined. For example, configure an AUT such that its usage events are charged differently based on the distance between origin and destination point, the time of day, and the customer rate class.

These examples are illustrations only and are not intended as an exhaustive list.

Final AUTS

Initial AUTs are mapped to final AUTs using activity segmentation keys. A segmentation key is an abstract key consisting of one or more elementary keys. The Final AUT is then associated to a tariff plan that ultimately specifies how to price the usage. Initial AUT's apply operator-wide whereas final AUT's are reseller-specific.

Final AUTS are generated automatically as part of the check-in operation for.the reseller version. However, you can make adjustments to generated AUTs. See the *Product Catalog User Guide* for specific instructions on using the Manage Reseller Version Lifecycle Screen. See the *Rating Technical Reference* for additional information regarding final AUTS.

Initial AUTs and Provisioning Items

Provisioning items model the network provisioning data that must be managed when interfacing with the network platform. You add provisioning items to initial authorized AUTs, and the CSR or consumer front-end application collects the required data during offer provisioning.

Usage plans define available and permitted AUTs and their associated tariff plans. Usage plans also define associated provisioning items. AUTs are associated to provisioning items as part of a usage plan. Provisioning items indicate information that you must capture in order to provision the usage plan on the network.

Provisioning items are configured via Product Catalog Basic System Infrastructure Layer -> System Configuration -> Provisioning Item.
Initial AUTs are configured via Basic System Infrastructure Layer -> Activity Definitions ->Initial AUT.

Resellers manually create service plans as collections of service items, and associate these service plans, as appropriate, with offers.

Service plans in subscriber-level offers define features associated with an offer, features that do not generally have usage associated with them. Subscriber-level offer service plans can contain provisioning items. Provisioning items dictate information you must capture in order to provision the service plan on the network.

Both the association of provisioning items (automatically) and service plans (manually) to the offer trigger the automatic population of extended data configuration tables that tie extended attributes to the given offer, or if indicated in the provisioning /service item configuration, with the subscriber or account.

See also the *Product Catalog User Guide* and the *Database Reference Guide*.

AUT Groups and Inclusion/Exclusion Lists

An AUT group is a collection of final AUTs. AUT groups are used in defining inclusion/exclusion lists for balances and accumulators and for mapping to the postpaid usage group.

An AUT group consists of an AUT group name and one or more application and corresponding subtypes.

Many inclusion/exclusion lists use AUT groups.

Calendars and Rate and Time Periods

The tariff applied to a given call depends on the date and the time of day the call took place. Many network operators use different rates for different times of the day and days of the week (weekdays/weekends). It is crucial to associate time types for the entire day without gaps or overlaps. Calendars enable operators to manage days of the year for regular or special rating and charging on a per-primary-offer basis.

Each primary offer has exactly one "default" calendar and zero to four "alternate" calendars. If appropriate, several primary offers share the same calendar, or each primary offer has its own dedicated calendar.

Calendars, Day Types, and Time Types

Calendars, day types, and time types are defined in the Product Catalog Service Layer.

Calendars

To allow charging for time-sensitive transactions, a calendar with daily schedules and associated time types is provisioned for each tariff plan. from one to five concurrent tariffs are be provisioned for each time type, so the tariff varies based on the time of day for these transactions.

The calendar uses daily schedules to identify day type (weekday, weekend, or holiday). Multiple calendars accommodate special holidays or different off days versus workdays. They often share the same daily schedules or have their own daily schedules. If appropriate, several primary offers share the same calendar (so that multiple identical definitions are avoided).

Calendars and rate and time periods are used in the configuration of rating through usage and service plans.

When a subscriber makes a call, a tariff plan is pointed to as previously described. The associated calendar is consulted. Within that calendar, the daily schedule for the date the call is placed is the schedule that determines the time type.

Table 9 Calendar

Day of Week	Daily Schedule Name
Sunday	DI_Weekend_DT
Monday	DI_Weekday_DT
Tuesday	DI_Weekday_DT
Wednesday	DI_Weekday_DT
Thursday	DI_Weekday_DT
Friday	DI_Weekday_DT
Saturday	DI_Weekend_DT

NOTE Daily schedules must be defined before defining calendars.

Each primary offer has exactly one default calendar and zero to four alternate calendars. Each primary offer has its own dedicated calendar. If appropriate, several primary offers can share the same calendar.

Figure 20 Calendar Example: Weekday

Calendar Exception

A calendar exception functions as follows:

- identifies days to be treated as exceptions, via exception date
- identifies the day type to be used for the specified date

Table 10 Calendar Exceptions

Calendar Date	Daily Schedule Name
July 4	DI_Holiday_DT
December 24	DI_Holiday_DT
December 25	DI_Holiday_DT

Typical Calendar Scenario

Here is a typical usage scenario:

- define 3 time types — peak, off-peak, weekend
- define weekend day type — single timeslot covering 24 hours, associated with weekend time type
- define weekday day type:
  - first timeslot from midnight to 9 A.M., associated with off-peak
  - second timeslot from 9 A.M. to 6 P.M., associated with peak time type
  - third timeslot from 6 A.M. to midnight, associated with off-peak
- associate weekend day type to Saturday and Sunday
- associate weekday day type to Monday through Friday
- create calendar exceptions for national holidays, associated to weekend day types (that is, weekend rates apply on national holidays)

The following restrictions apply when defining Calendars:.

- Periods in a day type must cover 24 hours uninterrupted
- Periods in a day type must not overlap.
- A day type must be associated to each week day.
- Cannot define more than one exception for a specific date (within a specific Calendar).

Day Types

Day types identify the rating profile for a specific day.

Table 11 Day Type

Day Type Name	Time Type	Time Slot
DI_Weekday_DT	DI_24Hrs_TT	DI_24_Hrs
DI_Weekend_DT	DI_24Hrs_TT	DI_24_Hrs
DI_Holiday_DT	DI_24Hrs_TT	DI_24_Hrs

Time Types

In determining the tariff, time type information is critical for applications such as the voice call. Most wireless service providers use time type-based tariffs to promote or discourage subscribers from using the services at different times of the day. Time types are used as a rating key and are associated with each day period. Once all the data is in place (this includes defining the tariff plans for the primary offer, selecting a calendar for each tariff plan, and pointing that calendar to the appropriate daily schedules) the time type is obtained.

The system enables the operator to define various time types and selection of tariff based on the time type, called rate type. Time type defines the various times of the day as peak, off-peak, and others. For some applications like data or SMS, the Time Type is not relevant; however, it is crucial information for activities like the voice call.

Time types identify different periods of a day.:

Table 12 Time Slot

Time Type Name	Begin Time	End Time
DI_24_Hrs	00:00:00	23:59:59

Table 12 Time Slot (Continued)

DI_Non_Peak_Morn	00:00:00	06:59:59
DI_Peak	07:00:00	16:59:59
DI_Non_Peak_Eve	17:00:00	23:59:59

Daily Schedule

A daily schedule defines how a 24-hour day is partitioned into time intervals, and identifies the time type associated with each of these intervals. The partitions always cover a full 24-hour day, with no gaps or overlap. Every second in the day belongs to exactly one time interval. With the daily schedule and the time of day, the time type is immediately determined.

After all the daily schedules are defined, they are later assigned to days on the calendar.

The daily schedule uses time types to define a 24-hour period. There are several daily schedules depending upon the workday, off day, special day (such as a national holiday), and for various applications. For example, for voice calls, the peak hours are 8:00 A.M. – 5:00 P.M. but for data, the peak hours are from 7:00 P.M. until 11:00 P.M. because most backups are done during these hours. To accommodate these types of differences, the operator chooses to create different daily schedules for different activities.

Time Zone Activation

Time zones can be activated for prepaid service. Only selected time zones are assigned to subscribers.

Markup Rating

Markup rating enables the subscriber's home operator to add a percentage markup to a roaming charge. The home system makes money on the usage associated with roaming subscriber originating voice calls from non-CAMEL 2 foreign networks.

Markup Correlation

Markup correlation provisions a markup to a GSM provider and assigns a charge code and a service code to the markup.

Users can view, modify, and enable or disable currently configured markup correlations for the primary offer. The markup rating definition must be first completed before performing these procedures.

Recharge Control

The Recharge Control Table (RCT) modifies the behavior of a recharge. The Recharge Control Table can:

- Enable a recharge (which contains a single value and a single expiration offset) to affect multiple balances and their associated grants
- Modify the balance amounts and expiration adjustments specified in the recharge. For example, to change a $5.00, 10-day recharge into a $7.00, 30-day recharge.
- Swap the primary offer of the subscriber being recharged
- Add supplemental offers to the subscriber or account being recharged.

Every recharge operation consults the RCT. If no match is found in the RCT matching criteria, the recharge applies the face value and face offset of the voucher to the subscriber's core balance.

The RCT is made up of multiple rows. Each row consists of common information, configured at the top of the New Recharge Control Key pane in the Product Catalog, and four logical sections configured on each of four corresponding tabs.

The Priority field, configured on the General tab, is considered common information. The Priority field specifies the order in which the row is searched for a match and can be reset to change the order of search.

The three remaining sections of the row are configured on the following tabs:

- **Matching Criteria**: Contains information about the conditions of the recharge.
- **Balance Adjustments / Awards**: Contains information on how a recharge affects balances.
- **Offer Adjustments / Awards**: Contains information on how the recharge affects the recharged entity's offers.

When a recharge is performed, the RCT is searched row by row, starting with the first row, for a match between the recharging conditions, and the RCT matching criteria.

When a match is found, the Balance Adjustments / Awards and Offer Adjustment / Awards sections configured on that row determine the effect of the recharge on the recharged entity.

Because matching criteria contain data such as date of recharge, value of recharge, whether the entity being recharged is an account or a subscriber, and other criteria, a reseller can configure the same recharge to do different things on different days. For example, on Mother's Day each recharge gets a five percent bonus. Recharges can also be configured to do different things for different values, for example, any recharge over $100 gets a 10 percent bonus plus five free SMSs.

Recharge Control Tables in Comverse ONE solution are managed on a reseller level, so each reseller has its own RCT.

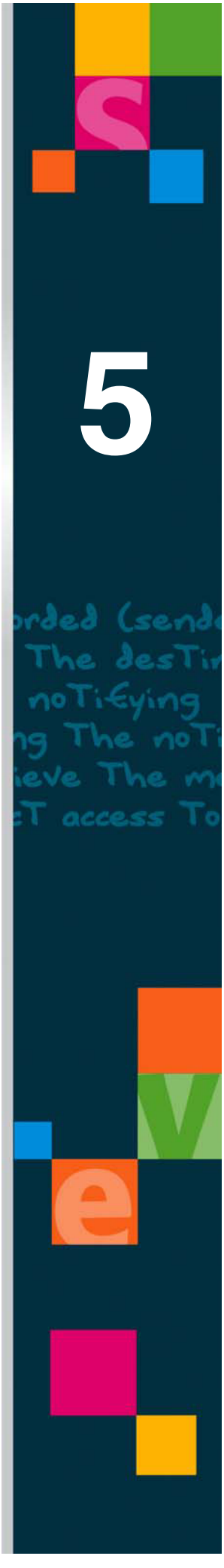
The RCT also enables resellers to provide differentiated recharge offers to different sets of subscribers and to provide special offers applicable only during certain periods. For example, it can enable the actual balance addition to be 110 percent of the face value during a special holiday week.

Recharge control involves creation of recharge promotions for up to 100 different scenarios.

See also the *Voucher and Recharge Guide*.

Chapter 5

Rating Support



The Comverse ONE solution supports various types of rating scenarios and types. This chapter provides a general description of some of these.

Location Hierarchy

Location-based rating is supported for those activities that are sensitive to location. Location-based rating involves the billing of usage based on the location of the originating party with reference to the location of the destination party. For example, calls in the same city incur are charged with a low tariff while calls between cities are charged at a higher tariff.

For many activities such as the voice call, location information is critical in determining the correct tariff. In some wireless networks the location (home base or roaming) of the originating party and the location of the destination party are important for determining the proper tariffs. However, for certain activities such as data transactions the location may not be relevant.

The Location Hierachy table enables the operator to define multiple levels of granularity from a global area to a local region. This provides full flexibility to the operator and enables charging for home vs. roam, distance sensitive applications, and source vs. destination of the activity.

The location of both parties is not always known. For example, if a wireless prepaid subscriber makes a call to a cellular phone of another network, there is no way of knowing location of that other cellular subscriber since the system does not have access to the other network's Home Location Register (HLR).

Location-based rating involves the following:

- Definition of location hierarchy, which is done only once and cannot be modified once done. This sets the structure of locations
- Definition of locations: real locations and pseudo locations

  Pseudo locations model cases like toll free numbers or special services
- Definition of location translations

  In order to map information like GSM network cell into locations and therefore be part of the location hierarchy (which is internal to the system)

The location hierachy structure and the resulting billing scheme are internal to the system. The rest of the telephone network uses other terms of different types to indicate location. For instance, location of fixed network dialed numbers can be inferred from the area code. The locations of wireless subscribers can be provided in the form of a cell ID number.

A mechanism is required to map all these other location domains and numbers into the location structure. This is done with a global number translation table that is part of the billing model. The table is capable of mapping the many types of numbers and entities including the following:

- Cell ID
- Telephone Numbers
- MSRN

Location Relationships

Location Relationships identify relationship between the A-party location and B-party location. Location relationship can be used in the location segmentation key (one of the supported rating segmentation keys.

This enables the definition of AUT translation that are specific and dependent upon the location relationship and therefore, to map the common initial AUT (like Voice call for example) to various final AUTs which would model specific activities from the reseller viewpoint, and assign them specific tariffs.

Pseudo Locations

Pseudo locations can be defined for non-location-related call destinations. The following are examples of typical uses of pseudo locations:

- Toll-Free numbers.
- International calls (the location of the caller within the country is not important; the country prefix is determines the tariff).
- Special services (premium rate, directory assistance, and so forth.).
- Calls to other cellular networks within the same country (each network does not have access to the other network's Home Location Register (HLR)).

Pseudo locations are all the same level and do not have a hierachy. They do have assigned LI numbers so they can be used in the billing model. The type digit for pseudo locations is 2, and the remainder of the LI number is unique assigned number sequence.

A pseudo location must be defined for all GPRS B locations. This location is used as the LIB for all GPRS activities.

Table 13 Psuedo Locations Examples

Location	Time Zone
Pseudo1	ESTEDT
Pseudo2	ESTEDT
Access Number1	ESTEDT
Access Num PassThru1	ESTEDT

Location Relations Table

In order to rate location-based activities like voice calls, the system uses the location hierarchy to determine the location of the source and the destination of the activity. It then uses the Location Relations table to determine the location relationship (and subsequently, the location-based component of the tariff for the call). Each location relationship represents a leg of a call (incoming or outgoing) between two real locations.

The Location Translation table associates locations with number prefixes or cell IDs. When a call is made from location A to location B, the location of A is determined by cell ID. Since the location of B can be either fixed (landline) or wireless (handset), determining the location is more difficult because wireless locations vary, and calls are forwarded.

The Location Relations table contains combinations of originating and terminating locations. Each entry specifies the calling and called party locations and the location relations name for each type of call that establishes that location relationship:

- incoming (terminating or TPPS)
- outgoing (originating or OPPS)
- home location
- roaming location
- whether Network Call Forwarding or USSD Callback options are enabled

- a call made through the General Packet Radio Services (GPRS) interface.

Table 14 Location Relation Examples

LIA	LIB	Originating			Terminating		
		Home	Roam	NCF	Home	Roam	NCF
City 1	City 2	LocalCall1	LocalCall1	LocalCall1	LocalCall1	LocalCall1	LocalCall1
City 1	City 3	LocalCall2	LocalCall2	LocalCall2	LocalCall2	LocalCall2	LocalCall2
City 1	City 4	LocalCall3	LocalCall3	LocalCall3	LocalCall3	LocalCall3	LocalCall3
City 2	City 3	Long Distance 1	Long Distance 1	Long Distance 1	Long Distance 1	Long Distance 1	Long Distance 1
City 3	City 4	Long Distance 2	Long Distance 2	Long Distance 2	Long Distance 2	Long Distance 2	Long Distance 2
City 4	City 5	Long Distance 3	Long Distance 3	Long Distance 3	Long Distance 3	Long Distance 3	Long Distance 3
City 5	City 6	Long Distance 4	Long Distance 4	Long Distance 4	Long Distance 4	Long Distance 4	Long Distance 4
City 6	City 7	Long Distance 5	Long Distance 5	Long Distance 5	Long Distance 5	Long Distance 5	Long Distance 5
PassThru1	PassThru2	PassThru	PassThru	PassThru	PassThru	PassThru	PassThru
Offline 1	Offline 2	Offline TPPS	Offline TPPS	Offline TPPS	Offline TPPS	Offline TPPS	Offline TPPS
Offline PassThru 1	Offline PassThru 2	Offline PassThru	Offline PassThru	Offline PassThru	Offline PassThru	Offline PassThru	Offline PassThru
City 1	Access Number1	Access Number	Access Number				
City 2	Access Number1	Access Number	Access Number				
City 3	Access Number1	Access Number	Access Number				
City 4	Access Number1	Access Number	Access Number				
City 1	Access Number PassThru1	Access Number PassThru	Access Number PassThru				
City 2	Access Number PassThru1	Access Number PassThru	Access Number PassThru				
City 3	Access Number PassThru1	Access Number PassThru	Access Number PassThru				

Location parameters, locations, and relationships are defined via the Product Catalog GUI in the Basic System Infrastructure Layer ->Lookup Enumerated Values. For further information, see the *Product Catalog User Guide*.

IP Address Usage

The system supports either specific IP addresses, for which the system attempts to find an exact match, or ranges of addresses using Classless Inter-Domain Routing (CIDR) notation.

A CIDR address includes the standard 32-bit IP address and also information on how many bits are used for the network prefix. For example, in the CIDR address 206.13.01.48/25, the "/25" indicates that the first 25 bits are used to identify the unique network, leaving the remaining bits to identify the specific host.

In addition specific IP addresses, (that is, 123.14.23.5), and IP address ranges using the CIDR notation (for example, 123.14.0.0/16), the system supports an IP address of a single asterisk (*) to indicate that the location is to be considered the default location for IP addresses and used when no match is found.

Personnel who configure the system for location-based billing using IP addresses need knowledge of IP addresses and subnets, and the Classless Inter-Domain Routing (CIDR) method of specifying ranges of addresses. Detailed information about IP addresses and subnets is available at http://www.cisco.com/warp/public/701/3.html. An overview of CIDR is available at: http://public.pacbell.net/dedicated/cidr.html. Additional information is available at the following sites:

- http://www.oreilly.com/catalog/coreprot/chapter/appb.html
- http://www.subnetmask.info/
- http://ebn.wikipedia.org/wiki/IP_address

IP Addresses as Locations

Location information related to data transactions is available in two formats: SGSN Global Title and SGSN Network IP address. To provision SGSN IDs and IP Addresses use the Location Translation Screen: Lookup/Enumerated Values -> Location Parameters -> Location Relationships -> Location Translation screen

To provision an IP address, the Prefix field is used for the IP address, and a new Number Type, IP Address is used to indicate that this prefix is an IP address.

The system supports both specific IP addresses, (for example, 123.14.23.5), as well as IP address ranges using the CIDR notation (for example, 123.14.0.0/16).

In addition, the system supports an IP address of a single “*” (asterisk) to indicate that the location is to be considered the default location for IP addresses (used when no match is found).

Table 15, “Configuring IP Addresses” contains examples of specific IP addresses and both valid and invalid address ranges.

Specific IP Address

A specific IP address must be entered as four octets, with each containing up to three digits, representing a number between 0 and 255. Within octets, leading 0s are ignored (for example, 002 = 02 = 2). Only numeric characters 0-9 and “.” (decimal point) are allowed.

For example;

8.20.15.1 –	Valid IP address
8.256.15.1 –	Invalid (second octet greater than 255)
8.20.15 –	Invalid (only 3 octets)
8.20.0 –	Invalid (empty octet)
8.*.9.0 –	Invalid (* not allowed)

When a specific IP address is provisioned, the system requires an exact match between the provisioned IP address, and the IP address received from the external source (DCMP over the OSA interface).

IP Address Ranges in CIDR Format

A CIDR address range begins with the network address (padded on the right with the appropriate number of zero-valued bits - up to four octets), followed by a "/" character and a prefix length, in bits, defining the length of the subnet mask which determines the size of the network.

Valid prefix lengths are 01 through 31 inclusive.

Note that actual allowed values are 0 – 32. However a subnet mask of 0 is any IP address, and the system already has a "*" to represent this. A subnet mask of 32 is essentially a specific IP address which must be entered as the specific address without a subnet mask.

For example:

- 192.168.0.0/**24** represents IP addresses 192.168.0.0 through 192.168.0.255 inclusive, with 192.168.0.255 being the broadcast address for the network.
- 192.168.0.0/**22** represents the IP addresses 192.168.0.0 through 192.168.3.255 inclusive, with 192.168.3.255 being the broadcast address for the network.

When a CIDR address range is provisioned, the system looks for a match with the **Network ID** of the provisioned CIDR. (The Network ID is the provisioned IP address logically AND with the subnet mask).

The system enables the configuring of ranges that are fully contained within another range but does not allow fully duplicate ranges.

The requirement that a CIDR address range format "begins with the network address padded on the right with the appropriate number of zero-valued bits" is strictly enforced.

IP Address Validation

On selection of the IP Address" option from the Number Type drop down, a user is allowed to enter a valid specific IP address or a valid IP address range in the CIDR format in the Prefix textbox. The OPPS and the TPPS drop downs default to the No Query value and are disabled for this number type option. In addition, the system supports an IP address of a **single "*"** (asterisk) to indicate that the location is to be considered the default location for IP addresses and used when no match is found.

The system enforces the following rules for configuring and validating IP addresses and rejects any entries that do not meet the criteria:

- Single IP addresses and IP address ranges in CIDR notation are allowed.
- For a specific IP address or a range of IP addresses, four full octets must be provisioned, each with a range of 0-255.
- For a specific IP address or a range of IP addresses, leading 0s within octets are ignored (that is, 002 = 02 = 2). Only numeric characters 0-9 and "." (decimal point) are allowed.
- For a specific IP address, the first octet cannot be 0.
- Duplicate specific IP addresses are not allowed.
- When using CIDR notation, valid subnet mask values are 1-31 inclusive. Attempts to provision any other values are rejected.

When using CIDR notation, the IP address part must be in the format of a network address, padded to the right with the appropriate number of zero-valued bits.

- If a CIDR notation entry is received which appears to be valid but the IP address part appears not to be zero-padded, the system rejects the entry. However, the system suggests the appropriate entry.
  - For example, if 123.34.34.255/25 is entered, the system rejects this entry, and suggests that 123.34.34.128/25 is the proper value.
  - The suggested text is as follows (using the above example):
    The CIDR entered does not contain a proper network address padded with 0-value bits. The proper format for a CIDR entry for the IP address Range 123.34.34.129 to 123.34.34.254 is 123.34.34.128/25.

The original bad entry remains. It is up to the system user to replace the bad entry with either the suggested entry, or with something else.

  - An easy way to determine if there is a zero-padding issue is to compare the original IP address with the with the resultant masked IP address. If they are different, then there is a zero-padding problem.
- Exact duplicate ranges are NOT allowed, however configuring of ranges within ranges is allowed. Also, provisioning specific IP addresses within a range is allowed.
- The Location Translation screen supports the configuring of an IP address of "*" which is used as the default location for IP addresses.
- Only a single IP address location of "*" is permitted.

Table 15 Configuring IP Addresses

IP Addresses Provisioned	Network ID	Matching IP Address Range	Comments
133.41.24.111	N/A	133.41.24.111	When a specific IP address is provisioned, the system looks for an exact match
128.20.32.0/22	128.20.32.0	128.20.32.0 - 128.20.35.255	Valid range
128.20.32.0/23	128.10.32.0	128.20.32.0 - 128.20.33.255	This is a subset of first range
128.20.32.240/25	128.20.32.128	128.20.32.129 – 128.20.32.255	Not allowed by the system, as the Network ID part of the provisioned IP address should have been 128.20.32.128 /25
199.5.0.0/16	199.5.0.0	192.5.0.0 - 192.5.255.255	Valid range

Map IP Addresses to Locations

To map IP Addresses, assume the following entries were provisioned in the system Location Translation table as shown in table 16:

Table 16 Sample Location Translation Table

IP Address	Location	Matching IP Range Address (Not part of table)
128.20.32.0/22	Europe	128.20.32.0 - 128.20.35.255
128.20.32.0/23	Paris	128.20.32.0 - 128.20.33.255
128.20.33.21	Eiffel_Tower	128.20.33.21
*	Anywhere	Any valid IP address

- If an IP address of 128.20.33.1 is received and falls within both the Europe and Paris ranges, Paris would be the best match, as it is more specific than Europe.
- If an IP address of 128.20.34.222 is received, the location Europe would be used.
- If an IP address of 128.20.33.21 is received, the location Eiffel Tower would be used, as it is an exact match.
  - If an IP address of 128.44.32.1 is received, Anywhere would be used.

Since the system supports the provisioning of IP address ranges (CIDR), including ranges that are fully within another range, as well as the specific single IP addresses, it is possible for a received IP address to match multiple entries provisioned in the system.

To handle this, the system uses a best match algorithm for IP addresses as follows:

- Attempt to find an exact match with a specific IP address.
- If an exact match is not found, find all of the CIDR ranges to which the IP address fits.
- If multiple ranges match, use the range with the largest number of subnet mask bits.
- If no matches are found, use the default "*" entry.
- If the default is not configured, return "No Location Found" and use existing system logic to reject the activity because of no location.

IVR Capability

Three types of calls require a temporary connection to an Interactive Voice Response Unit (IVRU):

1. Calls requiring pre-call or terminating announcements.
2. Calls to access numbers pointing to IVR-based resources such as Customer Care, Admin Menu, Recharge Server, Info Server, and so on.
3. Calls intercepted because of the subscriber's account life cycle.

In the GSM (Global System for Mobile Communication) environment, many Mobile Switching Centers (MSCs) do not support temporary connections to IVR resources. Also, subscribers roaming in foreign networks often cannot reach the IVR resources of the home network using short dial codes. In these situations calls can be misrouted or dropped.

To address these issues, the system provides the following configuration capabilities to the operator:

- To support pre-call and terminating announcements, the system has a configurable "white" list that enables provisioning on an MSC-by-MSC basis, whether or not each MSC supports the temporary IVR connections required for these announcements.

  If the MSC is not configured to support pre-call announcements, the system skips the pre-call announcement and continues the call as dialed.

Contact your Comverse Support Representative for information on configuring the MSC "white" list.

- To support access numbers and lifecycle call intercepts, provision a list of MSCs to identify whether specific MSCs support or do not support temporary connections to IVRUs.
  - If the serving MSC is configured to support temporary connections, the call is handled normally.
  - If the serving MSC is not configured to support temporary connections, the system establishes a direct connection to the IVR resource.

Note the following limitations when using a direct connection:

- Calls to calling card access number are dropped.
- Any attempt to perform fast recharge or make calls from card-based accounts is prohibited.
- Intercepts to customer care because of account lifecycle state will only work if the announcement is suppressed.
- Calls to the admin menu connect but follow-on calls to some resources, such as customer care, do not work if the MSC does not support the temporary connection capability.

The system users enter MSC addresses, assign easily remembered names to entries in the MSC list, and specify whether each MSC enables temporary IVRU connections. In addition, the system provides a default entry with the MSC Address set to "@" and the MSC Name "Others". When a call is received from a foreign network, the received MSC ID is matched against the MSC list. If no match is found, the default "Others" entry is used.

The MSC information window contains the following fields:

- **MSC Address**: enter an address for the MSC. The MSC Address length is 16 characters. Only the characters 0-9, *, #, A, B, and C are allowed.
- **MSC Name**: enter a name for the MSC. The MSC Name is provided for the convenience of the system users. It is not used by the system itself.
- **Support Temporary Connection to IVR**: select this checkbox to indicate whether the system attempts to connect subscribers roaming in foreign networks to IVR resources in the home network by sending the destination number of the resource.

External Interfaces

The Comverse ONE solution provides a number of interfaces to the global telecommunications and data network that range from the Event Charging Interface, a generic TCP/IP interface that enables a comprehensive set of transaction capabilities from diverse kinds of external clients using a simple set of network queries and response, through the robust and proven Open Services Access (OSA) interface, to today's most flexible and broadly capable interface paradigm, Diameter.

Event Charging Interface

The Event Charging Interface is a generic TCP/IP-based network interface capable of communicating with an external client and the Comverse ONE solution to apply charges or tariffs to a Mobile Originating subscriber for SMS and other transaction activities, and adjust subscriber account balances. The Comverse ONE solution receives a usage amount in units which must be rated, or a currency amount of the charge for services from the Event Charging Interface.

Open Services Access Interface

The Open Services Access (OSA) Charging Interface enables external value-added services such as SMS, MMS, and so on, to interface with the Comverse ONE solution in accordance with the 3GPP OSA/Parlay Charging API, thereby enabling these external services to charge the subscriber's account using standards-based and widely deployed OSA charging methods.

The OSA Charging Interface implements reservation and debit/credit methods of the Charging Service Capability Feature. Direct charging and split charging (multiple users being charged for using an application such as multi-user games) are not supported.

OSA is a value added option and may or may not be part of your deployment.

OSA enables external value added services such as SMS, MMS, data transactions, and so forth, to interface with the system via TCP/IP. It enables external services to charge the subscriber's account using OSA charging methods.

The Open Service Access (OSA) external interface is configured as follows:

- **OSA URL**: Internet site address of the external service application activity
- **OSA Merchant Account**: external service operator of the application activity
- **OSA Unit Type Mapping**: map External Unit Types to internal real-time billing Unit Types
- **OSA Charging Parameters**: charging parameters
- **OSA Service Mapping**: Merchant accounts and associated billing parameters

OSA Default Locations

In many data applications, the location of either party is not included in the information sent by the OSA client. This could occur while a subscriber is interacting with an application. While the subscriber's location would typically be available (based on, for example, the SGSN ID, the MSC ID, the Cell ID, and so forth), the application may not have location information associated with it.

In order to support the setting of default locations for OSA, the system contains two prefixes used specifically for OSA default locations. OSA_A_DEFAULT and OSA_B_DEFAULT represent the OSA A-party location and OSA B-party location respectively when no other location information is available. The system uses these default locations only when no location information is provided by the OSA client for the respective party (A or B). The OSA default prefixes cannot be deleted.

OSA_A_DEFAULT and OSA_B_DEFAULT are different from the prefix "*". The "*" means that location information was received but no match with any provisioned location in the system was found. OSA_A_DEFAULT and OSA_B_DEFAULT mean that no location information was received for the respective party.

Once the IP address has been mapped to a location, a list of the existing location functionality is available. This includes the location hierarchy which means that, if so provisioned, locations Paris and London could both be part of a higher-level location of Europe. This also includes location relationships, as well as existing relationships that have been defined for voice calling, and newly defined relationships for data services.

Once the IP address to location mapping has been provisioned in the system Location Translation table, and assuming that location relations have been defined in the Locations Relations table,

provisioning location-based charging for data services is the same as provisioning location-based charging for voice (or other) services.

Data Activities/subtypes/units must be configured with Location Activity Modifiers in the Activity Definition screen as shown below.

OSA Configuration

Configuring the OSA interface involves:

- Setting URLs
- Define Merchant Accounts
- Define Unit Type mappings
- Define Charging Parameters
- Define Service Mapping

GPRS

The system supports billing for third-generation (3G) network packet data services using the CAMEL 3 General Packet Radio Services (GPRS) in GSM networks. GSM data services vary from streaming media to internet web surfing and are fundamentally limited only by mobile handset capabilities and interface bandwidth.

The CAMEL 3 (CAP Phase 3) protocol has support for prepaid data services billing that is built directly into the protocol, such that an SCP can allow or disallow and charge for data transactions. The system receives usage information for subscriber services in the form of octets or seconds from the GPRS network. The system rates this usage by converting it into corresponding currency units, such as dollars or euros.

A reservation-based mechanism is used for charging. Balances corresponding to the amount of usage authorized are set aside when the network requests a reservation. The balances are permanently reduced only after consumption is confirmed. Unused portions of the reservation can be returned and the balances readjusted accordingly. Reservation amounts are configurable.

CAMEL # GPRS is configured via the Product Catalog GUI System Infrastructure Layer.

GPRS Parameters

- Access Point
- Quality of Service

Activity Parameters

- Application
- subtype
- Charge Type

Diameter

The Comverse ONE solution provides two separate implementations of Diameter charging.

Comverse Diameter Charging Interface (DCI) provides value-added services based on the rich set of rating and capabilities of the Comverse ONE solution implementation of the 3GPP Online Charging Server (OCS)

Comverse Packet-Switched Diameter Charging Interface (PS DCI) provides an interface to enable billing for data transactions that use the General Packet Radio Service (GPRS) capabilities of the Global System for Mobile Communications (GSM).

See the *Product Catalog User Guide* for detailed information on configuring external interfaces.

FlexSLE

ComverseOne Flex Service Logic Element (FlexSLE) is a sub system of the ComverseOne OCS which interprets Diameter messages and submits these to the OCS state machine for processing. All messages are interpreted in this way. FlexSLE provides an implementation that performs the interpretation function based on a description file. The description file, referred to as the FlexSLE specification, contains a sequence of instructions for the interpretation of Diameter Messages for a particular message event.

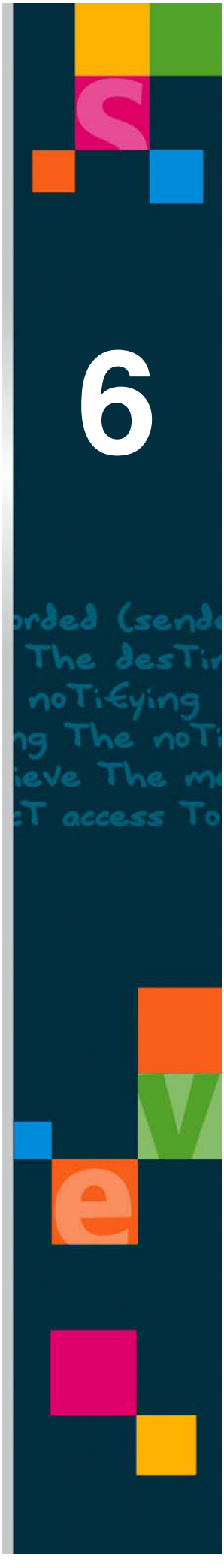
The Product Catalog interacts with a database to store, retrieve, and modify data used in FlexSLE provisioning. The system uses data from the database to make processing decisions when handling incoming traffic. In effect the user communicates with the system applications through the database. The typical model is that some value(s) are used as a key and the result of the query are the complete dataset (or all columns) from the row in any given table.

In the Product Catalog GUI, FlexSLE leverages the contents of the `DIAM_FLEXSLE_SERVICE_KEY/REF/VALUES` tables to dynamically provide Diameter subcategories for configuring FlexSLE diameter data. Additionally, this results in dynamic category grids and editors for each dynamic category.

FlexSLE entries are defined in the `DIAM_FLEXSLE_SERVICE_KEY/REF/VALUES` tables. These entries are process at the Product Catalog GUI application launch; for each entry, a dynamic category is generated. Each category takes its display name from the `display_value` field in the `DIAM_FLEXSLE_SERVICE_VALUES` table entry. These dynamic categories are located in the Product Catalog GUI (Basic System Infrastructure - > External Interfaces Diameter.

Chapter 6

Tariffs and Tariff Plans



Transactions that generate usage (voice calls, data transactions, and other information services on the system interfaces) are charged using tariffs. A tariff is a usage rate. It defines how much a transaction costs in terms of money per time unit (seconds) in the case of voice calls, or bytes when a data download is involved. For example, a call lasting 120 seconds based on a one cent per second tariff is charged at $1.20.

A tariff defines the following value for charging purposes: Charge unit size for the initial and additional consumption amounts. Charge unit size is the minimum amount that can be charged. For example, if charge unit size is 10 seconds and a subscriber consumes 55 seconds, they are charged for 60 seconds.

A complex set of algorithms and data structures for rating and charging subscriber transactions in real-time is employed. This model utilizes a multi-dimensional rating engine allowing for comprehensive rating schemes based on time, location, subscriber usage, features, and other criteria.

See also “Activity Usage Types (AUTs),” starting on page 61.

Service items do not generate usage activity. They include features such as call forwarding and three-way calling.

Tariff Plans

A tariff plan is a set of predefined tariffs (usage rates) used by the system to charge subscribers for transaction activities. Each tariff plan is assigned a calendar, allowing different tariffs to be configured by time type, and is assigned a unit type for charging purposes. A final AUT is associated with a tariff plan as part of a usage item. A usage item defines the available and permitted usage activities and their associated tariffs and thus is the relationship between Activity Usage Type (AUT) and tariff plan. Customized unit-based tariffs are specifically tailored to rate application activities.

Calendars, that contain multiple Time Types (intervals covering a 24 hour day are assigned to a tariff plan for further breakdown of time-sensitive charging to identify the tariffs applicable at the time of an activity. For example, the charge for a long distance call is dependent not only on the location relationship but also on the predefined calendar and time of day. Digital data services can be charged based on a time type as determined by the service provider.

Within each tariff plan, up to five concurrent tariffs can be assigned to each time type.

Regular Tariff

A regular tariff may contain multiple tariffs per time type. A regular tariff plan contains up to five tariffs per time type.

A list of all time types is available for association to the tariff plan.

See “Rating Segmentation Keys,” starting on page 61.

Figure 21 Normal Tariff Plan

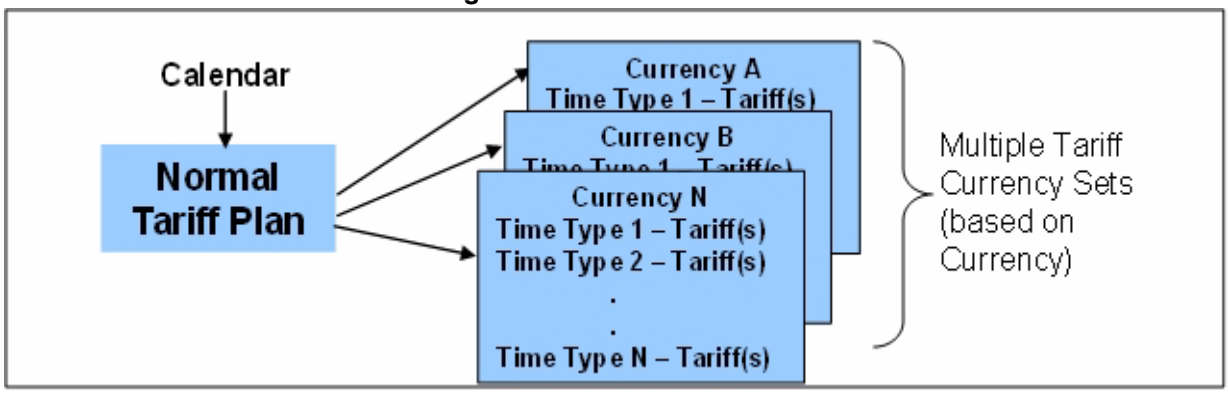


Figure 22 GUI Window: Regular Tariff Plan

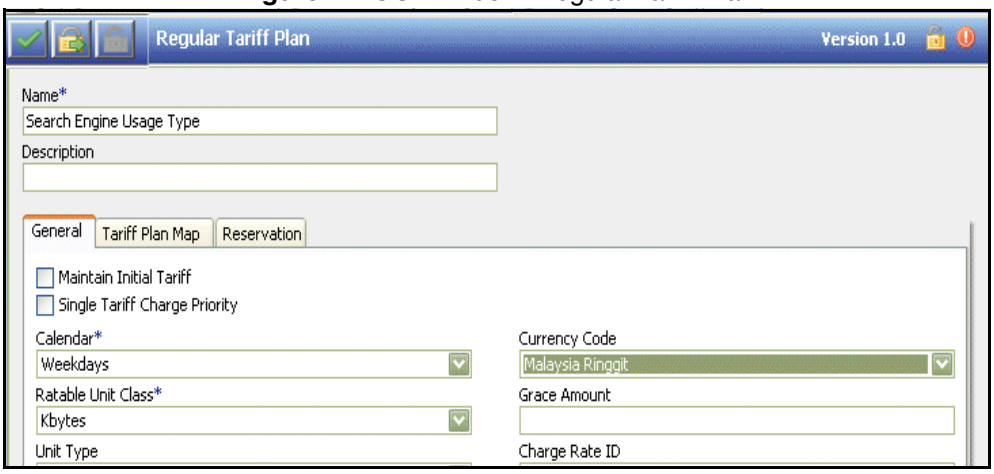


Table 17 Regular Tariff

Name	Unit Type	Default Currency	Initial Consumption Value	Initial Consumption Charge	Additional Consumption Value	Additional Consumption Charge	Eligible for Discount	Eligible for Non-Monetary Balance
DI Single 1	Seconds	US Dollars	10	1	10	0.5	x	x
DI Single 2	Seconds	US Dollars	10	2	10	0.5	x	x
DI Single 3	Seconds	US Dollars	10	3	10	0.5	x	x
DI Single 4	Seconds	US Dollars	10	4	10	0.5	x	x
DI Single 5	Seconds	US Dollars	10	5	10	0.5	x	x
DI Concurrent1	Seconds	US Dollars	10	1	10	1		x
DI Concurrent2	Seconds	US Dollars	10	0.5	10	0.5		x
DI Negative	Seconds	US Dollars	10	1	10	-1	x	x
DI Euro	Seconds	EURO	10	0.1	10	0.1	x	x
DI Multicurrency	Seconds	US Dollars	10	1	10	1	x	x
DI SMS	SMS	US Dollars	1	2			x	x

Table 17 Regular Tariff (Continued)

Name	Unit Type	Default Currency	Initial Consumption Value	Initial Consumption Charge	Additional Consumption Value	Additional Consumption Charge	Eligible for Discount	Eligible for Non-Monetary Balance
DI Octet	Octet	US Dollars	5000	2	1000	1	x	x
DI GPRS Dur	Seconds	US Dollars	10	1	10	0.5	x	X
DI_OSAAmt	Octet	US Dollars	50	2	100	1	X	x

Markup Tariff

A markup tariff plan does not use calendars.

Tariff Plans and Currencies

An offer can have tariffs plans with multiple currencies: Tariff plans contain tariff currency sets.

A tariff currency set is a currency of one or more tariffs (limited to a one simple tariff plan) that are used when that currency is chosen. In general, the currency chosen matches the subscriber's currency. In the case where a tariff plan does not contain a tariff currency set matching the subscriber's currency, the tariff currency set matching the tariff plan currency setting is used.

Tariffs within the tariff currency set need not be in the same currency as the tariff currency set.

Tariff Plan Overrides

A tariff plan override defines a way to override a tariff plan upon specific conditions that apply to the subscriber and its subscription. For example, tariff plan enables the implementation of special rates for the subscriber's birthday (on the subscriber's birthday, use a different tariff plan).

The basic flow for guiding to a tariff plan is as follows: For the final AUT, or each final AUT if there were splits:

- Use the offer associated with the final AUT and find the tariff plan associated with final AUT.
- Find the subscriber's tariff plan override template.

The tariff plan(s) associated with usage never changes during the lifetime of the usage.

When the usage is liability redirected to a shadow subscriber, the shadow subscriber's tariff plans ar e used

Under all other scenarios, the main subscriber's tariff plans are used.

An override tariff plan provides a flexible solution for offering special or complicated promotions which are not accumulator based to new or existing customers. For example, birth date tariff,

balance based tariff, special rates during happy hour, and prefix based tariff, promotions based on subscriber attributes, and loyalty based promotions.

If a promotion is accumulator based then it is a promotion override not a tariff override. See also chapter 8, “Rating-Time Promotions.”

Override tariffs enable you to do the following:

- Change tariff plan based on balance at the beginning of the call
- Offer special day tariffs
- Change tariff plan based on called number prefix

See also the *Rating Technical Reference Guide*.

Attribute (or segmentation keys) support this functionality. They are categorized as: subscriber attributes, market attributes, and account attributes. Each of these attribute categories are sub-divided into fixed (predefined) or extensible (configurable) attributes. Here are some examples:

- **Fixed subscriber attributes**: Accumulator ID / Name, Balance ID / Name, Last Activation Date
- **Extensible subscriber attributes**: Birth Date, Anniversary Date, Credit Score

A maximum of 10 attributes is supported.

See “Rating Segmentation Keys,” starting on page 61.

Tariff Charge Size and Conversion Rate

All billable or chargeable transactions (voice calls, data transactions, and other information services on the system interfaces) are charged using tariffs. The tariff for a particular activity enables the operator to specify two values:

- charge size for the initial consumption charge and additional consumption charges, for example, a 10-second length for a voice call
- conversion rate to currency for the initial charge and additional charges, for example, $.01 per 10-second length

The system charges all calculations to at least six decimal places beyond the major currency unit ($2.123456) with configurable control over the number of decimal places shown in charges and balances.

Consumption Units

Within each tariff, it is possible to define the initial consumption amount, also known as the initial consumption unit (both in terms of amount and cost), and additional consumption units which

take place after the initial unit. Often, the first unit is longer (for example, 60 seconds) and the additional units are shorter (for example, 12 seconds). Using this method, a higher minimum charge is guaranteed, even for very short calls (because the first unit is always applied in full).

Each transaction activity is assigned a unit type. The tariff for a particular activity, for example a voice call, has a unit type of seconds. An MMS transaction frequently uses MPEG as the unit type. The system supports unlimited currency and non-currency units.

Voice Calls

The charge for a telephone call generally depends on whether the call is local or international, whether the call is made during peak hours, and how long the call lasts. The system determines these parameters by looking at the signaling information for the call. For a typical voice telephone call, the tariff depends on many factors including:

- Time Type variable (date and time of day of the call)
- Duration of the call
- Dialed number
- Subscriber home location (if defined)
- Location relationship (location of the calling and called party)
- OPPS (originating) or TPPS (terminating) call
- Special feature associated with the call (such as Friends and Family)

Digital Data Transactions

Digital data transactions and information services are typically rated by the content and volume of the transaction. An example is the number of megabytes transferred in the case of a file downloaded from the Internet, and perhaps whether the content was a premium audio or video data transfer.

For data and information services, certain factors used to charge for a telephone call are often not relevant, such as the location of the originating and destination parties. Determining the tariff for data services involves factors such as:

- **Time-Type variable**: The date and the time of day of the transaction
- **Duration**: Seconds
- **Volume**: Number of octets (bytes) transferred
- **Content**: Type, premium level of the service
- **Quality of Service**: Characteristics of the data session (56 Kbps, DSL, cable)

Regardless of the subscriber's transaction activity, a tariff based on any of the factors listed above is defined for the purpose of rating and charging. The actual configuration of the model and the parameters used to measure transaction activities are dictated by the market needs of each given network operator.

Tariff Examples

This section contains some tariff examples.

Tariffs for Voice Calls

This topic reviews how basic tariffs are applied in terms of unit types and consumption units for time-sensitive transactions like voice calls. It discusses different types of tariffs including flat rate tariffs, negative tariffs, settlement tariffs, tariffs crossing multiple time type boundaries, and concurrent tariffs.

As previously mentioned, tariffs for voice calls depend on many factors, including the time type and duration of the call, and the location of the originating and destination parties (location relationship). The tariff is more than just a single rate of X currency units per Y seconds. A tariff for any transaction is defined with the following basic parameters:

- The unit type (for example, seconds for voice calls) for charging.
- The currency of the tariff (for example, dollars, Euros). The system uses tariffs defined in multiple currency types.
- The length of the initial consumption unit in seconds. This length must be at least one second.
- The charge for the initial consumption unit (called the initial consumption charge), in minor currency units, such as cents, the smallest subdivision of the dollar currency unit. A minor currency unit is typically 1/100th of any global major currency unit.
- The length of any additional consumption units, in seconds. This length must be at least one second.
- The charge for any additional consumption units (called the additional consumption charge) in minor currency units.
- A tariff modifier or dependency (for example, a promotion type such as the Friends and Family feature) that indicates how the tariff is used in conjunction with another feature.

The following table shows several tariff examples for voice calls, focusing on the billable units' length and charge. As illustrated below, different combinations serve different purposes.

Table 18 Tariff Examples (Voice Calls)

Tariff	Initial Consumption Unit	Initial Consumption Charge	Additional Consumption Unit	Additional Consumption Charge	Eligible for Discount	Comment
T1	30 sec.	$0.50	30 sec.	$0.50	Yes	Simple tariff, first and additional units are exactly the same.
T2	2 min.	$2.00	30 sec.	$0.50	Yes	Longer first unit so every call is charged at least $2.00. The charge "rate" is the same ($1 a minute).
T3	2 min.	$1.20	30 sec.	$0.50	Yes	Longer first unit, but it has a lower "rate" ($0.60 a minute) than the additional units ($1 a minute).
T4	1 sec.	$1.00	60 sec.	$0.00	Yes	All calls are charged exactly $1.00, regardless of their length. The call is charged with a one-time charge.
T5	3 min.	0	30 sec.	-$0.10	Yes	All calls longer than 3 minutes are discounted $.10 per unit.

Tariff T4 is an example of a flat rate tariff. There is one flat charge for the entire call. The charge for the additional units is zero, but the length of additional units is not. A zero-length time parameter is not valid because it implies that an infinite number of units are required. A zero charge is acceptable as shown in tariff T5.

In the examples above, T5 illustrates negative tariffs. Make sure that negative tariffs are always used concurrently with appropriate positive tariffs. Misuse of negative tariffs often results in free calls. In addition, negative tariffs are not used in combination with free seconds.

Table 19, "Charging Voice Calls Using Tariffs" shows how calls of different lengths are charged using the different tariffs for voice calls defined above. Each entry shows the charge in dollars, as well as the number of units charged, in parentheses. The two numbers show the number of initial charge units (always 0 or 1) and the number of additional charge units. For example, an entry of $2.00 (1, 3) means one initial charge unit and three additional charge units, with a total charge of $2.00. Study the table carefully to gain a full understanding of the number of units and the charge applied for each call length.

Table 19 Charging Voice Calls Using Tariffs

Call Duration	Charge with T1	Charge with T2	Charge with T3	Charge with T4
1 sec.	$0.00 (0, 0)	$0.00 (0, 0)	$1.20 (1, 0)	$1.00 (1, 0)
2 sec.	$0.00 (0, 0)	$0.00 (0, 0)	$1.20 (1, 0)	$1.00 (1, 1)
5 sec.	$0.50 (1, 0)	$2.00 (0, 0)	$1.20 (1, 0)	$1.00 (1, 1)
30 sec.	$0.50 (1, 0)	$2.00 (1, 0)	$1.20 (1, 0)	$1.00 (1, 1)
45 sec.	$1.00 (1, 1)	$2.00 (1, 0)	$1.20 (1, 0)	$1.00 (1, 1)
1:00 min.	$1.00 (1, 1)	$2.00 (1, 0)	$1.20 (1, 0)	$1.00 (1, 1)
1:30 min.	$1.50 (1, 2)	$2.00 (1, 0)	$1.20 (1, 0)	$1.00 (1, 2)
2:00 min.	$2.00 (1, 3)	$2.00 (1, 0)	$1.20 (1, 0)	$1.00 (1, 2)
3:00 min.	$3.00 (1, 5)	$3.00 (1, 2)	$2.20 (1, 2)	$1.00 (1, 3)
5:00 min.	$5.00 (1, 9)	$5.00 (1, 6)	$4.20 (1, 6)	$1.00 (1, 5)

Calls lasting one or two seconds are free of charge under tariffs T1 and T2 because they are shorter than the grace period (3 seconds).
All calls, of all lengths, are charged $1.00 with T4 because it only defines a non-zero first unit charge. All the additional units (which are calculated and counted) are free.

Calendars, Day Types, and Time Types

To allow charging for time-sensitive transactions, a calendar with daily schedules and associated time types is provisioned for each tariff plan.

Calendars and Day Types

The calendar uses daily schedules to identify day type (weekday, weekend, or holiday). There are multiple calendars to accommodate special holidays or different off days versus workdays. These calendars often share the same Daily Schedules or have their own daily schedules. If appropriate, several Classes of Service share the same calendar (so that multiple identical definitions are avoided).

When a call is made by a given subscriber, a tariff plan is pointed to as previously described. The associated calendar is consulted. Within that calendar, the daily schedule for the date the call is placed is the schedule that is used to determine the time type.

Time Types

Once all the data is in place (this includes defining the tariff plans for the primary offer, selecting a calendar for each tariff plan, and pointing that calendar to the appropriate daily schedules) the time type is obtained for any instance in time.

In determining the tariff, time type information is critical for applications such as a voice call. Most wireless service providers use time type-based tariffs to encourage or discourage subscribers from using the services at different times of the day.

From one to five concurrent tariffs are provisioned for each Time Type, so the tariff varies based on the time of day for these transactions.

The system enables the operator to define various time types and selection of tariff based on the time type, called rate type. Time type defines the various times of the day as peak, off-peak, and others. For some applications like data or SMS, the time type is not relevant; however, it is crucial information for activities such as a voice call.

Daily Schedules and Time Types

The daily schedule uses time types to define a 24-hour period. There are several daily schedules depending upon the workday, off day, special day (for example, Mother's Day), and for various applications. For example, for voice calls, the peak hours are 8:00 AM – 5:00 PM but for data, the peak hours are from 7:00 PM until 11:00 PM because most backups are done during these hours. To accommodate these types of differences, the operator chooses to create different daily schedules for different activities.

Tariff Plan Application

A single call spans more than one time type and requires billing in more than one currency. Proper tariff application is vital to ensure correct billing for all possible instances.

Multiple Currencies

The system enables tariff rates to be defined in one currency and then automatically converted to another currency. This feature is useful for billing purposes if a local carrier uses an international carrier, with a different currency, to provide international calling services. For example, Mexi Telecom is a service provider that uses AT&T for their international calling services. AT&T charges Mexi Telecom in **Dollars** for each international call, and Mexi Telecom charges their subscribers in **Pesos**. An example of the charges for an international call is as follows:

- Tariff 1 (Call Duration) = **Pesos**
- Tariff 2 (Toll) = **Dollars**

Negative Tariffs

Negative tariffs are used to support telescoping charges or to decrease per time unit charges for calls over a period of time thus enabling the reduction of call charges when concurrent tariffs are used.

For example, notice in the following table that the additional unit charges for T2 and T3 are negative. Therefore, when these three tariffs are used concurrently, only $0.25 is charged for each additional unit beyond the first 10 minutes or 600 seconds.

Table 20 Additional Unit Charges

Tariff	Initial Consumption Unit	Initial Consumption Charge	Additional Consumption Unit	Additional Consumption Charge
T1	60 Sec.	$1.00	60 Sec.	$1.00
T2	300 Sec.	$0.00	60 Sec.	-$0.50
T3	600 Sec.	$0.00	60 Sec.	-$0.25

Make sure that negative tariffs are always used concurrently with appropriate positive tariffs. Misuse of negative tariffs often results in free calls. In addition, negative tariffs are not combined with free seconds.

Percentage discounts on negative charges are supported. However, the network operator must ensure that this feature is configured correctly. Otherwise, the discounting of an entire negative charge could occur.

Settlement Tariff

A settlement tariff calculates a price but this amount is not charged to the subscribers balances. A settlement tariff calculates a price, but this amount is not charged to the subscriber's balances. Its primary use is to track the cost of the call to the network operator. For example, a subscriber makes a call from Germany to France. A tariff called settlement tracks values that determine how much the French network charges the German network operator for the French network usage. This information is recorded only in a CDR, and is used to reconcile charges between or within network operators.

Pulse-Count Tariffs

Certain operators measure the duration of a voice call for rating purposes by generating periodic pulses with the call. A pulse, sometimes called a tick, is a count of time units.

For example, a local call uses 60-second pulses resulting in one pulse for each minute of the call. Therefore, a call with lasting 1 – 60 seconds uses one pulse, a call with a duration of 61 – 120 seconds uses two pulses.

Different calls use different pulse units. While a local call uses 60-second pulse units, a long distance call uses 45-second pulse units. The operator is capable of setting the pulse units on a call-by-call basis.

The system includes the pulse rate for each call in the call detail record (CDR). A settlement tariff is configured to calculate the number of pulses for the call activity to reconcile the charges between network operators. The system also includes the pulse rate on invoices and usage statements.

Example:

To create a 60-second pulse count, a tariff is configured as shown in the following table.

Table 21 Pulse60 Settlement Tariff (Example)

Tariff	Unit Type	Currency	Initial Consumption Unit (ICU)	Initial Consumption Charge (ICC)	Additional Consumption Unit (ACU)	Additional Consumption Charge (ACC)
Pulse60	Sec.	USD	60 seconds	$1.00	60 seconds	$1.00

To create a 45-second pulse count, a tariff is configured as shown in the following table.

Table 22 Pulse45 Settlement Tariff (Example)

Tariff	Unit Type	Currency	Initial Consumption Unit (ICU)	Initial Consumption Charge (ICC)	Additional Consumption Unit (ACU)	Additional Consumption Charge (ACC)
Pulse45	Sec.	USD	45 seconds	$1.00	45 seconds	$1.00

The Pulse60 and Pulse45 settlement tariffs are then added to the tariff plans to calculate the pulse counts.

Configuration Guidelines

- Pulse count tariffs must be configured as settlement tariffs and classified as a charge type of pulse.
- Only one pulse tariff is included in a tariff plan (although there is nothing to prevent the configuring of multiple pulse count tariffs).
- Pulse count tariffs are only used for call activities (although there is nothing to prevent them from being used for other activities).
- The currency for the pulse count tariffs matches the primary offer currency in which it is being used (to avoid currency conversions). If the system supports multiple subscriber currencies, pulse count tariffs need to be created for each currency.

Concurrent Tariffs to Non-Currency Balance Charging

Rules for Concurrent Tariffs

The following rules describe system behavior when applying concurrent tariffs:

- The system uses the guided to offer non-currency consumption amount value associated with the unit type, if it is a non-zero value. Otherwise the consumption amount and additional consumption amount from the primary tariff are used.
- For all concurrent tariffs that are charged against noncurrency balances, as long as there are accessible non-currency funds, the same reservation amount applies to all of them (there is no need to sum up the consumption amount from each concurrent tariff).
- For the concurrent tariffs that cannot be charged against noncurrency balances, the consumption charges are totaled and the total amount used for reservation and charging against the currency balances.
- Once the non-currency funds are consumed, the additional consumption charge values from each concurrent tariff are used to charge against the accessible currency balances.

The following is a description of the reservation mechanism when applying concurrent tariffs for MMS transaction activities with charging against non-currency and currency balances.

Assumptions:

- Four concurrent tariffs

- T0 is a primary tariff
- Non-currency consumption unit for MMS = 0
- Accessible balance amounts defined:

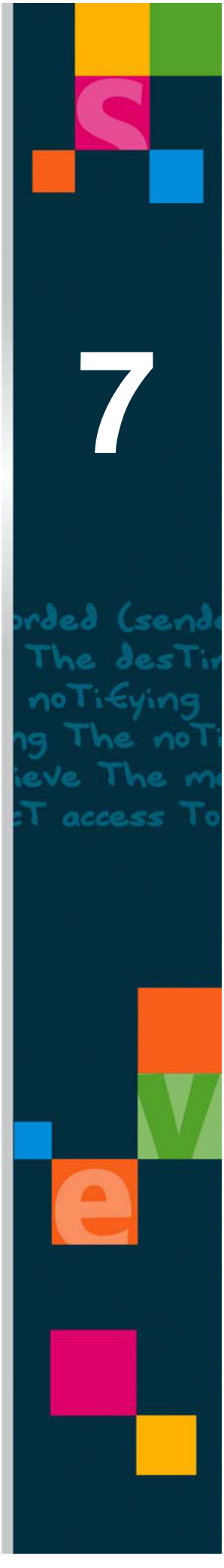
B6 (100 MMS)	B2 ($6.00)
B4 (25 MMS)	B1 ($20.00).

Table 23 Sample Tariff Parameters

Tariff	Initial CC / CA	Additional CC / CA	Non-currency Balance	Settlement Tariff
T0	$0.50 / 10 MMS	$0.25 / 10 MMS	Y	N
T1	$0.40 / 15 MMS	$0.25 / 10 MMS	Y	N
T2	$1.00 / 20 MMS	$0.50 / 25 MMS	N	N
T3	$0.10 / 60 MMS	$0.10 / 60 MMS	N	Y

Chapter 7

Bill-Time Promotions (CV)



Converged only
This entire chapter pertains to CV only.

Capabilities

Bill-time promotions enable you to package bill-time discounts and unit credits and add them to offers. Bill-time discounts and unit credits are calculated and issued at the end of the bill period, when the invoice is generated.Bill-time promotions include the following capabilities:

- **Subscribers**: Bill-time promotions are applicable to prepaid and converged subscribers in addition to postpaid-only subscribers, and applicable across multiple subscribers within an account.
- **Periods**: Cyclical bill-time promotions are configurable to periods such as day, week, month, quarter, or year.
- **Services**: Bill-time promotions span services of any kind; are targeted (or restricted to) any group or type of charge, or rate period.
- **Charge**s: Bill-time promotions are applicable to all charges on an invoice or to a subset of charges
- **Discounts**: Discounts are percentage-based or a flat rate, incremental or tiered, or a grant for future usage.
- **Applying:** Bill-time promotions are applied when the invoice is calculated (not real time), but the results of bill-time promotion discount can be applied to real-time balance when a balance template is associated to the discount.
- **Charge Specifications**: Bill-time promotions specify contributing and target charges as follow:
  - Bill-time promotion are always calculated pretax.
  - Bill-time promotion amounts can be stored separately from undiscounted charge amounts and journalized to a separate journaling category.
- **Packaging**: For converged accounts, bill-time promotion plans can be packaged together with real-time promotion plans.
- **Grouping**: Bill-time promotion items, discounts and unit credits can be grouped into plans with the items in each plan ordered for precedence.

Bill-Time Promotion Plan

The bill-time promotion plan is a collection of discount and unit credits that define a promotion, The promotion plan holds the definition of the promotion types (formerly referred as contract types) which are:

- Standard
- Commitment
- Cycle-independent
- HQ
- Hierarchy Branch Discount
- Global
- Historic discount

- Historic payback
- Rollover

Bill-Time Discount Item

Bill-time discounts are calculated and issued at the end of the bill period, when the invoice is generated. You define the discount as described in the Product Catalog User Guide then package it in a bill-time promotion plan. The plan can then be added to an offer or bundle for provisioning to the customer.

When you have configured the discount item, configure a rate for it.

The following types of discounts are available. Use the Discount Type field to specify which type of discount you are configuring. .. I

- **Incremental Discount** An incremental or "tiered" discount breaks up a charge by discrete thresholds, with a different discount rate applied to each increment — for example, 10% off all usage charges between $100 and $200, and 15% off for usage over $200. Define the required number of rate bands in the Rate Discount screen as described in the *Product Catalog User Guide*. Incremental discounts can apply to usage units as well as charge amounts. To configure this discount, set Discount Type to 2 (incremental discount)
- **Minimum-Price Discount**
(Bulk or Incremental): A minimum price discount is a guarantee that the discounted amount is never higher than the lowest recurring charge rate for the product over the discount's active period. The guarantee can be applied to a bulk or incremental discount for a recurring charge. To configure this discount, set Discount Type to 3 (minimum-price bulk discount) or 4 (minimum-price incremental discount).
- **Usage Rounding**
(Four-Decimal) Discount: Usage-rounding discounts (also known as four-decimal discounts) minimize the effects of rounding errors in usage rating. If you are rounding charges up, a usage-rounding discount offsets the rounding error just as a normal discount does (the discount reduces the charges). If you are rounding usage charges down, a usage-rounding discount offsets the rounding error as a negative discount (the discount increases the charges). Configure the rate in the Rate Discount screen. The typical discount rate is 100%, since the purpose of the discount is to eliminate the difference between the four-decimal rated charge and theunrounded usage amount. This type of discount can only be applied to usage charges. To configure this discount, set Discount Type to 5 (usage rounding discount).
- **Bulk Discount**
A bulk discount applies to the entire amount of the charge beyond a specified threshold for example, 10% off all usage charges if the customer has more than $100 in charges for the bill period. A bulk discount has a minimum of two rate bands. The intersection of any two contiguous rate bands represents the threshold at which the bulk discount amount or percentage discount becomes active. Define the required number of rate bands in the Rate Discount screen as described in ìAbout Rate Bandsî on page 249. To configure this discount, set Discount Type to 6 (bulk).
- **Guaranteed Minimum Discount**
A guaranteed minimum discount (also known as a ìcustomer winsî discount) ensures that, if necessary, a recurring charge for usage is reduced to a specified threshold after all other discounts are applied. For example, assume a customer pays $10 a month for a usage plan that includes 20% off all usage. The customer makes $40 worth of calls, and receives a discount of $8. The guaranteed minimum discount applies an additional discount of $2 to reduce the amount of the monthly fee to zero, so that the client is not paying more than she would have for straight usage charges.
To configure this discount, set Discount Type to 7 (guaranteed minimum discount).

- **Incremental Cross-Product Discount**
  Cross-product discounts are calculated based on one set of charges (eligible charges) but applied to another set (target charges). For example, you could offer $10 off the monthly service fee if the customer orders five ringtones. In this case, the ringtone is the eligible charge, and the monthly fee is the target charge.
  Define the eligible charge and other properties in this screen and create the target(s) to which the discount applies in the Bill-Time Discount Targets screen.
  To configure this discount, set Discount Type to 8 (incremental cross-product discount). For this type of discount, the Discount Quantum field must be set to 1 (monetary).

See additional detailed information regarding discounts in the *Product Catalog User Guide*.

Discount Targets and Restrictions

When both targets and restrictions of the discount are the same and the target of the discount is not complex, there is no need to provision discount target or discount restriction entities tied to the discount item. The discount target can be configured in the discount item by the domain (usage, RCs, NRCs, or all), domain ID and possibly the rate period, or product line.

(This is not true when targets are balances and in such case the balance template is required).

In the case of more complex restrictions, but still identical to the discount targets (that is, non cross-product discounts), discount restrictions must be provisioned as tied to the discount items.

The last case is when targets differ from restrictions (that is, cross product discounts); then, discount target and discount restriction entries must be provisioned separately and tied to the discount item entity.

Bill-Time Unit Credit

The main difference between unit credit and discount is that discount only applies to money amounts, where unit credit can represent either a monetary amount off or some free units (non-monetary unit).

But strictly focusing to monetary promotions, unit credits are less powerful; for example, they do not support targeting balances.

Bill-Time Unit Credit Restriction

Unit credit restrictions complete the unit credit definition by specifying restrictions. Separate unit credit restriction items are only needed if the restriction is complex. An example of a complex restriction is a restriction that targets two different usage types.

Bill-Time Promotion Plan Types

Standard Promotion Plan

A standard promotion plan delivers bonuses and discounts that apply at bill time through offers. Additional capabilities and features applicable to bill-time promotions can be delivered using the additional promotion plan types described in this section.

Commitment Promotion Plan

Commitment Promotion Plans are managed through the Offer Contract Term and Recurring/Non-Recurring Charge (RC/NRC) terms.

Cycle-Independent Promotion Plan

In a cycle-independent contract, the initially allocated unit credit amount (credit or rebate) carries over from one bill period to the next, instead of applying separately to each period.

Cycle-independent promotion plans can only contain bill-time unit credit items. The unit credits are valid as long as the offer is active.

Hierarchy Branch Promotion Plan

A hierarchy branch promotion plan is provisioned and billed to the parent account in an account hierarchy, but the discount or unit credit applies to the charges generated by the child accounts. The discount or unit credit plan you use in a hierarchy branch promotion plan must be set to account level.

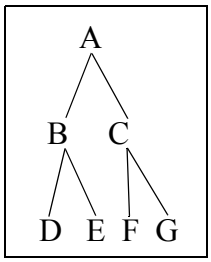
You can configure a hierarchy branch discount or unit credit promotion plan that is provisioned and billed to a parent account (owning account number) in an account hierarchy, but applied only to the charges generated by the child accounts belonging to the account hierarchy.

By contrast, if you provision a standard promotion plan (promotion type = 6) to a parent account, it applies only to the parent's charges and any charges that are redirected from to the parent account from the child account; it does not apply to charges assigned to the child account. Likewise, if you provision it to the child account, it applies only to the child's charges, and not to any charges that are redirected to the parent account.

Hierarchy branch promotion plans also work for complex account hierarchies (hierarchies within hierarchies, where a child account of one parent account is the parent account for other child accounts). They enable you to offer different discounts to different branches of the account hierarchy.

For example, consider the account hierarchy shown in figure 23. You can provision hierarchy branch promotion plans that give accounts in hierarchy branch B 10% off all charges, while accounts in hierarchy branch C get 20% off all charges. In both cases the discount applies only to the child accounts, not to the parent.

Figure 23 Sample Account Hierarchy



To configure a hierarchy branch promotion plan, specify the discount level = 2 (account level) and contract category = 10 (hierarchy branch discount).

See the *Product Catalog User Guide* for configuration instructions and the *Customer Center User Guide* for provisioning instructions.

Global Promotion Plan

A global promotion plan applies to all accounts on a given customer server. There is no need to provision global contracts. However, they must exist in the configuration. For example, if you have a usage outage, you can configure a discount rebate and place it in a global promotion plan. Or you can configure a "100% off all charges" discount for charges that are older than a specified date. Global promotion plans can include discounts and bonus point scenarios, but they cannot contain unit credits.

Global promotion plans apply to all accounts except those marked for exclusion. A CSR can mark an account such that is does *not* participate in a global plan.

Global promotion plans behave in the same manner as a standard provisioned promotion plan at the account level, except that the first use dates and last use dates are not updated by the system.

Global promotion plans have two limitations: they cannot be restricted by bill cycle, neither can they be one-use only promotion plans. Only individuals with the appropriate permissions can provision global promotion plans.

See the *Product Catalog User Guide* for detailed configuration instructions for global promotion plans.

Historic Discount and Payback Promotion Plans

Historic promotion plans are associated with a contribution period that can include several bill periods. A contribution period is defined as a bill period. The contribution period defines the period during which the system accumulates eligible charges for the promotion plan as it generates invoices for the account. The system stores contributions in the database to be evaluated at the end of the contribution period. After the system evaluates the promotion plan it moves the historic promotion plan into its next contribution period or, if the promotion plan has been terminated, terminates the contribution and evaluation cycle.

There are two types of historic promotion plans:

- **Historic discount promotion plans**: offer discount rates or rebate amounts based on eligible charges accumulated over a configured period of time rather than the amount of eligible charges on a customer's current invoice. The system total the contribution accumulated during a contribution period to establish a historic threshold value. This value is used to determine a discount create for all invoices generated during the next contribution period.
- Historic payback promotion plans: offer a payback (refund) either as a percentage of accumulated charges or as a flat rebate amount. Using charge total accumulated over a configured period of time, the system determines the refund amount and generates a payback as non-balance-affecting payment for the account. The payback is applied to the account's balance the next time an invoice is generated.

Rollover Unit Credit Promotion Plan

The rollover unit credit promotion plan enables you to control how unit credits such as free minutes expire and how subscriber spend them. Unit credits that are part of a rollover unit credit promotion plan and are unused in one bill period remain valid for use in subsequent bill periods (unused credits are said to be rolled over to the next bill period). Unit credits that are not part of a rollover unit credit promotion plan are lost if they are unused in a particular bill period.

As with other discounts and unit credits, rollover unit credits must be provisioned as part of a promotion plan. You cannot provision rollover unit credits to an account or subscriber directly.

You can control whether rolled-over credits are used before or after the current period's credits and if the oldest unused credits are applied first or last. You can configure a rolled-over credit limit so that customer cannot accumulate credits above a certain value. Rolled-over unit credits can be valid indefinitely or expire after a certain number of days or bill periods. Rollover credits expire in one of four ways:

- a certain number of days after they are earned (rolled over credits are said to be earned on the last day of the bill period in which they are issued)
- a certain number of bill periods after they are earned
- a certain number of days after the start date of the promotion plan
- a certain number of days after the end date of the promotion plan

Expiration Dates

When provisioning a promotion plan, the CSR sets fields for the grace period, rollover period start and rollover period.

When provisioning the promotion plan, the CSR sets the customer promotion plan:

- grace period: the number of days the promotion plan remains active after the promotion plan end date.
- rollover period start: specifies when the rollover period starts. You can set it to one of four values:
  - 1 = rollover earned date (the invoice cutoff date)
  - 2 = promotion plan start date
  - 3 = promotion plan end date
  - 4 = specified in bill periods after the rollover earned date
- rollover period: the number of days following the date specified in rollover period start in which rolled over unit credits are valid.

  If the rollover period start is set to 4, set the rollover period to the number of bill periods after the earned date that the credits are valid.

  If the rollover period is left unset, then the promotion plan end date plus the grace period for the promotion plan is the expiration date for the rolled-over unit credits.

For example, consider a rollover promotion plan which includes a unit credit offering six free units each month. The promotion plan is active on Jan. 1, 2005 and expires March 1, 2005: two bill periods, during which it generates 12 free units. The CSR provisions this promotion plan to an account and enters the following settings:

- grace period = 0
- rollover period start = 3 (contract end date)
- rollover period = 31

The account generates the following usage events:

- Jan. 21: 3 units
- Feb. 21: 3 units
- Mar. 21: 3 units

The first two usage events fall within the active period of the promotion plan and are awarded free units. When the promotion plan ends on Mar. 1, there are still six unused units. Since the rollover period is 31 days, these credits are available for the entire month of March, so the usage recorded on Mar. 21 is also awarded free units.

Now suppose we use the following configuration:

- grace period = 31

- rollover period start = 3 (contract end date)
- rollover period = unset (Null)

Since the rollover period is unset, the effective rollover period is the promotion plan end date plus the grace `period`, the free units are still active for the entire month of March. The usage recorded on Mar. 21 is awarded free units.

Imagine a third scenario using the following configuration:

- grace period = 31
- rollover period start = 3 (contract end date)
- rollover period = 15

Since there is a value set for rollover period, grace period has no effect on rollover eligibility. The rollover period ends 15 days after the contract end date, so the usage recorded on Mar. 21 is *not* awarded free units.

> If rollover period is set to a value greater than or equal to zero (>=0) for a Rollover Unit Credit Contract (contract category 13), then you must set rollover period start to either 1, 2, 3, or 4.

Maximum for Rollover Unit Credits or Cash Amounts

`The` maximum rollover units and maximum rollover amount determine how many unit credits the promotion plan instance can roll over. You can set both fields to Null if you do not want to limit rollover credits.

Grouping and Spending Unit Credits

A promotion plan rollover grouping specifies how to apply rollover unit credits in relation to periodic earned credits. For rollover promotion plans (promotion type = 13 or 16), it specifies how rolled-over credits interact with earned credits:

- 1 = apply rolled-over credit before any current credits
- 2 = apply rolled-over credit after any current credits
- 3 = apply rolled-over credit just before applying corresponding current credit for the same unit credit type
- 4 = apply rolled-over credit just after applying corresponding current credit for the same unit credit type
- 5 = apply rolled-over credits before the current portion of this unit credit type. In this case, the rolled-over unit credits are used first, but use them as defined in unit credit plan order and order definition.

The rollover order field specifies the order in which unit credits are spent:

- set to 1 to spend the oldest (first earned) unit credits first
- set to 2 to spend youngest (most recently earned) unit credits first

Rollover Unit Credits Examples

Assume that you have configured unit credit plans as follows:

1. Unit Credit 1 is applied before Unit Credit 2.
2. Unit Credit 2 is applied before Unit Credit 3.
3. All plans spend the oldest unit credits first (`rollover order` is set to 1).

Table 24 through Table 27 present the results for each setting for `rollover grouping` for spending unit credits in relation to periodic earned credits.

If a given unit credit has spent quantities in one or all of the previous periods (either because it was not set up for rollover unit credits or because the customer has already spent the points), then the other priorities still apply.

When `rollover grouping` is set to 3, the system applies unit credits as shown in Table 24 :

Table 24 Spend RUCs Before Periodic UCs

Unit Credit	Jul 1 – Jul 31	Aug 1 – Aug 31	Current
UC 1	1	2	3
UC 2	4	5	6
UC 3	7	8	9

When `rollover grouping` is set to 4, the system applies unit credits as shown in Table 25 :

Table 25 Spend RUCs After Periodic UCs

Unit Credit	Jul 1 – Jul 31	Aug 1 – Aug 31	Current
UC 1	2	3	1
UC 2	5	6	4
UC 3	8	9	7

When `rollover grouping` is set to 1, the system applies unit credits as shown in Table 26 :

Table 26 Spend RUCs Immediately Before UCs for Period

Unit Credit	Jul 1 – Jul 31	Aug 1 – Aug 31	Current
UC 1	1	2	7
UC 2	3	4	8
UC 3	5	6	9

When `rollover grouping` is set to 2, the system applies unit credits as shown in Table 27 :

Table 27 Spend RUCs Immediately After UCs for Period

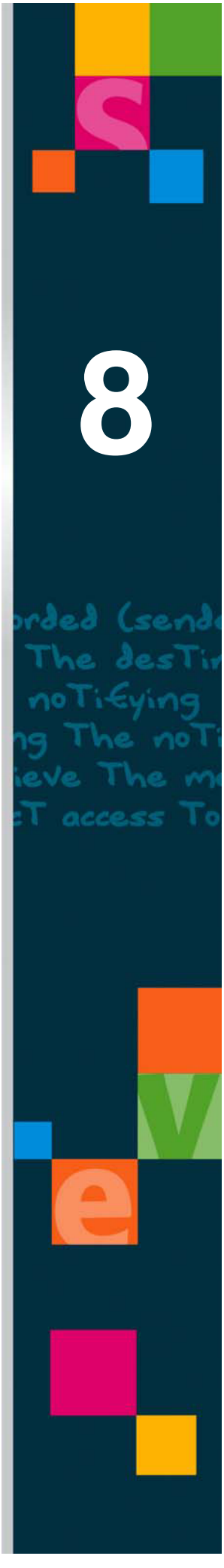
Unit Credit	Jul 1 – Jul 31	Aug 1 – Aug 31	Current
UC 1	4	5	1
UC 2	6	7	2
UC 3	8	9	3

ICB Rates

If the ICB Allow field for the bill-time unit credit is checked, CSRs can enter individual-case-basis unit credit rates for unit credit promotion plans if UNIT_CR_ITEM.icb_allow = 1. If icb_allow = 0 the CSR cannot enter the ICB rate.

Chapter 8

Rating-Time Promotions



Rating-Time Promotions (Discounts and Bonuses)

Usage-based promotions enable network operators to design and implement award plans that encourage subscriber usage and increase customer loyalty. Subscribers can be rewarded immediately for reaching certain usage levels within a configurable period of time through discounts or bonuses in the form of additional services or awards of additional usage minutes.

The Comverse ONE solution is capable of monitoring specific kinds of usage (off-peak calls, local calls, SMS, recharges, and so forth) and applying various types awards immediately, as the usage is rated.

Rating-time promotions are discounts or bonuses that are calculated and issued as each usage event is rated. You define bonuses and discounts and then package them in a rating-time promotion plan. The plans can then be added to an offer for provisioning to a customer.

The overall concept can be summarized as follows:

- While rating, appropriate usage is counted via accumulators.
- Discounts and bonuses are linked to thresholds of one or more accumulators.
- When the threshold conditions are met, the discount or bonus is applied.

A rating time discount can be either a fixed monetary amount that is credited to or a percentage reduction that applies to subsequent usage of a particular service or services. Rating Time Discounts only apply to monetary units. Examples:

- After 100 minutes of voice use, calls are discounted by 5%.
- For every 100 SMS, the next 50 are discounted by 50%.
- After 100 voice calls every future MMS will be discounted by $0.10.

A discount can be cross-product, that is, it measures one kind of usage but applies the discount to another. For example, send 100 SMS messages and get 10% off ringtone downloads.

A rating -time bonus can be either:

- **Balance Award**: grants added to Balances give free usage. Balance awards can be defined in terms of currency, events (SMS, local calls, and so forth), or charge units (seconds, bytes).
- **Offer Award**: a Supplementary Offer that is awarded to (instantiated for) the subscriber.

In the case of recharge events, the balance award can be defined as a percentage (a percentage of the value of the recharge that triggers the award).

Typically, discounts and bonuses are applied immediately. For example, if the subscriber is in a call and passes the 100 voice minutes threshold the 5% discount applies immediately during the call in progress. However, they can also be set to apply starting from the next event (not the one in progress) or to apply after a certain duration.

Accumulators

Accumulators are used to count or measure chargeable activities such as duration of voice calls, number of SMS sent or received, quantity of data usage, number and quantity of recharges, and so forth. Each Accumulator is configured to:

- reset to 0 periodically (for example, daily, weekly, bill cycle, at the end of the call …)
- count a specific type of unit:
  - event occurrence (for example, every SMS)
  - currency consumed or units consumed (seconds, K bytes, and so forth)
  - recharges (number of recharges or value of recharges)

- include or exclude specific activities from being counted via Time Types (peak, off-peak, and so forth) and Activity Usage Types (local call, national call, international call, and so forth)

Time types and calendars enable an operator to easily configure time periods that can be used to control applicable tariffs (for example, via tariff plan override templates) as well as discount and bonus awards via accumulators, as described in this chapter.

Activity Usage Types (AUT) are a flexible Comverse ONE solution concept that allow an operator to easily configure different classifications of activity and usage based on a wide choice of criteria. See also “Activity Usage Types (AUTs),” starting on page 61.

Accumulators can also be reset to 0 when a discount or bonus is awarded.
For recharge based promotions, when a bonus is awarded on the next recharge the accumulator is reset immediately after the award and ignores the accumulator reset configuration.
Accumulators are used in discounts and bonuses as described in this chapter. They can also be directly associated to primary offers, supplementary offers, and account offers. Accumulators associated to offers get instantiated on the subscriber or account, Even if no promotion plan actually uses them, because a discount or bonus added at a later stage can make use of the accumulator.
Account accumulators can only accumulate usage charged to account balances. To accumulate usage for all subscribers within an account configure them to use shadow balances pointing to the account balances, and then accumulate at the account.

Accumulators and Per-Call Discounts

You can use accumulators to set up per call discounts. For example, it is possible to configure a per call discount as follows: For every 4 minutes call, the 5th minute is free. Thus, minutes 1-4 are chargeable, the 5th is free, minutes 6-9 are chargeable, and minute 10 is free and so on.

You would set up the discount as follows:

First, set up an accumulator to count voice usage; this accumulator should have a period set to activity (indicating the period is not monthly, weekly, and so forth but the activity itself).

Next, set up a real-time bonus item using this accumulator, with a threshold of 4, awarding 1 to the voice balance and resetting the accumulator each time the threshold is reached.

This assumes you have a balance working in minute, accumulator in minute. Otherwise configure this by chunks of 60s.

Rating-Time Promotion Plan

A rating time promotion plan consists of one or more of the following items:

- Rating-time discount item
- Rating-time bonus item

A rating-time discount item identifies a discount and one or more specific Activity Usage Types (AUTs) to which the discount applies.

A rating -time promotion plan can be associated with primary offers, supplementary offers, and account offers.

A promotion plan can contain multiple discount items identifying the same discount and specifying different Activity Usage Types (AUTs) to which it can apply. Only AUTs that are specifically identified can qualify for the discount.

Rating-Time Discount Item

A rating-time discount can be either a fixed monetary amount that is credited to or a percentage reduction that applies to subsequent usage of a particular service or services. Rating- time discounts apply to monetary units. Examples:

- After 100 minutes of voice use, calls are discounted by 5%
- For every 100 SMS, the next 75 are discounted by 50%

Discounts are applied for the subscriber as soon as the discount threshold conditions are met. For example, if the subscriber qualifies for a five percent discount after 100 minutes of voice use, the discount applies immediately upon the 100th minute, during the call in progress as well as for subsequent calls.

A rating-time discount always has one primary accumulator and 0 to 4 qualifying accumulators. There is always one primary threshold and from 0 to 4 qualifying thresholds. Multiple monetary awards or percentage discounts can be configured at different thresholds.

Messages can be sent to the subscriber via notifications (SMS or USSD) when the award threshold is close or has been reached, through configuration of near-award and on-award Notifications.

The following applies to primary accumulator thresholds:

- Each Threshold value must be unique and greater than the threshold values in the previous row.
- Threshold criteria are evaluated in order of Primary Threshold value, lowest first to highest last.

Figure 24, “Rating-time Discount” shows a configuration example where the promotion being offered to the subscriber is:

- 10% discount after first 100 minutes of voice
- Increased to 13% if you have also used at least 10Mb of data
- Increased to 15% if you have used over 30Mb of data
- 20% discount after 200 minutes of voice
- Increased to 25% if you have also used over 50Mb of data

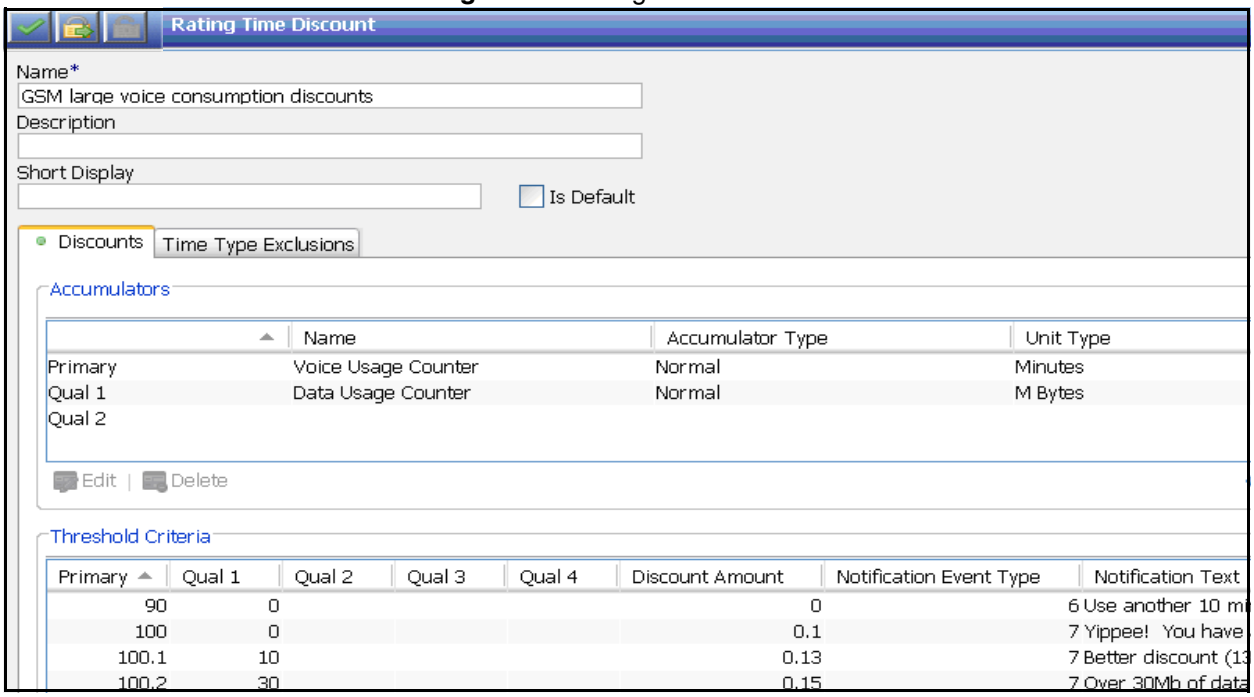
Because we cannot use the same Primary Threshold value twice, we cannot say:

100 Voice=10%, 100 Voice + 10Mb Data = 13%, 100 Voice + 30Mb = 15%

However, we can achieve an appropriate result by saying:

100 Voice=10%, 100.1 Voice + 10Mb Data = 13%, 100.2 Voice + 30Mb Data = 15%

Figure 24 Rating-time Discount



The option of resetting the primary accumulator on the last threshold is useful for managing repeating discounts. For example, the discount "For every 100 SMS, the next 75 are discounted by 50" could be configured as follows:

- Primary Accumulator is SMS Counter
- 1st Threshold is set as:
  - threshold value for SMS Counter = 100
  - on award notification: You have 50% off the next 75 SMS
  - discount value: set to 50%
- 2nd Threshold is set as:
  - threshold value for SMS Counter = 175
  - on award notification: Send 100 SMS and win 50% off the next 75 SMS
  - discount value: set to 0%
- Reset primary accumulator on last threshold is set to Yes

When the SMS counter reaches 100, the 50% discount is set (and the subscriber is notified). When the SMS counter reaches 175, the discount is reset to 0% (no discount) and the SMS Counter is reset to 0. When the SMS counter next reaches 100, the 50% discount is reapplied and the cycle continued.

Time type exclusions allow some fine-tuning of which usage is to be discounted.

- The AUT, associated to the discount via the discount item, identifies which types of usage are discounted (or example, local voice, national voice, international voice)
- Time type exclusions, defined within the discount, identify the periods in which the discount does not apply to usage (for example, peak, off-peak, weekend)

Rating-Time Bonus Item

A rating-time bonus item contains definitions of various bonuses and associated thresholds.

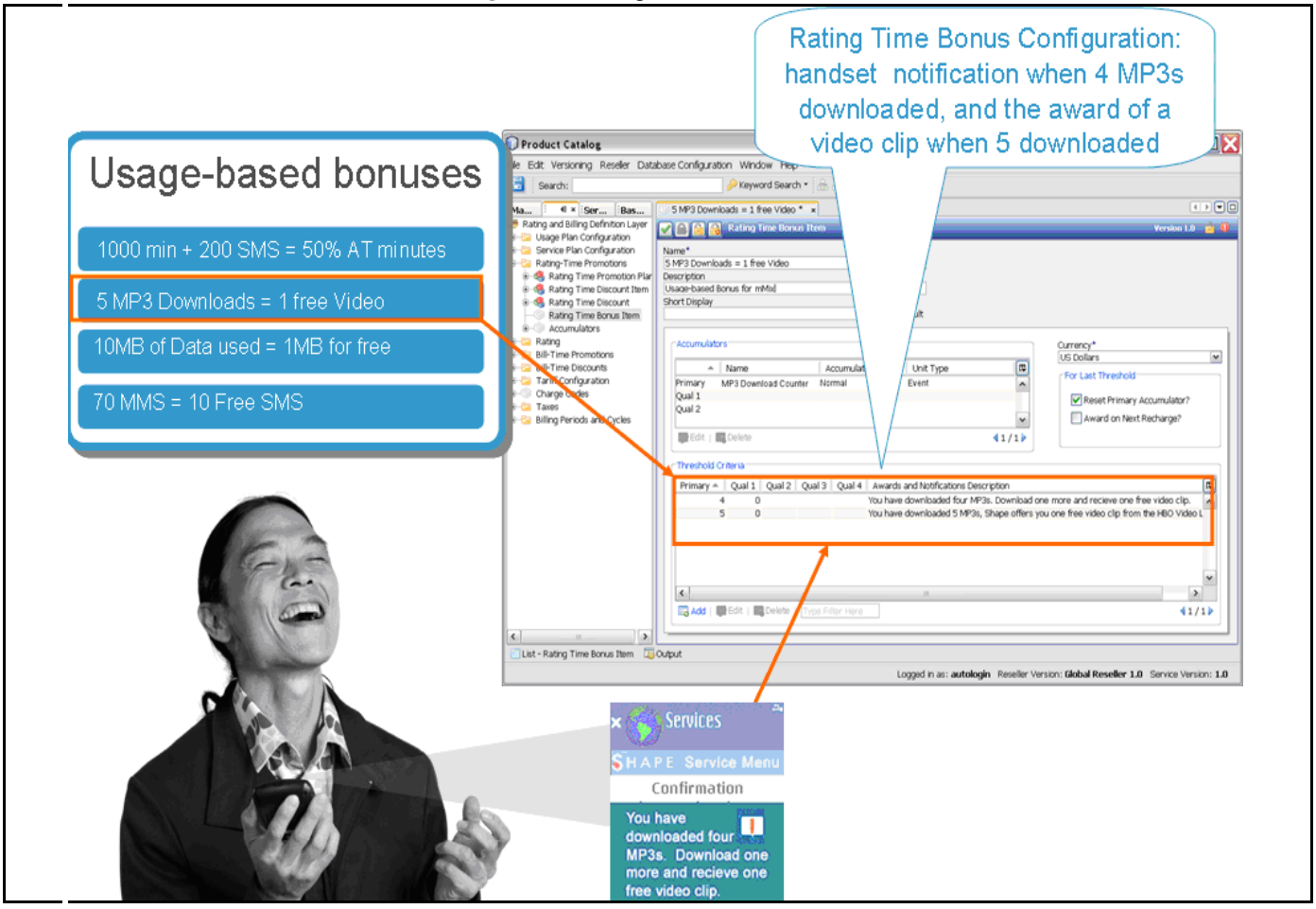
A rating-time bonus item defines bonuses (awards) based on the subscriber's usage. The subscriber receives a bonus for using a particular service or services beyond configured thresholds.

A rating-time bonus is either:

- **Balance award:** grants added to balances give free usage. Balance awards can be defined in terms of currency, events (SMS, local calls, and so forth), or charge units (seconds, bytes).
- **Offer award:** a supplementary offer that is awarded to (that is, instantiated for) the subscriber.

Elaborate bonus schemes can be configured with the use of multiple accumulators and thresholds. A rating-time bonus item can be configured using up to 5 accumulators. There is always one primary accumulator and from 0 to 4 qualifying accumulators. Multiple balance awards or offer awards can be configured at different thresholds. Text message notifications can also be sent to the subscriber when the award threshold is close or has been reached.

Figure 25 Usage -Based Bonuses



Percentage Based Bonuses

The Product Catalog GUI supports percentage based bonuses for normal accumulators in addition to the existing support for recharge accumulators. Subscribers can be awarded bonuses based on a percentage if they exceed the threshold set for the accumulators rather than the fixed bonus. With the percentage base bonus in effect, awards are available to the customer at the end of usage activity.

The following system parameter determines whether this feature is enabled or disabled:

`RTNG ALLOW_ACT_END_ PC_BONUS`

- `0`: disabled; do not allow activity end percentage bonus
- `1` : enabled; allow % bonus at the end of activity

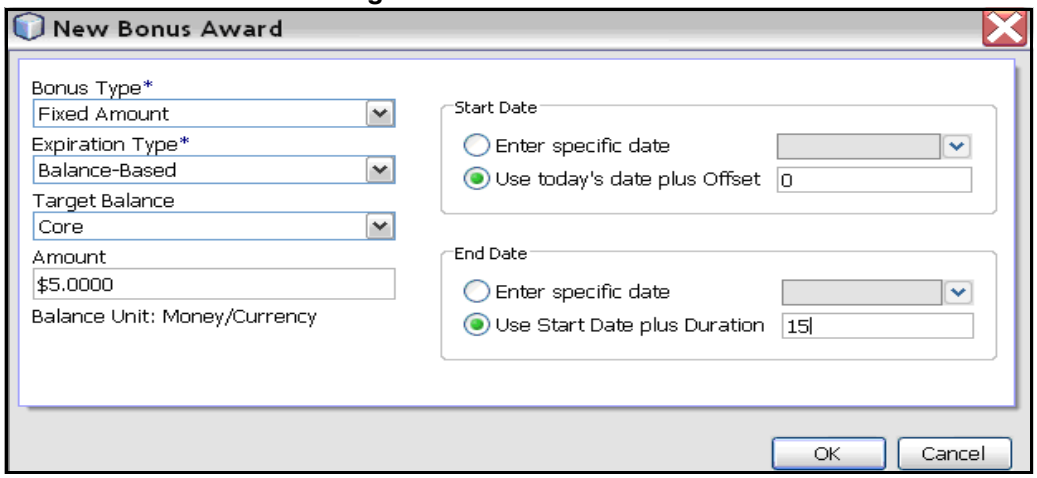
When configuring the rating time bonus item, after the association of the primary accumulator is complete and the bonus awards are configured, the award trigger type gets disabled. If the award trigger type needs to be changed, the alternative is to delete the configured bonus awards and thresholds thus enabling the award trigger type.

Balance Award

Example of a typical, simple, balance award: For every 50 minutes of voice used, receive an additional $5.00 to be used for local calls for the next week. This involves setting a threshold of 50 minutes on the Voice Usage accumulator and awarding $5 to the appropriate monetary Balance.

Multiple balance awards can be made on a threshold as shown in figure 26, “New Bonus Award.”

Figure 26 New Bonus Award



For each award, the balance and amount to be awarded is defined, as well as information concerning when the award is available for use and when it expires:

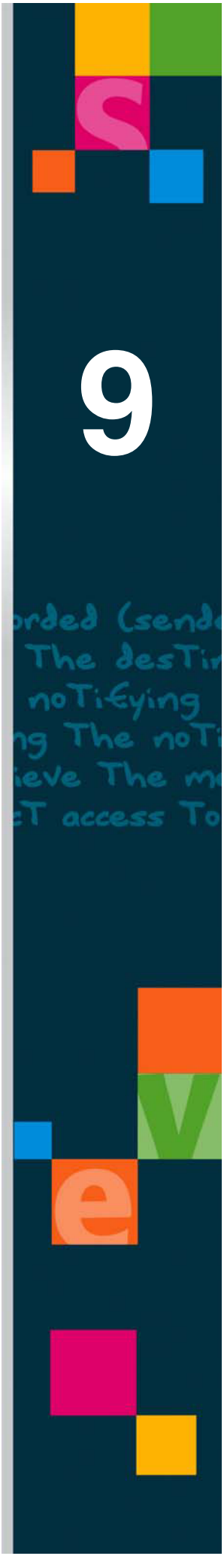
If the primary accumulator type is recharge and the unit type of the balance being awarded is currency, then the amount can be entered as a percentage (the indicated percentage of the recharge amount is awarded to the balance).

Offer Award

An offer award results in a supplementary offer being instantiated on the subscriber for a specified period of time.

Chapter 9

Templates



Product Catalog templates support the configuration of complex functional areas. The following templates are available:

- Compatibility Templates
- Liability Re-direction Templates
- Tariff Plan Override Template

See also chapter 6, “Tariffs and Tariff Plans.”

Compatibility Templates

There are two types of compatibility templates:

- **Account Compatibility Templates**: applicable to the account level and account-level entities.
- **Subscriber Compatibility Templates**: applicable to the subscriber level and subscriber-level entities.

Compatibility templates support the sale of additional promotional offers and bundles along with already subscribed offers and bundles and the assignment of priority order between various functional areas.

Duplicate offers and bundles are not allowed within a compatibility template. A list of all offer and bundles defined in the system is available for associating to the template.

Account Compatibility Template

Account level compatibility templates, are defined and selected based on account level attributes. An account compatibility template includes:

- account offers
- account bundles

Association of these entities into the account compatibility template also defines:

- display order
- RC term priority order
- balance priority order

A maximum of one compatibility template can be instantiated with an account, based on a best match between the corresponding account attributes and the attributes specified in the account level compatibility template:

- account category
- regulatory ID
- VIP code
- market code

The template indicates the priority order for application of these attributes.

Since the account compatibility template is not attached to any offer in the Product Catalog and is attached to an account when instantiating, the goal of matching criteria is to define which account compatibility template should be attached to the account.

For each attribute, one and only one value is specified.

Weights are associated to calculate a sum that applies to each template and compared to a similar sum on the account itself to find the best match. This assumes there is a compatibility template marked as default for cases where the best match is not obvious based on the calculation.

The definition of account compatibility templates, definition of these attribute weights and default account compatibility template are reseller-specific.

One compatibility template is marked as the default.

The account level compatibility template is assigned to the account at the time the account is created, or reassigned when an attribute for an established account is changed. Attribute reassignment does NOT trigger an eligibility re-evaluation of existing account level offers or bundle.

Subscriber Compatibility Template

The subscriber compatibility template provides two functionalities:

- Defines suggested items that can be sold with the associated primary offer
- Defines the priority order for tariff plans, balances, recurring charges, discounts, and display order for customer subscriber management.

A maximum of one compatibility template can be associated to each primary offer. A subscriber compatibility template can be associated to primary offer only. This association is optional; a primary offer does not require a subscriber compatibility template to be considered as complete.

A compatibility templates suggests, but does not limit, what a subscriber can buy in addition to the primary offer. Exceptions are supplementary offers that are specifically configured for sale outside of the primary offer compatibility template. These supplementary offers can be selected by the subscriber.

Additionally, in order to have a consistent and comprehensive set of priorities, primary offers are included in subscriber compatibility templates, not because they are items that could be suggested for subscription, but because priorities are defined across items of the template.

The offer compatibility template defines the priority order of application for the following:

- Subscriber level tariff plans
- Balances
- RC terms
- Discounts
- Display order for CSM

Primary offers that are managed within the compatibility template can have duplicate AUTs.

Offers have the attribute "can be sold outside of compatibility template" to model items that must not be impacted by the guidance from the compatibility template.

A subscriber bundle is composed of a subset of offers included in the subscriber compatibility template of its primary offer

Bundles and Subscriber Compatibility Template Association

Figure 27 Bundles and Subscriber Compatibility Template Association

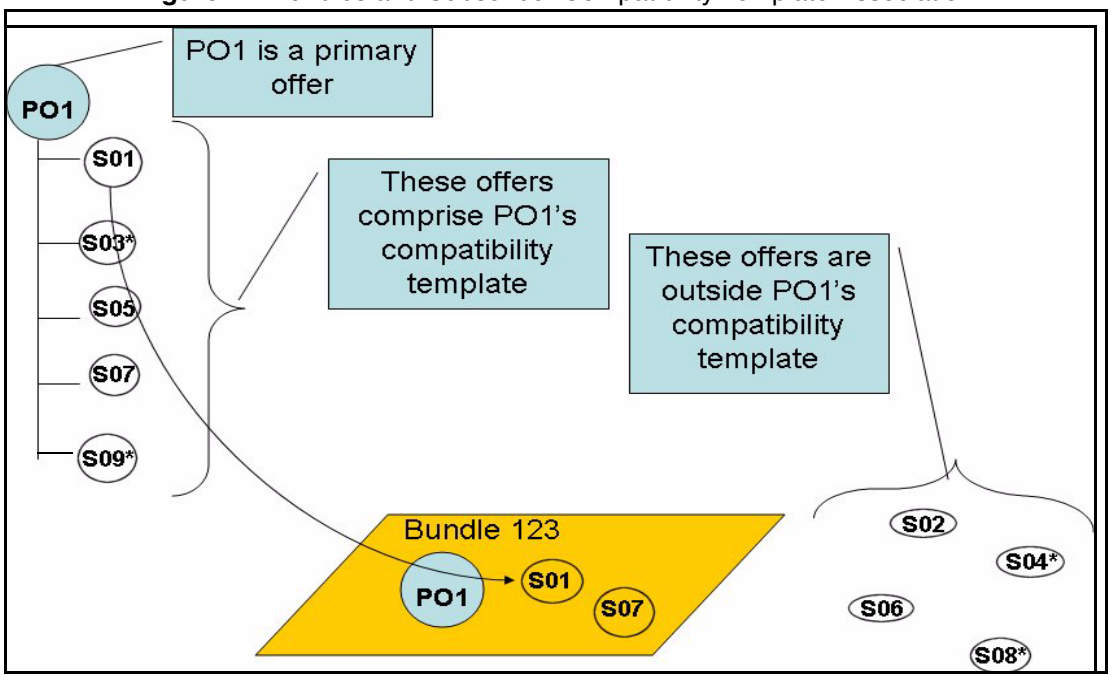


Figure 27, "Bundles and Subscriber Compatibility Template Association" shows how the Product Catalog user associates bundles with a compatibility template:

- Bundle 123 is configured.
- Primary Offer (PO1) is placed in Bundle 123.
- Any supplementary offer (SO) that is in the PO1 compatibility template can be placed in Bundle 123.
- SO3, SO5, and SO9 are not placed in the bundle even though they are in the template. This is a limiting device.
- Configuration of Bundle 123 is now complete.
- A subscriber created from Bundle 123 can order SO1 or SO7 from the bundle and also order any supplementary offer designated as "can be sold outside of the template."

NOTE Items marked with an asterisk (*) can be sold outside of the template

- Because SO3 and SO9 are in the compatibility template, they can be highlighted in the Customer Center in a separate tab to show that they are preferred over SO4 and SO8.
- A subscriber created from Bundle 123 cannot order SO5, SO2, or SO6 because there offers are not in the PO1 compatibility template and are not capable of being sold outside the template.

Liability Redirection Template

A liability redirection template is composed of one or more liability redirection rules that enable an assembly of various charges of various types in combination with calendars into a single template. These rules support the selection of specific charge types or wild card selection.

Liability redirection templates facilitate the work of CSR's to define the charge redirections for customers:

- Redirection instantiated to account (account to target account)
- Redirection instantiated directly to subscriber (subscriber to target account)
- Redirection from subscriber-to-shadow subscriber
- B-number criteria
- Time period (calendar)
- Charge type (usage/RC/NRC)
- Specific activity (AUT, AUT group, RC term, NRC term)

The liability redirection template and its rules manage the following redirection dimensions:

- Time Period (Calendar)
- Charge Type (Usage/RC/NRC)
- Specific Activity (AUT, AUT Group, RC Term, NRC Term)

Additional criteria are defined when the CSR selects a liability redirection template to generate rule instances to subscribers or accounts.

In order to ensure that liability redirections are processed without ambiguity when the system makes charges to a subscriber or account, the Product Catalog user must configure the rule priority as follows:

- Define relative priorities between dimensions in general (this is applicable to each reseller).

  The Product Catalog calculates the relative priority of each rule within a template based on the general relative priorities of the redirection dimensions.
- Restrict liability redirection to homogenous content.

  Thus a rule can only be associated with a collection of AUTs, or AUT Groups, or RC Terms, or NRC Terms but *not* to combinations of these collections. A specific liability redirection template can contain a heterogeneous collection of rules, but each rule itself is limited to a single charge type.

Rule definition supports the capability to redirect all instances of an entity (for example all AUT's).

- Calendars and their day types and times types involved in liability redirections must specific to redirection. Define time slots where redirection applies compared to those time slots where redirection does not apply.

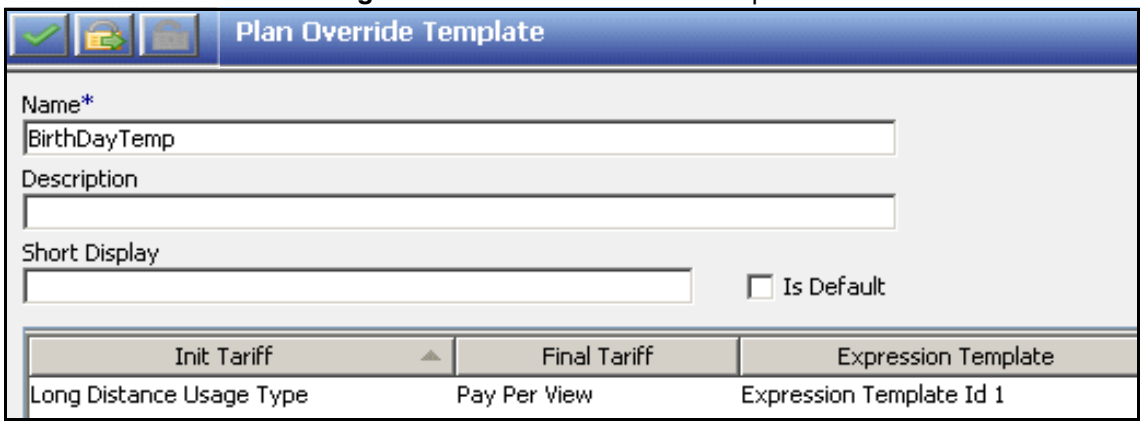
  To support the configuration, the Product Catalog distinguishes between those calendars dedicated to liability redirection from those dedicated to the definition of tariff plans.

Tariff Plan Override Template

The tariff plan override template is used for overriding tariff plan, based on specific conditions (such as a subscriber's birthday or a happy hour) specified in the template. This template can be associated to offers and bundles.

One or more Tariff Plan Override Templates can be defined in the system.

Figure 28 Tariff Plan Override Template



A Tariff Plan Override Template is a set of override rules. Each rule involves a condition, an initial tariff plan (the plan to override) and a final tariff plan (the replacement plan), plus a priority to define how rules are processed within the tariff plan override template.

Conditions involve the following criteria (account/subscriber attributes):

- **Balances**: One or more subscriber Balances, with a single operator (<, </=, =, >) and a single value

  For example, Balance12 > 15

  - Home Zone: Boolean, Did the usage occur within the subscriber's Home Zone?
    For example, Home Zone = True
  - Longevity: a single operator (<, </=, =, >) and a single value with Units of Days
    For example, Longevity 60 Days
  - Birthday: Boolean, is the usage on the subscriber's Birthday?
    For example, Birthday = True
  - Anniversary: Boolean, is the usage on the subscriber's Anniversary?
    For example, Anniversary = True
  - Happy Hour: Boolean, is the usage within the subscriber's Happy Hour?
    For example, Happy Hour = True
  - Favorite Area (LIB): Boolean, is the destination number in the subscriber's Favorite Area?
    For example, Favorite Area = True
  - Dialed Number Prefix: with a single operator (=) and a single string value
    For example, Prefix = #122#
- **Override Rule**: One or more criterion joined together with logical operators to form an Override Rule. For example;
  - Override Rule OR1: (Balance15 21.3) AND (Happy Hour = TRUE)
  - Override Rule OR2: (Birthday = TRUE) OR (Favorite Area = TRUE)

A tariff plan override template is associated to either:

- offer (only primary or supplementary)
- bundle (only subscriber)

Below is a brief summary of the algorithm used when the tariff plan is processed by the Unified Rating Engine (URE).

4. Guide to tariff plan
5. Look for the override template in bundle for the guided offer.

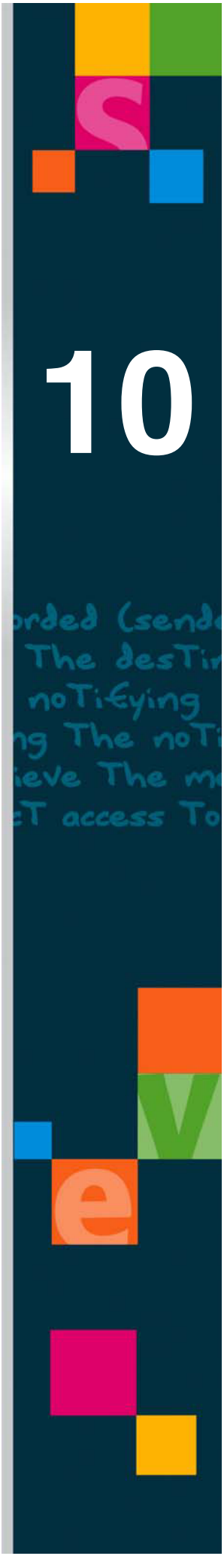
6. If found, override tariff based on expression.
7. If not found (in step 2), look for the override template in the guided offer.
8. If found, override tariff based on expression.

Bulk Load Template

Bulk loading accomplished via the selection and editing of the appropriate bulk data template and the use of the Load Bulk Data File. Detailed descriptions of the bulk load templates and the associated data are located in Chapter 3, “Database Configuration” in the *Product Catalog User Guide*.

Chapter 10

Calling Circles



Calling circles are configured via the Product Catalog Basic System Infrastructure layer. This chapter provides background information related to calling circles.

Calling Circles

Purpose of Calling Circles

A calling circle is the loose association of subscribers for the sole purpose of differentiated rating and charging. The Calling Circles feature enables network operators to provide differentiated rating for usage between subscribers that belong to the same calling circle. Differentiated rating and charging can be applied to any point-to-point service between members of the calling circle, such as voice calls, SMS, MMS, and so forth.

Operators may create hundreds of calling circles per Service provider, and market these calling circles in many ways. Perhaps the most important aspect of this marketing is the ability to offer a fixed periodic charge for a better usage rate.

Longer term, the network operator may want to charge a fee for the action of joining or leaving a calling circle, or may require the subscriber to stay in a calling circle for a fixed period of time, or prohibit a subscriber from changing calling circles too rapidly.

The flexibility of calling circles means there is some complexity in the provisioning of the feature.

A basic premise of all special features in the system provides that if an AUT resolves to a final AUT that is modified by a special feature (calling circle), but a Tariff Plan has not been configured for this FAUT, the usage is rejected. For this reason, subscribers can join calling circles only by calling customer service.

Customer Service Representatives must be instructed as to which offers have the appropriate usage plans, and all subscribers who wish to join a calling circle must be migrated to those offers. Alternatively, make sure all offers have calling circles in their usage plans. Thus, you do not need to convert to special offers when adding a subscribers to a calling circle.

Basic Capabilities of Calling Circles

- A subscriber can join multiple calling circles, up to a maximum of ten calling circles per subscriber
- A subscriber enjoys a differentiated rate when calling, texting, using MMS, and so forth another member of the same calling circle. Note that exactly what point-to-point services receive differentiated rates based on calling circle membership is up to the operator reseller.
- If the originating and terminating subscribers share multiple calling circles in common, the application of the differentiated rate is determined by the first match in the subscriber's prioritized calling circles.
- A number can be added to a calling circle even if the number does not belong to an Comverse subscriber.
- There can be millions of subscribers in a calling circle.
- A subscriber joins or leaves a calling circle by interacting with a customer care representative.
- Joining or leaving a calling circle optionally turns on or off a periodic charge.
- Each calling circle can have differentiated associated rates.
- A calling circle can be limited to one reseller.
- A subscriber can prioritize in which order to apply the differentiated tariff plans.

- An authorized customer care representative can request and receive a listing of all numbers in a calling circle.
- Calling circles never expire.

Calling Circle Groups

A calling circle group associates a number of individual calling circles for the purposes of sharing tariff plan associations and reducing the amount of provisioning for the network operator. As such, the calling circle group is only used internally.

Up to 100 calling circle groups can be provisioned system wide.

The name of the calling circle group consist of up to 32 alphanumeric characters including spaces, but not punctuation. Calling circle group names are not case sensitive.

A calling circle group can be deleted only if it is not used by any calling circles.

An attempt to delete a calling circle group that contains member calling circles causes a dialog to appear that lists the members in the group.

Each calling circle group is specific to a reseller.

Calling Circle Management

A subscriber interacts with the calling circle feature in the following manner.

- The subscriber joins a named calling circle by calling a customer care representative.
- The subscriber leaves a named calling circle by calling a customer care representative.

Joining or leaving a named calling circle creates a history record. A customer care representative uses the customer provisioning application to view the named calling circles that a subscriber has joined. the customer care representative can also see the history records of when a subscriber joined or left a named calling circle.

A subscriber is rejected from joining a calling circle when there are mismatches in the calling circle subscriber count/size or service provider, the subscriber is not in the active state, or the subscriber identity has already joined 10 calling circles.

A subscriber with the number 609-932-5373 (A number) dials 1-609-932-5374 (B Number). The system discards the initial 1 to resolve the B number to 609-932-5374. If both the A number and the B number belong to the same calling circle then the tariff plan associated with that calling circle is applied.

Discount Application

Receiving Discount

The discount for calling circles is not a percentage discount. It is a different rate. As such, it is possible to configure a higher rate, or a rate that potentially uses other Balances (if so desired). You can also target discounts to calling circle FAUTs

This applies based on specific AUT guiding.

It is also based on the calling circles A-number and B-number belong to and on some priorities assigned to calling circles themselves.

If a subscriber (A Number) performs an activity with another subscriber (B number), and that subscriber (B Number) is in more than one of the calling circles the originating subscriber (A number) belongs to, the originating activity is rated with the tariff plan that is in the “first” calling

circle priority of the originating subscriber (A Number) has in common with the B subscriber, regardless of the calling circle priority for the B subscriber.

The terminating activity is rated with the tariff plan that is in the first calling circle priority that the terminating subscriber has in common with the A subscriber, regardless of the priority of the calling circle for the A subscriber.

Tariff Plan Definitions for Calling Circle Groups

For the differentiated tariff plan to be available for a subscriber, the activity with a differentiated tariff plan must be enabled in the subscriber's primary offer or supplementary offer. For a subscriber to access differentiated tariffing in all the calling circles in the system each calling circle group must be enabled in the subscriber's primary offer or supplementary offer.

If a subscriber joins a calling circle and the associated calling circle group modified activity is not in the subscriber's primary offer or supplementary offer then the subscriber does not receive a differentiated tariff and the activity is rejected.

Calling Circle Number Translation

Calling circle number translations define how the system recognizes a dialed number belonging to a calling circle and enable subscribers to dial less than the complete subscriber number and still receive a differentiated tariff plan. For example, if the system stores subscriber `external_ids` as 10 digit numbers, but a subscriber can complete a call by dialing 7 numbers, a 7 digit dialed number is not be an exact match for the 10 digit subscriber ID. However, via calling circle number translation the system recognizes the number.

ComverseOne supports calling circle number translation for originating calls, originating numbers on terminating calls, and destination numbers on callback calls.

AUT Translation with Calling Circle Groups

Calling circle group names must be associated with final AUTs.

Subscriber Provisioning

All subscriber-related aspects of the calling circles option are provisioned in Customer Center.

See the *Customer Center Guide*.

Shadow Subscribers

ComverseOne, supports multiple subscriptions for a single point of service. Each subscription or identity is modeled as a separate subscriber and can be owned by any account in the system. Each subscription can have its own primary offer and supplementary offers.

The first subscription/subscriber owns the `external_ids` and inventory. Shadow subscribers share the `external_ids` that are owned by the first subscription/subscriber. Each subscription/subscriber has a wholly independent lifecycle from the others (for example, shadow2 is suspended but the first subscriber and shadows1 and 3 are still active).

Customers are allowed to recharge their shadow subscribers independently of their first subscription via the following methods: IVR, USSD, Unified API, Customer Center and CCC. For

USSD recharge the user is able to recharge any shadow subscriber independent of which liability overrides are applicable for specific usage.

Shadow Balances

Comverse ONE supports shadow balances as follows:

- Shadow balance functionality enables a shadow balance to point to a real balance anywhere in the subscriber's account hierarchy, not just the subscriber's parent account.
- For any subscriber, all shadow balances must point to real balances in the same target account.
- Subscriber-level configuration options control how to do charging when shadow balances point to targets outside of the direct parent account are used. There are two options:
  - **Use real, fallback to shadow** (default): Attempt to use only real balances. If the real balances cannot pay the charge, then use only shadow balances
  - **Use shadow, fallback to real**: Attempt to use only shadow balances. if the shadow balances cannot pay the charge, then use only real balances
- Each usage (or non-usage charge such as RC or NRC) has a single liable party; thus, if the subscriber has a shadow balances pointing to an account other than the immediate parent, the usage is paid for either the shadow balances, or the real balances but not both.

This includes enhancements to allow a CSR to break the connection between shadow balances and their target balances, and to re-connect them to new target balances.

Shadow Subscribers and Calling Circles

Shadow subscribers can have independent calling circles. These independent calling circles are supported by customer care, customer center, rating, and the Unified API.

Support for VPN Alternative/CUGs

VPN service provides a way for subscribers to call one another using a Private Numbering Plan (PNP) / Short Code. With this release of Comverse ONE, Closed User Groups (CUGs) are used to support a VPN like alternative as described in this section. This alternative functionality differs from Calling Circles which are used to support differentiated rating and charging only.

In summary the VPN alternative encompasses the following:

- each CUG includes a collection of members and has its own private numbering plan
- members are assigned short code; members access each other via short codes
- access restrictions are defined for members
- non-real time billing subscribers can be included in the GUG.
- special rates are available to CUG members for intra CUG calls, similar to friends and family
- call restrictions can be applied to CUG members; for example, restrict CUG members to intra CUG calls only.

Once a CUG is established member may be added to it. A short dial code enabled for each member. Intra CUG calls can have a maximum call duration restriction. Call barring restrictions can be implemented for CUG members; there are two options: intra CUG calls only are allowed or all calls are allowed.

ID and Name

- **CUG ID**: uniquely identifies a CUG
- **CUG Name**: associated to a CUG

Dial Length

- **Maximum Short Dial Length** (digits): maximum number of digits that are treated as a short dial number for a specific CUG. The largest value for this number is 6. A short dial code is a combination of digits (0-9), with an overall minimum length of 2, and a maximum length of 6.
- **Minimum Short Dial Length** (digits): maximum number of digits that are treated as a short dial number for a specific CUG.
- **Network Destination Code/Area Code**: used in defining VPN member's actual phone number

Call Duration

CUG level Max Duration: CUG level control for maximum call duration allows for maximum duration for on-net (Intra CUG call) and off-net (Non VPN calls). The following restrictions apply:

- **Max Offer-Net Duration**: set the maximum duration for intra CUG calls (length restriction applied
- **Max Offer-Net Duration:** set the maximum duration for non VPN calls, if allowed.
- **Offer Level Maximum Call Duration**

For any CUG-member call, the maximum call duration is the LOWER of the maximum defined in the offer and the CUG defined maximum.

Barred/Allowed Lists

CUG Level Barred/Allowed List: list of destination telephone numbers that CUG members may not call.

Destination Numbers may be specified either individually, or grouped by using the wildcard character (%). For example, 9% in the CUG Barred List means any number beginning with 9 is barred no matter what digits follow it.

The CUG Barred List may contain short-dial codes (including Access Codes) as well as full destination numbers.

The CUG Allowed List is a list of directory numbers that are exceptions to the CUG Barred List. For example, 9% in the CUG Barred List, and 911 in the CUG Allowed List indicates that all numbers beginning with 9, except 911, are barred.

- As with the CUG Barred List, groups of destination numbers may also be specified using the wildcard character (%) in the CUG Allowed List.
- Each list (CUG Barred and CUG Allowed) may contain up to 100 entries.
- The CUG-specific barring is independent of, and takes place AFTER any call processing for emergency and/or Primary Offer barred numbers.

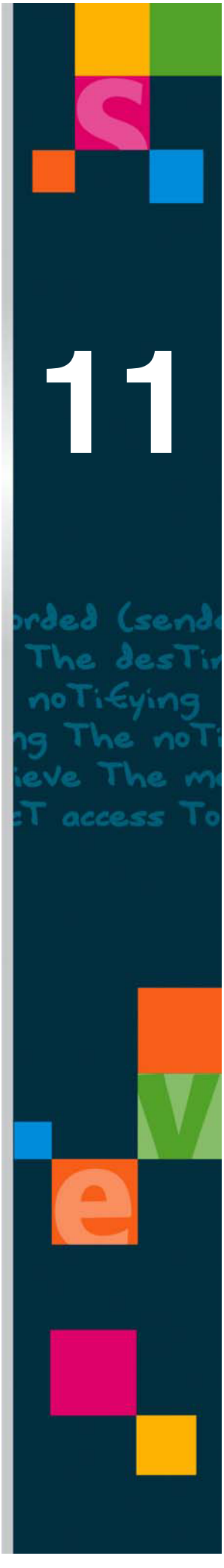
The created CUG configuration is associated to the existing Calling Circle Group in Product Catalog. This association enables the use of the existing special feature segmentation key's calling

circle attribute for applying of special rates for VPN/CUG calls. Since the same attribute is used for Calling Circle and VPN/CUG feature, the Calling Circle attribute is renamed “Charging Group.”

See also the *Product Catalog User Guide* and the *Unified API Guide*.

Chapter 11

Telephony Service Parameters



The following are managed via Product Catalog ->Basic Infrastructure Layer ->Telephony Service Parameters's:

- Access Numbers
- Emergency Numbers
- Prefixes
- Tones
- Trunks

The following are managed via Product Catalog ->Service Layer->Telephony Service Parameters

- Barred Number Set
- USSD Codes
- Feature Codes
- Phonebook Valid

MSC Information is managed via the Product Catalog -> Basic Layer.

Numbers

Access Numbers

Access numbers are special numbers provided for the convenience of subscribers to access specific subscriber functions such as the administrative menu, prepaid calling card menu, the recharge server, the information server, customer care, language selection menu, and a promotional information server.

Access numbers are defined operator-wide and are associated with resellers.

Access numbers are configured via the Product Catalog GUI Basic System Infrastructure Layer.

Emergency

Emergency numbers are numbers that can be dialed regardless of the state of the subscriber's account or account balance. Usually these are numbers for the police, first aid, fire department, and rescue department

Normally, when subscribers make outgoing calls, the call is only carried through if several conditions are met: the subscriber is recognized, the account is active, and there is enough balance to pay for the call.

However, the system supports a list of emergency numbers that are always called by any subscriber. The dialed number is matched against the emergency number list before all other criteria are checked and met. In fact, a call to an emergency number is carried through even if the caller is not recognized as a valid prepaid account.

Even unrecognized subscribers call emergency numbers, because these numbers are processed without any subscriber record lookup. However, it is unlikely that these calls even reach the system, because calls to emergency numbers from pay phones are normally routed directly to their destination, and not to the system.

The list of emergency numbers is global to the service, and is not configurable otherwise. Calls to emergency numbers are always free.

Prefixes and Trunks

Prefix Routing

In prefix routing the network recognizes a prepaid subscriber and attaches a prefix to the destination number and routes the call to the prepaid platform. The prepaid platform has a table of registered prefixes that determines where the incoming call is sent.

Prefixes are of variable length but the overlapping portion must be unique. For example, the prefixes 123 and 4567 are used. The prefixes123 and 1234 cannot.

In prefix routing, an ID numbering scheme is provisioned to efficiently determine the appropriate routing of calls. The network defines the prefixes used for both OPPS and TPPS. These prefixes are then defined in the Product Catalog so that OPPS calls are directed to the OPPS application and TPPS calls are directed to the TPPS application. The database is set to read specific wildcard characters (@ and #) in prefixes. A service then registers for prefix routing using the @ symbol. By OPPS registering with the @ symbol, all calls are routed to OPPS unless otherwise indicated (thus making OPPS the default service). #88 is used to define calls that must be routed to TPPS.

After the call is routed appropriately, the prefix is stripped for processing. When the call has been processed, it is returned to the network with or without a prefix, depending on the network requirements.

One set of prefixes is defined for OPPS, and one for TPPS. The value of Prefix In for OPPS and TPPS cannot be the same. The Prefix Out is undefined if the network does not require it.

Prefixes are also used in number portability configuration. Eligible Prefixes (A-number or B-number prefixes on this list) require lookups in the number portability database. Prefixes are defined via the Product Catalog GUI Basic System Infrastructure Layer

Table 28 Prefixes Example

Prefix In	Prefix Out	Service ID
In	Prefix Out	Service ID
22	22	OPPS

Trunk Group Routing

In trunk group routing the network recognizes a prepaid subscriber and routes the call to the prepaid platform on a specific trunk group. On the prepaid platform, there are trunk groups defined for both originating and terminating calls.

When using trunk groups, all prepaid calls to the OPPS (outgoing or originating calls) or TPPS (incoming or terminating calls) are routed to the platform via a unique trunk group. Originating and terminating calls are not routed on the same trunk. When the platform has processed the call, it returns it to the network for forwarding on either the same or a different trunk group.

An inbound trunk group number may be used only once in the Trunk In column. Calls received on the listed inbound trunk are directed to the platform service application indicated by Service ID. The Service ID may be either OPPS or TPPS. After processing, the application sends the call out on the trunk group number defined by Trunk Out. The Trunk In and Trunk Out numbers may be the same.

Trunks are defined via the Product Catalog Basic System Infrastructure Layer.

Table 29 Trunks Example

In Trunk	Out Trunk	Service ID
1323	213132	OPPS
2131	2131	TPPS

Tone

Enables the user to provision the tone the subscriber hears in association with a particular system response.

Barred Numbers

Barred numbers are numbers and specific prefixes that are disallowed as dialed numbers. Numbers are barred in two ways:

- **Implicitly**: A tariff is not associated with the dialed number. A call to a billable number must have a defined call type and an associated tariff. If these are not defined then the call does not go through.
- **Explicitly**: By listing the number or a prefix in the subscribers barred number list the call is barred regardless of whether it has an associated tariff.

The barred number list contains entries of varying length, single numbers, or short prefixes that represent any number starting with that prefix. Table 30, “Barred Number List Example” that assume a USA numbering plan provides barred number examples.

Table 30 Barred Number List Example

Barred Number List	What It Bars
608 2800	Calls within the same area code
1 856 608 2800	Calls from other area codes
1 781	Calls to area code 781

The table bars calls to number 608-2800 in area code 856. Both local calls (without the area code) and long distance calls (with the area code) are barred. In addition, all long distance calls to area code 781 are barred.

Barred numbers (or prefixes) are used to explicitly limit calls to specific numbers and sub-ranges inside legitimate called number ranges. For example, if no long distance calls are allowed for a given primary offer, this is achieved by not specifying such a call type (as part of the billing model). Then long distance calls are implicitly barred. If however, long distance calls are allowed except for area code 781 (for whatever reason), then explicitly excluding that area code is the appropriate approach. Another example is that international calls are allowed for a primary offer, yet calls to Iraq are barred.

Barred numbers often include premium rate services as well as international numbers where fraud is suspected.

Each primary offer has one table of barred numbers, with any number of entries.

Barred Number Sets

A barred number set is a collection of barred numbers. Each barred number set is given a unique name. Assignment of a barred number set to a primary offer is optional.

Number Precedence

When a new or changed private number conflicts with a fixed number (emergency number, or access number), the fixed number takes precedence. When a conflict exists, the private number does not function.

Subscriber Numbers and SDP Ranges

Ranges of subscriber numbers are assignable to specific SDPs.

The total number of subscribers created cannot exceed the capacity for the SDP. For example, if the SDP is limited to 500,000 subscribers, the total number of subscribers actually created (from all of the defined ranges assigned to that SDP) cannot exceed 500,000.

A subscriber cannot be created with a subscriber number that is not within one of the defined subscriber number ranges.

It is not possible to delete a range for which subscriber records still exist. For example, if the range to be deleted is 1000 to 2000, and there is a subscriber in the system with subscriber ID 1001 the range cannot be deleted.)

Figure 29 System SDP Ranges (ID is dependant on Table Server_Definition)

Rating DB ID	Range Start	Range End
1	8100000	8190000
1	9100000	9190000
2	8200000	8290000

Because SDP ranges apply to databases (the SDP to the rating database) there is a connection between database target groups configured in the Product Catalog. Within a given target group, there must not be any overlap of ranges inside the rating database for the group. However, ranges can overlap across several target groups. For example, range 100-200 could be in rating database 1 which belongs to target group 1 and range 150-200 could be in rating database 2 which belongs to target group 2. The rational for overlap is that target groups represent distinct physical instances of the system. One target group would be dedicated to test and the other would be dedicated to production.

Codes

Feature Codes

Feature Request codes are short codes that subscribers in WIN networks dial to get account information. Prepaid subscribers check their account balance, while postpaid subscribers check their available credit and billed balance.

USSD Codes

Unstructured Supplementary Services Data (USSD) codes enable the system to support subscribers roaming in GSM networks that are not compliant with the CAMEL Phase 2 standard.

Additionally, USSD can be used to help subscribers manage their accounts by supporting operations such as balance checking and recharging.

USSD Information Available Subscriber's Language

You can select a language for each USSD and global response message created. If a USSD response message in the subscriber notification language is not specified a default message is sent. You select the notification language and specify the content via the Product Catalog GUI. A global response must be specified in a particular language before it an be overridden at the offer level.

See also the *Product Catalog User Guide* and "Notifications and Messages," starting on page 145.

Number Portability

Number Portability, a network feature, is the porting of phone numbers from one network operator to another thus enabling subscribers to keep their phone numbers when moving to a different operator.

Porting subscribers in and out affects daily operations including subscriber acquisition and disconnect, inventory, and pricing, and requires the provisioning of many network elements.

Comverse One supports the following number portability type: **Operator-based**
With operator-based number portability mobile subscribers (or fixed telephony subscribers) shift from one mobile (or a fixed) service provider to another in the same area and retain their original number.

Using the Product Catalog GUI tree node "Number Portability" the user configures a list of operators; and for each operator, a list of porting prefixes and a list of number range prefixes.

This Number Portability node is shown if the system parameter NpEnabled is ON (1). Within the node the following configuration items are supported:

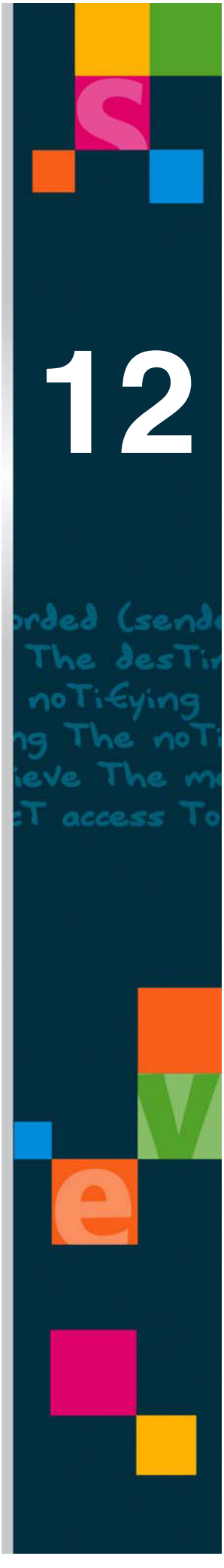
- Operator Prefixes: reference data that enables the user to configure a list of operators, and for each operator, a list of RN Prefixes, and optionally a list Routing Prefixes
- NP Configuration: list of NP related parameters including NP_Lookup_Per_Usage_ Source option and Send Routing Info for Voice Calls flag
- NP MSCID Whitelist: a user-entered list of leading digit strings of MSCID;
- NP Lookup Digit Prefix Whitelist: a user-entered list of leading digit strings.

Additional attributes are included in the Initial AUT editor. Specifically whether this Initial AUT requires number portability lookup for originating usage, terminating usage, both, or neither. These options are only available when the global NpEnabled flag is enabled and NP_Lookup_Per_Usage_Source = Internal.

See the *Product Catalog User Guide* for further details.

Chapter 12

Operators, Resellers, and Dealers



Operators and resellers function as follows:

- Operators define and manage resellers; a reseller organization does not define itself.

  Defining a new reseller is the equivalent of creating a new brand or VNO. Once defined, information relevant to this reseller can be created in other layers and versions of this information can be propagated.

  Operators also manage all data exposed within the Basic System Infrastructure Layer.
- Resellers define and manage the product group for dealers and dealers. They also manage their own data set within the Marketing, Rating, and Service layers.

  Defining a new dealer is equivalent to creating a new distribution channel for a reseller. The product group for dealers allow products to be associated with specific dealers. Used together with the region concept, the dealer and the product group for dealers enable flexible support of various product distribution scenarios.

Operators

There is a single operator in the Product Catalog because the Product Catalog serves a Comverse ONE solution deployment. This operator supports several resellers. The operator manages the network-level data defined in the Basic System Infrastructure Layer. There is a one set of Product Catalog versions for this data.

See also “Product Segmentation and Market Distribution,” starting on page 8.

Resellers

Resellers have their own Product Catalog versions. They maintain their Product Catalog data in a separate partition and have no access to the dataset of other resellers.

Each reseller version is linked to a service version. Elements within a reseller version can reference the service version, but not vice-versa.

Reseller Definition

Editing and creating reseller definitions is accomplished via the Product Catalog GUI Reseller menu.

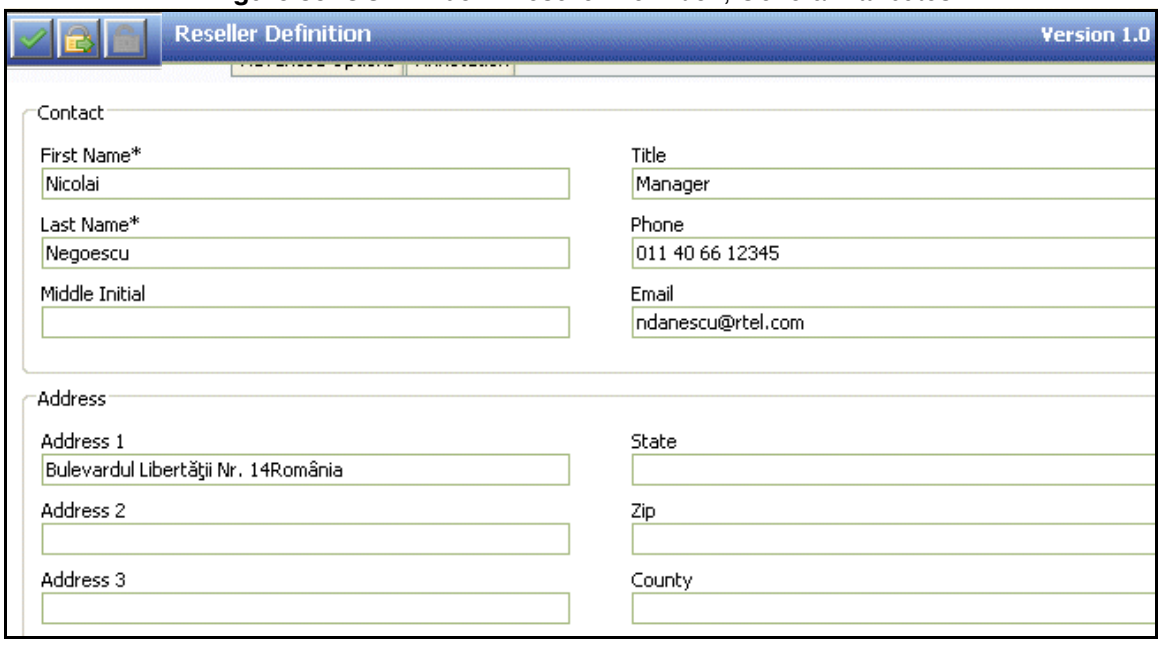
Reseller attributes are as follows:

- Contact Information
  - Unique name, contact and address information
  - Title
  - Phone
  - E-mail
- Advanced Options
  - Unique Code
  - Voice Mail Number
  - Maximum retry settings for administration, recharges, and card
  - Forward idle subscriber calls to customer care
  - Recharging before account activation
  - Enable recharging server

For recharging before account activation or forwarding idle subscriber calls to customer care specify either no number, a default number, or a specific number.

- Annotation

Figure 30 GUI Window: Reseller Definition, General Attributes



Dealers and Product Group for Dealers

A dealer is a business entity that sells a subset of the bundles and offers marketed by a reseller. Dealers belong to a reseller or are independent organizations. A product group for dealers is organized specifically for the purpose of selling specific sets of bundles and offers. Dealers and a product group for dealers are related to only one reseller.

SEE

A dealer is generically a distribution channel and its exact meaning depends on operator requirements. For example, the Comverse ONE solution's self service component is identified as a product group for dealers, thus allowing the choice of products available via this channel to be controlled from the Product Catalog.

The following apply to a reseller and dealer relationship:

- A dealer must belong to one (and only one) reseller.
- A product group for dealers belongs to one (and only one) reseller.
- A product group for dealers can be associated with zero or more dealers. The product group for dealers and the dealers must all belong to the same reseller.

Dealer Definition

The dealer definition and the product group for dealers definition is accomplished via the Marketing/Packaging Layer. Dealers are defined per Reseller. Bundles and offers are associated with the product group for dealers.

The Product Catalog GUI supports the following dealer management related functionality:

- **Dealer definition**: General information includes Dealer Type, Active Date, Inactive Date; Contact Information includes Name, Title, Phone, E-mail, and Address information.
- **Product Group for Dealers definition**: associates bundles, offers, and dealers
- **Relationship between reseller and dealer**: Resellers and dealers are directly associated because dealers are defined within the Marketing Layer as reseller-specific entities.
- **Annotation**

Product Group for Dealers and Bundles and Offers

Corresponding to each product group for dealer defined in the system, it is possible to associate zero or more bundles and offers.

A list of only bundles and offers available to the reseller to which the product group for dealers belongs is available for selection.

Offers and bundles cannot be directly associated to dealers.

Segmentation by Region and Reseller

Bundles and offers (and dealers and the product group for dealers can be either targeted to one or more regions, or flagged as global (that is, valid for all regions). Each Comverse ONE solution instance takes into consideration only the entities that have corresponding regions.

Reseller-Based Segmentation

In Reseller (VNO) based segmentation the data view is limited to what is relevant to individual resellers; a reseller can have multiple dealers but each dealer belongs to only one reseller. Currently everything is provisioned at the reseller level.

Product Catalog data not specific to a reseller does not follow this segmentation and is applicable to all operators. Therefore, it applies to or impacts all resellers managed by the Product Catalog.

Data Segmented by resellers includes:

- All entities and associations defined in the Marketing Layer
- All entities and associations defined in the Rating/Billing Layer
- All entities and associations defined in the Service Definition Layer; definition of dealers and the product group for dealers for a reseller, association between dealer and product group for dealers.

Data non-segmented by resellers includes:

- All entities defined in the Basic System Information Layer
- The definition of Resellers themselves
- The definition of regions, propagation targets and target groups (that is, system instances)

Regions and Segmentation

Region segmentation applies to data propagation. Regions are distinct of resellers. A region is physically equivalent to a Comverse ONE instance. Operators define regions and assign new resellers to existing region(s).

Offer and bundle elements are assigned to a region as follows:

- **Per region**: Available to only one region assigned to reseller.
- **All regions**: Available to all region assigned to reseller.

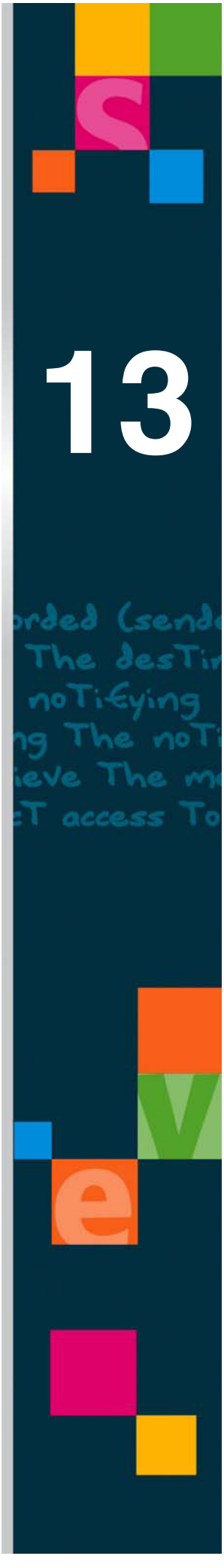
Service Provider

Service providers are the entities that actually deliver services to the subscribers. Depending on your deployment, a service provider may be equivalent to a reseller, or it may refer to a subcategory of reseller. Service providers are associated with various Product Catalog entities as described in the *Product Catalog User Guide*.

A service provider is *not* equivalent to an operator.

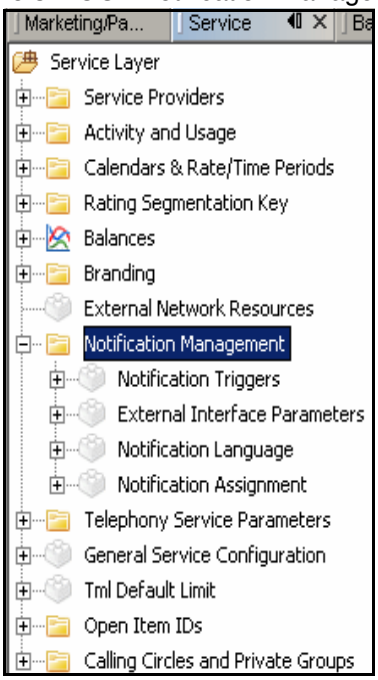
Chapter 13

Notifications and Messages



This chapter describes various notifications announcements that are configured via the Product Catalog Service Layer. Figure 31, "GUI: Notification Management" shows the Notification Management folders in the Product Catalog Service Layer.

Figure 31 GUI: Notification Management



Notifications

Notifications are used by the Comverse ONE solution to provide event-based messages to resources external to the solution. The Comverse ONE solution uses the Short Message Service (SMS) and Unstructured Supplementary Services Data (USSD) notifications to notify subscribers about events and status. Multiple messages are configured, on a per-primary offer bases to be sent at various times and under different conditions.

When event conditions are met, the Comverse ONE solution builds up notifications messages and tries to send them out through predefined interfaces to the external devices (UPM and HLR devices and USSD). These external devices ultimately deliver the notifications to the subscriber devices. Notifications are generated due to the Comverse ONE solution activities (for example, reservations) or customer care activities.

Notifications to the subscriber and to the network HLR are both generated using the same mechanism.

Handset-based notifications are commonly used for:

- Alerting the subscriber that an event (such as account expiration) is about to occur.
- Warning that the account balance is below a configured threshold.
- Notice that a periodic charge has been deducted from the subscriber's account.
- Providing charging details for the most recent activity transaction.

Some notifications can be based on specific features, such as usage awards.

Short message notifications are sent to subscribers to inform them of certain threshold events or conditions associated with their account. These can include one of the following:

- Change of account state (for example, from active to suspended)

- Successful recharge of the account
- A change of account balance or spending limit that causes it to reach a predefined threshold (for example., after a billable call)
- A change of expiration date
- A usage award in the form of a bonus or discount
- A balance transfer, activity characteristic or charge

Each event is associated with a condition (operator and value) that triggers the notifications. The system has a set of predefined events that are used to set up notifications triggers. Some events are feature-based and are only active if the feature is on.

Each event can have a particular condition or a defined threshold associated with it that triggers the sending of a notification message to the subscriber. For example, an operator may want subscribers to be notified when their account balance falls below a certain amount. In this case, a balance threshold value is defined as the event condition for this notification and the message is triggered when that event condition is first detected. Similarly, when a subscriber earns a usage-based award, the bonus or discount threshold triggers a notification message.

For some events, such as completion of a successful recharge, the event itself is the condition that triggers a notification message to a subscriber.

Based on the event, the system provides a list of appropriate operators and values. Operators are Boolean. Value is the threshold that triggers notifications when crossed.

For feature-dependent events like the near award, the conditions are set up within the feature and are not available on the Customer Provisioning notification window.

In addition, based on the event, the system either provides a list of valid predefined values (for example, state = idle) or enables a threshold value entry from the user.

Usage Awards Notifications

The system provides two notification event types for the usage-based promotions feature:

- Award
- Near Award

Subscribers are informed that they have been given an award or are near an award level, thereby encouraging additional usage.

Each award level within bonus and discount plans can be assigned notification text. Notification text is divided into an award-specific message and a primary offer -specific message. This text becomes available in the primary offer via a token, called <award_token>, that provides specific details about the award or near award. Within the primary offer, the operator can configure a basic text message for near awards and a different basic text message for awards.

The award notification message string limit is 160 characters.

The actual notification triggers are based on the value of the particular accumulator associated with the usage award. The notification type and award-specific text (<award_token>) are configured as part of the global award (discount or bonus) definition.

The award-based notifications are controlled by a global parameter NEAR_AWARDS_ENABLED which enables or disables Customer Provisioning access to the notification type.

This parameter has the following functions:

- Turn on or off usage-based notifications entirely
- Disable near award notifications but allow award notifications

This parameter is set when the system is installed. The default value is disabled.

Usage-based promotions events are feature-controlled only at the Bonus/Discount Plan level; not at the Global and SMS Notifications level.

When defining award notifications, trigger conditions are based on the value of the particular accumulator threshold associated with the usage award.

Each award level within bonus and discount plans can be assigned notification text.

The award-based notification provisioning process starts with activating the feature. If the usage award feature is on, and the accumulators and the award based notifications are on, then bonus and discount plan notifications can be configured.

To build a meaningful notification message, the <Award_Token> token specific to awards is provided in the global token list. This token enables the notification text defined within the award (bonus or discount) to be included in the actual notification message.

The actual notification text is divided into an award-specific message and a primary offer -specific message.

Award notification triggers are defined in the Service Layer. Primary offer-specific handling is configured as part of the primary offer notification configuration via the Marketing and Packaging Layer.

Account Level Notifications

ComverseOne provides account level notifications for subscribers to notify them of low balances, state changes or other activities such as the payment of an international call from the subscriber's balance.

Account level notification functionality includes the following:

- Support of account level tokens; balance value, state, TML value, and so forth via the Product Catalog.
- Support of account level events; triggers, TML, balance, status, liability redirection, and so forth via the Product Catalog.
- Ability to designate subscriber/s to receive account level notifications via customer management, customer support)

The Product Catalog user configures account level notifications by defining the following:

- Notification Management Attributes
- Account Level Notification trigger events
- Create Account Level Notification templates

  Manage (edit and delete) Account level notification templates. This includes the ability to create notification template criteria based on one or more account attributes similar to account upsell/compatibility template.
- Create the notification text messages sent to an account when events occur; includes notifying an account recipient when subscribers are added or deleted
- Notify account notification recipient when subscribers are added/new, disconnected or transferred from account.

- Notify account notification recipient when an offer or bundle is disabled, activated or disconnected.

The account notifications feature includes the addition of notifications for offer states and bundle states at the subscriber level.

Notification Provisioning

Provisioning and configuring notification to subscribers is managed via the Product Catalog and involves the following:

System level task for setting up notifications are:

- Feature activation
- Setting up triggers
- Setting external interface parameters
- Interface assignment

There are some notifications that could be based on specific features like Usage Awards.

Provisioning and configuring notification to subscribers is managed via the Product Catalog and involves:

- System level notification setup
- Primary offer configuration to provision related notifications, assigning events, and defining messages.

Notification Triggers

A trigger defines the event and the condition (operator and value) that set off notifications. There are instances where a feature must be activated before an event is used in a trigger. However, some trigger events are global and not dependent on features.

The system enables the following types of notification triggers:

- **One trigger for a single event:** One message is sent to subscribers based on the occurrence of a single event, for example, low balance, recharge warning, expiration date, and so forth.
- **More than one trigger for a single event**: Multiple triggers generate notifications when different threshold conditions are reached for the same type of event.
- **One trigger for multiple events (compound trigger)**: For example, a subscriber is notified that their account is active and they receive a warning that their balance has fallen below $5.00.

Notification triggers are defined on a system-wide level and applied to subscribers. The notification trigger configuration includes the following fields: Category, Sub-Category, Operator, Value, Monetary Value, State, and Activity Characteristics. Each trigger has a maximum of 30 characters including special characters.

The value field takes on values in accordance with the triggering event.

- **Balance change**: the value field is a numeric.
- **State**: the value field is any state.
- **Bonus, or discount**: the value is number of days and so forth.

Figure 32 Notification Triggers

The following operators are applicable to notification triggers: equal to, not equal to, less than, greater than, less than or equal to, greater than or equal to.

Conditions

Each event can have a particular condition or a defined threshold associated with it that triggers the sending of a notification message to the subscriber. For example, an operator may want subscribers to be notified when their account balance falls below a certain amount. In this case, a balance threshold value is defined as the event condition for this notification and the message is triggered when that event condition is first detected. Similarly, when a subscriber earns a usage-based award, the bonus or discount threshold triggers a notification message.

For feature-dependent events like the near award, the conditions are set up within the feature and not available on the Customer Provisioning notification window.

In addition, based on the event, the system either provides a list of valid predefined values (for example, state = idle) or enables a threshold value entry from the user.

Currently, the system provides the following notification events:

- **State:** Change of account state; for example, from active to suspended or previous state
- **Recharge:** Successful recharge of the account.
- **Balance**: A change of account balance that causes it to reach a predefined threshold (for example, after a billable call)
- **Change of Expiration Date:** Account or Balance expiration (core, 2-10)
- **Usage Award**: (Near Award, Award) a bonus or discount.
- **Activity Characteristic**
- **Activity Charge**
- **Spending Limit**
- **Balance transfer**: Group Balance to Balance
- **Identity Change**: Currently only available with the converged feature.

Notification Definition (Within Offer, For All Offers)

Table 31, "Primary Offer Notification Examples" contains primary offer notification examples.

Table 31 Primary Offer Notification Examples

Notification	Interface (if there are more than one DI interfaces, try to provision for each of them)	Language	Latch	Category Token	Sub-Category Token	Message
Bal_trigger	DI_Notif	English	on	Balance	Pick a balance provisioned within this offer	Your balance is <Add Sub-Category token>
State_Trigger	DI_Notif	English	on	State	None	Your current state is <token>
NearAward_Trigger	DI_Notif	English	on	Accumulator	Pick an Accumulator provisioned within this offer	Near Award! Your Accumulator now is < Add Sub-Category token>
Award_Trigger	DI_Notif	English	on	Balance	Pick a balance provisioned within this offer	Award Received! Your balance is <Add Sub-Category token>

Notifications and External Interfaces

Currently, the system supports the following interfaces.

- HLR
  - **Ericsson HLR**: for sending HLR messages via telnet.
  - **Siemens HLR**: for sending HLR messages to a Siemens switch via a serial port.
- **Generic SMS**: for sending SMS messages to the Comverse SMS gateway via TCP/IP.

  Optionally, SMS notification can be used to inform a subscriber of the charge for their last activity transaction.
- **USSD Notification**

Only five external interfaces for each Product Catalog are permitted.

Notifications through HLR

The system supports notification to the HLR, the main database of permanent subscriber information for a mobile network. HLR notification is an available optional feature that informs the network HLR that certain predefined special events have occurred in the subscriber account. Messages that contain updated subscriber data are sent to the HLR and are stored in the database. The HLR sends response and acknowledgement messages to the system.

The HLR stores and updates a variety of subscriber account information that is used to determine call handling. In some cases, it is important to notify the network HLR about special events that occurred in the subscriber account.

For example, many networks bar terminating calls to subscribers when their accounts expire, yet do not pass all terminating calls through the system, since such calls are free of charge because the calling party pays. By notifying the HLR as soon as the subscriber has become suspended, it is possible to bar these incoming calls on the HLR.

If the subscriber recharges and reactivates the account, another message is sent to the HLR, re-enabling incoming calls to that subscriber. In other cases the HLR needs to be notified. Most notifications are related to account state changes (for example, when the subscriber account is activated for the first time).

When event conditions are met, the system builds up notifications messages and attempts to send them through predefined interfaces to the external devices (TRM, HLR devices, USSD). These external devices ultimately deliver the notifications to the subscriber devices. Notifications are generated because of the system activities (for example, reservations) or customer care activities.

Mechanism

Both notifications to the subscriber and to the network HLR are generated using the same mechanism. The same logic enables the definition of multiple types of notifications that are sent under very specific conditions and are configurable on a per-primary offer basis. Subscriber (SMS) and HLR (MML) notifications differ, primarily, in the message destination and the communication protocol is used.

Notifications are checked for latching and bypass prior to being sent. Bypass is not possible for notifications generated by the SDP but is applicable to all SLF notifications. The bypass mode must be configured in order for the bypass notification to be generated.

HLR notification and SMS notification based on activity type are optional features.

HLR Configuration

HLR Configuration involves the following:

- Configuration of the NOTIFAGENT process on the SLU.
- Defining the external interface on the database.
- Defining the notification assignment.
- Defining the trigger.
- Defining the free text message to be sent with the offer along with tokens, interface, SDP, and latching.

SMS Notifications

Short message notifications are sent to subscribers to inform them of certain threshold events or conditions associated with their account. These events might include a change in the subscriber balance, account state or expiration date, a recharge warning, a usage bonus or discount award.

Various triggers and associated thresholds or conditions determine which subscribers receive notifications. External interfaces and communications parameters further enable the notification process. Each defined interface must be assigned specific SLUs responsible for processing the message notifications in the queue.

Once defined, the operator configures a notification message to be sent to a subscriber based upon the occurrence of a single event or multiple event conditions. The notification message is defined when the primary offer is provisioned and linked to the appropriate external interfaces.

Notifications are used by the system to provide instant information to the subscriber regarding events and account activity. Notifications are commonly used for:

- Alerting the subscriber that an event (for example, account expiration) is about to occur
- Warning that the account balance is below a configured threshold
- Notice that an RC term has been deducted from the subscriber's account
- Providing charging details for the most recent activity transaction

The system uses the Short Message Service (SMS) and Unstructured Supplementary Services Data (USSD) notifications to notify subscribers about events and account status. Multiple messages are configured on a per-primary offer basis and sent at various times and under different conditions.

SMS notification based on the activity type enables a subscriber the option of receiving SMS notification at the end of a specified activity. For example, this could be used to send a notification to a subscriber at the end of each long-distance call with the actual call charges.

SMS notification based on the activity type and activity characteristic provides the subscriber with the option of receiving an SMS notification at the end of a specified activity; for example, to send a notification to a subscriber at the end of each long distance call with the actual call charges. The following conditions apply to SMS notifications.

Like other notifications, the SMS Notification triggers are defined on a global (system) basis, and then optionally configured on a account or subscriber basis with the specific notification text.

- SMS messages are sent to subscribers through the TRM. TRM is capable of communicating with multiple types of SMS systems made by Comverse and other vendors.
- SMS messages are limited to 2000 bytes.
- The SMS interface supports both Telnet and TCP/IP connections.
- SMS messages could also be targeted to an HLR. In this case, specific HLR interface conditions apply.

When event conditions are met, the system builds up notifications messages and attempts to send them through predefined interfaces to the external devices (TRM, HLR devices, USSD). These external devices ultimately deliver the notifications to the subscriber devices. Notifications are generated because of the system activities (for example, reservations) or customer care activities.

Optionally, SMS notification can be used to inform a subscriber of the charge for their last activity transaction.

Reservations

For one CAMEL 3 SMS activity, there is one and only one reservation issued by SLF_SMS, an SLU service application. When the Subscriber Data Server (SDS) calculates the reservation or consumption for a CAMEL 3 SMS activity, it always uses the first consumption charge of the primary tariff. The reservation is either granted or rejected and the reservation chunk size is always one SMS. Since the CAMEL 3 protocol reserves one SMS chunk at a time there are no partial SMSs.

USSD Notifications

USSD notification enables primary offer notifications to appear as text messages directly on a handset screen. USSD notification is applicable only in GSM networks and is accomplished through the SGU to the HLR gateway that forwards the notification to the subscriber.

The following limitations apply to USSD Notification:

- Only Standard ETSI GSM Phase 2 and Ericsson Phase 2 are supported
- All HLRs must support either ETSI GSM Phase 2 or Ericsson Phase 2 in the network

USSD notifications are delivered in the language of the subscriber.

The system supports notification through the Home Location Register (HLR). HLR is the main database of permanent subscriber information for a mobile network. HLR notification is an available optional feature that informs the network HLR that certain predefined events have occurred in the subscriber account. Messages that contain updated subscriber data are sent to the HLR to be stored in the database. The HLR sends response and acknowledgement messages to the system.

USSD Service Codes

A service code is a string of characters that the subscriber enters on a handset to access the recharge and information servers. The system validates these service codes based on a specific syntax and logic. The syntax is separated into distinct pieces.

USSD notification enables notifications to appear as text messages directly on a handset screen.

USSD notification is applicable only in GSM networks.

Unstructured Supplementary Services Data (USSD) codes enable the system to support subscribers roaming in GSM networks that are not compliant with the CAMEL Phase 2 standard.

You can add, modify, and delete an unlimited number of USSD service codes via Product Catalog Service Layer -> Telephony Service Parameter. A service code is a string of characters that the subscriber enters on a handset to access the Recharge and Information Servers. The system validates these service codes based on a specific syntax and logic. The syntax is separated into distinct pieces.

USSD service codes are configured via the Product Catalog GUI Service Provisioning Layer

Table 32 USSD Service Codes Example

Service Code	USSD Function	Response Code	Subtype
#121	Info Server	Ussd Info Server 1	Any
#122	Account Info		Any
#123	Recharge		Any
#124	Recharge		Any
#125	Callback		Any

USSD CallBack

USSD CallBack (UCB) is an optional feature.

To support roaming in a prepaid environment, each prepaid call attempt must be individually authorized and active calls must be monitored. This requires the involvement of the system during both call setup and call progress.

The most convenient method of supporting prepaid roaming uses the GSM CAMEL Phase 2 standard. This Intelligent Network call model (fully supported by Comverse) is designed for the wireless telephone industry and enables a subscriber to roam in any network that is CAMEL compliant. Unfortunately, not all GSM networks around the world are compliant and a backup approach is required to support roaming in these cases. One of the more popular alternative methods is based on USSD callback.

The system complies with the following USSD standards:

- USSD Standard Phase 1 and 2
- Ericsson USSD Phase 1 and 2 (not based on the GSM MAP J interface specification)
- Nokia Phase 1 and 2 (Variant of the standard)
- USSD Codes

Notifications Via Feature Codes

Feature request codes are short codes that subscribers dial to get account information. Prepaid subscribers check their account balance, while postpaid subscribers check their available credit and billed balance.

After a feature request code has been set up, a tone the subscriber hears in association with a particular system response message can be provisioned.

Table 33 Feature Code: Service Feature Code

Service Code	USSD Function	Sub Function
*11	Info	

Notification Language

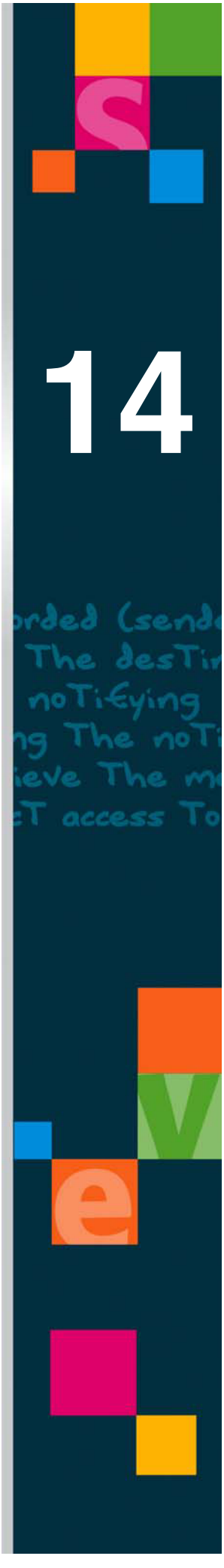
You can select a language for each USSD and global response message created. If a USSD response message in the subscriber notification language is not specified a default message is sent. You select the notification language and specify the content via the Product Catalog GUI

Once languages are defined, a language can be selected for each subscriber via customer provisioning.

See also “USSD Codes,” starting on page 136 and the *Customer Center Guide.*

Chapter 14

Audits and Security



Product Catalog data is organized logically into a hierarchy. The hierarchy is used for organizing data and also to control security; users are allowed access to different parts of the tree structure according to their permissions level.

Security is achieved primarily using an interface to Security Server. Security Server acts as the repository and authoritative source for all users, principals, resources, security roles, permissions, and so forth. Security Server performs user authentication and authorization of operations. Oracle security is used at the database level.

The Product Catalog has a number of points at which security is required:

- GUI
- Backend API
- Propagated Catalog
- Oracle Database

Basic Security Capabilities

The Product Catalog supports user security roles/privileges based on the platform's security capabilities.

Security proceeds as follows:

- The Product Catalog prompts the user is prompted for username/password
- The Product Catalog connects to the Security Server and authenticates.
- The Security Server returns the security roles containing all permissions available for the security roles in which the user is a member.
- The Product Catalog caches the security roles and uses this information to hide or show layers and navigation.
- The Product Catalog also access the user security roles cache to determine screen and attribute level access.

Authentication

Authentication is performed via the platform-wide authentication mechanism.

For detailed information on authentication see the *Security Platform Operations Guide*.

Users and Security

Product Catalog security is of interest to the following users:

- **Administrators**: ensure that the Product Catalog GUI can connect the proper DB schema with good DB connection settings (oracle security, and so forth).
- **Operators**: manage catalog data at the operator level which means, for example, the capability to create resellers themselves. Operators also hand Basic Layer data which other users can view but not modify.
- **Reseller users**: inside reseller users have security roles based on the layer they can manipulate (Marketing and Rating, and Service). It is assumed that the because the user who defines and configure a final AUT is not the same as the one who configures a bundle.

Permissions

Permissions and Elements

Authorization is checked for each operation on an element. Permissions can be assigned separately to individual elements, although in practice relatively few elements have explicit permissions. Elements assume a default set of permissions when they are created. The default permissions are assigned by the operation creating the element, and typically are determined from the folder in which the element is created.

The following permissions are available:

- **View**: This gives access to the object's View operation(s). The View operation(s) varies between object types, but typically gives the user the ability to view the element, its properties and its child elements. If the user does not have view permission on a particular child element, then the user can view the child element's identity but not usually its children or properties, because these are usually only accessible using the child object's view operation(s).
- **Reference**: This gives the user the ability to create a reference to the element. This might be to share it (here the reference would be from a folder containing shared elements), make it part of a Bundle (here the reference would be from the Bundle).
- **Modify**: This gives the user the ability to lock, change, save, and unlock the element.
- **Grant**: This gives the user the ability to change permissions on the element.

Other types of permission may also be available, depending on the element type.

Permissions and Layers

Separate user security roles and privileges are definable for Product Catalog GUI layers:

- **Create**: Enables users to create new data corresponding to the respective layer.
- **View**: Enables users to view data corresponding to the respective layer.
- **Modify**: Enables users to modify existing data corresponding to the respective.
- **Delete**: Enables users to delete data corresponding to the respective layer

A user who does not have create, modify, and delete privileges on a layer can view entities for the layer.

Special Security Roles and Permissions

A special administrative user role or privilege enables a user to have all permissions for one or more Product Catalog layers.

A separate transition role or privilege is supported to correspond to each Product Catalog version state. To transition a Product Catalog version from one state to another, users must have a corresponding transition or role privilege.

Permissions and Resellers

Each reseller is assigned its own Product Catalog dataset, which supports versioning. Each reseller version exists in a separate partition, and a reseller has no access to the Product Catalog data of other resellers. This arrangement enables network operators to host multiple service providers on a single Comverse ONE Billing & Active Customer Management solution platform, while giving each service provider completely independent management of their subscribers, service plans, and vouchers.

Security roles are managed in the Security Platform. See the *Security Platform Operations Guide* for information on managing and assigning security roles. See the *Product Catalog Overview* for a list of security roles that are pre-configured for Product Catalog.

Table 34 Security Roles

Security Server Item	Security Role Name	Purpose
PC_OperatorAdmin:Total administration of the Product Catalog	Operator User - Operator Administrator	This role is the most powerful security role for users of the Product Catalog GUI. It includes the ability to do all operator level functions.
PC_OperatorSystemDeploymentAdmin	Operator User - System Deployment Administrator	This security role enables the operator user to manage ComverseOne system instances and databases including regions. This is an operational security role.
PC_OperatorResellerAdmin	Operator User - Reseller Administrator	This security role enables the operator to create and edit resellers. This is an operational security role.
PC_OperatorBasicLayer	Operator User - Configure Data in the Basic Layer	This security role enables the operator user to configure data in the existing versions of the basic layer.
PC_OperatorBasicLayerAndPropagate	Operator User - Configure Data in the Basic Layer and Propagate Data	This security role enables the operator user to configure data in existing versions of the basic layer and to propagate data.
PC_OperatorActAsResellerAllLayer	Operator User - Act as Reseller on All Data	This security role enables the operator user, acting as a reseller user, to manipulate reseller data in existing versions.
PC_OperatorActAsResellerAllLayer And Propagate	Operator User - Act as Reseller on All Data and Propagates Data	This security role enables the operator user, acting as a reseller user, to manage all data and propagate it.
PC_OperatorActAsResellerMarketingLayer	Operator User - Act as Reseller on Marketing Layer Data	This security role enables the operator user, acting as a reseller user, to manage reseller data in existing marketing layer versions.
PC_OperatorActAsResellerRating BillingLayer	Operator User - Act as Reseller on Rating and Billing Layer Data	This security role enables the operator user, acting as a reseller user, to manage reseller data in existing rating and billing layer versions.
PC_OperatorActAsResellerServiceLayer	Operator User - Act as Reseller on Service Layer Data	This security role enables the operator user, acting as a reseller user, to manage reseller data in existing service layer versions.

Table 34 Security Roles (Continued)

Security Server Item	Security Role Name	Purpose
PC_ResellerAllLayer	Reseller User - Configure all Data	This security role enables the reseller user to configure all reseller data in existing versions.
PC_ResellerMarketingLayer	Reseller User - Configure Data on the Marketing Layer	This security role enables the reseller user to configure marketing layer data in existing versions.
PC_ResellerRatingBillingLayer	Reseller User - Configure Data on the Rating and Billing Layer	This security role enables the reseller user to configure rating and billing layer data in existing versions.
PC_ResellerServiceLayer	Reseller User - Configure Data on the Service Layer	This security role enables the reseller user to provision reseller data of the service layer in existing versions.
PC_ResellerServiceLayerCCViewOnly	Reseller User - Configure Data on the Service Layer but Limited to Calling Circles	This security role is for demonstrating how to configure and limit permissions at the entity level.

Basic Auditing Capabilities

Basic auditing capabilities provide an ability to audit all Product Catalog operations that change Product Catalog data and version states. An audit trail is generated in the offline database and retained in system to record all such operations.

Any changes to the Product Catalog data as a result of create, modify, or delete operations are audited. At minimum, the following information is recorded in the system for *versioned data only*:

- User making change (including operations related to association and disassociation)
- Date and time of change
- Object changed
- Changed version
- Old and new values corresponding to the changed object

Audit Trail

Data can be queried for the following:

- Last N operations
- Operations by type (create, modify, delete)
- Operations by user
- Operations by object type
- Operations by object
- Operations between the from/to date time

Log Files

Log files are located in

```
<drive>:\documents and settings\<uid>\pcSettings\logs
```

Old logs are called pc.log.1, pc.log.2, and so on.

Opening and Debugging Log Files

Open log files with any standard text editor such as Notepad. Debugging is by default set to the log4j information level. It can be configured to another level via the Help > Configure Logging Level dialog within the Product Catalog.

There are several hard coded log settings. They are:

```
log4j.logger.org.hibernate.type=debug
log4j.logger.org.hibernate.SQL=debug
log4j.logger.com.comverse.pc.propagation=debug]
```

Service Data Logging

Comverse ONE includes the capability to log all insert, update, and delete activity that directly impacts activity charging parameters within the Product Catalog. This functionality provides a clear audit trail that shows what was done, by whom, and when. This information is used to analyze and ensure the integrity and validity of operations performed by Comverse ONE users. Logging of reseller and service version data is included.

Configuration

Logging is turned ON or OFF by setting the following system parameter:

`pc_enable_service_data_logging`

- 0 sets logging to OFF
- 1 sets logging to ON

Upon deployment the parameter is set to OFF for all tables but can subsequently be set to ON.Service Data Logging can be turned ON or OFF for individual service data tables. The ability to add, modify, or remove service data tables from the configuration is supported.

Logging is supported for the creation, modification, or deletion of service and reseller versions.

The following tables specifically support Service Data Logging:

- `SERVICE_DATA_LOG`
  This table is used to log changes to service data.
- `AUDIT_LOG_CONFIG`
  This table stores the list of tables where auditing is desired.

See the *Database Reference* for detailed table information.
See the *Product Catalog User Guide* for information on setting the auditing parameter via the Product Catalog GUI.

Log Contents

Service Data Logging captures inserts, updates, and deletes. Inserts, updates, and deletes are identified for the service data column used by Product Catalog versioned tables.

Logging for non-versioned tables is not supported

All changes made to Product Catalog future versions are captured at the time of the change and not when the new version is submitted. Each column that is inserted, updated, or deleted within a logged table row has its own audit table record.

Inserts, Updates, and Deletes

- INSERTS are defined as an insert of a new table row.

  Only columns that have values are logged for inserts. For example, if a new table row has been inserted and there are 30 columns in the row and only 15 columns have values that were inserted the audit table will have 15 log records.
- UPDATES are defined as modifications to existing table rows.

  Some updates are performed by doing delete and insert activities and not just a single update activity.

  For updates, each column within an existing table row that has been updated, inserted or deleted has its own log record.
- DELETES are defined as a delete of an entire table row.
  Only columns that have had values deleted are logged. For example, if a table row has been deleted and the row had 20 columns but only 15 had data that was deleted, only the 15 columns will have log records

Log Maintenance

All versioned tables, including Service Data Log tables, can be archived and restored.

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