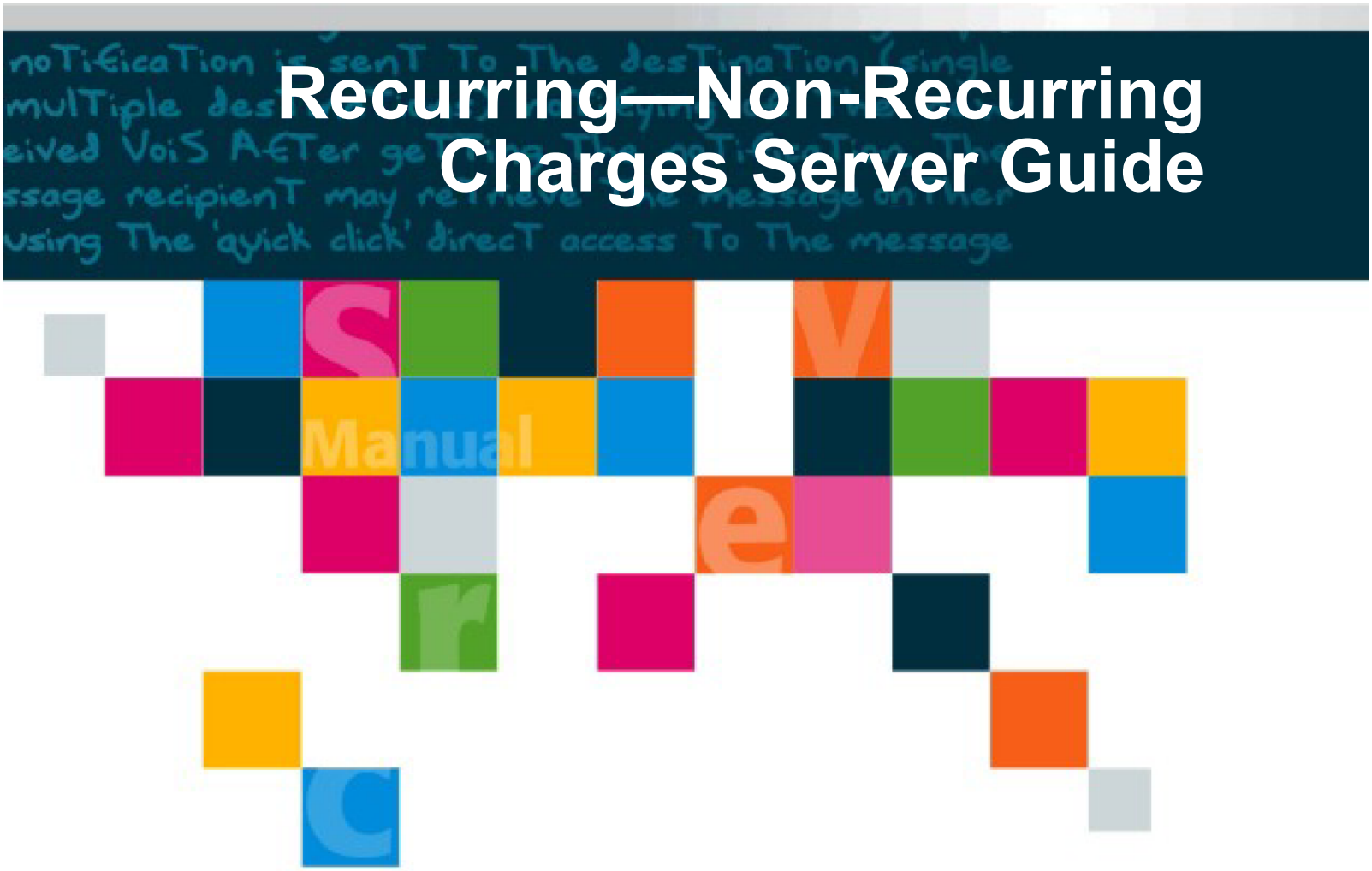
COMVERSE

ComverseONE™

3.5 RT TR 2.0

Recurring—Non-Recurring Charges Server Guide



COMONE-3.5-RT-TR2.0-RCSG-2011-09-30

Notice

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Revision History

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

Date	Chapter	Description
09/30/2011		Initial publication.

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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.

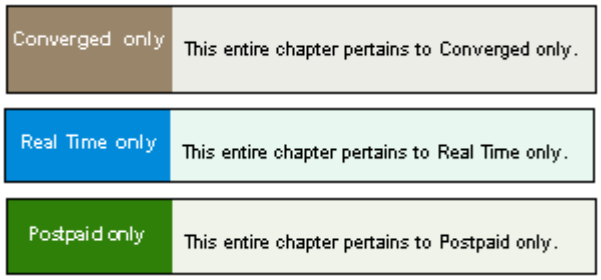
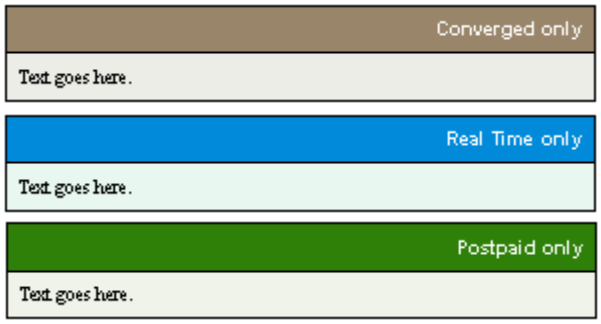
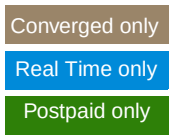
Table 2 Labels in Markers

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

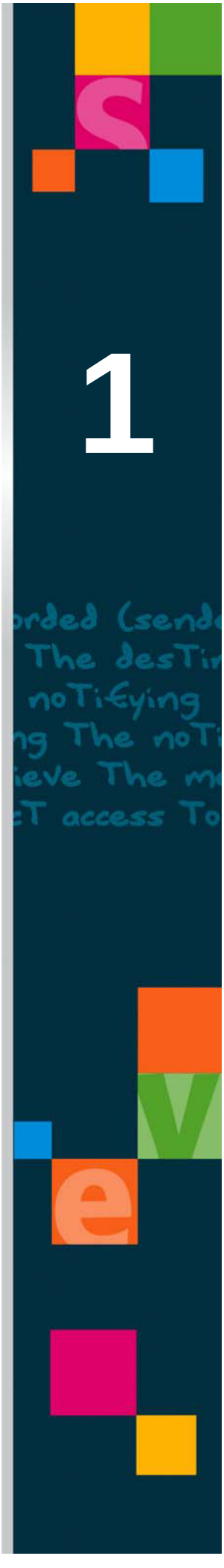
Online Catalog Manager (OCM) documentation includes the following (in alphabetical order):

- *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 *Recurring–Non-Recurring Charges Server Guide.*

The RC-NRC server is a Comverse ONE component that applies recurring and non-recurring charges for prepaid, postpaid, and converged/hybrid subscribers. It is a separate process from the overall invoicing process. It enables more timely charging and updates to real-time balances.

What This Document Provides

This document provides a description of Recurring and Non-Recurring Charges (RCs/NRCs) and the RC-NRC Server.

It is primarily intended as a reference manual and assumes a working knowledge of the UNIX operating system and of relational database principles, as well as a basic familiarity with the general concepts underlying the Comverse One solution.

Configuration of RCs and NRCs is accomplished via the Product Catalog GUI. See the *Product Catalog User Guide* for detailed instructions.

What's New in This Release

- Support for TML and postpaid offer and balances in RT billing

  See "Payment Modes for Offers and TML," on page 30.

RC-NRC Server: Main Capabilities

- Ability to charge any Monetary Balance
  - Ability to charge multiple monetary balances, with clear balance order and charge priorities
  - Ability to generate charges for postpaid customers with no balances updates
  - Support for charge redirection to accounts and shadow balances
  - Insufficient balance options to guide how charges and associated services are handled when target balances can not cover entire charge
  - Supports a configurable duration for recovery of charges that are missed due to insufficient balance options

  Once a charge is defined, the Product Catalog maintains its attributes and associations. If information in Product Catalog is updated it pushes the newer version to the database, and the RC-NRC Server uses the new configuration in generating and applying charges.
- Ability to define different rates per charge based on rate keys; Helps match charging with subscriber/account or service characteristics
  - Allow rate overrides/ ICB rates from CSM/CSR level

    Rates are configurable for override when a term is associated with an offer. This is not supported for bundles. CSRs can override rates as well as modify rates and specify ICB rates.
- Support for different charging behaviors based on customer lifecycle
  - Charge or not charge in Postactive, while suspended, Fraud lockout

- Ability to link RC with awards, awards are grants exchanged for the charges, e.g., 1000 minutes for $20 prepaid monthly charge.
  - Ability to Prorate awards based on charged amount and time of service
  - Ability to extend balance lifecycles (using awards)
- Support for real time notification; notify when charges are attempted
  - Successful and fully charged
  - Successful but partially charged
  - Unsuccessful, no charge

  For NRCs, only successful/unsuccessful charging attempts generate notifications
- Ability to generate charges based on different cyclical schedules to support;
  - Prepaid charging needs- Fixed, relative, flexible cycles
  - Postpaid charging needs- Bill cycles
  - Hybrid - off cycle
- Ability to Prorate Charges; Only charge for the actual time subscriber had service.
  - Lifecycle based charge full, prorate or no charge, or give back credit
  - Based on insufficient balance options

  Options to always charge full, no charge, charge to zero, charge to balance minimum.

  Ability to disable non primary offers due to insufficient balance options

  Ability to define what bundle charges override individual offer items
- Ability to detect primary offer and bundle swaps and gracefully terminate or prorate existing charges. And ability to generate disconnect credits in case of charged-in-advance RCs.
- RC Records - Charge records and MTRs
  - Produced for each charge attempt, by balance, and with enough details to link segmented records and support auditing.
  - Charge records produced with enough detail to support downstream processes, such as invoicing, journals, and so forth.
- Active and active/inactive dates that defines the duration within which the term is available to associate with offers/bundles are configurable.

  These should not be confused with instance provisioning start and end date which are captured during provisioning by the CSM:

  Start date: earliest date that the charge can be applied.

  End date: the day the charge must be terminated/latest date the charge can be applied

For information on configuring RCs and NRCs see “RCs/NRCs Configuration Summary,” on page 5 and also the *Product Catalog User Guide*.

The RC-NRC Server (RCS) supports recurring charges that have the following characteristics:

- Are applied at a specified frequency such as daily, weekly, monthly, quarterly, yearly, bill cycle, and off-cycle.
- Can be pro-rated, charged in advance, or charged in arrears.
- Can be consumed or awarded from or to multiple balances.

The RC-NRC Server supports various types of NRCs:

- Activation, early termination, commitment, subscription, refinance, late fees, and so on.
- Notifications on successful charge application.

See also the *Network Interfaces and Notifications Guide.*

- The RC-NRC Server runs a background module and processes on-line RC/NRC charge requests triggered by customer care. It is also scheduled in batch mode every day to generate the recurring fees.

The RC-NRC Server is integrated with the UPM Scheduler. See the *Unified Platform Guide*

RC terms define the relationship between RC and NRC charges for account and subscriber offers and are configured via the Product Catalog GUI. When an RC term is provisioned to an account it is known as an RC term instance.

The RC-NRC Server supports various types of NRCs:

- Activation, early termination, commitment, subscription, refinance, late fees, and so on.

See also “NRCs,” on page 18.

- Notifications on successful charge application.

See “Announcements,” on page 17 and also the *Network Interfaces and Notifications Guide.*

RCs/NRCs Configuration Summary

Configuration of RCs and NRCs is accomplished via the Product Catalog GUI. Use the Product Catalog GUI to do the following:

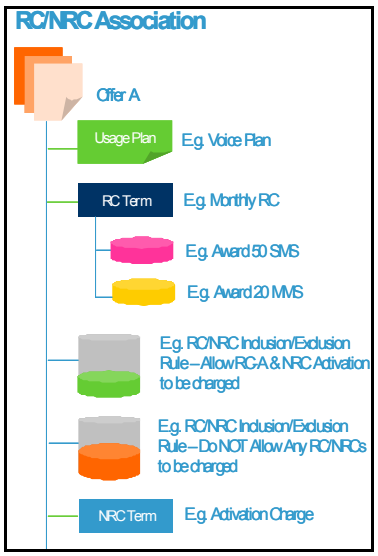
- Define RCs and NRCs.
- Define rating information governing how RC and NRC amounts are calculated.
- Associate RCs and NRCs (with or without awards) with bundles and offers, and with contracts and equipment charge codes.

Figure 1, "RC-NRC Definition" shows an example configuration.

Figure 1 RC-NRC Definition

Once configured, RCs and NRCs can be associated with offers or bundles as shown in figure 2, "RC Term and NRC Term Associated with Bundle."

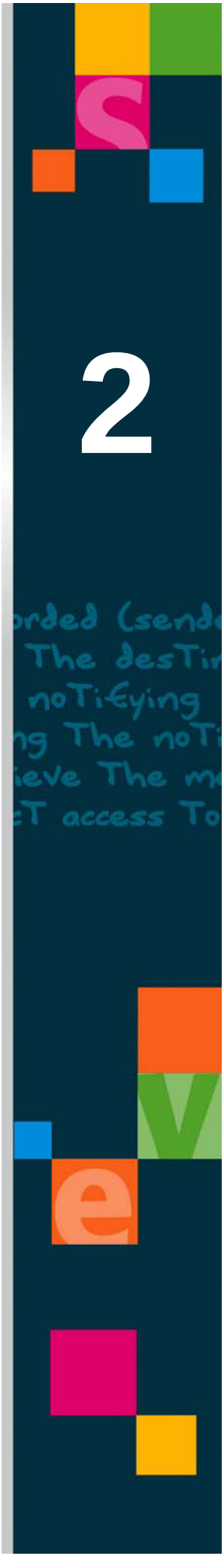
Figure 2 RC Term and NRC Term Associated with Bundle



See the *Product Catalog User Guide* for detailed instructions on configuring recurring charges.

Chapter 2

Recurring and Non-Recurring Charges



This chapter contains a high-level description of Recurring Charge (RC) and Non-Recurring Charge (NRC) functionality.

RCs and NRCs processes are separate from the overall invoicing process. They enable more timely charging and updates to real-time balances. The RC-NRC Server applies RCs and NRCs for prepaid, postpaid, and converged subscribers

RCs

This section describes RC functionality.

Number of Applications Configuration

The RC charge application limit method limits the number of applications for an RC to control how many times an RC is applied. This can also be interpreted as the number of full cycles that the RC is attempted. This number must be > 0 or blank; the default is blank to imply that the RC does not end, unless the service (offer/bundle) /subscriber/account is terminated or the CSR specifies an end date.

Thus, it is possible to limit the RC to only one application similar to an NRC, and yet issue awards to any balance including the core balance.

The CSR can override the remaining applications by recalculating the end date via the remaining applications field. For example, for a monthly charge provisioned on January 1, the CSR can set remaining applications = 12. Based on this, CSM/SAPI automatically determines the end date to be (Today/current system date + 12 cycles/months) and thus the end date is set to January 1 next year. End dates are exclusive, so the last and 12th cycle ends on the last minute of 12/31.

Capabilities

An RC is a charge assessed at regular intervals regardless of subscriber activity; for example, a monthly subscription fee.

The Comverse ONE solution supports the following RC capabilities:

- Charge any monetary balance
  - Charge multiple monetary balances
  - Specify balance charge order
  - Prioritize balance charge order based on offers and Up Sell Templates
- Disable non-primary offers due to insufficient balance
- Generate charges for converged postpaid customers with no balance updates
- Charge redirection to shadow balances
- Charge multiple cycles in advance
- Different charging behaviors based on customer lifecycle; charge or not charge in postactive, while suspended, fraud lockout and so on
- Prorate awards based on charged amount and time of service
- Configurable duration for recovery of charges missed due to insufficient balance options
- Real-time notification based on whether charges are applied or not applied due to insufficient balance options
- MTR generation due to insufficient balances

- Generate charges based on different cyclical schedules to support prepaid or postpaid charging needs: bill cycles, fixed, relative, off cycle, on-demand, and flexible cycles.

See also “Charge Cycles,” on page 49

- Prorate Charges
  - Charge for actual time (charge full, no charge, and so forth)
  - Prorate on start, end or both based on options: charge full, no charge, and so forth
- Support insufficient balance options; options to always charge full, no charge, charge to zero, charge to balance minimum.
- Ability to configure bundle charges to override offer charges

  RCs in a bundle can override offer terms. The override is specified as either mandatory, optional, or selective.
- Detect primary offer swaps and gracefully terminate, waive, prorate, or carry over existing charges
  - Carry Over of Regular RCs

    Regular RCs can be carried over in an offer swap uninterrupted if the RC term rate does NOT allow offer rate override and is common in both the old and new offer.

    Regular RCs cannot be carried over in an offer swap if the RC term supports rate override at the offer level or the resultant rates keys are different in the new offer; carrying over would result in the loss of the desired rate flexibility.

    This functionality is controlled by the primary offer configurations. The original primary offer is used to determine if charges can be carried over.
- Downstream system support; charge records and MTRs

  When a charge is successfully applied a charge record produced.

  Records are produced for each charge attempt, by balance, and with enough detail to link segmented records and support auditing as well as downstream processes such as invoicing and journals.
  - In CV, RC and NRC application charges are recorded in the charge history, and RC awards are recorded in MTR
  - In RT, RC application charges are recorded in RC history, and RC awards are recorded in MTR
  - In RT, NRC application charges are recorded in NRC history (awards are not supported for NRCs)
- Recalculate end dates

  The end date is set in the Product Catalog. However, a CSR can reset the end date if they have the appropriate permission. As an example, for a monthly charge provisioned on January 1 a CSR with the requisite permission could set the `remaining applications = 12`. As a result, the end date would be reset to today/current system date + 12 cycles or months. End dates are exclusive, so the last and 12th cycle ends on the last minute of 12/31.

See also the *Customer Center User Guide* and the *Product Catalog User Guide.*

See also “MTR Codes for Partial, Insufficient and Disconnect Credit,” on page 28.

Terms

Real Time only
Only Regular RCs are supported in Comverse ONE Real-Time Charging derivative. Commitment RCs, Inventory Vanity RCs, and Equipment RCs are not supported.

RC terms define the relationship between RC and NRC charges for account and subscriber offers and are configured via the Product Catalog GUI. When an RC term is provisioned to an account it is known as an RC term instance.

An RC is applied periodically based on a defined schedule.

RC Types include RCs associated with equipment codes; associated with an equipment code not offer, but provisioned as part of an offer

The following types of RC terms are available. Use the RC Type field to specify which RC term you are adding or configuring:

- **Regular**: This is the standard type of RC term.
  Only regular RCs are eligible for carry over in an offer swap. All other RCs must be ended and provided again for the new offer.
- **Commitment**: A commitment RC term represents the RC portion of a commitment promotion plan.
- **Inventory Vanity**: This type of RC is not associated directly with an offer. Rather, it is linked via the Inventory Line you select in the Offer/External ID Corequisite Relationship when you add an external ID to an offer.
- **Equipment**: This type of RC is added directly to an offer, or linked indirectly via the Inventory Line you select in the Offer/External ID Corequisite Relationship when you add an external ID to an offer.

  Equipment and vanity code are special types not associated with an offer but rather through an equipment or inventory charge code. When a subscriber gets an equipment that also has an RC the CSM can choose to associate the RC; this is also applicable to a NRC of the same type.
- **Minimum Charge**: A minimum charge RC are applied based on minimum charge plan and is also called unmet obligation charge. It ensures that a customer pays for example $100 a month in usage. A minimum charge RC supports bill time promotions and the RCS generates the base charge record. This charge is applied or not applied based on set target. It can only be assigned to postpaid offers and never targets a running balance. The actual amount is based on the cycle (duration) and on the usage target; if the target is not met for the specified cycle, the RC is applied.

If you change the definition of an RC in Product Catalog, its child RC term instances are not affected by the change. The *association* of an RC term instance and a subscriber or account is stored in the table `RC_TERM_INST`.

An RC term can be prorated, charged in advance or in arrears, consumed from multiple balances, and awarded units. RC terms can be part of the same single charge or multiple charges.

Real Time only
Minimum charges are not applicable in the Comverse ONE Real-Time Charging derivative. Minimum charge RCs can only be associated with postpaid offers.

- Provisioning level
  - Account and Subscriber: whether account or subscriber level charge
  - Active and inactive dates: earliest and latest dates that an RC term can be associated with an offer/equipment code

Activation

An RC can not be charged before the RC term instance (the provisioned product) start date. Charging of an RC always begins on the later of the following dates:

- Subscriber/account activation date
- Account activation date
- Offer start/activation date
- RC term instance start date

When an RC is provisioned, its start date should default to the offer or bundle activation date. The CSR can change the start date to a future date.

Prorate configuration (activation code and prorate on start) indicates whether a charge can be prorated. This occurs only if the number of days remaining in the initial duration are less than the underlying cycle duration.

There is no difference between offer and bundle RC activation; between supplementary offer and primary offer RC activation; between account and subscriber activation, except when charging in real time.

RCs are always provisioned via an offer or bundle.

Charging

Initial RCs may be charged in real time (pseudo real time) or batch.

The Auto-Activation Flag determines if the initial charge is attempted in real-time or not.

A charge request is triggered by offer provisioning (order processing). It is queued and processes asynchronously by back end modules (ASYNC) which interact with RCS on demand.

The following options are supported:

- Batch: indicates that a charge is applied during the regular batch process based on schedule and apply day
- Real-time: indicates that a charge is applied as part of offer provisioning.
- Subscriber activation: if one term is real-time (in any offer), then all due charges are processed in real time- activation request is on subscriber not individual term
- Account/Offer Activation: activation is per term not offer based

The first usage event indicates that charge will be attempted upon first usage/recharge activity

- All due charges are attempted- account/subscriber
- Active (ongoing RCs) are always charged via batch mode
- Successful charges produce a charge record.

Failed Charges

If the charge fails (initial or active) an insufficient balance MTR is generated. Based on configurable duration the charge may be retried. If the charge can not be recovered for the configured duration, it is written off.

A supplementary offer is disabled if the charge is not successful due to an insufficient balance. When the charge is recovered, the offer is re-activated by RCS.

Recovery charges are attempted based on insufficient balance options; if the option indicates NO charge, then entire charge must be recovered.

Primary offers, and bundles, can not be disabled due to insufficient balance

Termination

An RC may be terminated due to the following:

- End date: the configured end date arrives, RCS terminates the RC via the batch process.

  End dates are determined in two ways: at a set date- future dated or real time request, or terminations due to offer terminations as in the following cases:
  - Offer/bundle termination: when the entity that the RC is attached to is terminated the RC is terminated.
  - Offer swap: discussed in a later slide.

    See “Swap Options,” on page 17

  - Subscriber: a subscriber termination is handled by RCS like an offer/bundle termination. This implies that the RC will not be charged again.

Two types of terminations based on term are considered;

- When future dated, the end date is exclusive
  - If future dated, the charge may be tried based on configured duration until the end date
  - Disconnect prorate configuration on the term is used; option to prorate, not prorate or not charge. This is not the same as insufficient balance options. Which are also applicable during the final charge.
- If the termination proceeds after the charge for the current cycle has been applied, the end date is charged (inclusive)
  - Uses disconnect credit configuration on the term; no credit, full credit, or partial credit. This is not the same as insufficient balance options which are also applicable during the final charge.
- In all terminations, one of the above terminations type is in effect per term;
  - There is no difference between account versus subscriber RC termination
  - There is no difference between offer based and bundle based terminations.
  - There is no difference between standalone offer termination and offer termination due to swap- bundle or Offer based.

- Offer/bundle terminations or RC end date based are final; no more attempts are made once the offer is removed or end date is reached.

Suspend, Recover, Reactivate

Suspending, recovering, reactivating an RC has the following effects:

- Primary offer and bundles can not be disabled due to insufficient funds.
- Non primary offers are disabled due to insufficient funds
- Recovery on insufficient balance amount allows retry of missed charges.
- Charges retried for a configured duration (in attempts, or number of attempts).
  - For example, retry the charge for the next 7 days (runs); attempts are independent for each cycle (the retry does not reset on cycle start/end).
  - Excludes stoppages, and fraud lockout.
- No recovery of partial charges.
- Awards are issued for recovered/past cycles.

  Respect current configuration but issue grant life cycle with an offset equal to the current cycles charges.
- RC server responsible for enabling disabled offers upon recovery of funds
  - History record created.
- Accounts and Subscribers can not be directly suspended by RCS server due to lack of funds

Processing

Charges can be processed via on demand and batch processing. Batch processing is based on a scheduled process.

Within subscriber-level RCs for a subscriber or account-level RCs for an account, RCs are processed in the following order:

- The offer order prescribed by the upsell template.
- For offers that are not defined as a part of the up sell template (that is, associated with primary offer), RCs corresponding to the last subscribed offer/bundle have higher priority
- For RCs for the same offer, in order of `RC_TERM_INST.CHARGE_ORDER`
- For RC-NRC Server with the same charge_order, in order of `RC_TERM_INST_ID`

Account-level RCs are processed before subscriber-level RCs. Within an account, subscriber-level RCs are processed in `subscr_no order`.

This order is only applicable when mixed level charges are due at the same time.

Awards

An award is a rule that applies a monetary amount or non-monetary units to a balance. Sources for awards include voucher purchases, recharges, RCs, and bonus plans. The award is consumed in real time, through usage that occurs after the award has been granted. Awards can be activated, terminated, and rolled over.

Activation

Awards are configurable for each and every bill cycle via the Product Catalog GUI.

For specific instructions on configuring awards see the *Product Catalog User Guide*.

Termination

The termination date defines the date that awards will expire or the first date that awards shall cease to be available for consumption. This day is exclusive. The expiration date is always determined by RCS based on award configuration.

Real Time only
In Comverse ONE Real-Time Charging derivative the `ACCOUNT_SUBSCRIBER` balance is updated due to an MTR disconnect. Subscriber disconnects are not supported in a Comverse ONE Real-Time Charging derivative.

Rollover

Awards can be set to expire at the end of the current cycle or rollover.

- When awards are configured to not rollover, they expire on the next apply day.
- This is true even when the expiry is configured to be beyond the current cycle.
- Rollover Awards will keep rolling over every cycle until they expire.
- It is possible for awards to expire before they are considered for rollover.
- Rollover date/s is based on the underlying cycle.
  - This date is always same as next apply date.
  - Rollover date is always exclusive.

It is possible to limit the award amount to rollover as follows:

- Configure Maximum Grant Rollover- From the specific grant
- Configure Total Rollover - Total rollover for all grants from same source

The award consumption order is used when there are multiple rollover awards.

- Defines how the rollover awards are consumed (system wide configuration)
- Possible values; (LEFU, and so forth)

Awards also have a rollover order that is determined within one balance and one source. There are two possible values: active then rollover OR rollover then active.

Schedules

Each RC must have a schedule. An RC can have only one schedule. Active RCs can change schedules but the frequency (weekly, monthly, quarterly) can never change, except for bill cycles.

A schedule defines the special characteristics of a charge cycle; for example, bill cycle, relative, fixed, off cycle, and so on. It includes the following:

- **Frequency**: Defined in relation to valid calendar cycles of daily, weekly, month, quarterly, yearly, and flexible days:
  - Can have account bill cycles

- RC frequency is *not* modifiable once it has been attached to an offer/bundle and offer/bundle has been propagated to the online Product Catalog.

- **Offset Day**: Indicates the cycle start day if the desire is to *not* align the cycle with calendar boundaries. An offset day is always validated against the calendar cycle.

  Offset Days are only applicable for off-cycle schedules. They are used to offset the underlying cycle from the calendar boundaries

  For example, start my cycle on the 10th of every month; the offset in this case would be set to 10.

  Offset = 0 implies that the offset will be the later of subscriber activation or RC start date-computed at provisioning

- **Apply Day**: the day the charge is generated and running balances are updated; subscriber is in active state; proration and charging are based on the apply day. Always validated against the cycle

  Apply Day; Defines the day the charge will be generated and if applicable applied to balances. Each cycle except daily has an apply day

  Apply day = 0 means the later of the subscriber activation or RC/Offer start date is taken as the apply day and computed at provisioning In relative (and any time charging in advance) mode the apply day is always the first day of the current cycle.

See also “Recurring Charge Schedule Options,” on page 47

A subscriber requested apply day and the bill cycle can occur on the same date or a different one. Thus it is possible to sync an RC apply day with the date specified by subscriber or the account. This functionality is supported for charges with a monthly cycle.

You can split or prorate an RC due to a tax rate change or an RC rate change.

If a bundle or rate override rate is allowed and entered, RC-NRC Server uses the override rate for billing, otherwise the default rate is used

The *Customer Center User Guide* includes directions on provisioning RC and NRC terms for subscribers.

For complete step-by-step instructions for configuring RC/NRCs term via the Product Catalog GUI refer to Chapter 6, Marketing/Packaging Layer, in the *Product Catalog User Guide*.

- **Cycle Day**: the cut off date for charges including all generated charges in the invoice.

See also“Valid Apply Day Settings,” on page 52.

- **Indicator**: Indicates whether the charge is applied in advance (relative) or arrears (fixed) or in between (relative off-cycle).

An RC must be marked as whether it allows defined schedules or whether it should follow an account bill cycle. If the RC allows defined schedules, then only one frequency is supported. The frequency can not change for the active life of the RC.

Swap Options

This section describes primary offer and bundle swap options.

Primary Offer Swap

A primary offer swap defines how charges are terminated or activated during a primary offer swap: terminate or activate as normal and charge the early termination or activation fee (if it exists).

All NRCs and RCs from the old offer are attempted or applied and terminated. All NRCS and RCs from the new offer are provisioned as new.

Bundle Offer Swap

All swaps involving bundles are cease and reprovide.

- Primary offer bundle swap
  - All charges in the primary offer are terminated.
  - All charges within the bundle and offer/s included in the bundle are activated in respect to bundle override configuration.
- Bundle to bundle
  - All charges in the old bundle and offer within are terminated.
  - All charges in new bundle and offer/s included in the bundle are activated in respect to bundle override configuration
  - New bundle override rules are evaluated.
- Bundle to primary offer
  - All charges in the old bundle are terminated.
  - All offers in primary offer are activated
  - All charges in other offers (old or new) that were subject to old bundle override are activated as new.

Announcements

RCs are announced when they are successfully applied. The announcement is for successful subscriber level RCs only. NRCs are not announced.

The following two attributes to control whether a specific RC is announced.

- On the RC term: announcement required; this flag indicates whether the RC can be announced.
- On the Primary Offer; the subscriber PO must be configured as supporting pre-call and RC announcements.

Account level announcements are not supported since accounts do not support pre-call announcement.

RC announcements controlled by the term and by the primary offer configuration include the following:

- Notifying subscribers that an RC was applied to their account and their balance updated.
- Notifying subscribers of the successful application of RC/NRCs
- Notifying the subscriber that shadow charges have been applied

This feature requires the following:

- The announcement required flag must be set on the RC term to indicate that the RC can be announced.
- The subscriber's primary offer must be configured to support pre-call and RC announcements.

Shadow charges are announced to the real subscriber.

NRCs

An NRC is a one-time charge. NRCs are applied at either the account or subscription level.By their nature, NRCs do not have cycles.

The Comverse ONE solution supports the following NRC capabilities:

- **Activation**: Intended to be charged before the service is activated; charged in real time

  Charge for activating a service (offer/bundle) is instantiated when offer is instantiated. The apply date must default to offer or contract activation date
- **Early Termination**: applied if the contract is terminated before it expires.

  An early termination charge is applied when the entity that is attached to the NRC terminates before its expected end date. It must be attached to a contract or must have an expected duration, otherwise if the duration is not specified the NRC charge is = 0

  An early termination charge may be waived by CSR. The CSR can specify an ICB rate

  Proration of early termination NRCs based on the number of days remaining in the contract is supported. If the subscriber terminates the offer before the contract duration expires, the subscriber is only charged for the remaining contract duration.
- **Commitment**: Usually attached to a contract and carries a commitment reference. The commitment reference is an RC that reduces the NRC commitment amount each bill cycle.

  When a commitment RC term allows CSR rate override, the CSR is not permitted to set a lower rate. The CSR can perform the override with a higher rate than the Product Catalog configured rate but not lower. The prevents RC cycles from extending the commitment payoff duration beyond the contract duration.

  The CSR instantiates the offer with a commitment term. At this time the commitment amount and commitment rate are instantiated onto the `RC_TERM_INST`.

  CSM does not allow the CSR to set a lower rate than instantiated on `RC_TERM_INST` (also referred to as the default rate). CSR can override the commitment rate with a higher rate than default rate but not lower. The intent is to prevent RC cycles from extending the commitment payoff duration beyond the contract duration.

  When CSR sets a lower rate, the Unified API validates the rate against the default rate of this RC, return failure. The error is displayed in CSM; the transaction is rolled back.
- **Unmet Commitment**
- **Inventory Vanity**
- **Equipment**

- **One Time Charge**: This charge is offer based and standalone.; offer based is always provisioned via the offer. Standalone can be attached at any time to subscriber or account by the CSR. These charges provide a flexible mechanism to charge for various activities, such as resending a bill copy or a bounced check. They support events and the event determines how they are provisioned.

  One-Time Administrative Charge: In Comverse ONE operators or resellers can configure which of defined and supported events are chargeable. Thus customers can be charged for processes associated with various transactions or administrative activities such as:

  - Bill Resend
  - Friends and Family (Update, Delete, Add)
  - Adding subscriber to an account
  - Removing (disconnect) Subscriber from an account
  - Adding a new account to an existing account
  - Favorite area
  - Favorite destination
  - Happy hour
  - Special day

The operator or reseller determines which of these activities are chargeable. Rates for these activities are set by the operator or reseller and vary by account or subscriber attributes including the offers subscribed to by the account.

Configuration is based on the combination of event, channel, channel type, user interface, reason and so forth and includes setting up the NRC terms and rates and a proceed or halt indicator to handle a charge failure.

See also the *Customer Center User Guide* and the *CCC Guide*.

- **Late Fee**: A penalty is calculated based on overdue balance by an external system that calls the RC server API to apply the charge.
- **Deferred Rounding**
- **Refinance**: Provides a payment plan for outstanding owed balance. Normally, if authorized, the CSR zeros out outstanding charges/invoice and re-establishes a refinance plan allowing the customer to pay in installments re-applied as a refinance charge. This NRC is pure postpaid and never applied to balances by the RC server.
- **Installment**: Allows a charge to be broken down into multiple payments. The term is configured to allow installments and set max allowed installments. If so, CSR can decide to offer installments. The charge is calculated based on the number of installments. Requires an installment schedule; currently only bill cycles are used as installments cycles. If this NRC is terminated before it is fully paid off, the remaining balance is assessed in full

NRC Term

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

There are some term attributes that when modified may control the instance behavior; for example, rates. Most NRC terms are applied by the RC-NRC Server only within a short period of time after they are provisioned, as opposed to RC terms which can be applied over and over through several billing cycles.

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.

NRC term are internally categorized as follows:

- **System NRC terms**: Can only be provisioned via system processes such as billing and balance transfer. This category cannot be associated via an offer in Product Catalog. The category includes late fee NRC terms and deferred rounding NRC terms. 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 bundle. NRC terms in this category include activation, commitment, early termination and so on, and they cannot be provisioned outside an offer.
- **CSM terms**: can only be provisioned as standalone
- **CSM/PC terms**: can be provisioned via an offer/bundle or as standalone

The RC-NRC Server applies a given NRC term only once, unless it fails due to insufficient balance.

NRC terms do not have a start date or end date. NRCs have an apply day.

See "Valid Apply Day Settings," on page 52.

See the *Product Catalog User Guide* for information on configuring NRC term eligibility. NRC terms and apply dates are provisioned to subscribers via the Customer Center. See the *Customer Provisioning Guide*.

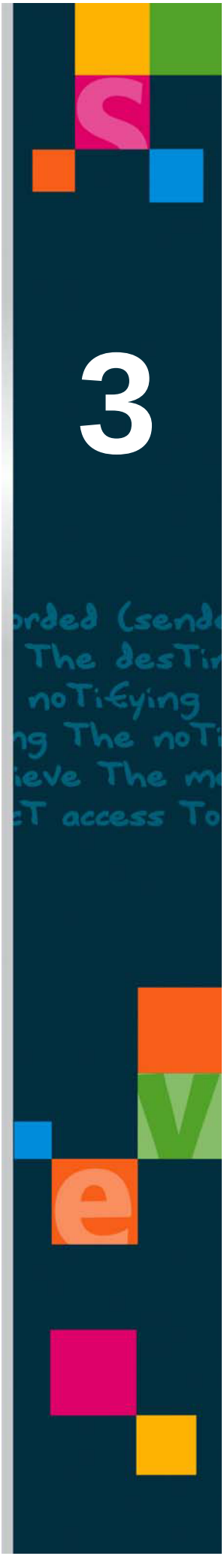
Association Bundles and Offers

The following association types are supported between the NRC term and an offer or bundle: subscription, termination, activation, equipment, commitment, and one time charge.

	Real Time only
Off -cycle schedules are not supported.	

Chapter 3

Recurring/Non-Recurring Charges and Balance Management



Balance Charge Order

An RC can target more than one balance and balances provided by different offers. A defined balance charge order is used.

When charging, balances from the guided to offer always have the highest priority.

- These balances are always attempted first based on the balance order within the guided to offer.
- A balance charge for balances provided by the same offer is defined within the offer.
- A balance inclusion and exclusion list specific to each RC and NRC is also used.

Charges can be subscriber or account or standalone directed charges.

General Rules

The general rules for applying charges against balances are as follows:

- **RC target:** An RC can target more than one balance.
- **Balance Eligibility**: Balance eligibility is based on inclusion or exclusion configuration. A balance can exclude or include a specific term or all terms.
- **Relative Priority**: Balances are charged in the relative priority of their related offer as defined in the Upsell Template or in the bundle offer priority for balances coming from offers within a bundle.
- **Balances across offers:** For balances across offers, balance priority is determined via the UpSell Compatibility Template. If the offer is not part of the UpSell Compatibility Template, then the order in which the offer is purchased determines the priority. The last purchased offer has the highest priority.
- **Balances from same offer**: For balances coming from the same offer, their balance charge order is defined within the offer as follows:
  - Offer versus bundle priority is defined in the upsell template.
  - Priority of offers within a bundle is defined in the bundle.
  - Bundles do not provide balances.
- **Balances from other offers:** Balances from other offers will be ranked based on referencing offer priority. This priority is defined in the UpSell template
- **Balance referenced by more than one offer**: If a balance is referenced by more than one offer, the highest priority is taken with it's attributes, inclusion/exclusion.
- **Priority of offers**: Priority of offers within the bundle is defined in the bundle
- **Insufficient balance options and offers**: Insufficient balance options are always based on offer owning the charge not offer owning the balance.
- **Charges attached to bundles**: Bundles do not provide balances. Bundle charges are applied based on priority of offers owning the target balance. This order is defined in the UpSell template

Balance Charge Order and Offers

The balance charge order is summarized as follows:

- Balances from the offer to which the RC/NRC belongs always have the highest priority. These balances are charged based on the balance order within that offer.

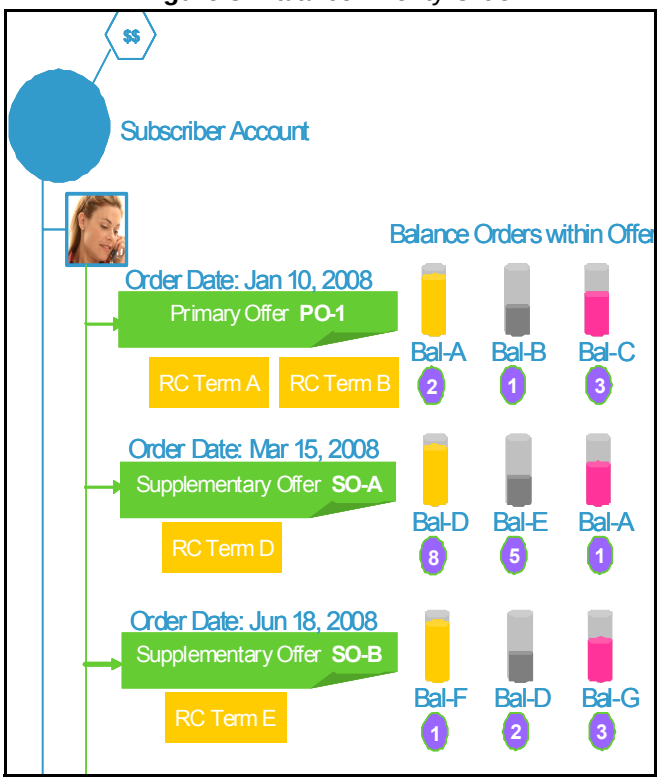
- Balances from offers which are not part of a bundle are charged based on offer priority defined in the upsell template. These balances always rank lower than balances from the offer to which the RC/NRC belongs.
- Balances from offers that are part of a bundle are attempted based on the offer priority defined in the bundle.
- The balance inclusion or exclusion list specific to each balance within each offer is used to determine eligible balances. This eligibility determines if a particular balance can be charged by a specific term.
- If a balance is provided by more than one offer, the highest priority offer's inclusion or exclusion rule and balance attributes are used.
- Insufficient balance options are always based on the offer owning the charge, not on the offer owning the balance.

Offer Balance Priority Order Example

Table 4 Balance Priority Order

Offer	Balance Priority	RC Term Priority	Tariff Plan Priority
PO-1	2	2	4
SO-A	1	4	2
SO-D	4	1	1
SO-F	3	3	3

Figure 3 Balance Priority Order

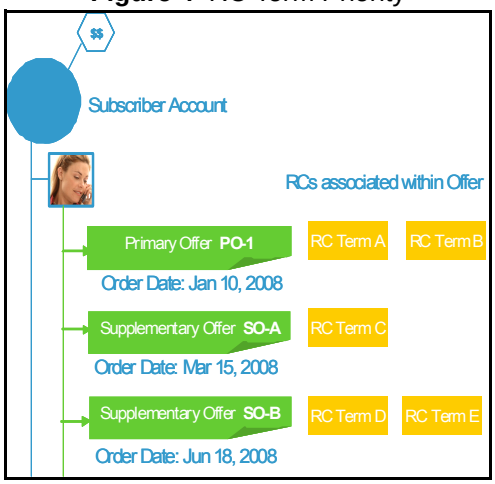


RC Term Priority Example

For RC terms applied at the same time, across offers and bundles, balance priority is determined via:

- UpSell/Compatibility Template
- If the offer is not part of an UpSell/Compatibility Template, then the order in which the offer is purchased determines the RC term priority. The last purchased offer has highest priority. In figure 4, "RC Term Priority", from June 18 on RC term priority across offers will be: (1) SO-B, (2) PO-1, and (3) SO-A.

Figure 4 RC Term Priority



Non-primary offers are disabled for lack of funds for the charging RC. Services within primary offer are controlled via subscriber life cycle state.

Bundle Based Charge Priority

- Since bundles do not provide balances, bundle based charges are not guided to the offer.
- Bundle charges are applied to highest priority balances as defined in the upsell/compatibility template taking into consideration balance inclusion/exclusion rules.
- Bundle-based charges are applied to balances provided by subscriber or account offers. These balances are ranked based on the referencing offer priority as defined in the upsell template.
- If target balances are from a bundle, they are charged based on the bundle offer priority and the balance priority within each offer.
- If a balance is referenced by more than one offer, the highest priority reference is taken with its attributes and inclusion/exclusion.
- Insufficient balance options are always based on the bundle owning the charge, not the offer owning the balance.

Charges and Shadow Balances

RC-NRC Server creates a separate charge for each shadow balance containing the value of the charge for that account, prorated as necessary. Each charge contains data that can be used to recreate the original charge from the split charges.

Standalone RC and NRC Charges

A standalone charge is provisioned outside the context of an offer (for example, a calling circle charge).

These charges are applied in exactly the same way as bundle charges, with respect to the balance liability impact method, plus the following:

- The charge offer map attributes are provided via a system parameter.
- Account charges are applied as if they are attached to an account bundle.
- The balance liability method is always respected.
  - If the balance liability method is equal to balance and liability and the target has no eligible balance or TML enabled the charge fails.
  - If the balance liability method is equal to balance ability and the TML is not enabled the charge fails.
  - If the balance liability method does not exist only a charge record is produced and the charge is considered successful.
- Insufficient balance options are full or no charge. (If the balance is not sufficient the charge fails).
- Recovery duration is based on a default system parameter value.
- Charge (RC/NRC) offer map attributes values are provided via system parameters.

Insufficient Balance

Insufficient Balance Options and Multiple Balances

Insufficient balance options determine how charges are applied if the target balances can not cover the entire charge without going below the set balance limit.

When several charges are generated in one RCS run, and the first charge is successful and others are failed because of insufficient balance, the first *failed* charge is written-off irrespective of whether the previous charge was successful or not successful.

If a charge is attached to a primary offer, or if a bundle that contains a primary offer, the following options are considered:

- **Charge Full**:

  This option applies charges in full regardless of the balance minimum.
  When charging for multiple balances, the highest priority balances are charged to the configured minimum. If an amount from all the balances can not cover the entire amount, the excess amount is charged to the lowest priority balance.
  Based on this the lowest priority balance could be charged below balance minimum.
  Negative charges are charged in the same order.

  Charge Full applies to offers, and non-primary offers and bundles.

- **Charge to Balance Minimum**:

  When the charge is >0, if the total amount taken from all balances is > 0 but can not cover the full charge, then the charge is considered successful and the uncovered charge portion is written off.

  When the charge is >0, if the total amount taken from all balances = 0, then charge is considered unsuccessful. This charge may be retried or written off based on insufficient balance options.

  For negative charges, the highest ranking balances are credited to each balance maximum. Any excess amount is credited to the lowest ranking balance in full- this could exceed the balance maximum.

- **Charge to Balance Minimum up to Zero for Each Balance**:

  When the charge is >0: If the total amount taken from all balances is greater than 0 but can not cover the full charge, then the charge is considered successful and the uncovered charge portion is written off.

  When charge is >0: If the total amount taken from all balances = 0, then the charge is considered unsuccessful. This charge can be retried or written off based on recovery duration.

- **Negative Charges**
  Highest ranking balances are credited to each balance maximum. Any excess amount is credited to the lowest balance in full. As a result the balance maximum could be exceeded.

f the resultant balance amount is above the suspend threshold and the subscriber was suspended due to low balance, the subscriber will be re-activated.

- **No Charge**

  If the total amount available from all eligible balance is less than the charge amount, then the charge fails. This charge can be retried or written off based on recovery duration.

See also the *Product Catalog User Guide*.

RC and NRC Charges and Insufficient Balance Options

- RC with an offer or a bundle supports all four balance insufficient options: `chargeFull`, `noCharge`, `chargeToZero`, `chargeToMinBal`.
- RC can not be standalone RC without an offer and a bundle supports the `noCharg` option.
- NRC charge supports `noCharge`

For termination RC, at the point of write-off, if the insufficient balance option is `chargeToZero` or `chargeToMinBal`, the RC behavior is not changed. If the insufficient balance option is `noCharge`, `chargeToMinBal` overrides it.

Termination of NRCs can be overridden with `chargeToMinBal`.

All RCs and NRCs that are assessed during the charge request disconnection phase are eligible for assessment with this option.

When an insufficient balance occurs an MTR is generated if the payment mode is prepaid or converged with charged prepaid balances and there is no recovery option or the recovery duration is exceeded before a charge is successfully applied. In this case, two RC-NRC Server MTR- related fields write off and capture and record the charge amount when the write off occurs

If the payment mode is postpaid or converged with charged postpaid balances a charge record is generated. RC-NRC Server modifies the logic for the RC charge creation:

- `RC.amount` includes the uncharged amount
- `RC.amount_postpaid` includes the uncharged amount.
- `RC.x_tax_postpaid` includes the tax portion of the uncharged amount.

Example: A $10 calculated RC, $8 charged with running balances with tax rate of 10%

- If the payment mode is prepaid, $2 is written off and the $10 total charge recorded in the write off MTR
- If the payment is postpaid, $4 is paid by the postpaid balance and another $4 is paid by the prepaid balance. Thus the `RC.amount = 10`, `RC.amount_postpaid = 6`, `RC_TAX.federal_tax_prepaid = 0.4`, `RC_TAX.federal_tax_postpaid = 0.6`. Everything else is same as current.

Prerequisites: Balances are properly set up in the system and funds are insufficient to cover the RC charge.

See also “Taxation,” on page 29.

Insufficient Funds and Split Charges Across Multiple Balances

If there are insufficient funds in the first balance charges are directed to, RCs and NRCs can be split across multiple balances. Each balance must be able to accept charges of that RC or NRC term type, as defined in `BALANCE_EXCLUSION_INCLUSION`.

MTR Codes for Partial, Insufficient and Disconnect Credit

Comverse ONE generates three MTR codes by for partial, insufficient, and disconnect credit scenarios:

- MTR type 54 for `INSUFFICIENT_BALANCE`; this MTR is for information only.
- MTR type 55 for `WRITE_OFF`
  - if charge amount is greater than 0, then the charge is partially applied
  - if charge amount is 0, then the charge is not applied
- MTR type 56 for `DISCONNECT_CREDIT`.

An MTR is generated for unsuccessful and write-off charges. All MTRs are clearly identified by a type and subtype based on the source and reason for non-success. No comments are entered in the MTR comments field. Instead of codes, new and separate records are generated.

RC_NRC server generates a *charge record* for full and partial successful charges. Full and partially applied charges are not differentiated. However, the amount that was not covered by balances is recorded.

Termination Charges

Termination charges include all the RCs and NRCs that are assessed during the termination phase of RC calculation.

During a subscriber disconnect RC-NRC Server assesses termination charges based on insufficient balance option.This occurs either in RC-NRC Server on demand mode or as part of an RC-NRC Server batch run.

Full or partial charging of termination charges is supported. This capability overrides the insufficient balance options set at the offer level when terminating charges. It forces RC-NRC Server to take as much as possible from the target balance up to the balance minimum, except when the insufficient balance option is configured as allow charge to zero.

There are no bundle override effects.Charges for offers within a bundle are applied based on the offer's insufficient balance option.

The last cycle charges for normal RC expiration are not treated as termination charges.

RC/NRC Pending Charges and Balance Replenishment

RC and NRC pending charges are applied upon balance replenishment. The following activities trigger retries of RC and NRC pending charges for both subscribers and accounts when the associated system parameter `PENDING_RC_RETRY` is set to 1:

- voucher and non-voucher recharge and via any channel (IVR, USSD, SAPI, CSM, and so forth)
- state transition to active regardless of the pre-state (for both account and subscribers)

Liability Impact Method

The Product Catalog supports an attribute for each RC/NRC term to control how changes impact balances and liability. The following are set via the RC Balance/Liability Impact Method field:

- **Balance and Liability** (Default): This is the normal charging behavior; the charge is applied based on available target balances and liability. This charge affects the Total Monetary Liability (TML) if applicable.
- **Only Liability**: This configuration indicates that the charge does not impact any real-time balances but does affect TML. If the target TML is not enabled the charge fails.
- **None**: This configuration indicates that the charge does not impact any real-time balances and does not affect TML. In this case, RC-NRC Server only generates a charge record.

These field settings cannot be overridden via the Customer Center.

Taxation

Taxes are calculated by functions in the Taxation Libraries (TaxLibs). TaxLibs is called by the following modules:

- BIP
- The Unified Rating Engine (URE)
- The RC/NRC Server (RCS)

TaxLibs takes its Product Catalog tax data configuration from the URE Data Cache as it calculates taxes.

RCS calls TaxLibs during rating to tax recurring and non-recurring charges. It supports tax calculation only for individual charges, not aggregate charges.

`TAX_PREPAID_POSTPAID` determines what tax is calculated. It has the following values:

1=tax prepaid and postpaid the same (default);
2=only tax postpaid;
3=only tax prepaid.

Postpaid Taxation

If the charge is designated postpaid, tax will be calculated and charged only if `TAX_PREPAID_POSTPAID=1 or 2`

Postpaid taxation is handled as follows:

- RC-NRC Server passes the charge amount and tax amount separately to Balance Management.
- Balance Management determines if the tax needs to be recalculated based on `TAX_PREPAID_POSTPAID` and the balances used for the charge.
- The information is passed back to RC-NRC Server and is set properly in the RC or NRC record.

Prepaid Taxation

If the charge is designated prepaid, tax is calculated and charged if `TAX_PREPAID_POSTPAID=1` or `3`.

Configure taxation functionality for prepaid installations in one of the following two ways:

- Calculate tax the same way for all funds
- Prepaid usage is untaxed, and tax is calculated only on postpaid funds. This configuration is appropriate when tax is paid on a voucher or on top-up.

Prepaid installations calculate only point-of-sale taxes. Point-of-invoice, binned, and threshold taxes are not calculated. Tax is calculated using the transaction date as the point-of-sale tax point.

See the *Taxation Guide* for detailed information regarding taxation.

Payment Modes for Offers and TML

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

- Prepaid
- 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.

RCS processes the RC term defined in an offer with any payment mode. Based on the payment mode of the owning offer RCS determines the eligible balances in addition to existing criteria.

- If the owning offer is a prepaid offer, prepaid balance and shadow balance can be used.

- If the owning offer is a postpaid offer, postpaid balance and shadow balance can be used.
- If the owning offer is an either or an hybrid offer, prepaid balance, postpaid balance and shadow balance can be used.

Charge Record

When RCS writes the RC and NRC charge record, in addition to all prior existing information, the following information is recorded for each charge record:

Total **postpaid amount**: This is the Sum of monetary charges in all postpaid monetary balances plus uncharged postpaid amount. The uncharged postpaid amount is the postpaid portion of the charges not applied to running balances. Some usages have an uncharged amount due to balance is not available, or not sufficient, or system parameter always_charge_offline_usage is set to `NO`.

Total prepaid amount: the sum of monetary charges in all prepaid monetary balances plus the uncharged prepaid amount.

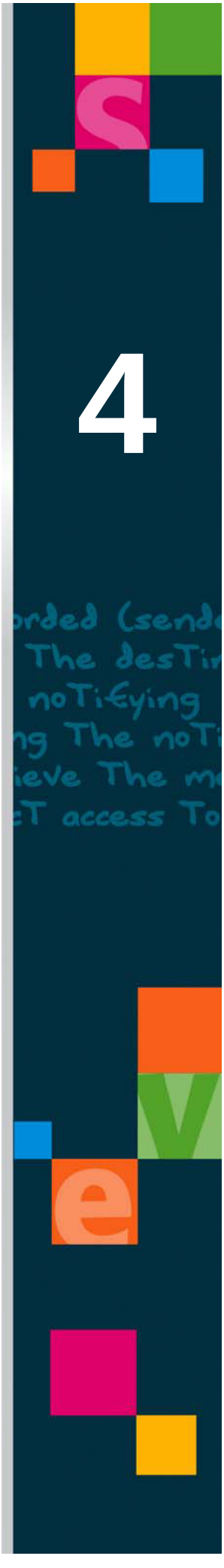
TML

When TML is enabled, and RCS processes RC/NRC charges in postpaid monetary balances, depending on the RC term and NRC term balance/liability impact method, TML is updated up to the TML maximum or not updated at all. Here are the details:

- If the balance/liability impact method is both or TML only, the TML is updated up to the TML maximum but does not exceed the TML maximum.
- If the balance/liability impact method is none, the TML is not updated.
- If the account level currency is different from the subscriber level currency, the amount is converted into the account level currency and this change is applied to the TML.
- As in converged billing, the TML value and TML maximum are not used to determine if an RC/NRC is charged or not or how much to charge.
- Credit adjustment to a postpaid monetary balance decreases the TML till it reaches 0. The TML cannot be below 0.
- Debit adjustment to a postpaid monetary balance increases the TML until it reaches the TML limit. The adjustment cannot be above the TML limit.

Chapter 4

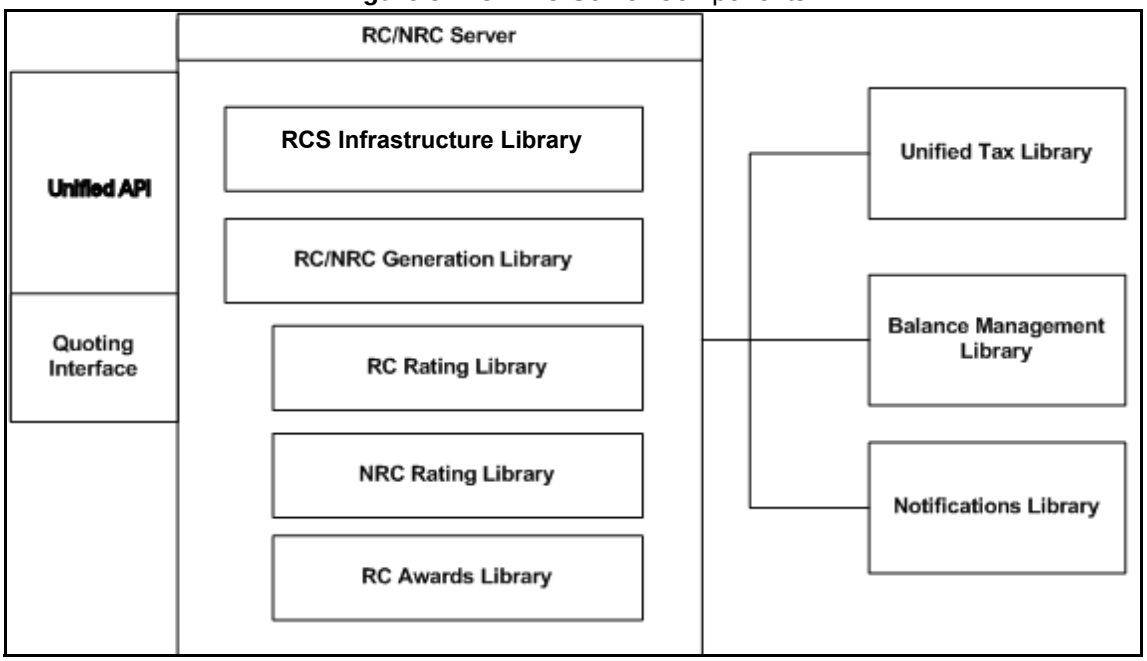
Components, Interfaces, and Processes



Components

RC-NRC Server components are shown in figure 5, "RC-NRC Server Components."

Figure 5 RC-NRC Server Components



Controller

The RC-NRC Server controller supports two modes: batch and on-demand. The RC-NRC Server infrastructure library monitors request from the URE framework and starts either of these processing modes as appropriate.

- In on-demand mode, URE framework uses the TCP/IP server to get the request from the Unified API and pass it to the RC-NRC Server Controller.
- In batch mode, the URE framework is responsible for starting up the RC-NRC Server command line, and RC-NRC Server gets the input parameters from `PROCESS_SCHED`.

Process List: Batch Mode

The RC-NRC controller is responsible for assembling the initial list of RC and NRC instances to process.

In batch mode this list is assembled from the `RC_TERM_INST` and `NRC_TERM_INST` tables.

Time-Based Processing

You can apply and calculate subscriber RCs just after midnight base on the subscriber's Time Zone not the system time.

RC_NRC Server batch mode allows charges to be generated up to a specified date which must be less than the current system date. The main use of this feature is to generate charges which were missed on previous batch runs for various reasons.

RC instances can be charged multiple periods in advance. If an RC instance is charged in advance, and you then change the configuration so the balance is no longer eligible for the award (for example, configuring the target balance to be eligible for the associated RC), the balance still

receives the award. This makes sense if you think of the RC as the subscriber paying for the award, and once they have paid for it they must receive it unless you refund the charge.

Real Time only
In a prepaid system generating RCs in advanced should never be done.

On Demand Mode

In on-demand mode, the RC-NRC Server runs continuously and applies RCs and NRCs to balances as soon as they are assigned to a subscriber and recorded in the Customer database.

If you do not choose to apply an NRC on demand, the RC-NRC Server applies it in batch generation.

Process List: On Demand Mode

The RC-NRC controller is responsible for assembling the initial list of RC and NRC instances to process.

In on-demand mode the list is generated from the input request.

On Demand Interactions

RC-NRC Server and the Unified API support the charging of RCs and NRCs in real-time before instantiation.

When an order is completed offers or bundles are activated before recurring charges are made. When the next RC-NRC Server batch process runs, RC-NRC Server does following:

If the charge is attached to a subscriber primary offer or subscriber bundle containing a primary offer and the charge fails, the primary offer or the bundle containing the primary offer is not be directly affected. In this case, RC-NRC Server uses the recovery option if configured. If there's no recovery option, RC-NRC Server writes off the charge.

If the charge is attached to a subscriber/Account supplementary offer and the charge fails:

- RC-NRC Server disables the supplementary offer and thus the services controlled by that offer or bundle are not available to the subscriber or account.
- If the offer or bundle has recovery options configured, RC-NRC Server retries the charge for the configured duration
- If the offer or bundle does not have recovery options configured, RC-NRC Server writes off the charge.

If the charges succeed, then the offer or bundle status is not affected.

A batch charge does not prevent a primary offer swap. If the charges from the old primary offer are not successful and the subscriber moves on to the new primary offer, the charges are written off without recovery. If for some reason the subscriber retains the old offer, then charges are attempted based on recovery option.

Recovery Mode

You can run the RC-NRC Server in recovery mode if it crashes or if you stop it for other reasons. Recovery mode is similar to batch mode, except that RC-NRC Server calculates and applies charges for all RCs and NRCs that were due during downtime, not only RCs and NRCs that are due on the current date or during the current RC cycle.

Libraries

The RC-NRC Server uses the following libraries: Charge Generation, RC Rating, NRC Rating, RC Awards, Taxation, URE Infrastructure, GFR infrastructure, URE Balance Management, URE Charging, URE Notifications, URE Logging. It interacts with the Product Catalog through database tables.

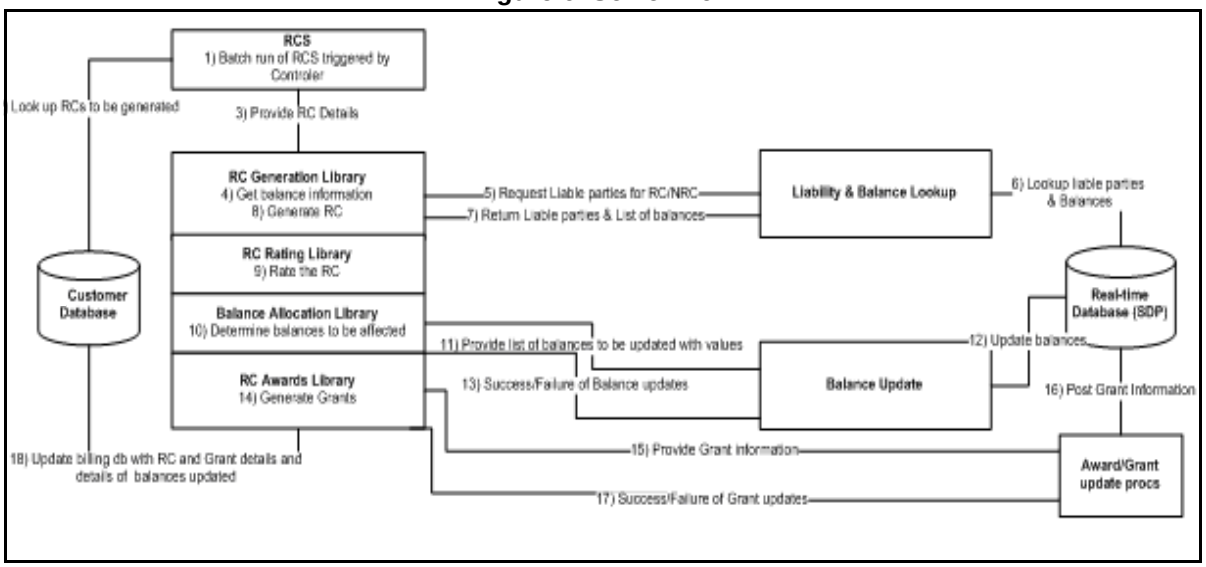
TSP Server

The RC-NRC Server requires a running instance of the TSP server The TSP server instance must run on the customer DB server and must be configured with certain tables. The configuration files are supplied with the setup package. The RC-NRC Server startup script confirms whether the TSP is running.

Server Flow

Figure 5, "RC-NRC Server Components" shows the RC-NRC Server flow.

Figure 6 Server Flow



When it runs, RC-NRC Server performs the following seven steps:

1. RC-NRC Server controller starts.
2. Looks up charges to generate in the database.

   Generates RCs and NRCs
3. Passes generated charges to the RC and NRC Rating libraries, which rate the charges (see "RC Rating," on page 42 and "NRC Rating," on page 43).
4. Passes rated charges to the Balance Management library, which performs the following three steps:
   a. Determines which balances to apply charges to
   b. Updates balances in the database
   c. Logs success or failure of balance updates
5. Then passes requests for awards on RCs to the Awards library, which performs the following three steps:

a. Generates awards
b. Updates balances and awards in the rating database
c. Logs success or failure of award generation

6. Updates the Billing database with details of grants and balance updates

When you are selecting a balance to which you will apply an award in the Product Catalog GUI RC Term/Award Relationship window, do not select the same balance that the RC term is charged against. Doing so can cause the RC/NRC server to charge the RC and issue awards even when the balance amount is insufficient. See also the *Product Catalog User Guide*.

Number of Running Servers

Converged only
In a converged environment there is one RC server running per customer databases.

Real Time only
In a real-time environment there is one RC Server running per rating database.

Interfaces

Product Catalog

Use the Product Catalog to do the following:

- define RCs and NRCs
- define rating information governing how RC and NRC amounts are calculated
- associate RCs and NRCs with Product Catalog bundles and offers, and with contracts and equipment charge codes

Once you have defined a charge, the Product Catalog maintains its attributes and associations. If information in Product Catalog is updated it pushes the newer version to the database, and the RC-NRC Server uses the new configuration in generating and applying charges.

For rates the RC-NRC Server is able to detect, it rates charges based on different Product Catalog versions such that an RC-NRC Server could be applied based on one or more rates being active (segmented charges).

Awards are also managed via the Product Catalog.

When selecting the balance to which the award is applied via the Product Catalog GUI do not select the same balance that the RC term is charged against. Doing so can cause the RC/NRC server to charge the RC and issue awards even when the balance amount is insufficient.

See the *Product Catalog User Guide* for detailed information on defining and configuring RCs and NRCs via the Product Catalog GUI.

Customer Center

Use the Customer Center to do the following:

- assign RCs and NRCs via an offer or bundle or outside the context of the offer or bundle.
- assign bundles and offers containing RCs and NRCs to subscribers. When an RC or NRC is assigned to a customer, Customer Center updates the Customer database.

You can set an effective date when assigning an RC or NRC in Customer Center. The charge will not affect rating and billing until that effective date.

You can also have charges take effect immediately. In the case of RCs, the RC is charged on its next apply date (which can be the current date). In the case of NRCs, after Customer Center updates the Customer database it immediately calls the RC-NRC Server to apply the charge.

See the *Customer Subscriber Management Guide*.

Unified API

When the RC-NRC Server runs in on-demand mode, URE and Customer Center pass requests for charge generation to it through the Unified API.

See the *Unified API Guide* for a description of RC-NRC Server related Unified API methods.

When the RC-NRC server performs terminations the results are persisted in a staging area where they are read by the Unified API and completed.

The use of staging area and the Unified API reading of termination results are only applicable for the offer termination part of requests.

The service order activation part of NCA, account, and subscription disconnects are managed by asynchronous queuing of charge requests to the RC-NRC server after the Unified API transactions are committed to the database.

Databases

For related database information, see the *Database Reference Guide*.

Server Procedures and Processes

Running the Server

To run RC-NRC Server, follow these two steps:

1. Insert a row into `PROCESS_SCHED` as follows:

```
insert into PROCESS_SCHED
(process_name, task_name, task_cycle, task_mode, sched_start,
task_intrvl, task_status,  task_priority, slide_time, db_name,
sql_query, debug_level, plat_id, usg_crt_hour,  usg_plat_id, usg_
version)
values
('<process name>', '<task name>', NULL, <task mode>, <date /
time>, 0, 0, 0, 0, NULL, <sql query>, 0, NULL, NULL, NULL, NULL)
```

   where

   - *`process name`* — The RC-NRC Server process instance identifier (for example, `rcs01` or `rcs02`)

   This is unique on a given server. You cannot run two tasks at the same time with the same process name.

   - *`task name`*: A task name. This can be Null or the same as the process name.
   - *`task mode:`* Mode of operation. 0 = batch mode, 1 = on-demand mode.
   - *`date/time`*: System date and time when the process will start. Batch mode only.
   - *`sql query`*: SQL query specifying which RC and NRC instances to process. Batch mode only.

   These fields are all documented in the PROCESS_SCHED table in the *Database Reference Guide*.

2. Start the RC-NRC Server using URE.

   In batch mode, URE runs RC-NRC Server at the time specified in `PROCESS_SCHED`. RC-NRC Server gathers RC and NRC instances for processing and generates charges as in “Process List: Batch Mode,” on page 35.

   In on-demand mode, RC-NRC Server runs continuously. RC-NRC Server receives requests for real-time generation of RCs and NRCs through the single API interface.

Scheduling

You can run multiple RC-NRC Server processes at once. In on-demand mode, RC-NRC Server runs continuously.

You should still run it in batch mode periodically to apply charges that you did not choose to apply on demand. If possible, run batch mode during hours of low usage to minimize delays in processing usage, and when few to no other resource-intensive processes are running to maximize

system performance. Run batch mode at least once a day; preferably before running billing processes so charges appear on postpaid subscribers' invoices.

Run RC-NRC Server in recovery mode when you restart it after a period of downtime. You can replace an instance of running in batch mode with running in recovery mode; after a period of downtime this is not necessary.

Charge Generation

In Charge Generation, the RC-NRC Server performs the following eleven steps:

1. RC-NRC Server collects charge instances to process. This differs whether it is running in batch mode, in which it collects charges whose apply date has been reached; or on-demand mode, in which it processes charge instances that are passed to it through the single-API interface.
2. Group instances by offer, bundle, and target account. All instances in the same offer with the same target account are processed together.
3. Segment instances between threads based on target account (batch mode only). This process will attempt to balance the load between different threads. The maximum number of threads is configurable by the operator.
4. RC-NRC Server determines whether or not to generate the charge. The RC-NRC Server does *not* generate charges for
   - accounts that have not yet been activated (generates a warning message)
   - accounts that have been suspended, unless `RC_TERM_REF.apply_during_suspend` is set.
   - accounts that are in fraud lockout, unless `RC_TERM_REF.apply_during_fraud_lockout` is set.
   - accounts that are postactive, unless `RC_TERM_REF.charge_postactive` is set.
   - offers contained in suspended bundles, unless `RC_TERM_REF.apply_during_suspend` is set

   If the RC-NRC Server determines not to generate a charge, it updates the charge's status in `RC_TERM_INST` or `NRC_TERM_INST`.
5. RC-NRC Server determines the charge dates.
   The dates of the charge are based on its schedule, its apply_day and advance_periods (RCs only) values, and the last date charges were generated. If the RC or NRC does not allow a specified schedule, the schedule is based on the account schedule (CMF.bill_period for postpaid/ACCOUNT_SUBSCRIBER.bill_period for prepaid), otherwise it is based on the specified schedule in the instance (period frequency, schedule_type, offset, and fixed_cycle_duration for RCs, fixed_cycle_duration for installment NRCs, application_date for other NRCs). The cycles in the schedule between the last charged date (instance start date for a new instance) and the current date determines the dates for which charges need to be generated. After schedule changes, these dates can cover either multiple charges or none at all.
6. RC-NRC Server generates the charge(s).
7. RC-NRC Server rates the charges.

See "RC Rating" on page 42 and "NRC Rating" on page 43 for details.

8. RC-NRC Server calls the Taxation library to apply taxes.

See the *Taxation Guide* for more information on taxes.

9. RC-NRC Server applies charges to balances.

   In a real-time environment, applies all charges to balances except refinance NRCs. Refinance NRCs are generated from previously postpaid amounts, and do not affect real-time balances.

10. RC-NRC Server calculates award grants due to RCs.

See also chapter 3, “Recurring/Non-Recurring Charges and Balance Management.”

Rating

A preconfigured amount per unit that is used to price usage and nonusage charge types. Rates are derived based on a number of key fields.

For RCs and NRCs, the keys used to derive rates include the following:

- RC/NRC term
- Class of Service
- Subscriber class
- Subscriber type
- Rate class
- Offer
- Currency

RC Rating

For each RC generated, the RC-NRC Server rates it as follows:

- If the RC term is rated by award balances, the calculated rate is multiplied by the number of balances that are provisioned to receive awards from this RC, regardless of whether they actually receive an award at this time.
- If an override rate is defined for the RC, and the dates of this rate overlap any of the RC dates, the override is used to rate the RC. If only some dates of the RC are covered by the override rate, the RC is split and each piece is then rated appropriately.
- Rates an RC instance in the currency specified.
- Prorates the RC:
  - If the charge dates of the RC do not match a full cycle of its underlying bill period, RC-NRC Server prorates it by the ratio of days in the RC to the number of days in the bill period.
  - If it is the first charge for the RC instance, RC-NRC Server prorates it based on the term activation code. If it is the last charge for the RC instance, RC-NRC Server prorates it based on termination code.

See “Rate Keys,” on page 44 and the *Rating Technical Reference* for related information on rate keys and rating.

NRC Rating

If a rate is defined for an NRC term instance it is used to rate the NRC. Otherwise, the system looks up the rate using rate keys. The same process applies to RC rating although fewer rate keys are supported.

For each NRC generated, the RC-NRC Server rates it as follows:

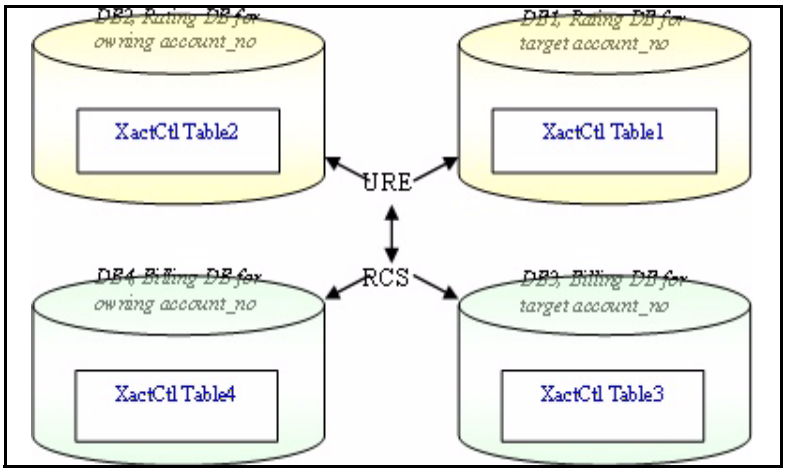
- The RC-NRC Server uses a transaction control table for every SDP to hold recovery data and provide fault tolerance. Both the RC-NRC Server and the Unified Rating Engine (URE) are involved in global transactions which are handled as follows:
  - On RC-NRC processing, the transaction control table that exists on every SDP is updated by URE when charges are applied to balances. (Additionally, the transaction control table is involved in every billing and customer database information recovery.)
  - When RC-NRC Server runs, it calls a URE API interface to query every available SDP for transaction control records. Meanwhile, RC-NRC Server queries every available billing database for transaction control records. After RC-NRC Server analyzes the returned records, unresolved transactions can be recovered in the correct order. When the URE processes are complete on the SDP, RC-NRC Server updates the billing database for owning and billed accounts. After all these steps are done, URE begins to delete the related transaction control record first on the billed account SDP and then on the owning account SDP. Then RC-NRC Server continues to delete the transaction control record on the billed account's billing database and then to the owning account's billing database.

Recovery

Figure 7, “Unified Rating Engine and Recurring—Non-Recurring Charges Serve” illustrates normal processing

Figure 7 Unified Rating Engine and Recurring—Non-Recurring Charges Serve

r



.

In figure 7, “Unified Rating Engine and Recurring—Non-Recurring Charges Serve”, XactCtl refers to transaction control and RCS to the RC-NRC Server.

Rate Keys

Rating is based on rating keys. Some keys are mandatory and some are optional. For RCs, `rc_term_id`, `period_frequency`, and `currency_code` are mandatory. For NRCs, `nrc_term_id` and `currency_code` are mandatory.

When selecting a rate to use, the values for each rate key in the RC instance (which come from the `RC_TERM_INST` and `RC_TERM_INST_RATE_KEY` tables) are compared to the rates, row by row.

See the *Rating Technical Reference* for more information on rate keys.

Currency Code

Currency code is always the currency code of the balances charged for the RC or NRC. Rate key values must match exactly; there are no wild-cards. If no row is found the currency code is replaced by the default currency code value for the RC or NRC, and the search is done again. If no rate is found, and the charge is an RC, the default rate is then looked up. The default rate has matching value for the mandatory rate keys, the default currency code, and the value zero for all optional keys (its also flagged as a default rate in the PC GUI screen).

If no rate is found, the RC or NRC can not be rated and RC-NRC Server rejects the instance with a configuration error. If more than one rate is found and the rate is not incremental, the instance is also rejected with a configuration error.

RC Rating and Dates

For RC rating only, the dates of the RC can cross the dates of multiple PC versions. RC-NRC Server behavior in this case depends on the value of the system parameter `SPLIT_RCS_FOR_RATE_CHANGE`. If the system parameter is off, the version active on the `apply_date` of the RC is used to look up the rate applied to the entire charge. If the system parameter is on, the RC charge is split into pieces based on the active dates of the versions which overlap the RC dates, and each piece is rated by the matching version. The final price of each RC piece is prorated by the ratio of the number of days in the RC piece to the number of days in the original RC.

Normal Processing

RC-NRC Server normal processing proceeds as follows:

Data Fetch and Segmentation

1. In batch mode, RC-NRC Server gets the input parameters from PROCESS_SCHED and assembles the initial list of RC/NRC instances from RC_TERM_INST/NRC_TERM_INST. In on-demand mode RC-NRC Server gets the input parameters and the initial RC/NRC instance list all from Single API, as seen in Figure 7, step (1).
2. RC-NRC Server generates RC/NRC instance batches based on offer.

3. And these instance batches are further grouped by SDP ID into segmenting messages.
4. The segmenting messages are passed down to next stage and segmented by GFR nodes. All instance batches belongs to the same owning account in a segmenting message go to a unique node. In each node, the change list is generated for each instance batch.
5. The RC-NRC Server calls the URE using Instance Batch with Chargelist.

URE Charges and Award Balancing

6. Updates charge balances on the database and the transaction control table 1.
7. Updates award balances on the database and the transaction control table 2.
8. URE Returns to the RC-NRC Server using RCBALANCETAX/AWARD

RC-NRC Server Billing Database Updates

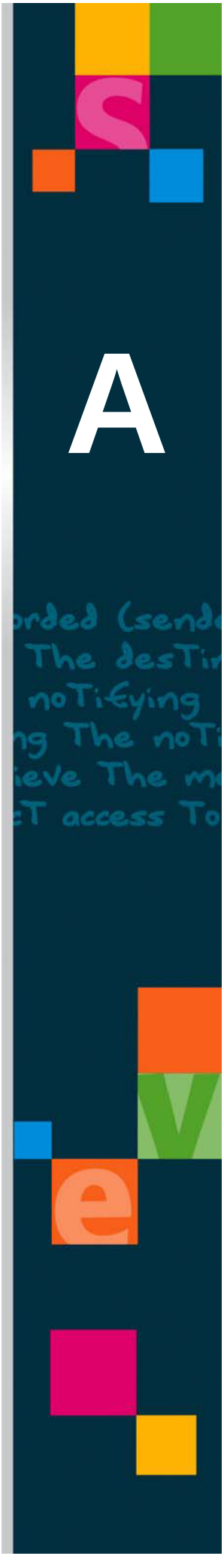
9. Updates RC BALANCETAX on database 3 and the transaction control table 3
10. Updates RC_TERM_INST on database 4 and the transaction control table 4.

RC-NRC Server Working Cycle and Maintenance

11. Loop from 4 to process the next segmented message
12. Loop from 3 to process the next segmented message
13. The RC-NRC Server fetches the next group in the RingBuffer from (2).
14. The RC-NRC Server finishes the schedule or request in (1) and shuts down.

Appendix A

Recurring Charge Schedule Options



Charge Cycles

When you run the RC-NRC Server, it determines the charge cycles or billing cycles covered by each RC term based on the charge term's schedule as configured in Product Catalog and Customer Center. An RC or NRC instance appears on an account's invoice for a given billing cycle.

The number of cycle applications can be interpreted as the number of full cycles that the RC attempts. This number must be > 0 or blank; a blank default value implies that the RC does not end, unless the service (offer/bundle) /subscriber/account is terminated or the CSR specifies an end date. This functionality makes it possible to limit the RC to only one application thus ensuring that it behaves as an NRC and issues awards to any balance not just the core balance.

Charge Cycle and Advanced Billing

For billing in advance (default):

- Charge cycles cover the period from the last (or current) apply day until the end of the day before the next apply day. For example, if the apply day is 15 and the billing cycle is monthly, on April 15 RC-NRC Server applies a charge covering April 15 to May 14.
- RC-NRC Server cannot apply charges in advance for multiple charge cycles.

Supported Recurring Charge Schedules

The following RC schedules are supported.

Bill in Advance

In this schedule, frequency is relative to the calendar cycle and the apply day is always the first day of the cycle.

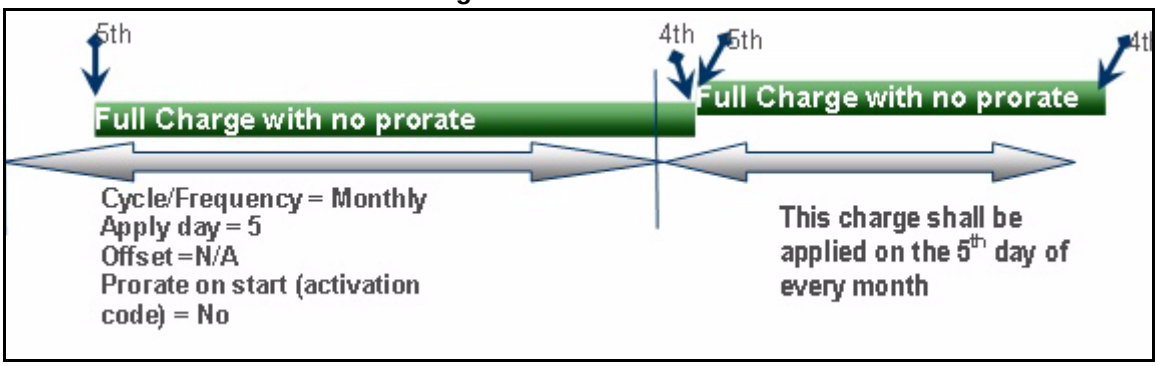
The bill in advance schedule is defined with the following configuration.

- Allow defined schedules
- Bill in advance (relative)
- Frequency (weekly, monthly, and so on)
- Apply day can be set to any valid day of the cycle or 0

  Example:

  If an RC is on monthly frequency and the apply day is set to 4, the charge is always taken on the 4^{th} and the charge covers the duration from apply day to the day before next apply day (4^{th}- 3^{rd}).

Figure 8 Bill In Advance



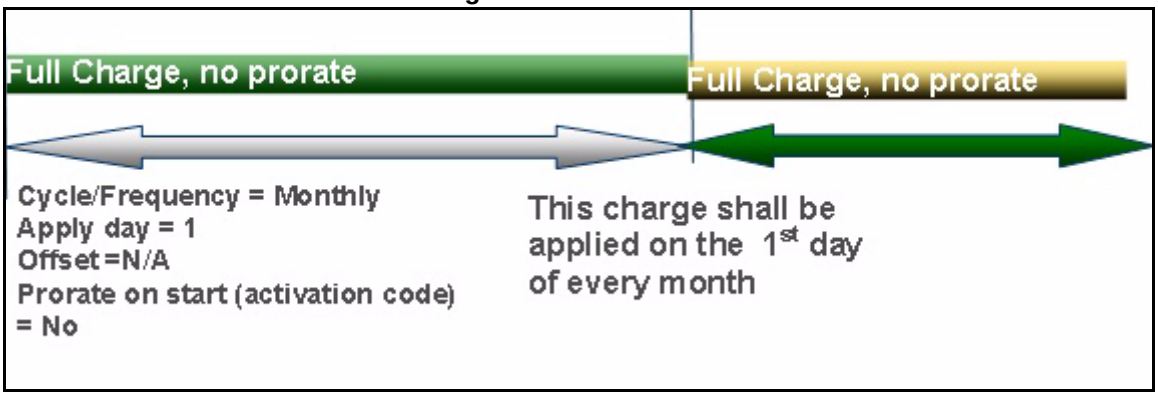
Bill In Arrears (Fixed)

In this schedule, frequency is arrears to the calendar cycle and the apply day can be any day within the cycle. The schedule is fixed to the calendar cycle.

This schedule is defined with the following configuration:

- Allow defined schedules
- Bill in Arrears (Fixed)
- Frequency (weekly, monthly and so on)
- Apply day can be set to any valid day of the cycle or 0

Figure 9 Bill in Arrears



Off Cycle

Real Time only
Off-cycle schedules are not supported in the Comverse ONE Real-Time Charging derivative.

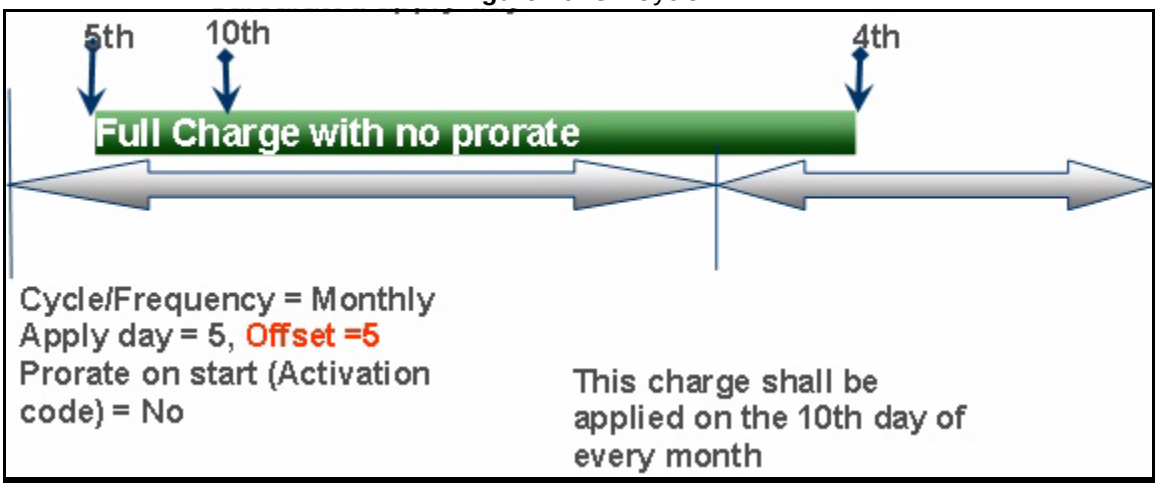
This cycle (seemingly complex) enables charging that is neither in arrears nor in advance on a relative cycle. Rather, it offsets the underlying calendar cycle with the specified offset days and has an apply day that is not the same as the start or end of the cycle.

This schedule is defined with the following configuration

- Allow defined schedules
- Frequency (weekly, monthly, and so on)

- Offset day- see offset day validations
- Apply day can be set to any valid day of the cycle or 0

Figure 10 Off Cycle



European Weekly Cycle Format

Weekly cycles in European week formant (Monday - Sunday) are supported by offsetting the underlying calendar cycle with specified offset days and having an apply day that is not the same as the cycle start or end day. This avoids charging in arrears and advance on a relative cycle. For example, an RC can defined for the following cycles:

- Weekend cycle with apply day set to day 6 or 7

  If set to day 6 the charge can be recovered if it is not applied successfully. In this case the recovery value is set to 1.
- RC defined for weekday cycle. In this case the apply day can be set to days 1-5. Recovery duration can be set = (5 - apply day): for example, if the apply day is day 2 the recovery would be set as 5-2= 3. The charge can be applied on day 3, 4 and 5.
- RC defined for entire week. In this case the apply day can be set to day 1-7. Recovery duration can be set = (7 - apply day); for example, if apply day is day 2 the recovery would be set as 7-2= 5. This means we can retry the charge on day 3, 4, 5, 6 and 7.

When an offer is activated and the RC start date is not in the future all RC charges are attempted regardless of the apply day and schedule. For the first cycle, charges are not doubled when the configured apply day arrives.

Flexible

This schedule allows charging based on number of days instead of calendar based cycle boundaries;

This schedule is defined with the following configuration

- Allow defined schedules
- Bill in Arrears or Advance (Default = Advance)
- Cycle Duration (for example, 20 days)
- If charging in advance, apply must always be 1.
- If charging in arrears, apply must always be the last day of cycle.

Bill Cycle

Enables you to charge based on the account bill cycle. This is the default frequency and defaults to bill in arrears.

- Does not allow defined schedules
- Must have an apply day.
- In the Product Catalog, the apply day is always set to 0.
- At provisioning 0 apply day is set as follows;
  - If the item is marked to be billed in advance then the apply day defaults to the first day of the cycle- this would be the only valid day
  - If the item is marked to be billed in arrears then the apply defaults to the last day of the cycle.
  - Thereafter the CSR can change the apply day to any day of the cycle (must be a valid day within the cycle.)

A specific apply day can be requested by the subscriber. This requested apply day can be the same as the bill cycle. Bill cycle implies the cut off date for including all the generated charges in the invoice. When the apply day is the same or earlier than bill cycle date it means the system does not include those charges in the current invoice.

Valid Apply Day Settings

Table 5 Valid Apply Day Settings

Period	Allowable Apply Dates	Comments
Daily	N/A	The Daily setting does not require an apply date.
Weekly	Monday, Tuesday, Saturday, Sunday	Monday means apply every Monday; Tuesday means apply every Tuesday, and so on.
Monthly	0, 1, 2, 3, 4... 31	1 means first of every month, 2 means the second of every month, and so on. 0 means the of the day of activation, or the day of the recurring charge start date, whichever is later.
Quarterly	0, 1, 2, 3, 4... 90, 91,92	1 means Jan. 1, Apr. 1, Jul. 1, and Oct. 1 2 means Jan. 2, Apr. 2, Jul. 2, and Oct. 2 and so on. 0 means the day of activation, or the day of recurring charge start date, whichever is later.
Yearly	0, 1, 2, 3, 4, 5... 365	1 means every Jan. 1st, 2 means every Jan. 2nd, and so on. 0 means the later of the day of activation, or the day of recurring charge start date.

Table 5 Valid Apply Day Settings (Continued)

Flexible Cycles	1, or last day of the cycle	N/A
Relative Off-cycle	0, or any day within the specified frequency range	0 apply day is only valid if the offset =1 or 0. 0 apply day is not valid if the RC start date is in the past (CC/CCC). 0 can be a valid offset day, implying that the charge cycle start date or the first day of the relative cycle is later than the subscriber activation date or the offer start day or the RC start day. Apply day = 1 means that the charge is always taken in advance. That is, relative mode. An offset =1 means that the cycle is fixed to the underlying schedule. That is, cycle is aligned with the schedule
Bill Period/Bill Cycle	0, or any day within the specified frequency range	At provisioning (CSM), the 0 apply day is replaced based on the desired account bill cycle. Replace the 0 apply day with appropriate values as follows: If the item is marked to be billed in advance then the apply day defaults to the first day of the cycle. For bill in advance, the CSR never sets the apply day to any other day except the first day of the cycle. For bill in arrears, the CSR sets the apply day to any other day within the selected bill cycle including last and first day. For account bill cycles, the CSR changes the account level bill cycles frequencies. Therefore, an item previously billed using monthly frequency can be billed to weekly frequency.

Valid Offset Day and Apply Day Validations for Offset Cycles

- The apply day is any valid day within the cycle. It is configured via the Product Catalog GUI and can be modified by a CSR. It must be validated against the cycle and the offset day.
- The offset day is any valid day within the cycle configured in the Product Catalog and can be modified by a CSR.
- Both days (apply day and offset) can be modified at any time but must be validated in the Product Catalog and CSM.
- 0 apply day is only valid if the offset =1 or 0. (Product Catalog GUI only.)
- 0 should be translated accordingly by CC/CCC.
- 0 can be a valid offset day; thus the charge cycle start date/first day of the relative cycle is latter than the subscriber activation date, offer start day and RC start day. (Product Catalog only)
- 0 offset day must be translated by CC/CCC as above.
- An apply day equal to 1 means that the charge is always taken in advance (that is, relative mode).
- An offset equal to 1 means that the schedule is fixed to the underlying calendar frequencies; for example, the first to the last day of the month.

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