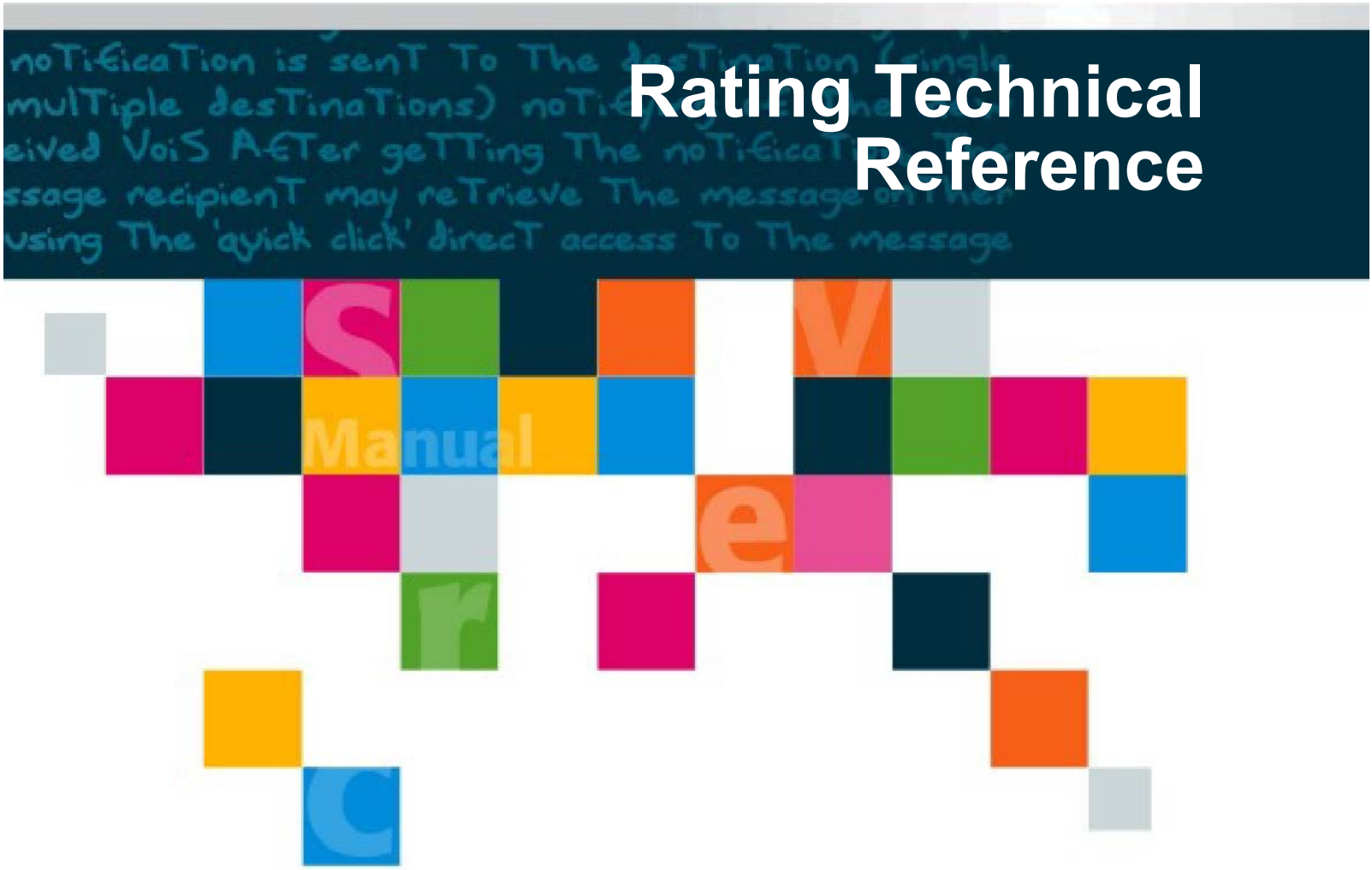
COMVERSE

ComverseONE®

3.5 RT TR 3.0

Rating Technical Reference



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Notice

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Revision History

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

Date	Chapter	Description
09/20/2012		Initial publication.

Contents

Figures

Tables

Notational Conventions

Useful information appears in this format.

Provides direction to important information

Important information appears in this format.

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

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

Table 1 Notational Conventions

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

Special Markers

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

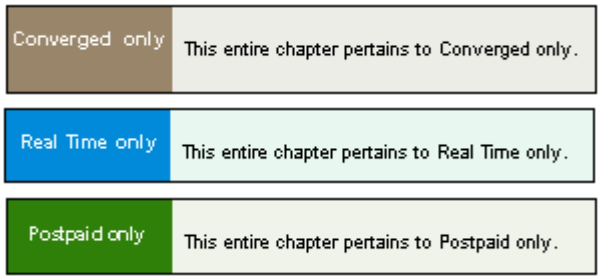
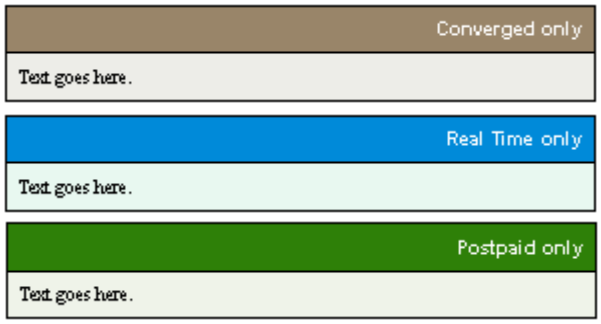
Table 2 Labels in Markers

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

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

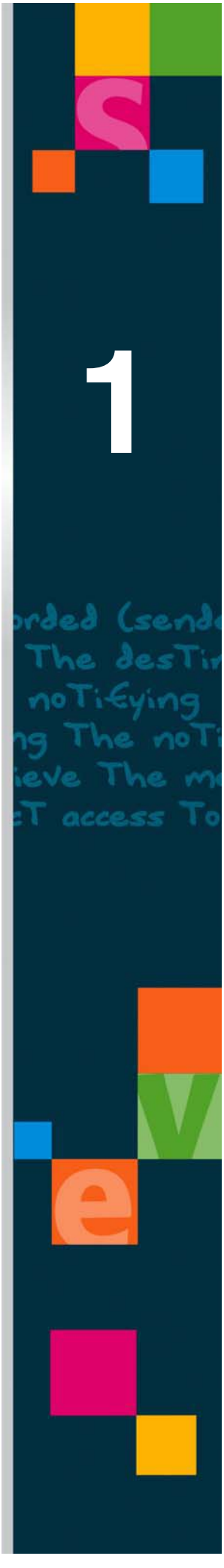
- Entire chapters
- Selected portions of chapters
- Tables, either entire or partial

Table 3 Types of Markers

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

Chapter 1

Introduction



Overview

This manual describes the Comverse ONE 3.5 RT TR 2.0 Unified Rating Engine (URE), the subsystem responsible for gathering incoming usage records and processing them for billing.

Rating usage means determining the appropriate rate for charging usage. Because charges vary from account to account for many reasons, the URE considers many factors, such as balances, discounts and promotions, and tariff plans, in establishing the rate at which a subscriber is finally billed. This manual describes the URE in terms of processing flow, including interactions between modules, servers, and databases.

Additional Documentation

For a list of other Comverse ONE documents, see the *Comverse ONE Documentation List*.

Who Should Use this Manual

The Comverse ONE solution *Rating Technical Reference* is primarily intended as a reference manual for System Integrators and Comverse Deployment teams. It assumes a working knowledge of relational database principles and a basic familiarity with the concepts underlying the Comverse ONE solution.

New Features for This Release

The Comverse ONE 3.5 RT TR3.0 release of the *Rating Technical Reference* retains the rating features implemented in the previous Comverse ONE 3.5 RT TR2.0 release.

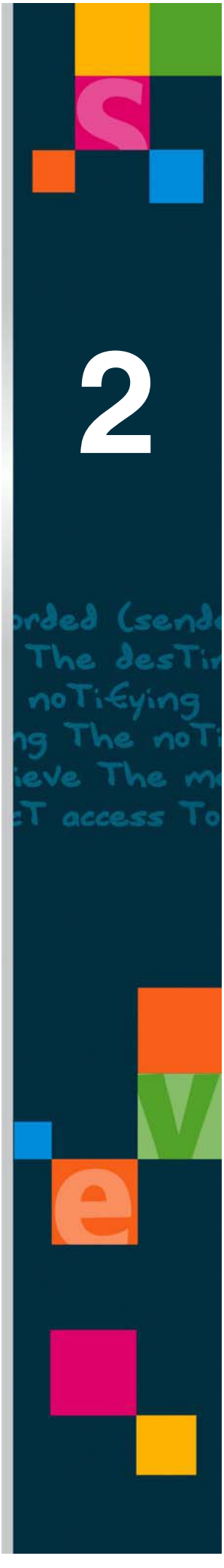
The following lists the new feature in the Comverse ONE 3.5 RT TR3.0 release that impacts Rating:

- The URE supports the VPN Enhancements for Closed User Groups feature, which adds functionality for Super CUGs, includes non-Comverse ONE subscribers as CUG members, and adds support for CUG Global Table.

  (Details of this feature's functionality as it impacts the URE are provided in Chapter 6, "Activity Usage Type (AUT)" in the section, "URE Support for Enhanced CUG Functionality," on page 147.)

Chapter 2

Rating Architecture



To present a single logical view of rating to the customer, the Comverse ONE solution supports a Unified Rating Engine (URE) for both online and offline rating. The URE carries out all the necessary processing of usage records to determine the charges on that usage so it can be billed correctly. The URE implements:

- configuration through Product Catalog
- common logging, tracing and alarming utilities specified by the Unified Platform
- a unified caching mechanism for static data
- a unified means of data exchange between rating applications

Rating Applications

The Unified Rating Engine (URE) is a single rating engine for all usage rating in Comverse ONE.

Rating Library

The Comverse ONE Rating Library presents a single interface for any application performing any rating activity. The rating library is grouped in four modules:

- Guiding
- Pricing
- Charging
- Balance Management

These modules are hosted independently of each other and connect the rating libraries by functionality through a common URE API. The output of one, however, might serve as the input to another. Each module can contain one or more libraries.

The Rating Library has the following functions:

- determines Segmentation Keys
- determines Final AUT
- determines Offer and Tariff information
- determines Discount and Bonus information
- determines Liable Party
- checks Service Eligibility

Product Catalog

The Product Catalog GUI is a unified configuration GUI for rating data. Detailed information about the Product Catalog is in the *Product Catalog User Guide*.

Alarms, Events, and Logs

Alarm, event, and log utilities are common to all applications across the Comverse ONE platform. All rating components use these common utilities. A customer can inspect the system by examining alarms, events, and logs. The URE provides a common format for alarms and events, and a single mechanism for logging and inspecting log files. Logs have the same format for all usage. Rerating capabilities and functionality are covered in this manual in chapter 12, “Rerating.”

TSP/Data Caching

The data caching mechanism is uniform throughout Comverse ONE. The URE uses the Tariff Server Process (TSP) module to access rating data and activity-related data.

As the mobile virtual network operator (MVNO) concept is enhanced in Comverse ONE, TSP and the related data caching mechanism is enhanced to support MVNO in addition to the previous versioning mechanism.

Rating Modules

The Unified Rating Engine is comprised of the following modules:

- *Guiding*: finding the user responsible for activity, the activity usage type, and the liable (billable) party
- *Pricing*: determining the price of the usage based on offers, tariffs, and promotions (discounts and bonuses)
- *Charging*: computing the charge for the usage
- *Balance Management*: crediting/debiting accounts, locating the appropriate balance to charge

The URE modules allow customized replacements or overrides of core functionality in each logical unit. All URE modules use the Foundation Class Framework to ensure seamless portability across platforms and variations required to support internationalization.

The URE loads modules according to specifications in a configuration file in order to adapt dynamically to the functionality supported.

Guiding Module

The Guiding Module provides the following capabilities:

- checks if activity for the subscriber is authorized based on subscriber and initial AUT information
- guides to the activity
- guides to the liable party for the activity
- determines segmentation keys
- determines final AUT
- determines offer and tariff information
- determines discount and bonus information
- guides to liable party
- checks service eligibility

Pricing Module

The Pricing module provides the following capabilities:

- calculates the Tariff Plan/Rate Plan to be applied based on subscriber and activity information
- calculates the activity charge (both reservation on and off mode) for:
  - events, such as send/receive SMS.
  - start and end segment of the session-based activity for a given activity, session length, subscriber, and tariff information
- calculates the activity length or volume (both reservation on and off mode) for a given activity, subscriber, and tariff information. (This is so-called inverse rating.)
- reserves balances for reserving one or more balances for an activity.
- provides the detailed AoC for the following scenarios:

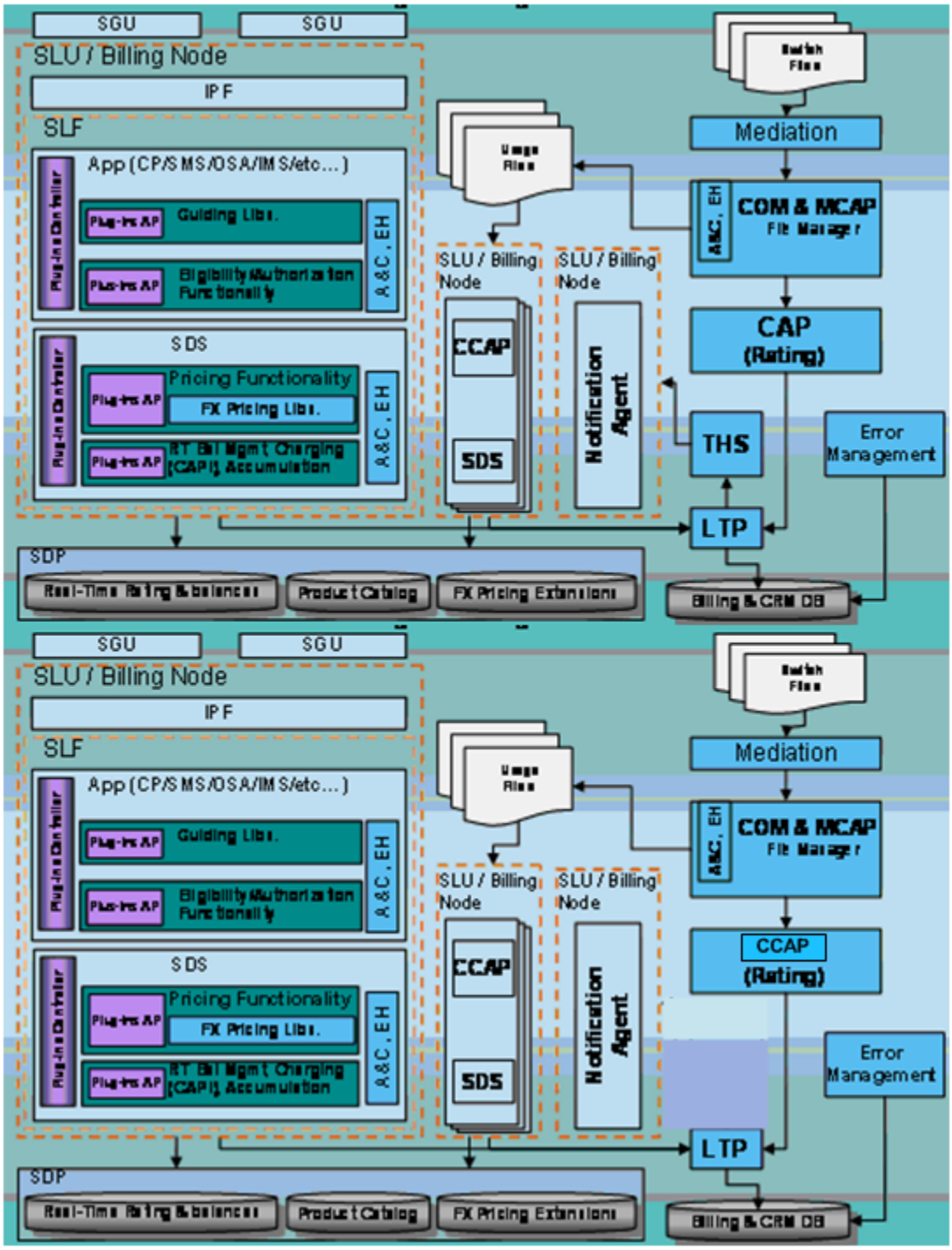
- calculates the cost of an event given the activity parameters, subscriber information, and return cost information
- calculates the cost of an event given the activity parameters, subscriber information, return cost information, and indication whether subscriber has sufficient funds to reserve
- calculates the cost of a session (voice/video, and so on), given activity info, subscriber info, and how long session will last
- calculates the cost of a session given activity information, subscriber information, session length, return cost information, and indication whether subscriber has sufficient funds to reserve
- calculates how long a session can last for given activity information and subscriber information, including balance information
- calculates taxes to be applied to the charge
- in addition to the charge applied to the balance, known as the *net charge* (with unit credit and with discount), pricing also calculates base charge (no unit credit and no discount), non-credit charge (with unit credit and no discount), value of unit credit, and value of discount
- based on total charge, either authorize or deny the reservation for session-based activities

Balance Management Module

The Balance Management module provides the following capabilities:

- applies the actual charge after all rating considerations (such as discounts, bonus, charge redirection), update accumulators, and determine any bonuses to be awarded to the user
- provides charge advice at end of activity
- determines balance eligibility
- reservation

Figure 1 URE Architecture



URE Request Types

The URE performs various services, known as *request types*, involved in authorization, rating, and charging for usage.

Usage applications, such as Call Processor, OSA, batch processor, and the like, invoke one or more of these services as part of their normal processing flow.

The following are the URE request types:

- Initial Authorization Request (no reservations/charging): used at the beginning of any online activity to determine whether it can proceed, but not to charge a usage.
- Initial Authorization Request (with reservations): used to initially authorize and price the initial segment of real-time usage.
- Extend existing reservation: used to continue an existing real-time reservation.
- Finish Existing Reservation: used by real-time applications to complete/terminate an existing reservation. This will include determining the final pricing, determining per-balance charges (where appropriate), updating balances and accumulators (where appropriate), and generating an output usage record. In some places we support multiple models for the same concept, but these never overlap or require additional configuration.
- AoC non-guaranteed: used to get the price of a future online usage. This would include determining the final pricing, but would not make any reservations, update any Balances/Accumulators, or generate an output record. Because we don't create reservations or update balances, the result is not guaranteed. Since no funds are reserved, an activity can be priced differently at a later date, based on a different state of available balances.

Since the URE is stateless, it maintains no internal status information about existing sessions, reservations, and so on, although it updates subscriber and account records. It is up to the application to maintain any session context and to know which service(s) to invoke and in what order for any usage.

Input To The URE

Input to the URE comes from several disparate sources:

- Generated by a switch
  - Real-time requests

  Signaling session requests are generated by a switch.
- Generated by an application
  - Instant chargeable events
  - Internet real-time rating/charging requests (event charger, OSA, Diameter)

  Internet session requests and instant chargeable events are generated by applications; all come through real-time interfaces such as CAMEL, WINA, Event Charger, OSA, and Diameter. Such gateway applications as the SGU, DGU and ODS process incoming requests first, followed by IPF applications that abstract protocol-specific details from the messages and pass them to the appropriate rating applications (IP INA for Call Processor, IP IND for GPRS & CAP3SMS, and USSD_IPF for USSD).
- Retrieved from the Billing DB
  - Mediated switch-sourced CDRs
  - Usage records (in rerating)
  - Outage records

  Call Detail Records (CDRs) generated by network and usage records (rerating) are retrieved from the Billing database. CDRs go through Data Mediation and File Manager, while usage records (rerating) go through rerating processes.
- Configuration information
  - Subscriber balances
  - Product Catalog configuration data

Subscriber balances and URE-related Product Catalog configuration data (such as Tariff Plan information, promotion plans, and so on) are stored on and retrieved from the Rating Server (SDP).

Output of URE

Outputs are messages back to the network, updated data in the DB, and history records. The outputs of the URE are:

- authorization

  Authorization and session control information is communicated back to network/applications.
- session control info
- updated subscriber balances

  Updated subscriber balances and short usage records (call histories) are stored on SDP while the Usage Record Transfer (URT) capability transfers long usage records to the Billing Database in near-real-time fashion.

Short usage records and long usage records are generated depending on the deployment mode.
In real-time (RT) mode, short usage records are generated in the `CALL_HISTORY` table for CallPro/GPRS/CAP3SMS apps; in the `OSA_HISTORY` table for OSA, in the `DIAMETER_MAIN` table for Diameter, and in the `PS_TRANSACTION` table for Payment server.
In converged (CV) mode, long usage records are generated in `USAGE_RECORD_MAIN*` tables for CallPro/GPRS/CAP3SMS/OSA, and `USAGE_RECORD_REVERSIBLE*` tables for Payment server and Diameter.

- usage records, notification, errors, and error usage records

  As a rule, notification messages are generated in real time and then enqueued to a SDP queue and dequeued by notification agent and sent to appropriate parties.

Comverse ONE Databases

Comverse ONE uses a multi-server database model. This means that each database type is installed separately on its own database instance. The URE Database Access libraries are so designed that changing the underlying database requires changes to these libraries only.

Database Instances

The Comverse ONE solution has the following database instances:

- Offline Product Catalog: one Oracle instance
- Master/Slave: one or more Oracle instances
- Main/History: one instance for each Master or Slave
- Billing

  (multi-server architecture [MSA])
  - Catalog
  - Dynamic
  - Unscaled

Rating

- Master/Slave
- Main/History
- Dynamic
  - SDP (Rating Server)

Billing

MSA: Three or more instances

- Catalog: one instance
- Customer (Dynamic): multiple instances
- Unscaled: one instance

Product Catalog

- One instance containing both Product Catalog and Admin database objects
- Located on a local network with Rating and Billing Databases

Product Catalog is always installed.

Rating Database (SDP)

The Rating database is also known as the Service Data Point (SDP). Balances and short usage records are maintained on the SDP. Every SLU connects to every SDP. URE-related Product Catalog data is stored on the SDP.

Record Transfer

Record Transfer is the process of moving event-related data from the small, highly available Rating database to the large Billing database, where the data is available for billing and/or CSR review.

The Record Transfer process is performed by one of four Extractor applications:

- Usage Record Transfer (URT) is used to extract usage data from the Rating DB for transfer to the Billing DB by LTP.
- MTR data Transfer (MHT) is used to extract MTR data from the Rating DB for transfer to the Billing DB by LTP.
- Recharge History Transfer (RCT) is used to extract recharge history data from the Rating DB for transfer to the Billing DB by LTP.
- Reversible Usage Record Transfer (URR) is used to extract reversible usage data from the Rating DB for transfer to the Billing DB by LTP. URR will also preserve the usage in the reversible tables until the reversal time period is expired.

After records have been transferred, that data is purged from the Rating DB so that the Rating DB remains small and performance criteria is maintained.

Record transfer also converts data from formats efficient for online processing (Rating DB) to formats better suited for billing and presentation (Billing DB).

The URE's place in the basic data flow is that it inserts new records into the tables on the Rating DB. Records come from both online and offline usage.

Details for configuring and running the Record Transfer process are fully described in the Comverse ONE document, *Operations Reference*.

Usage Record Transfer (URT)

For purposes of illustration, this section describes the URT functionality. All four of the record transfer extractor applications are configured identically and operate identically.

The Comverse ONE Usage Record Transfer (URT) infrastructure provides the following functionality:

- Customer and Order Management retrieves usage records only from Billing database and does not retrieve usage usage records from SDP when Billing database is down.
- Customer and Order Management always retrieves running balances from SDP through the Unified API.
- Relationship between SDP and Billing database is n<->m relationship. URT tracks which Billing database to send usage records to.
- Representation of long usage record is aligned between SDP and Billing database in the Comverse ONE solution.
- There is no re-guiding/rerating or calculation during record transfer; that is, after usage records are generated by the URE and before they are persisted on Billing database.
- Reconciliation of records between Billing database and SDP is part of the URT infrastructure.

URT has the following capabilities:

- Usage record filtering in order to determine what records need to be actually persisted onto the Billing database. For example, long usage record corresponding to the no-answer, busy, and so on, are not transferred to Billing database.
- Flow control for transmission of long usage record to Billing database
- Local persistence of long usage records when Billing database is down
- Retransmission in case of error in transmission to Billing database

Inserting a usage record and updating the subscriber record are atomic operations. No records are lost in the transfer process. URT can recover if Billing database is not available.

Long usage records must be transferred and finally persisted on the Billing database. The URE transfers usage records to the Billing database in order for the CSR to view them and so that downstream processes can use them for billing through the URT. The long usage record is persisted on the SDP with the balance update. The long usage record is then transferred from SDP to the Billing database.

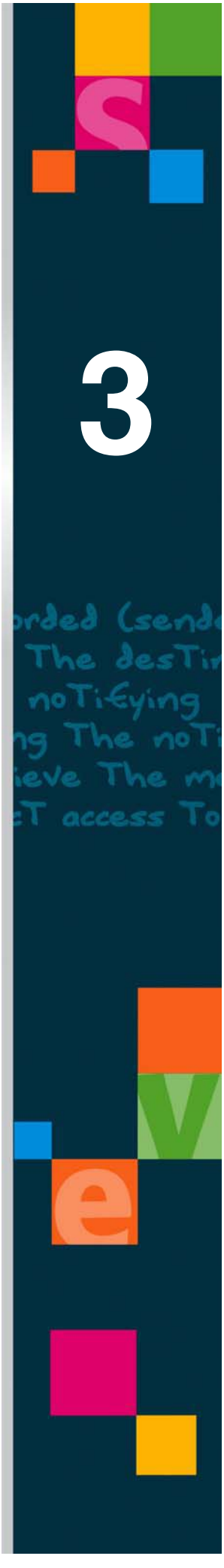
In some cases it is necessary to transfer these long usage records to an external system. Real-time processing controls when and how records are transferred. External systems cannot retrieve records from real-time components of Comverse ONE. Instead, we push the records to external systems as well as to the Billing database.

Should the Billing Database be unavailable or unable to receive records, URT infrastructure (SDP) stores long usage records. Even if the receiving database is available, it may not be able to handle the load, so the SDP can control flow and in the meantime generate alarms.

Should SDP be unavailable, the URE creates an outage usage record, to be rated later by the offline rating process. The long usage record generated by the offline rating process is transferred to Billing database. The outage record itself is not transferred to the Billing database.

Chapter 3

Rating Processing



After initialization of its four component modules, the URE takes one of two paths: online URE or offline URE. Online URE is an event-driven process; its actions are based on real-time incoming messages. Offline URE is a task-driven process that uses the C-CAP module, which interfaces with the task and file management processes.

Call Detail Record Overview

This chapter describes the specifications for Call Detail Records (CDRs) for both real-time and offline usage processing.

There are three main categories of usage records:

- Real-time
- Outage (processed by the Outage Record Processor - ORP)
- Offline

All three categories of usage records have associated CDRs. Real-time CDRS are generated at the end of a call by the switch. Real-time CDRs are ASCII Files. Offline CDRs are generated by the mediation device, which packages usage records as files for input to COM. (See the section, "URE Basic Flow" on page 113.)

CDR Types

Table 4 CDR Types

Name	Service Parameter ID
VOICE_CDR	33
PMT_CDR	34
USSD_CDR	35
SMS_CDR	36
GPRS_CDR	37
OSA_CDR	38
OCS_CDR	511
OFFLINE_CDR	3056

CDR File Names

The name of any billing file has the following format:

`IPbill.<cename>.<seq>.<nnnnnnnnnn>`

where:

`<cename>` is the host name of the SLU

`<seq>` is a 4-digit zero-filled sequence number from 0001 to 9999. The value of the sequence number is stored in the `data/cename/IPbillseq` file.

`<nnnnnnnnnn>` is a 10-digit representation of the coordinated universal time (UTC) in seconds (since 00:00:00 UTC, January 1, 1970. See `time(2)` when the file is open.

Example:

The active Billing Manager on `slu1` opens the file named:

`IPbill.slu1.0001.0000000000`
if the system is started on 00:00:00 UTC, January 1, 1970.

Real-Time CDR

The Rating Server generates real-time CDRs in the form of an ASCII text file that contains information in additon to that provided in usage files. (See Figure 2, "Real-Time CDR File Format" for information about the format of a real-time CDR.) This information includes initial AUT, Tariff, and so on, as well as a lot of information that is also found in a usage file. Unlike the usage file, however, the CDR contains information about both completed and uncompleted calls. A completed call results in the creation of both a usage file and a CDR; an uncompleted call produces a CDR only. These records are created primarily for traffic analysis, although they can also be used in real-time deployments to feed downstream applications. Since they provide information about uncompleted calls, CDRs provide operators with a useful tool.

Real-time CDRs are generated by the real-time applications (for example, by the CallProcessor application) whenever a call ends (completed or uncompleted). The real-time application writes the CDR directly to the file system on the Rating Server where the application resides. These CDRs are subsequently picked up by an archival process and centrally stored on the UPM. Such files are generated on a service-level-configurable, periodic basis (as defined by the value of a service-level attribute). The default is one file every hour and the maximum frequency is one file every minute.

Offline CDR

An offline CDR is a proprietary offline usage file that is an input to Comverse ONE, and is in the form of an ASCII file generated by the mediation device. It is a formatted file with a header that describes the format. Currently there are 40 record types for about 20 file types; it is therefore not possible to provide details of offline CDR file format.

Real-Time Data Flow

System management of real-time service-related billing files on the UPM is provided using the standard system product capabilities which address intra-system file retrieval, file naming conventions, file transfer to remote network operator and service provider (SP) host system, file archiving, restoration, backups, and purging.

Files are transferred to remote host systems using FTP for subsequent processing by the network operator and service providers (SPs). The network operator and SP can process CDR data for a number of purposes, including the following:

- auditing administrator activity
- auditing the accuracy of the system real-time billing process
- deriving real-time account-level measurement statistics (such as number of calls, administrative function usage, typical call duration)

The network operator and service providers must provide a host for the UPM, with username and password, so that files can be pushed to the host using FTP.

The UPM deposits the files into a configurable path relative to the home directory of the provider user account.

CDR Generation

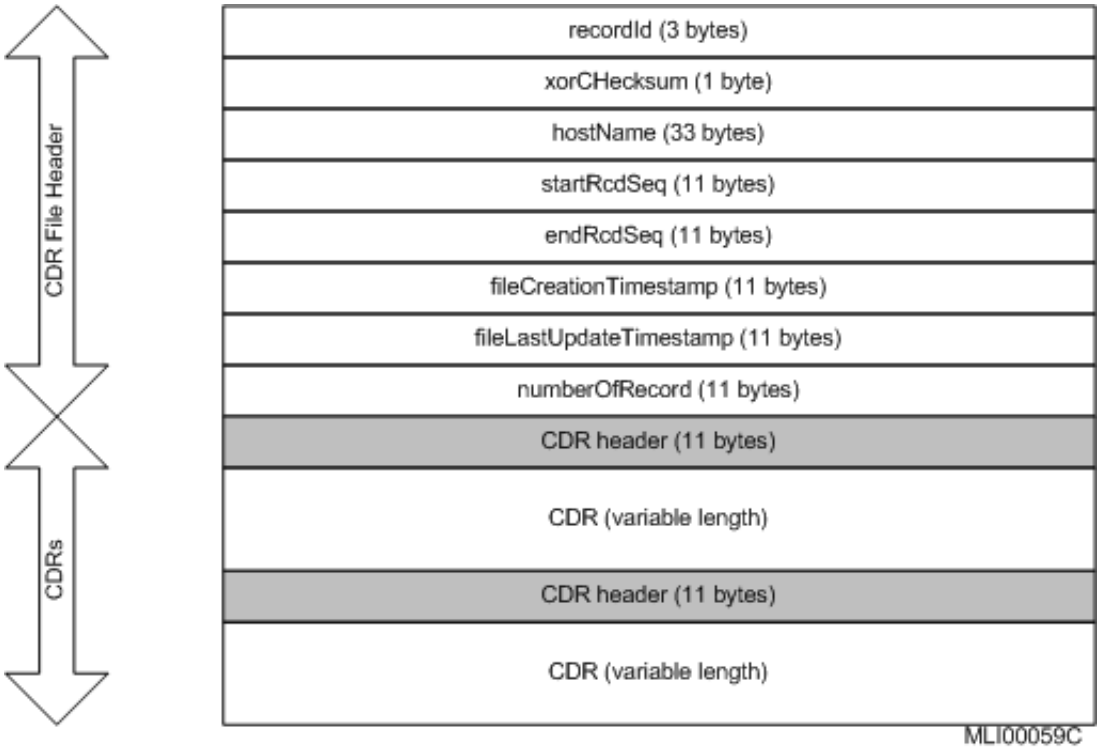
Usage processing generates Call Detail Records (CDRs) during application processing and administration. A real-time event causes the switch to send a trigger, resulting in the creation of usage file and a CDR. Depending on the application, CDRs are of several types. Their generation is controlled by rows in the `SYSTEM_PARAMETERS` table. To enable CDRs for a given application,

the value for the row should be set to 1 (ON). Table 4, "CDR Types" details the Row ID for each CDR type. In the SYSTEM_PARAMETERS table, the Module for a Rating-specific parameter has the value RTNG. The system parameter GEN_CDR controls logging of CDRs globally across all applications. If this parameter is set to 0 (the default value), then regardless of the application-specific CDR flag, the CDRs are not logged; if it is set to 1, CDRs are logged only if the application-specific CDR flag is 1.

Real-Time CDR File Format

Each CDR file consists of a file header followed by one or more CDRs. Each CDR has a CDR header. Figure 2, "Real-Time CDR File Format" details the CDR file format.

Figure 2 Real-Time CDR File Format



The CDR file has a dynamic set of Balances, Accumulators and Extension information based on the subscriber's configuration. The number of fields in a CDR record varies across the same type of activities, depending on the configuration specified in the format file.

Table 5, "Real-Time CDR Control Fields" describes the fields that control the display of fields present in Balance, Accumulators, Account Balance, Account Accumulators, Versions and Extension in the CDR file.

Table 5 Real-Time CDR Control Fields

Name	Length	Description
NUM_OF_FIELDS_FOR_BAL	6	This field controls the number of fields in balances that are displayed in the CDR file.
NUM_OF_FIELDS_FOR_ACC	4	This field controls the number of fields in accumulators that are displayed in the CDR file.
NUM_OF_FIELDS_FOR_EXT	2	This field controls the number of fields in extensions that are displayed in the CDR file.
NUM_OF_FIELDS_FOR_ACCOUNT_BAL	4	This field controls the number of sub-fields present in ACCOUNT_BALANCE_INFO: Value = 0, no sub-field will be displayed Value = 1 - 4, up to 4 sub-fields will be displayed in the CDR file.
NUM_OF_FIELDS_FOR_ACCOUNT_ACC	4	This field controls the number of sub-fields present in ACCOUNT_ACCUMULATOR_INFO: Value = 0, no sub-field will be displayed Value = 1 - 4, up to 4 sub-fields will be displayed in the CDR file.
NUM_OF_FIELDS_FOR_VERSION	2	This field controls the number of sub-fields present in VERSION_INFO: Value = 0, no sub-field will be displayed Value = 1 - 2, up to 2 sub-fields will be displayed in the CDR file.

Example:

Assuming the field `NUM_OF_FIELDS_FOR_BAL` is `8`, the `BALANCES_INFO` contains the following information:

`BALANCE_ID` (6 bytes)

`BALANCE_NAME` (30 bytes)

`BALANCE` (16 bytes)

`BALANCE_CHANGE` (16 bytes)

`BALANCE_UNIT_TYPE` (2 bytes)

`BALANCE_SIGN` (1 byte)

`BALANCE_CATEGORY` (1 byte)

`BALANCE_TAX_AMOUNT` (16 bytes)

If the `MAX_NUM_BALANCE` is 40, then the balance information length would be 3120 (that is, 6+30+16+16+2+1+1+6 = 78 x 40 = 3120).

If the number of balance fields is increased or decreased, the fields are modified accordingly. The `MAX_NUM_BALANCE` field displays a maximum number of 40 balances.

Like Balances, Accumulators (ACCUMULATOR_INFO), Account Balance (ACCOUNT_BALANCE_INFO), Account Accumulator (ACCOUNT_ACCUMULATOR_INFO), Version (VERSION_INFO) and Extension (EXTENSION_INFO) fields are also displayed in the CDR depending on the configuration specified in the format file.

Real-Time CDR File Header

The CDR file header format is detailed in Table 6, "CDR File Header Format".

Table 6 CDR File Header Format

Name	Length	Range	Description
CDR	3	NA	String identifying records as CDR records.
XorChecksum	1	0-255	The exclusive-or checksum value is generated using an 8-bit exclusive-or operation performed on all bytes in the file. Before the operation, the exclusive-or checksum field is set to zero first. Then the result of the calculation, an 8-bit value, is set in the exclusive-or checksum field of the record header. The validation of the record file with embedded exclusive-or checksum value works as follows: if the 8-bit exclusive-or operation performed on all bytes in the file resulted in a zero value then the file is validated.
hostName	33	NA	The host name. The field is null terminated.
startRcdSeq	11	0000000000-0099999999	If the file has no record, this field is set to "000000000". The field is null terminated.
endRcdSeq	11	0000000000-0099999999	If the file has no record, this field is set to "000000000". The field is null terminated.
fileCreationTimestamp	11	0000000000-4294967295	The field is null terminated.
fileLastUpdateTimestamp	11	0000000000-4294967295	The field is null terminated.
numberOfRecord	11	0000000000-0099999999	The field is null terminated.

CDR Record Header

The CDR record header is detailed in Table 7, "CDR Record Header".

Table 7 CDR Record Header

Name	Length	Range	Description
rcdSeqNum	11	1-9999999	For a fixed CDR, this field is null terminated. It is a null filled ASCII text string. For example, x"30 30 30 30 30 30 30 30 30 30 0". For a delimited CDR, the field is terminated with the field delimiter. For example: "0000001|"

Octet Dump of CDR Header

Following is an example of a CDR file header:

```
cat IPbill.slu1.1915.1269241200 |od -c |more
0000000 C D R w s l u 1 \0 \0 \0 \0 \0 \0 \0
0000020 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0
0000040 \0 \0 \0 \0 \0 0 0 0 0 0 7 5 6 4 \0
0000060 0 0 0 0 0 0 7 5 6 6 \0 1 2 6 9 2
0000100 4 1 2 0 0 \0 1 2 6 9 2 4 4 8 0 0
0000120 \0 0 0 0 0 0 0 0 0 0 3 \0
```

1. The **w** is the XOR checksum value (`0x77` in this case).
2. The nulls after the `hostName` value are due to `hostName` having a length of 33 bytes, so any name less than 33 gets padded with zeros.
3. Newline is only for OR records. CDRs do not end in newline.

Timestamp Truncation

Real-time processing captures the start and end times of voice activity to the granularity of one second. Therefore, call duration is also measured in units of a whole second. This approach also applies to handling time-based and duration-based activities by non-voice applications during processing of start and end timestamps and duration calculation. This Timestamp Truncation option is the default setting and provides backward compatibility with the existing real-time functionality.

Table 8 Timestamp Truncation

Time (Start /End)	Service O/S Time (in millisec granularity)	Timestamp in CDR (in second granularity)	Timestamp in Call History (in second granularity)	Actual Duration (in second)	Charged Duration - No Rounding (in second)
Start	12:12:10.111	12:12:10.0	12:12:10	10.777	11
End	12:12:20.888	12:12:20.0	12:12:20		
Start	12:12:10.988	12:12:10.0	12:12:10	9.567	10
End	12:12:20.555	12:12:20.0	12:12:20		
Start	12:12:10.111	12:12:10.0	12:12:10	10.444	10
End	12:12:20.555	12:12:20.0	12:12:20		
Start	12:12:10.111	12:12:10.0	12:12:10	10.522	10
End	12:12:20.633	12:12:20.0	12:12:20		
Start	12:12:10.111	12:12:10.0	12:12:10	10.5	10
End	12:12:20.611	12:12:20.0	12:12:20		
Start	12:12:10.111	12:12:10.0	12:12:10	11.5	11
End	12:12:21.611	12:12:21.0	12:12:21		

The call duration is calculated using the standard UNIX TIME function.

Name

`time` - get time in seconds

Synopsis

```
#include <time.h>
time_t time(time_t *t);
```

Description

The time function returns the time since the Epoch (00:00:00 UTC, January 1, 1970), measured in seconds. If it is non-NULL, the return value is also stored in the memory pointed to by `t`.

Return Value

On success, the value of time in seconds since the Epoch is returned. On error, (`(time_t)-1`) is returned, and `errno` is set appropriately.

Errors

DEFAULT `t` points outside your accessible address space.

Notes

`POSIX.1` defines seconds since the Epoch as a value to be interpreted as the number of seconds between a specified time and the Epoch, according to a formula for conversion from UTC equivalent to conversion on the naive basis that leap seconds are ignored and all years divisible by 4 are leap years.This value is not the same as the actual number of seconds between the time and the Epoch, because of leap seconds and because clocks are not required to be synchronized to a standard reference. The intention is that the interpretation of seconds since the Epoch values be consistent.

Conforming To

SVr4, SVID, POSIX, X/OPEN, BSD 4.3

Under BSD 4.3, this call is obsoleted by `gettimeofday(2)`. POSIX does not specify any error conditions.

CDR Generation Examples

The following sections provide examples of CDR generation.

Voice Calls: Normal and USSD Callback

CDRs are generated regardless of the charge or whether the event is considered billable.

A single CDR is generated for the following voice events:

- for each successful call to or from an account-based subscriber
- for each call attempt to or from a subscriber which is rejected by the platform
- for a call made directly to an administrative function such as the Info Server or Recharge Server
- for a call attempt forwarded (intercepted) by the service to an administrative function and then terminated, or connected to a remote called party

Multiple CDRs are generated for voice events under certain circumstances. The CDRs produced contain a common attribute value to correlate them, typically the `ASSOC_CDR_REFERENCE` or `REFERENCE` field:

For card-based subscribers, a CDR is generated for each outbound call within a single invocation of the access number.

For Network Call Forwarding, both incoming and outgoing CDRs are generated.

For a call to the Admin Menu, separate CDRs are generated for each menu invocation, as well as for each outbound event selected. For example, a call to the Admin Menu, followed by a selection of Info Server, then a return to the Admin Menu, and finally, a selection of Recharge Server generates a total of four CDRs: one for the first Admin Menu session, one for the Info Server, one for the second Admin Menu session, and one for the Recharge Server. (A single CDR is issued for the entire Recharge Server session regardless of the number of cards used to recharge the account.)

Event Charging Interface (ECI)

When a real-time subscriber is offered a service that enables the subscriber to send or receive SMS messages, the SMSC sends the transaction information to the Event Charging Interface (ECI) in order to charge the subscriber using his account. This occurs before the terminating party receives the message. The ECI generates a single CDR for each of these transactions. Because the ECI is transaction, not session oriented, multiple CDRs are never generated for a single event.

CAMEL 3 SMS

A single CDR is generated for each successful or unsuccessful SMS event (for a valid subscriber). CAMEL 3 SMS is transaction oriented, like the ECI. Therefore, multiple CDRs are never generated for a single event.

GPRS

For each GPRS activity session, depending on the charge type of the activity, there may be one or two CDRs generated. If the charge type is duration only or volume only, then one CDR is generated for that session. If the charge type is both (that is, duration and volume) , then two CDRs are generated for that session. As with voice CDRs, the CDRs produced by GPRS contain a common attribute value to correlate them, typically the `ASSOC_CDR_REFERENCE` or `REFERENCE` field.

Table 9 Diameter OCS History Fields

Diameter Hist
SUBSCR_NO
SUBSCR_NO_RESETS
ACCOUNT_NO
PARENT_ACCOUNT_NO
TARGET_ACCOUNT_NO
START_CALL_DATE_TIME
END_CALL_DATE_TIME
ACTIVITY_TYPE
EXTERNAL_ID_TYPE
EXTERNAL_ID
INITIAL_AUT_ID
FINAL_AUT_ID
UNIT_TYPE_ID
SUBTYPE_ID
APPLICATION_ID
START_CALL_DATE_TIME_TYPE
END_CALL_DATE_TIME_TYPE

Table 9 Diameter OCS History Fields (Continued)

Diameter Hist
USAGE_AMOUNT
RESELLER_ID
CIRCLE_ID
REASON_CODE
DESCRIPTION
SUBSCRIBER_CURRENCY
CHARGE_CODE
ORP_TIME
CHARGE_ITEM_ID
SUB_SESSION_ID
SESSION_ID
SLU_ID
CONV_RATE_TO_BILLED_ACCT
BILLED_ACCOUNT_CURRENCY
BILLED_ACCOUNT_TML_CHANGE
BILLED_ACCOUNT_TML_VALUE
LIABILITY_REDIRECT_INDICATOR
USER_SUBSCR_NO_RESETS
USER_SUBSCR_NO
SPLIT_ROW_NUM
MSG_ID2
MSG_ID
PREV_ISO_CODE
CURR_CONV_RATE
GSM_PROVIDER_ID
PRE_CHARGE
MARKUP_PERCENT
OCS_COMMENT
BAL_INFO
ACCU_INFO
ACCT_BAL_INFO
ACCT_ACCU_INFO
EXT_FIELD

Table 10 F and F Phonebook History Fields

F and F Phonebook Hist
SUBSCRIBER_ID
TRANS_DATE

Table 10 F and F Phonebook History Fields (Continued)

LOGIN_NAME
SOURCE_APP
PHONE_NUMBER
CHANGE_FLAG
PHONEBOOK_COMMENT
PHONEBOOK_LIST

Real-Time CDR Format Configuration

The default format of a real-tme CDR is an ASCII, field-delimited record terminated by a newline character. A delimited CDR can vary in length as well as the fields contained within it. "|" is the default delimiter for a CDR field. The delimiter is configured in the `CDRFormat.config` file in the `FIELD_DELIMITER` field.

CDRs also contain sub-fields and sub-field delimiters. A sub-field delimiter is used within a field to separate each sub-field. "*" is the default sub-field delimiter for a CDR field. A subfield can also be configured to any ASCII character in CDRFormat configuration file in the `SUB_FIELD_DELIMITER` field, which is different from `FIELD_DELIMITER` character.

The `BALANCE_INFO`, `ACCUMULATOR_INFO`, `ACCOUNT_BALANCE_INFO`, `ACCOUNT_ACCUMULATOR_INFO`, `VERSION_INFO` and `EXTENSION_INFO` fields are the six CDR fields that contain sub-fields.

Detailed instructions about how to use the `FIELD_DELIMITER` field and `SUB_FIELD_DELIMITER` field can be found as comments within the `CDRFormat.config` file (`FIELD_DELIMITER` and `SUB_FIELD_DELIMITER` cannot be provisioned in the same manner).

Table 11, "Available CDR Fields" presents the available CDR fields.

The CDR fields are described in terms of the following:

- **Name**: A unique field name.
- **Format**: Provides format of field entry and lists possible values when appropriate. If the field delimiter is not enabled, a character will appear after the data in each extra space up to the maximum length of the field. For example, the length of the Call Reference field is 10 characters. If the populated call reference integer value is 12345, then a non-delimited field would be populated with "12345 " where the five blank spaces following the number 5 represents each extra character.
- **Always Populated?** A "Y" in this column indicates that this field requires data. An "N" indicates that data is optional.
- **Description**: A short text description of the field and an example or the possible values when necessary.
- **Length:** In a non-delimited format, the length value represents the fixed length of a field. The length of the data populated in a particular field is "padded with blank space" to the fixed field length when it is less than the fixed length for the field.

  In a delimited format, the length value represents the maximum length of the field. The data is not "padded with padded space" to the maximum length of the field. Instead only the significant data in the field is included before the delimiter.

- **Default CDR Format Configuration Files:** Several user configuration files provide flexibility in determining the CDR Format. The following files are delivered to `$OMNI_HOME/conf`:
  - Minimal Voice CDR (`CDRFormat.config`)
- Voice Calls (`CDRFormat.config.VOICE`)
- USSD Callback (`CDRFormat.config.USSD`)
- ECI (`CDRFormat.config.PMT`)
- CAMEL 3 SMS (`CDRFormat.config.SMS`)
- GPRS (`CDRFormat.config.GPRS`)
- OSA (`CDRFormat.config.OSA`)
- OCS (`CDRFormat.config.OCS`)

The `CDRFormat.config.<application>` files are delivered with the Comverse ONE deployment and are installed on the SLU in the `/home/omni/conf` directory.

While down-streaming, the system reads and processes the CDR records by reading the first field in the CDR record, `TYPE_OF_CDR`. See Table 11, "Available CDR Fields" below for the valid value and description of this field.

For example: The types of CDRs are:

```
1 = VOICE
2 = PMT
3 = USSD
4 = SMS
5 = GPRS
6 = OSA
7 = OCS
```

The above information helps down-streaming in using an application specific configuration to read the CDR. If the application specific configuration file is not available, the default `CDRFormat.config` is used.

These configuration files contain field names, byte offset values, and field lengths. The first column is the field name, the second column is the byte offset value, and the third column is the field length. Only the field name and the length are shown in Table 11, "Available CDR Fields".

The Byte Offset Value is only valid in a non-delimited format. In a delimited format, the field will not contain any offset characters, but only the significant data in the field.

Customizing a file by adding or deleting fields will alter the Byte Offset Value by an amount corresponding to the length of the added or deleted field. Do not modify or delete `BALANCE_INFO` `ACCOUNT_BALANCE_INFO`, `ACCOUNT_ACCUMULATOR_INFO`, `VERSION_INFO` and `ACCUMULATOR_INFO`. Also do not modify the fields with "!".

The Length field value represents the fixed length in a non-delimited format. In a delimited format, the length field value represents the maximum number of characters.

Available CDR Fields

Table 11, "Available CDR Fields" presents the available CDR fields. The formats of these fields are determined by CDR Format Configuration files listed in the Default CDR Format Configuration Files column.

Table 11 Available CDR Fields

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
ACCOUNT_ACCUMULATOR_CHANGE	Double	N	Account accumulator change due to activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCOUNT_ACCUMULATOR	Double	N	Account accumulator value after activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCOUNT_ACCUMULATOR_ID	INT	N	ID of account accumulator	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCOUNT_ACCUMULATOR_INFO	Varchar2	N	Account accumulators information in the following format: [id~ac~chg][id~ac~chg] Where: id: accumulator ID ac: new accumulator value chg: change in accumulator value	2040	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
ACCOUNT_ACCUMULATOR_NAME	string	N	Name of account accumulator	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCOUNT_BALANCE	Double	Y	Final account balance after activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
ACCOUNT_BALANCE_CHANGE	Double	Y	Account balance change for the activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCOUNT_BALANCE_ID	INT	Y	ID of the Account Balance	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCOUNT_BALANCE_INFO	Varchar2	Y	Account balance information in the following format: [id~bal~chg][id~bal~chg] Where: id: Balance ID bal: new/current balance (after transaction) chg: change in balance amount	2720	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
ACCOUNT_BALANCE_NAME	string	Y	Name of the account balance	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCOUNT_ID	INT	Y	OSA: merchant's account ID	10	CDRFormat.config.OSA
ACCOUNT_NO	string	Y	Account number for the subscriber.	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCOUNT_TYPE (Not used; as group account is not supported in the ComONE v3.5 release)	INT	N	The type of subscriber account used for the activity. 0 = group account owner 1 = spending limits only group account member 2 = does not belong to a group account 3 = member balances only group account member 4 = group account member with both member balances and spending limits Set to NULL	10	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
ACCUMULATOR	Double	N	Value of Accumulator after activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCUMULATOR_CHANGE	Double	N	Accumulator change due to the activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCUMULATOR_ID	INT	N	ID of accumulator	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCUMULATOR_INFO	CHAR String	N	ACCUMULATOR_INFO field will store information about 30 Accumulators Max. The format for each accumulator is: ACCUMULATOR_ID (6 Bytes), ACCUMULATOR_NAME (30 Bytes), ACCUMULATOR (16 Bytes), ACCUMULATOR_CHANGE (16 Bytes)	2040	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS
ACCUMULATOR_NAME	CHAR String	N	Name of accumulator	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACTIVITY_BILLING_CODE	string	Y	Billing code of the Service Provider handling this activity. Note: this field is hard coded based on the activity. (examples; GPRS -> GPR, SMS -> SMS)	3	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormatconfig.GPRS CDRFormat.config.SMS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
ACTIVITY_DIRECTION	INT	Y	Direction of activity from system perspective 1 = incoming 2 = outgoing 3 = payment 4 = USSD call	1	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACTIVITY_TYPE	string	Y	OSA: Type of activity - Debit, Credit, or Direct Transaction	26	CDRFormat.config.OSA CDRFormat.config.OCS
ACTUAL_DESTINATION_NUMBER	CHAR	N	Records the destination phone number as originally received from the network.	72	CDRFormat.config.CCBS3.0
ACTUAL_ORIGINATING_NUMBER	CHAR	N	Records the originating phone number as originally received from the network.	72	CDRFormat.config.CCBS3.0
ANSWERED_DATE	CHAR string: mm-dd-yy	Y	Activity Answered Date	8	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ANSWERED_TIME	CHAR string: hh:mm:ss.t	Y	Activity Answered Time	10	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
APN	CHAR string	Y	GPRS: Access Point Name of the activity, such as the URL of the service provider	120	CDRFormat.config.GPRS
APPL_DESC_TEXT	CHAR	Y	OSA: text description of application requested	49	CDRFormat.config.OSA
APPLICATION_ID	INT	Y	Application defining the activity	OSA=10 else=4	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
APPLICATION_INITIAL_SUBTYPE	INT	Y	Application Initial Subtype defining the activity. Lengths are different for different applications SMS,USSD,CCDS3.0 and VOICE length = 4, OSA=31, OCS=10 and GPRS=6	(see <-)	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
APPLICATION_SUBTYPE	INT	Y	Application final Subtype used for Tariff determination	4	CDRFormat.config.PMT
ASSOC_CDR_REFERENCE	INT		Used to associate the CDR for the second leg of NCCF call or for other Unit Type in case of GPRS/OSA, to associate other CDR for Admin calls	10	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
AUT_FINAL	INT	Y	Final application usage type ID	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS
AUT_INITIAL	INT	Y	Initial application usage type ID	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
BALANCE (Sub Field will be expanded to represent Balance 1 to 40)	Double		Final balance after the activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS
BALANCE_CHANGE (Sub Field will be expanded to represent Balance 1 to 40)	Currency/ Double		Balance change for the activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
BALANCE_ID (Sub Field will be expanded to represent Balance 1 to 40)	INT		ID number of the balance	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
BALANCE_INFO	CHAR String		BALANCE_INFO field stores up to 40 balances maximum. Each balance is stored in following format: (BALANCE_ID (6Bytes), BALANCE_NAME (30 Bytes), BALANCE (16 Bytes), BALANCE_CHANGE (16 Bytes), BALANCE_UNIT_TYPE (2 Bytes), BALANCE_SIGN (1 Byte)	OSA= 1420 else 3120	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
BALANCE_NAME (Sub Field will be expanded to represent Balance 1 to 40)	CHAR String		Name of the balance	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
BALANCE_SIGN (Sub Field will be expanded to represent Balance 1 to 40)	CHAR	Y	Sign of the core balance after the activity. the core balance may be positive or negative	1	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
BALANCE_TARGET_ID (Subfield of BALANCE_INFO will be expanded to represent Balance 1 to 40)	INT	N	Target account's real balance ID for particular shadow balance	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
BALANCE_TYPE (Subfield of BALANCE_INFO will be expanded to represent Balance 1 to 40)	INT	Y	Type of balance 1 = Shadow 2 = Real	1	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
BALANCE_UNIT_TYPE (Sub Field will be expanded to represent Balance 1 to 40)	INT		Unit type of the Balance	2	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
BEARER_CAPABILITY	INT	N	ECI: the bearer capability provided by the ISMSC	4	CDRFormat.config.PMT
BILLING_DESTINATION_NUMBER	string		VOICE type CDR	30	CDRFormat.config.VOICE
BILLING_ID	CHAR string	Y	ID of the IS-826 Billing ID	20	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.SMS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
CALLING_CIRCLE_ID	INT	N	ID of the calling circle used for the call. This is optional.	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
CALLING_NUMBER_PRESENTATION				1	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD
CALLING_PARTY_CATEGORY				3	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
CDR_CALL_TYPE	INT	Y	Identifies the type of Call Activity (refer to CDR_CALL_TYPE Possible Values, section CDR_CALL_TYPE Possible Values)	3	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
CELL_ID	CHAR string	N	Party-A Cell ID (CAC) For SMS, this field contains either the VLR Number (voice network) or the SGSN Number (data network).	15	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
CELL_ID_OR_LAI				16	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD
CHARGE_CODE	CHAR string	N	Type of network activity (local, long distance, etc.).	10	CDRFormat.config.OSA
CHARGE_ITEM_ID	CHAR string	Y		30	CDRFormat.config.OCS
CHRG_PARAM_CONFIRM_ID	INT	N	OSA: Information provided by the Application client to correlate CDRs between systems.	49	CDRFormat.config.OSA
CHRG_PARAM_CONTRACT				49	CDRFormat.config.OSA
CHRG_PARAM_ITEM	INT or CHAR	N	OSA: displays the item that was used for the transaction. Item parameters are used from the incoming OSA request to uniquely map and identify the Application type and subtype that would handle this transaction	49	CDRFormat.config.OSA
CHRG_PARAM_QOS	INT or CHAR	N	OSA: refers to the capability of a network to provide better service to selected network traffic and represents the characteristics of the data connection	49	CDRFormat.config.OSA
CHRG_PARAM_SERVICE_PARAM1	INT or CHAR	N	OSA: parameters that effect service logic, e.g., time zone offset to calculate the correct local time from UTC	49	CDRFormat.config.OSA

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
CHRG_PARAM_SERVICE_PARAM2	INT or CHAR	N	OSA: parameters that determine activity and Sub Type, e.g., Merchant ID, P_CHS_PARAM_ITEM, QoS, SERVICE_PARAM 1-4	49	CDRFormat.config.OSA
CHRG_PARAM_SERVICE_PARAM3	INT or CHAR	N	OSA: parameters for charging API input, e.g., Location A, Location A type	49	CDRFormat.config.OSA
CHRG_PARAM_SERVICE_PARAM4	INT or CHAR	N	OSA: parameters that are collected for CDRs, e.g., P_CHS_PARAM_CONFIRMATION_ID	49	CDRFormat.config.OSA
CHRG_PARAM_SUBTYPE	INT or CHAR	N	OSA: displays the subtype that was used for the transaction. Subtype parameters are used from the incoming OSA request to uniquely map and identify the Application type and subtype that would handle this transaction	49	CDRFormat.config.OSA
CLEAR_CAUSE	INT	Y	Reasons for activity being disconnected (refer to the section, "CLEAR_CAUSE Possible Values," on page 73)	3	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
CORRELATION_ID	INT	Y	OSA: ID number to correlate transactions in a session	10	CDRFormat.config.OSA
CORRELATION_TYPE	INT	Y	OSA: type is Voice, Data, or Multimedia	10	CDRFormat.config.OSA
CUG_CODE	INT	N	Uniquely identifies a Closed User Group (CUG)	10	CDRFormat.config.CCBS3.0
CURR_TRANS_CONV_RATE	Real	N	Conversion Rate from Old Currency to New Currency. (If Subscriber's COS currency conversion occurs during a call.)	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
CURR_ TRANS_ ORIG_ CHARGE	Real	N	Original Charge without currency conversion. (If Subscriber's COS currency conversion occurs during a call)	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.comfig.OCS CDRFormat.config.SMS
CURR_ TRANS_ ORIG_ CURR_ CODE	string	N	Original ISO Currency Code for the subscriber at beginning of the call. (If Subscriber's COS currency conversion occurs during call)	3	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SM
CURRENCY	CHAR string	Y	OSA: the currency used in the OSA transaction	4	CDRFormat.config.OSA
CURRENCY _CONV_ RATE_TO_ ACCT	Double	Y	Currency conversion rate applied to account.	16	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.SMS
CURRENCY _CONV_ RATE_TO_ TO_SUB	Double	Y	Currency conversion rate applied to subscriber.	16	CDRFormat.config.CCBS3.0 CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.SMS
CURRENCY _CONV_ RATE1	Double	Y	The conversion rate applied to the tariff. If an intermediate currency exists, then this field holds the conversion rate of tariff currency to intermediate currency 1 = none applied	16	CDRFormat.config.PMT
CURRENCY _CONV_ RATE2	Double	Y	The conversion rate applied to the tariff. If an intermediate currency exists, then this field holds the conversion rate of tariff currency to intermediate currency 1 = none applied	16	CDRFormat.config.PMT CDRFormat.config.USSD
CURRENCY _UNIT_TYPE	INT	Y	Currency Type used for charging the activity. (For GPRS, SMS & VOICE the length is 3; else 2).	2 or 3	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
DESCRIPTION	CHAR String	N	DiameterSession Description	49	CDRFormat.config.OCS
DESTINATION_NUMBER	string	N	Call Destination Number	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
DISCONNECT_DATE	CHAR String	N	Call Disconnect Date	8	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS CDRFormat.config.OCS
DISCONNECT_TIME	CHAR String	N	Call Disconnect Time	10	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS CDRFormat.config.OCS
DISCOUNT_ITEM_ID	INT	N	The discount applied during this activity	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS
DISCOUNT_PLAN_OFFER_ID	INT	N	Offer containing discount plan	10	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS
END_TSTAMP	CHAR string MM-DD-YYYY HH:MM:SS.t	Y	OSA: direct operation/reservation end time or activity time	24	CDRFormat.config.OSA CDRFormat.config.OCS
END_TSTAMP_TYPE	INT	N	0 = TS_LOCAL_TIME 1 = TS_CLIENT_PROVIDED_TIME	2	CDRFormat.config.OCS
ESN_IMEI	CHAR string	N	Converged Billing: the Electronic Serial Number of the subscriber's handset	25	CDRFormat.config.OSA

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
EXT_TOKEN_NAME (Sub Field will be expanded to represent Extension 1 to 20)	CHAR string	N	EXT_TOKEN_NAME fields stores the name of extension field. Used only Plugin modules.	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
EXT_TOKEN_VALUE (Sub Field will be expanded to represent Extension 1 to 20)	CHAR string	N	EXT_TOKEN_VALUE fields stores the value of extension field. Used only Plugin modules.	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
EXTENSION_INFO	CHAR string	N	EXTENSION_INFO field stores information about 10 Extension Fields Max. The data is stored by Plugin Modules. The format for each Extension format is: EXT_TOKEN_NAME (30 Bytes), EXT_TOKEN_VALUE (30 Bytes)	600	CDRFormat.config.CCBS3.0 CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.PMT
FIELD_DELIMITER	CHAR	Y	Delimiter to separate the fields in CDR (comma)	1	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
HOME_ZONE	INT	Y	Flag indicating home vs roam 0 = Home 1 = Roam	1	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
IMSI	String	Y	OSA: International Mobile Subscriber Identifier as provided by the application client for post processing purposes.	PMT= 16 else 32	CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.PMT
INCOMING_TRUNK_GROUP				8	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
INFO_PARAMETER	String	N	OSA: Information provided by the application client to be recorded in the CDR.	49	CDRFormat.config.OSA
INFOPARAM1	String	N	Stores info parameter sent in case of ApplyTariffVolume	32	CDRFormat.config.PMT
INFOPARAM2	String	N	Stores info parameter sent in case of ApplyTariffVolume	32	CDRFormat.config.PMT
INT_EXT_OR_IND	INT	N	ORP: used for ORP-generated CDRs to indicate whether the Outage Record file is internally or externally generated	1	CDRFormat.config.CCBS3.0CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
LAST_UNIT_ROUNDING_DISCOUNT_AMOUNT_POSTPAID	Double	N	Rounded discount amount for postpaid	16	CDRFormat.confiig.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormatconfig.SMSCDRFormat.config.VOICE CDRFormat.config.USSD
LAST_UNIT_ROUNDING_DISCOUNT_AMOUNT_PREPAID	Double	N	Rounded discount amount for prepaid	16	CDRFormat.confiig.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormatconfig.SMS CDRFormat.config.VOICE CDRFormat.config.USSD
LIABILITY_REDIRECT_IND	INT	N	Determines the liability redirection	1	CDRFormat.config.CCBS3.0 CDRFormat.confiig.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.OSA CDRFormat.config.SMS
LOCATION_B	Digit string	N	OSA: Digit string used to identify second location in a OSA transaction that uses location based billing	32	CDRFormat.config.OSA
LOCATION_B_TYPE	INT	N	OSA: Type of location used for LOCATION_B parameter. Possible values are: 1= Handset 2 = Dialed number 3 = MSRN ID 4 = CELL ID 5 = MSC ID 6 = SGSN ID 7 = IP_ADDRESS	10	CDRFormat.config.OSA

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
LOCATION_INDICATOR_PARTY_A	string	Y	Location relevant to type of CDR. The CDR field will contain the global location indicator of the calling number (may be left blank for non-billable access number calls)	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFomat.config.SMS CDRFormat.config.OSA CDRFormat.config.OCS
LOCATION_INDICATOR_PARTY_B	string	Y	Location relevant to type of CDR. The CDR will contain the global location indicator of the called number (may be left blank for non-billable access number calls)	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFomat.config.SMS CDRFormat.config.OSA CDRFormat.config.OCS
MARKET_SEG_ID	INT	N	Market Segment ID	4	CDRFormat.config.CCBS3.0
MARKUP_PERCENT	INT	N	Markup Rating for Roaming: the per cent markup applied to the monetary roaming charge of the activity	4	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
MERCHANT_ID	CHAR	Y	OSA: merchant's Name	49	CDRFormat.config.OSA
MSC_ID	CHAR string	N	MSC ID received from the network	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFomat.config.SMS
MSRN	Digit string	N	MSRN of B-Address	30	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS CDRFormat.config.OCS
NETWORK_PORTING_PREFIX	CHAR	N	Records the porting prefix for any number ported on the network.	30	CDRFormat.config.CCBS3.0
NOTIFY_B_NUM	INT	N	Notify B Number? 1 = yes; 0 = no	1	CDRFormat.config.CCBS3.0
NUM _OF_FIELDS_FOR_BAL	INT	Y	balance_info is expanded in order. Any change in number of field changes this field. Any Change here affects BALANCE_INFO length; for example, NUM_OF_FIELDS_FOR_BAL = 10	8	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
NUM_OF_ACCOUNT_ACCUMULATOR	Unsigned short	N	Number of account accumulators	2	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS
NUM_OF_ACCUMULATOR	Unsigned short	Y	Number of accumulators	2	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS
NUM_OF_EXTENSION	INT	Y	Maximum number of extensions that can be written to CDR.	2	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS
NUM_OF_FIELDS_FOR_ACC	INT	Y	accumulator_info is expanded in order. Any change in number of field changes this field .Any change here affects ACCUMULATOR_INFO length; for example, NUM_OF_FIELDS_FOR_ACC = 4	4	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
NUM_OF_FIELDS_FOR_ACCOUNT__ACC	INT	Y	accumulator_info is expanded in order in case of account accumulator. Any change in number of field changes this field. Any change here affects ACCUMULATOR_INFO length; for example, NUM_OF_FIELDS_FOR_ACCOUNT_ACC = 4	4	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS CDRFormat.config.OSA
NUM_OF_FIELDS_FOR_ACCOUNT_BAL	INT	Y	Balance_info is expanded in order in case of account balance. Any change in number of field changes this field. Any change here eafects BALANCE_INFO length; for example, NUM_OF_FIELDS_FOR_ACCOUNT_BAL = 8	4	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
NUM_OF_FIELDS_FOR_EXT			extension_info is expanded in order. Any change in number of field changes this field. Any change here affects EXTENSION_INFO length; for example, NUM_OF_FIELDS_FOR_EXT = 2	2	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
NUM_OF_FIELDS_FOR_VERSION	INT	Y	version_info is expanded in order. Any change in number of field changes this field. Any Change here affects EXTENSION_INFO length; fopr example, NUM_OF_FIELDS_FOR_VERSION 2	2	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.SMS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
NUM_OF_VERSION	INT	Y	Maximum number of version that can be written to CDR	2	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS
NUMBER_OF_ACCOUNT_BALANCE	Unsigned short	N	Number of account balance	2	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
NUMBER_OF_BALANCE	Unsigned short	Y	Number of balances	2	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS
OCS_COMMENT	INT		OCS comment for the transaction.	2000	CDRFormat.config.OCS
OR_ORIGIN	INT	N	ORP: the origin of the record. 0 = network (non-ORP) 1 = roaming rating (ORP) 2 = revenue recovery (ORP)	1	CDRFormat.config.CCBS3.0CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
ORIGINAL_CALLED_NUMBER	Digit string	N	Original B-Address	30	CDRFormat.config.CCBS3.0C DRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFomat.config.SMS
ORIGINAL_CHARGE_AMOUNT	Double	N	Markup Rating for Roaming: the original monetary roaming charge recorded in the TAP record of the activity	8	CDRFormat.config.CCBS3.0C DRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
ORIGINAL_CURRENCY	string	N	Markup Rating for Roaming: the original currency of the activity	3	CDRFormat.config.CCBS3.0C DRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
ORIGINAL_REDIRECTION_REASON				2	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD
ORIGINATE_OFFER_DATE	CHAR string: mm-dd-yy	Y	Activity offered/originated date.	8	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ORIGINATE_OFFER_DATETIME	Date/Time	N	Converged Billing: the combined local date and time of the activity	19	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
ORIGINATE_OFFER_TIME	CHAR string: hh:mm:ss.t	Y	Activity offered/originated time.	10	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.GPRS CDRFormat.config.OCS
ORIGINATING_NUMBER (formerly Calling_Number)	Digit string	N	Originating party number	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS CDRFormat.config.OCS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
ORP_DATE	CHAR string: mm-dd-yy	N	ORP: the date ORP processes this record. The ORP timestamp will be later than the timestamp of the activity	8	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
ORP_TIME	CHAR string: hh:mm:ss.t	N	ORP: the time ORP processes this record. The ORP timestamp will be later than the timestamp of the activity	10	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
OTHER_LOCATION	CHAR string	N	Currently not used.	32	CDRFormat.config.OCS
OTHER_LOCATION_TYPE	INT	N	Currently not used.	2	CDRFormat.config.OCS
OUTGOING_TRUNK_GROUP	INT	N	Trunk group associated with outgoing call	8	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD
PARENT_ACCOUNT_NO	INT	Y	parent_account_no of the subscriber. Multisubscriber account: populated with the subscriber's owning account. Single subscriber account: NULL.	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
PDP_INITIATION_TYPE				1	CDRFormat.config.GPRS
PMT_APPLICATION_ID	CHAR string	N	ECI: the discount provided by the ISMSC	4	CDRFormat.config.PMT
PMT_MESSAGE_NAME	INT	Y	ECI: the type of the message sent by the ISMSC	25	CDRFormat.config.PMT
PMT_SUBSCRIBER_TYPE	CHAR string	Y	ECI: the type of an Apply Tariff message: MO-to-MT, APP-to-MT, and MO-to-APP	10	CDRFormat.config.PMT
PRE_CALL_ANNOUNCEMENT_ID	INT	Y	Identifies threshold announcement, if any, played to calling party	9	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
PRE_POST_INDICATOR	INT	Y	Type of subscriber account charged: 0 = prepaid 1 = postpaid	1	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
PRIMARY_OFFER_ID	INT	Y	Unique primary offer ID	10	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
PS_STATUS	INT	N	Reason for failed ECI transaction. 0 = CHARGE_APPLIED 0 VALID_SUBSCRIBER 1 = INVALID_SUBSCRIBER 2 = SUBSCRIBER_NOT_ACTIVE 3 = SERVICE_UNAVAILABLE 4 = INSUFFICIENT_BALANCE 5 = TARIFF_ENGINE_ERROR 6 = TARIFF_NOT_FOUND 7 = TRANSACTION_NOT_FOUND 8 = INVALID_MESSAGE_TYPE 9 = INVALID_VOLUME	1	CDRFormat.config.PMT
QOS	CHAR string	Y	GPRS: Quality Of Service of the activity	32	CDRFormat.config.GPRS
RECHARGE_BATCH_NUM				10	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD
RECHARGE_CONV_FACE_VALUE	Double	N	Face Value of Recharge Voucher in original currency. (If Subscriber's Primary Offer currency and Recharge Voucher currency is not same.)	8	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.OSA

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
RECHARGE_CONV_RATE	Double	N	The conversion rate for Recharge Voucher currency to Subscribers currency. (If Subscriber's Primary Offer currency and Recharge Voucher currency is not same.)	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA CDRFormat.config.OCS
RECHARGE_EXP_OFFSET				3	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD
RECHARGE_FACE_VALUE				8	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD
RECHARGE_ORIG_CURR_CODE	Char String	N	Original ISO Currency Code for the Recharge Voucher. (If Subscriber's Primary Offer currency and Recharge Voucher currency is not same.)	3	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA CDRFormat.config.OCS
RECHARGE_RESULT_CODE	INT	Y	Result of attempt to use recharge card. The SUBSCRIBER_ID field identifies the recharged Prepaid Service account. 0 = Success 1 = Failed, Idle state 2 = Failed, Shipped state 3 = Failed, Disqualified state 4 = Failed, Stolen state 5 = Failed, Expired state 6 = Failed, Used state 7 = Failed, Invalid Currency Unit 10 = Failed, Excess recharge amount for single session 11 = Failed, Excess recharge amount for account balance (Field not applicable for ECI)	2	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.PMT CDRFormat.config.OCS
RECHARGE_SERIAL_NUM				10	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
RECORD_SEQUENCE_NUMBER	string	N	ORP: the Outage Record Sequence Number for ORP-generated CDRs	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
REDIRECTING_INDICATOR				2	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD
REDIRECTING_NUMBER				30	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD
REDIRECTING_REASON				2	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD
REDIRECTION_COUNTER				2	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.OCS CDRFormat.config.USSD
REFERENCE	INT	Y	Reference number of this activity	10	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
REFUND_FLAG	CHAR	N	ECI: indicates if transaction was a refund: Y = refund, N = not a refund	1	CDRFormat.config.PMT
REFUND_TRANS_ID_1	INT	N	ECI: Transaction ID 1 of original ECI transaction being reversed	30	CDRFormat.config.PMT
RESELLER_ID	INT	Y	ID of the reseller.	9	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS
ROUNDED_DURATION	INT	Y	Duration of call in tenths of seconds	9	CDRFormat.config.PMT CDRFormat.config.OSA CDRFormat.config.SMS CDRFormat.config.USSD CDRFormat.config.VOICE CDRFormat.config.GPRS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
ROUNDED_END_TIME	TIME (HH.MM.SS.t)	Y	End time of call	10	CDRFormat.config.PMT CDRFormat.config.OSA CDRFormat.config.SMS CDRFormat.config.USSD CDRFormat.config.VOICE CDRFormat.config.GPRS
ROUNDED_START_TIME	TIME (HH.MM.SS.t)	Y	Start time of call	10	CDRFormat.config.PMT CDRFormat.config.OSA CDRFormat.config.SMS CDRFormat.config.USSD CDRFormat.config.VOICE CDRFormat.config.GPRS
SEGMENT_ID				5	CDRFormat.config.OCS
SESSION_DESCRIPTION	CHAR string	Y	OSA: short description of session	49	CDRFormat.config.OSA
SESSION_ID	CHAR String	Y	OSA/Diameter: unique session identification number	OSA=10 OCS=128	CDRFormat.config.OSA CDRFormat.config.OCS
SHORT_DIAL_NUMBER	CHAR String	6	Short Code used to identify a Closed User Group (CUG)	6	CDRFormat.config.CCBS3.0
SIP_INC_CALLID	String	N	Incoming Call-ID in Session Initiation Protocol (SIP)	100	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE
SIP_OUT_CALLID	String	N	Outgoing Call-ID in Session Initiation Protocol (SIP)	100	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE
SLU_ID	INT	Y	The ID of the SLU handling the activity	4	CDRFormat.config.CCBS3.0 CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
START_TSTAMP	MM-DD-YYYY HH:MM:SS.t	Y	OSA: direct operation/reservation start time	24	CDRFormat.config.OSA CDRFormat.config.OCS
START_TSTAMP_TYPE	INT	Y	Diameter: Call Start Time Type (Platform Time, received time etc)	2	CDRFormat.config.OCS
SUB_COS_CURR_CODE	Char String	N	ISO Currency Code of the currency used for the Call.	3	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.OSA CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
SUB_FIELD_DELIMITER	CHAR		Delimiter character separating subfields	1	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.SMS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
SUB_SESSION_ID	CHAR String	Y	Diameter: unique sub-session id	20	CDRFormat.config.OCS
SUBSCRIBE_LOCATION_TYPE	INT	N	OSA: Type of location used for SUBSCRIBER_LOCATION parameter. Possible values are: 1 Handset 2 Dialed number 3 MSRN ID 4 CELL ID 5 MSC ID 6 SGSN ID 7 IP Address (applicable only for OSA)	OSA=10 OCS=2	CDRFormat.config.OSA CDRFormat.config.OCS
SUBSCRIBER_ID	Digit string	Y	Represents the ID of the subscriber, still used in CDRs. (Example: SUBSCRIBER_ID= 2165368002)	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
SUBSCRIBER_LOCATION	CHAR String	N	OSA: location of subscriber for location-based billing	32	CDRFormat.config.OSA CDRFormat.config.OCS
SUBSCRIBER_NO	INT	Y	Internal subscriber number	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.SMS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.OSA
SUBSCRIBER_NO_RESETS	INT	Y	Reset counter value for subscriber number	5	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS CDRFormat.config.OCS
SUBSCRIBER_STATUS	INT	Y	ECI: the ID of the state of the subscriber's account (active, suspended, etc.)	2	CDRFormat.config.PMT

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
TARGET_BALANCE_ACCOUNT_NO	string	N	The account number of the account from which the shadow subscriber consumes balances (that is, obtains its funds)	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.SMS CDRFormat.config.USSD CDRFormat.config.OCS
TARGET_IVR_NUMBER	string		VOICE type CDR.	16	CDRFormat.config.VOICE
TARIFF_PLAN_ID	INT	Y	Tariff plan associated with this activity invocation	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS
TIM1_TAR1_CHG_TYPE	INT	N	The charge type 0 = owner 1 = server 2 = tax configured for the charge applied due to the first tariff of the first Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TIM1_TAR1_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the first tariff of the first time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
TIM1_TAR2_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the second tariff of the first Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TIM1_TAR2_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the second tariff of the first time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
TIM1_TAR3_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the third tariff of the first Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TIM1_TAR3_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the third tariff of the first time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
TIM1_TAR4_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the fourth tariff of the first Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TIM1_TAR4_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the fourth tariff of the first time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
TIM1_TAR5_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the fifth tariff of the first Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TIM1_TAR5_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the fifth tariff of the first time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
TIM2_TAR1_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the first tariff of the second Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
TIM2_TAR1_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the first tariff of the second time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
TIM2_TAR2_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the second tariff of the second Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TIM2_TAR2_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the second tariff of the second time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
TIM2_TAR3_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the third tariff of the second Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TIM2_TAR3_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the third tariff of the second time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
TIM2_TAR4_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the fourth tariff of the second Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
TIM2_TAR4_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the fourth tariff of the second time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
TIM2_TAR5_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the fifth tariff of the second Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TIM2_TAR5_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the fifth tariff of the second time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
TIM3_TAR1_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the first tariff of the third Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TIM3_TAR1_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the first tariff of the third time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
TIM3_TAR2_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the second tariff of the third Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TIM3_TAR2_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the second tariff of the third time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
TIM3_TAR3_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the third tariff of the third Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TIM3_TAR3_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the third tariff of the third time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
TIM3_TAR4_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the fourth tariff of the first Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TIM3_TAR4_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the fourth tariff of the third time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
TIM3_TAR5_CHG_TYPE	INT	N	The Charge Type 0 = owner 1 = server 2 = tax configured for the charge applied due to the fifth tariff of the third Time Type of the TP	1	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TIM3_TAR5_CURR_CONV	INT	Y	1 = monetary balance used and currency conversion applied to the fifth tariff of the third time type of the TP 0 = none applied	1	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OSA
TIME_ZONE	CHAR string	Y	Time Zone applicable to all date/time fields specified in the CDR	18	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
TIME1_ DURATION (formerly FIRST_ TARIFF_ DURATION)	INT	Y	Duration of activity rated using the Tariffs during the first Time Type of the Tariff Plan. Also shared by the ECI	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME1_ FIFTH_ TARIFF_ CHARGE	Double	N	The total charge, in the currency used by that Primary Offer, applied due to the fifth tariff of the First Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME1_ FIFTH_ TARIFF_ID	INT	N	The ID of the fifth tariff applied for the First Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME1_ FIRST_ TARIFF_ CHARGE	Double	Y	The total charge, in the currency used by that Primary Offer, applied due to the primary tariff for the First Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME1_ FIRST_ TARIFF_ID	INT	Y	The ID of the primary tariff applied for the First Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME1_ FOURTH_ TARIFF_ CHARGE	Double	N	The total charge, in the currency used by that Primary Offer, applied due to the fourth tariff of the First Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME1_ FOURTH_ TARIFF_ID	INT	N	The ID of the fourth tariff applied for the First Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
TIME1_ID	INT	Y	The ID of the first Time Type in which the call originated	6	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.USSD
TIME1_ SECOND_ TARIFF_ CHARGE	Double	Y	The total charge, in the currency used by that Primary Offer, applied due to the second tariff of the First Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME1_ SECOND_ TARIFF_ID	INT	Y	The ID of the second tariff applied for the First Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME1_ THIRD_ TARIFF_ CHARGE	Double	N	The total charge, in the currency used by that Primary Offer, applied due to the third tariff of the First Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME1_ THIRD_ TARIFF_ID	INT	N	The ID of the third tariff applied for the First Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME2_ DURATION (formerly SECOND_ TARIFF_ DURATION)	INT	N	Duration of activity rated using the Tariffs during the second Time Type of the Tariff Plan. Also shared by the ECI	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME2_ FIFTH_ TARIFF_ CHARGE	Double	N	The total charge, in the currency used by that Primary Offer, applied due to the fifth tariff of the second Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
TIME2_FIFTH_TARIFF_ID	INT	N	The ID of the fifth tariff applied for the second Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME2_FIRST_TARIFF_CHARGE	Double	Y	The total charge, in the currency used by that Primary Offer, applied due to the primary tariff for the second Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME2_FIRST_TARIFF_ID	INT	Y	The ID of the primary tariff applied for the second Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME2_FOURTH_TARIFF_CHARGE	Double	N	The total charge, in the currency used by that Primary Offer, applied due to the fourth tariff of the second Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME2_FOURTH_TARIFF_ID	INT	N	The ID of the fourth tariff applied for the second Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME2_ID	INT	Y	The ID of the second Time Type	6	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.USSD
TIME2_SECOND_TARIFF_CHARGE	Double	Y	The total charge, in the currency used by that Primary Offer, applied due to the second tariff of the second Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
TIME2_ SECOND_ TARIFF_ID	INT	Y	The ID of the second tariff applied for the second Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME2_ THIRD_ TARIFF_ CHARGE	Double	N	The total charge, in the currency used by that Primary Offer, applied due to the third tariff of the second Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME2_ THIRD_ TARIFF_ID	INT	N	The ID of the third tariff applied for the second Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME3_ DURATION (formerly THIRD_ TARIFF_ DURATION)	INT	N	Duration of activity rated using the Tariffs during the third Time Type of the Tariff Plan. Also shared by the ECI	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME3_ FIFTH_ TARIFF_ CHARGE	Double	N	The total charge, in the currency used by that Primary Offer, applied due to the fifth tariff of the third Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME3_ FIFTH_ TARIFF_ID	INT	N	The ID of the fifth tariff applied for the third Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME3_ FIRST_ TARIFF_ CHARGE	Double	Y	The total charge, in the currency used by that Primary Offer, applied due to the primary tariff for the third Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
TIME3_FIRST_TARIFF_ID	INT	Y	The ID of the primary tariff applied for the third Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME3_FOURTH_TARIFF_CHARGE	Double	N	The total charge, in the currency used by that Primary Offer, applied due to the fourth tariff of the third Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME3_FOURTH_TARIFF_ID	INT	N	The ID of the fourth tariff applied for the third Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME3_ID	INT	Y	The ID of the third Time Type	6	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.USSD
TIME3_SECOND_TARIFF_CHARGE	Double	Y	The total charge, in the currency used by that Primary Offer, applied due to the second tariff of the third Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME3_SECOND_TARIFF_ID	INT	Y	The ID of the second tariff applied for the third Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TIME3_THIRD_TARIFF_CHARGE	Double	N	The total charge, in the currency used by that Primary Offer, applied due to the third tariff of the third Time Type of the TP	16	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
TIME3_THIRD_TARIFF_ID	INT	N	The ID of the third tariff applied for the third Time Type of the TP	6	CDRFormat.config.CCBS3.0 CDRFormat.config.GPRS CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
TOTAL_CURR_VALUE_UNIT_CREDITS	Double	Y	Total currrent value of unit credits.	16	CDRFormat.config.CCBS3.0 CDFFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS
TOTAL_CURRENCY_CHARGE	Double	Y	Amount of chargeable volume applied to Currency balances	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD
TOTAL_CURRENCY_CHARGE_CAT1	INT	N	The sum of the monetary charges configured with charge Category 1.	16	CDRFormat.config.VOICE CDRFormat.config.PMT CDRFormat.config.USSD
TOTAL_CURRENCY_CHARGE_CAT2	INT	N	The sum of the monetary charges configured with charge Category 2.	16	CDRFormat.config.VOICE CDRFormat.config.PMT CDRFormat.config.USSD
TOTAL_CURRENCY_CHARGE_CAT3	INT	N	The sum of the monetary charges configured with charge Category 3.	16	CDRFormat.config.VOICE CDRFormat.config.PMT CDRFormat.config.USSD
TOTAL_CURRENCY_CHARGE_CAT4	INT	N	The sum of the monetary charges configured with charge Category 4.	16	CDRFormat.config.VOICE CDRFormat.config.PMT CDRFormat.config.USSD
TOTAL_CURRENCY_CHARGE_SERVER	Double	N	The sum of the monetary charges configured with a Charge Type of Server.	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TOTAL_CURRENCY_CHARGE_TAX	Double	N	The sum of the monetary charges configured with a Charge Type of Tax.	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
TOTAL_NON_CURRENCY_CHARGE	Double	Y	Amount of chargeable volume applied to Non Currency balances	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TOTAL_POSTPAID_AMT	Double	N	Records the total postpaid monetary data.	16	CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.OFFLINE CDRFormat.config.OSA CDRFormat.config.PMT CDRFormat.config.SYS CDRFormat.config.VOICE
TOTAL_PREPAID_AMT	Double	N	Records the total prepaid monetary data.	16	CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.OFFLINE CDRFormat.config.OSA CDRFormat.config.PMT CDRFormat.config.SYS CDRFormat.config.VOICE
TOTAL_PULSE_CHARGE	INT	N	The total number of pulses charged for a special pulse tariff (charge type = pulse)	4	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.USSD CDRFormat.config.PMT
TOTAL_PULSE_DURATION	INT	N	The activity duration expressed as the product of the pulse size multiplied by the pulse count for a special pulse tariff (charge type = pulse)	4	CDRFormat.config.CCBS3.0 CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.PMT CDRFormat.config.SMS
TOTAL_USAGE (formerly CHARGABLE_TIME)	INT	Y	Chargeable volume of activity in billable number of units (a value of 45.2 would equal 45.2 units). If the activity is unsuccessful, the field will be populated with 0	9; for OSA = 30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TOTAL_VALUE_DISCOUNT	Double	Y	Total value of discount.	16	CDRFormat.config.CCBS3.0 CDFFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS
TRANS_ID_1	INT	Y	ECI: Transaction ID 1 for ECI transaction	30	CDRFormat.config.PMT

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
TYPE_OF_CDR	INT	Y	The type of CDR. 1 = VOICE 2 = PMT 3 = USSD 4 = SMS 5 = GPRS 6 = OSA 7 = OCS Note: this field must be the first field in the record	1	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
TYPE_OF_CHARGE	CHAR string	N	ECI: type of an Apply Charge message; received from the ISMSC	32	CDRFormat.config.PMT
UNCHARGED_AMOUNT_POSTPAID	Double	N	Uncharged postpaid amount	16	CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
UNCHARGED_AMOUNT_PREPAID	Double	N	Uncharged prepaid amount	16	CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
UNIT_TYPE_ID	INT	N	OSA: Unit type ID used on the OSA interface in the TpVolume element. The values here reflect the values provisioned in the OSA Unit mapping screen. Predefined values are: 0 P_CHS_UNIT_UNDEFINED 1 P_CHS_UNIT_NUMBER 2 P_CHS_UNIT_OCTETS 3 P_CHS_UNIT_SECONDS 4 P_CHS_UNIT_MINUTES 5 P_CHS_UNIT_HOURS 6 P_CHS_UNIT_DAYS	OSA=10 PMT=4	CDRFormat.config.PMT CDRFormat.config.OSA
USAGE_OFFER_ID	INT	Y	Offer used to determine usage of the call	10	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
USAGE_PLAN_ID	INT	Y	D to determine plan of the usage	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS
USAGE_UNIT_TYPE	INT	Y	Unit Type used for rating / charging the activity.	2	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS CDRFormat.config.OSA
USER_SUBSCRIBER_NO	INT	N	Original subscriber number in case of LR	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
USER_SUBSCRIBER_NO_RESETS	INT	N	Original subscriber reset counter in case of LR	5	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
UTC_OFFSET	INT	N	ORP: the offset (+ or -) from GMT of the time zone where service is provided, expressed in minutes.	4	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
VERSION_INFO	INT	Y	This field gives information about the changes happened over a period of time	200	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS CDRFormat.config.SMS

Table 11 Available CDR Fields (Continued)

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
VERSION_MAJOR	INT	Y	This field contains the version where latest data is loaded	10	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
VERSION_MINOR	INT	Y	This field contains the version where history data are loaded	10	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
VERSION_NUMBER				20	CDRFormat.config.OCS

Table 12 Available sub-fields in BALANCE_INFO field

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
BALANCE_ID (Sub Field will be expanded to represent Balance 1 to 40)	INT		ID number of the balance	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
BALANCE_NAME (Sub Field will be expanded to represent Balance 1 to 40)	CHAR String		Name of the balance	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
BALANCE (Sub Field will be expanded to represent Balance 1 to 40)	Currency/Real		Final balance after the activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS

Table 12 Available sub-fields in BALANCE_INFO field (Continued)

Name	Format	Always popu-lated?	Description	Length	Default CDR Format Configuration Files
BALANCE_CHANGE (Sub Field will be expanded to represent Balance 1 to 40)	Double		Balance change for the activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
BALANCE_TYPE	INT	Y	Type of the Balance 1 = Shadow 2 = Real	1	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
BALANCE_TARGET_ID	INT	Y	Target Account's Real Balance ID for Particula shadow balance.	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
BALANCE_UNIT_TYPE (Sub Field will be expanded to represent Balance 1 to 40)	INT		Unit type of the Balance	2	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
BALANCE_SIGN (Sub Field will be expanded to represent Balance 1 to 40)	CHAR	Y	Sign of the Core Balance after the activity. The Core Balance may be positive or negative	1	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS

Table 13 Available sub-fields in ACCOUNT_BALANCE_INFO

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
ACCOUNT_BALANCE_ID	INT		ID number of the account balance	6	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCOUNT_BALANCE_NAME	CHAR String		Name of the account balance	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCOUNT_BALANCE	Currency/ Real		Final account balance after the activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCOUNT_BALANCE_CHANGE	Double		Account balance change for the activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 14 Available sub-fields in ACCUMULATOR_INFO field

Name	Format	Always popu-lated?	Description	Length	Default CDR Format Configuration Files
ACCUMULATOR_NAME	CHAR String	N	Name of the Accumulator	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCUMULATOR	Double	N	Accumulator value after the activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS
ACCUMULATOR_ CHANGE	Double	N	Accumulator change due to the activity	16	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.SMS

Table 15 Additional sub-fields in ACCOUNT_ACCUMULATOR_INFO

Name	Format	Always populated?	Description	Length	Default CDR Format Configuration Files
ACCOUNT_ACCUMULATOR_ID	CHAR String		ID of the Account Accumulator	30	CDRFormat.config.CCBS3.0 CDFFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.SMS
ACCOUNT_ACCUMULATOR_NAME	CHAR String		Name of the Account Accumulator	16	CDRFormat.config.CCBS3.0 CDFFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.SMS
ACCOUNT_ACCUMULATOR	Double		Accumulator value after the activity	16	CDRFormat.config.CCBS3.0 CDFFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.SMS
ACCOUNT_ACCUMULATOR_CHANGE	Double		Accumulator change due to the activity	30	CDRFormat.config.CCBS3.0 CDFFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.PMT CDRFormat.config.GPRS CDRFormat.config.OCS CDRFormat.config.SMS

Table 16 Available sub-fields in EXT_TOKEN_INFO field

Name	Format	Always popu-lated?	Description	Length	Default CDR Format Configuration Files
EXT_ TOKEN_ NAME	CHAR String	N	EXT_TOKEN_NAME fields stores the name of extension field. Used only Plugin modules.	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS
EXT_ TOKEN_ VALUE	CHAR String	N	EXT_TOKEN_VALUE fields stores the value of extension field. Used only Plugin modules.	30	CDRFormat.config.CCBS3.0 CDRFormat.config.PMT CDRFormat.config.SMS CDRFormat.config.GPRS CDRFormat.config.OSA CDRFormat.config.VOICE CDRFormat.config.USSD CDRFormat.config.OCS

CLEAR_CAUSE Possible Values

The sections below contain the possible values for the `CLEAR_CAUSE` field.

Case 1 CLEAR_CAUSE Values (ISUP)

CODE	TEXT
0	Unknown
1	unallocated
2	noRoutetoNetwork
3	noRoutetoDestination
5	misdialledTrunkPrefix
6	channel_unacceptable
8	preemption
9	preemptionCircuitReservedForReuse
11	resourceNotAvailable
15	clearBackward
16	normalCallClearing
17	userBusy
18	noUserResponse
19	noAnswerFromUserAfterAlert
20	subscriberAbsent
21	callRejected
22	numberChanged
26	non_selected_user
27	destinationOutOfOrder

CODE	TEXT
28	addressIncomplete
29	facilityRejected
31	normalUnspecified
34	noCircuitAvailable
38	networkOutOfOrder
39	frame_mode_out_of_order
40	Success
41	temporaryFailure
42	switchingEquipmentCongestion
43	access_info_discarded
44	requestedChannelNotAvailable
46	precedenceCallBlocked
47	resourceUnavailableUnspecified
49	quality_not_available
50	requestedFacilityNotSubscribed
57	bearerCapabilityNotAuthorized
58	bearerCapabilityNotPresentlyAvailable
62	inconsist_access_info
63	serviceOptionNotAvailableUnspecified
65	bearerCapabilityNotImplemented
66	chan_type_not_impltd
69	requestedFacilityNotImplemented
70	onlyRestDigInfoBearerCapabilityAvailable
79	serviceOptionNotImplementedUnspecified
81	invalid_call_ref
82	chan_doesnt_exist
83	susp_call_error
84	identity_in_use
85	no_call_suspended
86	id_already_cleared
88	incompatibleDestination
91	invalidTransitNetworkSelection
95	invalidMessageUnspecified
96	mand_element_missing
97	messageTypeNonexistantOrNonimplemented
98	msg_not_compatible
99	parameterNonexistantOrNonimplementedDiscard
100	invalid_information
101	parameterNonexistantOrNonimplementedPassed
102	recovery_timer_expired
103	parameter_not_existant

CODE	TEXT
110	unrecognized_parameter
111	protocolErrorUnspecified
127	interworkingUnspecified
200	invalid_user_code

Case 2 CLEAR_CAUSE Values (SLF)

CODE	TEXT
400	NormalCompletion
401	InvalidRoutingPrefix
402	InvalidAccount
403	DisabledAccount
404	susp_accnt_no_cc_inter
405	AccountInUse
406	InvalidDestination
407	InsufficientCredit
408	InvalidIVRUselection
409	InvRechargeAttAccntFull
410	MaxCallDurTimerExpires
411	PinFailure
412	fraud_locked_account
413	InvCallForPostActive
414	invald_call_for_pre_active
415	ncf_call_not_startable
416	invalid_activity
417	invalid_apn_or_qos

Case 3 CLEAR_CAUSE Values (IN)

CODE	TEXT
512	normal
514	timeout
515	resourceCanceled
516	unansweredLeg
517	invalidLeg
518	userAbandon
519	invalidCode
520	failure
521	channelsBusy
522	calledPartyAnswered
523	resourceNotAvailable
524	isdnTimeout
525	resourceNotSupported

CODE	TEXT
526	taskRefused
527	invalidCallerResponse
528	capabilityFailure
529	protocolError
530	abort
531	suppServiceInvoked
532	srtCancelled
533	temporaryFailure
534	ipTimeout
535	improperValue
536	missingOrInvalidArgs
537	resourceLimitation
538	applicationError
539	unexpectedMessage
540	unrecognizedMessage
541	switchOpNotSupported
542	portNotConnected
543	invalidMacroID
544	noInvokeMacroBlock
545	onlyMacroBlockExpected
546	informationalMessage
547	origAbortIVRfail

Case 4 CLEAR_CAUSE Values

CODE	TEXT
600	systemFailure
601	unexpectedDataValue
602	facilityNotSupported
603	sM-DeliveryFailure
604	releaseFromRadioInterface

CDR_CALL_TYPE Possible Values

This section contains the possible values for the `CDR_CALL_TYPE` field. Interpretation of this field may be dependent on the values for the Type of CDR and Activity Direction fields.

CODE	TEXT
0	UNKNOWN_TYPE
23	USSD_RECHARGE_CALL
24	USSD_INFO_CALL
25	USSD_UNSUCCESSFUL_CALL
26	USSD_SUBCALLBACK_CALL
27	USSD_DESTCALLBACK_CALL

CODE	TEXT
28	USSD_ACCOUNT_RECHARGE_CALL
29	USSD_ACCOUNT_INFO_CALL
40	USSD_LR_OVERRIDE_ID_INFO_CALL
41	USSD_LR_OVERRIDE_ID_CHANGE
42	FEATURE_REQ_BALANCE_CHECK
43	FEATURE_REQ_UNKNOWN _TYPE
50	EMERGENCY CALL
51	ADMIN_CALL
52	OUTGOING_OPPS_CALL
53	INCOMING_TPPS_CALL
54	NETWORK_FWD_OPPS
55	INFO_SERVER_CALL
56	RECHARGE_SERVER_CALL
57	CUSTOMER_CARE_CALL
58	NETWORK_FWD_TPPS
60	LANG_SELECTION_CALL
61	LANG_SET_CALL
62	CARD_ACCESS_CALL
63	NETWORK_NO_CHARGE_OPPS_CALL
64	NETWORK_NO_CHARGE_TPPS_CALL
65	NETWORK_NO_CHARGE_CALL
66	ADMIN_FUNCTION_MENU_CALL
67	CF_PROV_CFU_CALL
68	CF_PROV_CFB_CALL
69	CF_PROV_CFNA_CALL
70	INVOICE_REPORT_CALL
71	INVOICE_PAYMENT_CALL
72	ACCOUNT_INFO_SERVER_CALL
73	ACCOUNT_RECHARGE_SERVER_CALL
77	OTHER_NON_BILLABLE_CALLS
78	OTHER_BILLABLE_CALLS
86	CAP3_ORIGINATING_SMS
87	CAP3_MS_ORIGINATING_GPRS
88	CAP3_NETWORK_ORIGINATING_GPRS
89	FAX_GRP_2_3_OPPS
90	FAX_GRP_2_3_TPPS
91	FAX_GRP_4_OPPS
92	FAX_GRP_4_TPPS
93	SYNTAX_VIDEOTEX_OPPS
94	SYNTAX_VIDEOTEX_TPPS
95	INT_VIDEOTEX_OPPS
96	INT_VIDEOTEX_TPPS
97	INTTELEX_OPPS

CODE	TEXT
98	INTTELEX_TPPS
99	X400_OPPS
100	X400_TPPS
101	FAST_RECHARGE_SERVER_CALL
102	NETWORK_DEFINED_RESOURCE_NM1_CALL
103	NETWORK_DEFINED_RESOURCE_NM2_CALL
104	NETWORK_DEFINED_RESOURCE_NM3_CALL
105	NETWORK_DEFINED_RESOURCE_NM4_CALL
106	NETWORK_DEFINED_RESOURCE_NM5_CALL
110	USSD_SUCC_BAL_TRANS_CALL
111	USSD_REJECTED_BAL_TRANS_CALL
112	USSD_FAILED_BAL_TRANS_CALL
113	TPPS_FUNDIAL

Outage Record Processor (ORP)

The Outage Record Processor (ORP) processes calls that may not have been rated at run time by a real-time process because the SDP was unavailable when the call occurred. Despite the Rating server being down, the subscriber can continue/complete the call. CDRs generated while an SDP is down are re-rated by the ORP. Call details during the outage are stored in the form of a CDR called the Outage Record. Outage Records are stored in the Outage Record file. ORP processes Outage Records, re-rates the call, and applies the appropriate charge for the activity.

Converged only

The instructions for configuring and invoking the Outage Record processes for handling offline outage records are contained in the document, *Operations Reference*, in the chapter entitled, “ORLTP Process”. This process, when invoked, calls the CAP and C-MCAP processes as applicable.

Each Outage Record File consists of a file header followed by one or more outage records. The file header is 7 fixed-length fields. Each header field is null-terminated and consists of the ASCII representations of numbers, names, and so on. Data stored in these fields includes a checksum, file creation time stamp, and record count. The outage record comprises many variable-length fields, delimited by pipes, and containing ASCII representations of numbers, names, and so on. An empty field is indicated by two consecutive pipe delimiters (that is, '||'). Data stored in the fields include the usage activity's start and end date/time, a consumption amount, and an outage record processing result. Each outage record is terminated by a carriage return. The contents of the file header and outage record are described in greater detail in the tables that follow.

How To Load ORP Records

There are two methods for loading the OR/CDR records: local mode and FTP mode.

Local Mode

OR/CDR records are put in one machine and COM/CMCAP are also run on the same machine.

- Configure table `EXT_CONTACTS` to have one row for COM/CMCAP with specific `EXT_CONTACTS.ext_contact_id` and `EXT_CONTACTS.access_method = 1`

- Configure table EXT_LOCAL_DIR_ACCESS such that EXT_LOCAL_DIR_ACCESS.ext_contact_id = EXT_CONTACTS.ext_contact_id and EXT_LOCAL_DIR_ACCESS.remote_ready = <directory where the OR/CDR files located>.
- Configure table HOST_CONTACTS to have one row for CMCAP where HOST_CONTACTS.host = <IP address of the machine where CMCAP is running>.

FTP Mode

OR/CDR records are put in one machine and COM/CMCAP are also run on a different machine.

- Configure table EXT_CONTACTS to have one row for COM/CMCAP with specific EXT_CONTACTS.ext_contact_id and EXT_CONTACTS.access_method = 2
- Configure table EXT_FTP_ACCESS such that EXT_FTP_ACCESS.ext_contact_id = EXT_CONTACTS.ext_contact_id and EXT_FTP_ACCESS.remote_ready = <directory where the OR/CDR files located>.
- Configure table HOST_CONTACTS to have one row for CMCAP where HOST_CONTACTS.host = <IP address of the machine where CMCAP is running>.

ORP Record Structure

The Outage Record contains 138 fields, each separated by a delimiter pipe (|).

The following is an example of a VOICE outage record:

```
ORHPkslu1000000001390000000139127070803812707081130000000001

VOI|0000000139|0|0|OR_RSLT_
UNPROCESSED(0)|||kslu10|1270708099|1270708100|1270708110|9112400002|911240
0005|
9112400002|0|4997||1|0|2|98305|30012|||16|903C790003504465|0|0.000000|-
10000|2||0.000000|||||||||||||||||||||||
903C790003504465|-1|-1|52|0|||||-
|O|||1|||||||||||||||||||||||||||||||||||||||||||||||||||||||0|126|140|126|
1||||9112400005|9112400005|0|1||||1|1
```

Table 17 shows the fields in order (offset). In the table some rows (fields) are optional, and may be omitted by passing NULL values (that is, consecutive delimiters). For each activity (for example, voice, SMS), it is indicated as to whether the field is Mandatory (X), Optional (O or blank) and Not Applicable (-). The colored fields (GREEN) are Comverse System derived and need not be taken care of by external MSC.

Table 17 ORP Record Structure

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
1	Record Type	String(3)	The record type indicating the network activity	"VOI" =Voice "CMS" =CAP3SMS "GPR"= GPRS "SMS"= ECI/Payment Server "USS" = USSD "OSA"= OSA "OCS" = Diameter		X	X	X	X	X	X
2	Record Sequence Number	10-digit Integer	A generated sequence number, for purposes of auditing CDRs			X	X	X	X	X	X
3	Activity Type	Integer	The network activity	0 Voice 1 CAP3SMS 2 DATA (GPRS) 3 ECI (SMS) 4 USSD 5 OSA 6 DIAMETER		X	X	X	X	X	X
4	Result Code	Integer	Result code in Integer	0	NULL						
5	Result Text	String(120)	Result code in string	for example: OR_RSLT_ UNPROCESSED	NULL						

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
6	Reserved 1	String(32)		Reserved For future use. NULL for now	NULL						
7	Reserved 2	String(32)		Reserved For future use. NULL for now	NULL						
8	Record Origin	String(30)	The name of the server created this file - the UNIX host name.								
9	Activity Offered Date/Time	Time_t	When the call indication was received by the network	This is an ASCII number, equal to the number of seconds since Jan 1, 1970 for example: 1251352922	Date/Time of answer (Note that for TAP rating, "Offered" and "Answered" times will be the same.)	X	X	X	X	X	X
10	Activity Answered Date/Time	Time_t	When the call was answered by the other party	This is an ASCII number, equal to the number of seconds since Jan 1, 1970 for example: 1251352922	Date/Time of answer (Note that for TAP rating, "Offered" and "Answered" times will be the same).	X	X	X	X	X	X

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
11	Activity Disconnect Date/Time	Time_t	When the call was disconnected from the network	This is an ASCII number, equal to the number of seconds since Jan 1, 1970 for example: 1251352922	Date/Time of disconnect Note that this duration must take into account any time adjustments that may have occurred during the call.	X	X	X	X	X	
12	A Number	String(30)	ID of subscriber initiating activity		Subscriber Id	X	X	X	X	X	X
13	B Number	String(30)	ID of destination subscriber	Destination Number	Called Number	X	X	X	X		
14	External_Id	String(144)	Source Identifier. This is the Subscriber's external ID in the Comverse ONE system. This could be a MSISDN/IMSI/ some other valid External ID based on External ID Types defined in the Comverse ONE system (via PC GUI).			X	X	X	X	X	X

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
15	External_ Id_type	short Int	This is an integer value that identifies the "type" of the External ID.	There are pre-defined values in EXTERNAL_ ID_TYPE_REF/ VALUES when Comverse ONE is installed. You can check to see which ones may be used for your usage. If none, you will need to configure new ones in this file for your usage.		X	X	X	X	X	X
16	MSC ID	String (16)	ID of network switch		Msc Id (NULL)	O	O	-	O	-	-
17	MSRN	String(30)	Subscriber's MSRN from network switch		Msrn Number (NULL)	O	O	-	O		
18	Application Type	Integer	Integer containing ID of application - set by SLU application or process translating switch CDR:	1-VOICE, 2-SMS	1-VOICE, 2-SMS Typically, for VOICE usage, set ApplicationType= 1, Subtype=0, UnitType=2. For SMS usage, set ApplicationType= 2, Subtype=0, UnitType=4/	X	X	X	X	X	X
19	Subtype	Integer	Integer containing subtype - Set by SLU application or process translating switch CDR	0-NONE	0-NONE	X	X	X	X	X	X

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
20	Unit Type	Integer	Integer containing the unit_type	1-CURRENCY, 2-SECONDS, 3-OCTET, 4-SMS, 8-VIDEO These are the possible values, should be used based on your usage.	1 - CURRENCY 3 - OCTET 2 - SECONDS (for VOICE) 4 - SMS (for SMS) 8 - VIDEO	X	X	X	X	X	X
21	Reference Number	Integer	Network CRN from switch		NULL	O	O	O	O	O	O
22	InitialAUT	Integer	Initial Activity Usage Type		NULL						
23	Charge Type	String(32)	String which signifies the charge type (that is, AMOUNT or UNIT based transaction).	For OSA, if the charge_type is UNIT then fill "OSA_UNIT_CHARGE"; else if AMOUNT then fill "OSA_AMOUNT_CHARGE". For Diameter, if the charge_type is UNIT then fill "OSS_UNIT_CHARGE"; else if AMOUNT then fill "OSS_AMOUNT_CHARGE".	For OSA, if the charge_type is UNIT then fill "OSA_UNIT_CHARGE"; else if AMOUNT then fill "OSA_AMOUNT_CHARGE". For Diameter, if the charge_type is UNIT then fill "OSS_UNIT_CHARGE"; else if AMOUNT then fill "OSS_AMOUNT_CHARGE".					X	X

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
24	SGSN	String(15)	SGSN as received from the switch		SGSN Id(NULL)	O	O	X	-		
25	Clear Cause	Integer	Call completion status		16 - for VOICE and SMS applications 400 - All other applications	X	X	X	X	X	X
26	Cell ID	String(15)	Subscriber's Cell ID. Cell_Id is an LAI from the network where the call is originating from and it is the location info for ComverseONE used to derive LIA and LIB (Location Information from A/B party).		Cell ID (NULL)	X	O	-	O		

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
27	Network Calltype	Integer	Switch-based call type for Call Processor and USSD. The possible values are: 0 - Regular Call 1 - Forwarding Pending 2 - Forwarded Call	For other applications like CAP2SMS, GPRS, possible values are: UNKNOWN_TYPE=0, USSD_RECHARGE_CALL=23, USSD_INFO_CALL=24, USSD_UNSUCCESSFUL_CALL=25, USSD_SUBCALLBACK_CALL=26, USSD_DESTCALLBACK_CALL=27, USSD_ACCOUNT_RECHARGE_CALL=28, USSD_ACCOUNT_INFO_CALL=29, USSD_LR_OVERRIDE_ID_INFO_CALL=40, USSD_LR_OVERRIDE_ID_CHANGE=41, FEATURE_REQ_BALANCE_CHECK=42, FEATURE_REQ_UNKNOWN_TYPE=43	CallType	O	-	-	-		

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
28	Consumed Amount	Double	Total amount consumed for that call		NULL				O	X	X
29	UTC Offset	Integer	Offset of local time zone from GMT (in minutes, e.g. +180, -240)	-1440 to +1440	UTC Offset of timezone where service provided. (No need to supply "+" for positive offsets).	X	X	X	X	X	X
30	Origin	Integer	Describes the origin of the record	0 Network 1 Roaming Rating 2 Revenue Recovery	For TAP rating, 1 should be used.						
31	Ported Number	String (30)	The Ported subscriber number. For example: if a subscriber X from T-mobile is ported in to CINGULAR it is assigned a number Y for location based rating. The ported number in the outage record is this number Y.		NULL	O	O	O	O	O	O
32	Original Charge Amount	Float	Original Charge for the activity (used for re-rating)		For TAP rating, the existing charge should be used	O	O	O	O	O	O
33	Original Charge Currency	String(4)	ISO Format for currency used in activity (for re-rating)	Set of ISO currencies (for example, "USD")	For TAP re-rating, this will "SDR	"O	O	O	O	O	O

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
34	GSM Provider ID	String(4)	Identifier for the network where the TAP record was generated. The record is treated as markup usage by ORP if this field is not empty.	GSM Provider from TAP-IN record.	Leave empty if markup usage; else populate with actual GSM Provider from TAP-IN record.	O	O	O	O	O	O
35	APN	String(100)	APN (Access point number) for Data Activity.		AccessWebSiteName	-	-	X	-		
36	QOS	String(32)	QOS (Quality of Service) for Data Activity.		QualityOfService Parameter[1]	-	-	X	-		
37	Reservation Type	Integer	Duration/VolumeBased OR	0-Duration Based 1-Volume Based	Reservation Type Specifier	-	-	X	-		
38	PDP Init Type	Integer	MS Initiated Call/Network Initiated Call	0 - A1129 MS Initiated Call 1-A1129 Network Initiated Call	PDP Initiation Type	-	-	X	-		
39	Service ID / Cell ID LAI	String(16)	LAI from network message. Cell_Id is a LAI from the network where the call is originating from and it iis the location info for Comverse ONE used to drive LIA and LIB (Location Information for A/B party).		LAI number (NULL)	X	O	O	O	O	O

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
40	ECI Message Type	String(26)	The type of message sent to the ECI/Payment Server (can be NULL for other activities)	"APPLYCHARGE_MSG "APPLYTARIFF_MSG "REVERSECHARGE_MSG "APPLY_CURRENCY_CHARGE_MSG "APPLYTARIFFVOLUME_MSG	Should be ("APPLYTARIFF_MSG") for non-CAMEL SMS usage and ("APPLYTARIFFVOLUME_MSG") for volume based tariffing (for example, MMS)	-	-	-	X		
41	ECI Associated Number	Integer	Unique Identifier for an ECI command		PaymentServerUniqueId (can be a locally-generated sequence number for SMS events)	-	-	-	X		
42	ECI MSISDN	String(30)	A party for ECI messages		MSISDN Number(NULL)	-	-	-	O		
43	ECI Alt MSISDN	String(30)	B party for ECI messages		Alt MSISDN(NULL)	-	-	-	O		

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability: Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
44	ECI Subscriber Type	String(10)	Subscriber type as received from the switch	If the call is mobile to mobile		-	-	-	X		
				"BOTH_ SUBSCRIBERS"							
				If originating number is sub							
				"ORIGINATING_ SUBSCR"							
				If terminating number is sub							
				"TERMINATING_ SUBSCR"							

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
45	ECI Bearer Capability	String(4)	The Bearer Capability for the Apply Tariff Message	Depends on System Provisioning	BearerCapability Id (default ???) See application_ mapping SMS bearer type=2 Content provider bearer type=11 Handset to Handset=101 Handset to VAS=102 Handset to Email=103 Subscriber App to Handset (Send on Behalf Of to Handset)=104 Subscriber App to Email (Send on Behalf Of to E-mail))=105	-	-	-	X		

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
45 (continued)					(Reserved for Future Use) Subscriber App to VAS (Send on Behalf Of to VAS)=106 VAS to Handset=107 Email to Handset=108						
46	ECI Application ID	String(4)	The Application ID for the Apply Tariff Message	Depends on System Provisioning	ApplicationId (0-255) SMS Application type P4 values 101 -Picture 102 - Audio 103-Video 104-Text 105-Ringtone 106-Multimedia 107-Empty 108-DRM	-	-	-	X	-	
47	ECI Transaction ID1	Unsigned Int	Tarnsaction Id which is used later for reverse transaction		NULL				X		

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
48	ECI Transaction ID2	Unsigned Int	Tarnsaction Id which is used later for reverse transaction		NULL				X		
49	ECI "Access MT"	Flag	Whether or not the "-accessMT" option should be used. When this flag is set MT (Mobile Terminating Party is billable)	0 Off 1 On	This is going to be site dependent based on whether sending or receiving party pays for SMS)	-	-	-	X		
50	ECI "MIN translation"	Flag	Whether or not the "-min" option should be used.	0 Off 1 On	Set this to 1 if the subscriber ID in the record is a MIN, rather than an MSISDN	-	-	-	X		
51	ECI Charge Amount	Float	Charge amount for Apply Charge messages		Not applicable to non-CAMEL SMS	-	-	-	X		
52	ECI "Prorate"	Flag	Whether or not the "-prorate" option should be used. This is going to be site dependent based on whether to enforce charging the full amount for SMS, or only what is available in the subscriber balance.	0 Off 1 On		-	-	-	X		
53	ECI SDP ID Origin	Integer	Origin SDP ID		NULL						
54	ECI InfoParam1	String			NULL				O		
55	ECI InfoParam2	String			NULL				O		

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
56	Call Processor Cell ID / LAI	String(15)	LAI From the Network Message. Cell__Id is a LAI from the network where the call is originating from and it is the location info for Comverse ONE used to derive LIA and LIB (Location Information of A/B party).		LAI number (NULL)	X	-	-	-		
57	Call Processor Pre/Post Indicator	Integer			NULL						
58	Call Processor POST PAID type	Integer	Identifies the type of Postpaid subscriber	0 Converged Postpaid, 1 Non-converged Postpaid, 2 Prepaid	PostPaidType(NULL)	O	-	-	-		

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
59	Call Processor Call Type	Integer	This is the identifier to differentiate all types of calls from Call Processor, USSD. Values = 0-113. Possible values: UNKNOWN_TYPE=0, USSD_RECHARGE_CALL=23, USSD_INFO_CALL=24, USSD_UNSUCCESSFUL_CALL=25, USSD_SUBCALLBACK_CALL=26, USSD_DESTCALLBACK_CALL=27, USSD_ACCOUNT_RECHARGE_CALL=28, USSD_ACCOUNT_INFO_CALL=29, USSD_LR_OVERRIDE_ID_INFO_CALL=40, USSD_LR_OVERRIDE_ID_CHANGE=41, FEATURE_REQ_BALANCE_CHECK=42, FEATURE_REQ_UNKNOWN_TYPE=43, EMERGENCY_CALL=50, ADMIN_CALL=51, OUTGOING_OPPS_CALL=52, INCOMING_TPPS_CALL=53, //NETWORK_CALL_FWD_CALL=54, NETWORK_FWD_OPPS=54, INFO_SERVER_CALL=55, RECHARGE_SERVER_CALL=56, CUSTOMER_CARE_CALL=57, NETWORK_FWD_TPPS=58, LANG_SELECTION_CALL=60, LANG_SET_CALL=61, CARD_ACCESS_CALL=62, NETWORK_NO_CHARGE_OPPS_CALL=63, NETWORK_NO_CHARGE_TPPS_CALL=64, NETWORK_NO_CHARGE_CALL=65, ADMIN_FUNCTION_MENU_CALL=66, CF_PROV_CFU_CALL=67, CF_PROV_CFB_CALL=68, CF_PROV_CFNA_CALL=69, INVOICE_REPORT_CALL=70, INVOICE_PAYMENT_CALL=71, ACCOUNT_INFO_SERVER_CALL=72, ACCOUNT_RECHARGE_SERVER_CALL=73, OTHER_NON_BILLABLE_CALLS=77, OTHER_BILLABLE_CALLS=78, CAP3_ORIGINATING_SMS=86, CAP3_MS_ORIGINATING_GPRS=87, CAP3_NETWORK_ORIGINATING_GPRS=88, FAX_GRP_2_3_OPPS=89, FAX_GRP_2_3_TPPS=90, FAX_GRP_4_OPPS 91, FAX_GRP_4_TPPS=92, SYNTAX_VIDEOTEX_OPPS=93, SYNTAX_VIDEOTEX_TPPS=94, INT_VIDEOTEX_OPPS=95, INT_VIDEOTEX_TPPS=96, INTTELEX_OPPS=97, INTTELEX_TPPS=98, X400_OPPS=99, X400_TPPS=100, FAST_RECHARGE_SERVER_CALL=101,NETWORK_DEFINED_RESOURCE_NM1_CALL=102, NETWORK_DEFINED_RESOURCE_NM2_CAL=103, NETWORK_DEFINED_RESOURCE_NM3_CALL=104, NETWORK_DEFINED_RESOURCE_NM4_CALL=105, NETWORK_DEFINED_RESOURCE_NM5_CALL=106, USSD_SUCC_BAL_TRANS_CALL=110, USSD_REJECTED_BAL_TRANS_CALL=111, USSD_FAILED_BAL_TRANS_CALL=112, TPPS_FUNDIAL=113									
60	Call Processor Network No Charge	String	Charge indicator of ACM/ANM	NO_INDICATOR=0, NO_CHARGE=1, CHARGE=2, SPARE=3	NULL						

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
61	Call Processor Redirecting Number	String (30)	The redirecting number from the network used in Call Forwarding. Used only for forwarding calls. For other calls, value=NULL		NULL	O	-	-	-		
62	Call Processor MIN/IMSI	String(30)	Subscriber's IMSI/MIN		NULL	O	-	-	O		
63	Call Processor Translated Destination Number	String(30)	Translated destination Number	NULL for now. Not being used	NULL						
64	Call Processor A party MSRN	String(30)	Subscriber's MSRN		MSRN Number (NULL)	O	-	-	-		
65	Call Processor NCF Leg	Char	Direction of the NCF leg. Used only for forwarding calls. For other calls, NULL.	'O' (letter) OPPS - originating call 'T' for TPPS - terminating cal	NCF Indicator (NULL)	X	-	-	-		
66	Call Processor Call Direction	Char	Direction of call (incoming/outgoing)	'O' (letter) OPPS - originating call 'T' for TPPS - terminating call	Call Direction	X	-	-	-		

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
67	Call Processor A number answer time	Time_t	Answer time for A party in a USSD callback (other activities may use NULL)		AnswerTime	X	-	-	-		
68	Call Processor B number answer time	Time_t	Answer time for B party in a USSD callback (other activities may use NULL)		AnswerTime	X	-	-	-		
69	Billable	Boolean	Indication if call should be billed - specifically included for case where network sets the NO_CHARGE indicator in response to originate message. This will allow for generation of CDR and call history. Default=False	'1' (True) '0' (False)	"t" (without the quotes) 0=false	X	-	-	-		
70	External System Sequence Number	VARCHAR2(16)	An externally-generated digit string for auditing purposes.		This should be a monotonically increasing number, with no gaps.	X	X	X	X		
71	Osa_ Reservation StartTime	Time_t	Reservation Start time for a Reservation Based activity		NULL					O	
72	Osa_ Reservation Type	Integer			NULL					O	

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
73	Osa_ SubscriberId	String(30)	A Party number		A party number					X	
74	Osa_ ParamItem	String(32)	Parameter represents kind of service delivered to the end user.		NULL					O	
75	Osa_Param Subtype	String(32)	Parameter represents subtype/ operation delivered to the end user.		NULL					O	
76	Osa_ ParamConfirmationId	String(32)	The ID that references a stored confirmation to authorize the required payment							O	
77	Osa_ ParamContract	String(32)	A signed confirmation.							O	
78	Osa_ TimezoneOffset	String(4)	Offset from UTC Time							X	
79	Osa_ ParamQos	String(32)	Parameter represents the Quality of Service Identifier							X	
80	Osa_ ParamService1	String(32)	Generic service parameter							X	
81	Osa_ ParamService2	String(32)	Generic service parameter							X	
82	Osa_ ParamService3	String(32)	Generic service parameter							X	

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
83	Osa_ ParamServi ce4	String(32)	Generic service parameter							X	
84	Osa_ ParamInfor mational	String(49)	Generic information parameter							X	
85	Osa_ ParamSubL ocation	String(32)	A party Location							X	
86	Osa_ ParamSubL ocationTyp e	String(10)	A party Location Type	1=if HandSet, 2=if Dialed, 3=if MSRN ID, 4=if CELL ID, 5=if MSC ID, 6=if SGSN ID, 7=IP Address (used with DCMP)	(see previous column)					X	
87	Osa_ ParamOthe rLocation	String(32)	Location for B-Party							X	
88	Osa_ ParamOthe r LocationTy pe	String(10)	Location Type for B-Party	1=if HandSet, 2=if Dialed, 3=if MSRN ID, 4=if CELL ID, 5=if MSC ID, 6=if SGSN ID, 7=IP Address (used with DCMP)	(see previous column)					X	
89	Osa_ ParamImsi Min	String(30)			NULL					X	
90	Osa_ MerchantId	String(48)	Merchant Id		MerchantId					X	

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
91	Osa_ SessionDescription	String(48)	Session descriptio		Session description (text)					X	
92	Osa_ SessionID	Integer	Session Id		Session Id					X	
93	Osa_ Correlation Id	Integer	Defines the sequence of data elements that identifies a correlation.							X	
94	Osa_ Correlation Type	Integer	Defines the type of correlation. This type can be extended with operator-specific items.	0-if Unknown correlation type, 1-Voice Call, 2-Data Session, 3-Multi-media session	0-if Unknown correlation type, 1-Voice Call, 2-Data Session, 3-Multi-media session					X	
95	Osa_ MerAccount Id	Integer	Merchant Account Id		MerchantAccount Id					X	
96	Osa_ ApplDesc Text	String(48)	Application Description text							X	
97	Osa_ ExtUnitType Id	Integer			NULL					X	
98	Osa_ Currency	String(4)	Currency info in string coming from the client.	USD, and so on						X	

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
99	Osa_ ReasonCode	Integer	Call completion status		NULL					X	
100	Osa_ Request_ Type	Integer	Determines the type of pending request: DIRECT_CREDIT or DIRECT_DEBIT or RESERVE.	0-if OSA_RESERVE, 1-if OSA_DIRECT_ DEBIT, 2-if OSA_DIRECT_ CREDIT	0-if OSA_ RESERVE, 1-if OSA_ DIRECT_DEBIT, 2-if OSA_ DIRECT_CREDIT	-	-	-	-	X	
101	Ocs_ application	String(30)			NULL						X
102	Ocs_appli-cation_ description	String(124)	Application description in text								X
103	Ocs_ special_ feature_ digits	String(32)	Prefix for special feature invocation, for example, Callin gCircle, Friends & Family.		NULL						X
104	Ocs_ activity_ time	time_t(10)	Activity Time			-	-	-	-	-	X
105	Ocs_ Request_ type	Integer	Determines the type of pending request: DIRECT_CREDIT or DIRECT_DEBIT or RESERVE.	0-if OCS_RESERVE, 1-if OCS_DIRECT_ DEBIT, 2-if OCS_DIRECT_ CREDIT	0-if OCS_ RESERVE, 1-if OCS_ DIRECT_DEBIT, 2-if OCS_ DIRECT_CREDIT						X
106	Ocs_T_Bit	Char	T_Bit		NULL						X

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
107	Ocs_ consumed_ units	int	Number of Consumed Units								X
108	Ocs_ consumed_ unit_type	String(32)	Consumed Units Type								X
109	Ocs_ currency_ type	String(32)	Subscriber Currency Type		For TAP record, “SDR”						X
110	Ocs_imsi_ num	String(32)	IMSI Num		NULL						X
111	Ocs_ charge_ item_id	String(30)	Charge Item ID								X
112	Ocs_ session_id	String(120)	Session ID								X
113	Ocs_sub_ session_id	String(20)	Sub Session ID								X
114	Ocs_ transaction _id	int	Transaction ID								X
115	Ocs_ subscriber_ id	String(32)	A party number		A number						X
116	Ocs_ session_ desc	String(49)	Session Description in Text		Session_ description						X

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
117	Ocs_sub_ location	String(32)	A party's Location coming from the network		A party's location						X
118	Ocs_sub_ location_ type	String(10)	A party's Location Type coming from the network		A party's location type						X
119	Ocs_sub_ other_ location	String(32)	B-Party,s Location coming from the network		B party's location						X
120	Ocs_sub_ other_ location_ type	String(10)	B-Party's Location type coming from the network		B party's location type						X
121	Ocs_tele_ service_ type	int		Type of call: NORMAL (Voice usage) or GPRSCALL (GPRS data usage)	NORMAL (0) GPRS (5)						X
122	Call processor TimeZone	Int	Time Zone value. Applicable only for Call Processor.		NULL	X					
123	Offered_ dt_ msec	3-digit Int	Activity Offered Date/Time: millisecond portion. Applicable only when millisecond feature is enabled.			O	O	O	O	O	O
124	Answered_ dt_msec	3-digit Int	Activity Answered Date/Time: millisecond portion. Applicable only when millisecond feature is enabled.								
125	Disconnect _dt_msec	3-digit Int	Activity Disconnect Date/Time: millisecond portion. Applicable only when millisecond feature is enabled.			O	O	O	O	O	O

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
126	Point Target External Id Type	Short Integer	B-Party External Id Type			X					
127	Network Porting Prefix	String(30)	Network Porting Prefix coming from the Network. Applicable when there is a prefix from network for number portability feature.			O					
128	IMSI A	String(72)	A Party IMSI Number								
129	IMSI B	String(72)	B Party IMSI Number								
130	type1NormalizedNumber	String(32)	Type 1 Normalized Number	Type 1 Number is used for some set of features							
131	type2NormalizedNumber	String(32)	Type 2 Normalized Number	Type 2 Number is used for some set features							
132	Calling Number Presentation	Integer	It is a Presentation Indicator provided by the network. Applicable only for Call Processor			O					
133	network_address_plan	3-digit integer	This is an integer value that identifiies the “type” of the External Id and comes from the network.	If Ext_Id_type exists in the record, it will be used as the first choice to look up subscriber. If Ext_Id_type = null or “0”, network_address_plan will be used to look up the subscriber.	Typically, for MSISDN, set NAP=1 (NAP_E164); for IMSI, set NAP=2 (NAP_E212)	X	X	X	X	X	X

Table 17 ORP Record Structure (Continued)

Field ID	Field	Type	Description	Possible Values	Suggested values / Notes for Roaming (TAP) Records	Application Applicability					
						Call Processor	CAP3SMS	GPRS	Payment Server	OSA	Diameter
134	Ocs_ segment_id	Integer	Segment Id which comes when “Midsession Rate” feature is on.	Segment Id	NULL						
135	Cp_ Incoming_ Call_id	String(100)	Incoming Call Id for SIP protocol based interfaces		NULL	O					
136	C[_ Outgoing_ call_id	String(100)	Outgoing Call Id for SIP protocol based interfaces		NULL	O					
137	Ocs_Start_ Call_Dat_ Time_Type	Int	The time type value for activity start_time	1-If the activity start time is coming from the network; else 0.	1-If the activity start time is coming from the network; else 0.						X
138	Ocs_End__ Call_Dat_ Time_Type	Int	The time type value for activity end_ time	1-If the activity end time is coming from the network; else 0.	1-If the activity end time is coming from the network; else 0.						X

Outage Record Filenames

The ORP file contains a header followed by one or more records sorted from oldest to most recent according to the record’s start time field.

It is unnecessary to sort by activity type. Sort records by activity start time.

ORP files have a maximum size of 10MB, and a maximum number of 10,000 records.

All billing files end with the extension '`.bill`'.

For Roaming Rating, the filename of externally created offline records has the following format:

`IPor.<file-creation-timestamp>.<hostname>.<file-sequence-number>.bill`

Table 18 File Name Format

Name	Type	Description
Hostname	String	String containing the host name of machine on which file is created: either an SLU-ID or switch name/ID
File Creation Time Stamp	String containing a 10 digit, time_t value	Time stamp when file was created….typically the timestamp of the oldest outage record in the file.
File Sequence Number	String containing 4 digit, 0 filled number	Time stamp when file was created….typically the timestamp of the oldest outage record in the file.

ORP File Header

Table 19, "File Header Format" gives the file header record format. In Comverse ONE 3.5 CMCAP processes all ORs. CMCAP sorts the ORs by SDP ID. The header contains an outage record field to distinguish ORs from other records. The first 3 bytes ("ORH") of the header indicate that this is an ORP header record. The header is followed by OutageRecord. The header is 92 bytes, fixed length..

Table 19 File Header Format

Field Name	Data Type	Size in Bytes	Description
ORH	String	3	String identifying records as OR records.
Checksum	Biinary	1	8-bit checksum generated by starting with a seed value of 0 and sequentially performing an exclusive or with each byte of the file. The value of this field should be set to 0 when calculating the checksum, and the correct checksum value populated thereafter.
Hostname	String	33	Name of host that generated the file. "slu1" (without the quotes) would be appropriate.
Starting Sequence Number	Number	11	Sequence number of the first outage record in the file. A wrap around, '0' filled value ranging from 1-9999999. Field is set to all '0's if file contains no records. It is preferable that the sequence numbers NOT contain gaps, as that will make it appear that records are missing. However, processing continues regardless.
Ending Sequence Number	Number	11	Sequence number of the last outage record in the file. A wrap-around, '0' filled value ranging from 1-9999999. Field is set to all '0's if file contains no records.
File Creation Time Stamp	Time_t	11	Timestamp when file was created. The field is '0' filled. The time is encoded as # of seconds since 1/1/70.
Last Update Time Stamp	Time_t	11	Timestamp when file was updated. The field is '0' filled. The time is encoded as # of seconds since 1/1/70.
Record Count	Number	11	The number of outage record s in the file. The field is '0' filled.

The FILEVP Tool

Offline usage input files (either in FX style format or OR format) are ASCII files and are processed by COM, CMCAP and CCAP. Intermediate files are generated by CMCAP and CCAP. Those intermediate files are binary files which can be viewed and/or transformed to ASCII files. FILEVP can also be used with other files generated by other offline processes(URT, URR, MHT, RCT, LTP, MIUB, URC, and so on).

You can use the FILEVP tool to transform a binary CDR into an editable ASCII text file and back to binary. The FILEVP tool is thus useful for both inspection of CDRs as part of data analysis and for correcting errors.

Command Syntax

`FILEVP -e|s|r|p -f input_file [-w field_width] [b]`

`-s` standard mode resulting in a file where each field has its own row of output

`-e` enhanced mode resulting in '`|`' delimited data with 1 row per record

`-f` Name of file to be viewed

`-w` minimum field width for enhanced output

`-b` perform binary dump of each buffer load

`-r` Detailed report on File Types and possible contents

`-p` Name of text file from enhanced mode output to be re-parsed; without the trailing `.EDIT`

File name is not specified.

Procedure for Using the FILEVP Tool

The FILEVP tool is typically used for files with a data transfer error or some other data problem, so that the file cannot be inserted by LTP. This would typically be an extraction error file.

Follow these steps to employ the FILEVP tool:

1. Go to the BLUS database and search `USAGE_FILE_STATUS` for files with a `file_status=8`. These are the files needing correction.

   The file name of for files tracked by `USAGE_FILE_STATUS` is the following concatenation of `USAGE_FILE_STATUS` fields

   <file_name>.<file_id_serv>.<file_id>.<target_db_a>.<target_db_b>.<file_part>.<file_class>.<copy_cnt>

   The file directory location will be specified by the configuration in `HOST_CONTACTS`. The dir will be the `HOST_CONTACTS.host_output` directory of the where the `HOST_CONTACTS.host_contact_id = USAGE_FILE_STATUS.host_contact_id`.
2. Run FILEVP in **`-e`** (edit) mode. This will produce a file that has each record in a single line of text. The format of the records is printed at the top of the file. These header lines start with `*|`*<record_type>*. Data records start with `|`*<record_type>*. The output will be the same file name as the input, with `.EDIT` added to the enbrad.
3. Use a text editor to manually correct the generated file.
4. Run FILEVP in **`-p`** (parse) mode using the original file name. This will parse the *<original_file>*`.EDIT` file into an *<original_file>*`.parse1` file.
5. Copy the *<original_file>*`.parse1` file to the original file.
6. Go to the `USAGE_FILE_STATUS` entry (BLUS database) and change the `file_staus` from **`8`** (need correction) to **`1`** (ready for processing).

Example of Output for Usage Record

```
File Name :[200902121527.USAGE_RECORD_MAIN_2A.09.538.09.03.0.200.1]
Trailer Size :[24]
Format :[ CURRENT - COMPRESSED]
FileType: LTP_EX_USAGE_FILE Type_code: 200 Format: 1 HeaderSize: 8 Record
Headers: YES
```

```
Data Supported: GFR_FILETRAILER GFR_DATETRAILER GFR_BLANK USAGE_RECORD urc_
FileTrailer
Allowed Data :[GFR_FILETRAILER,GFR_DATETRAILER,GFR_BLANK,USAGE_RECORD,urc_
FileTrailer]
*|URT1|Group|originate_datetime |second_dt |terminate_datetime |usage_
processing_datetime
|roundedoriginateDatetime|roundedterminateDatetime|rated_units |total_
usage |billed_account_tml_change |billed_account_tml_value |uncharged_
amount_postpaid |uncharged_amount_prepaid |last_unit_rdisc_amt_prepaid
|last_unit_rdisc_amt_postpaid |rawduration|account_no |aggr_usage_id |aut_
id |initial_aut_id |clear_cause |discount_item_id |discount_offer_id
|extract_file_id |file_id |msg_id |msg_id2 |open_item_id |owning_account_no
|provider_id |reseller_id |subscr_no |target_account_no |tariff_plan_id
|tariff_plan_offer_id |usage_plan_id |user_subscr_no |last_charged_
balance_id |bundle_id |roundedduration|application_id |application_subtype
|billing_unit_type |external_id_type |rev_rcv_cost_ctr |subscr_no_resets
|units_currency_code |usage_unit_type |user_subscr_no_resets |utc_offset
|equip_class |timezone
|roundingmethod|originateDatetimemsec|terminateDatetimemsec|roundedorigina
teDatetimemsec|roundedterminateDatetimemsec|point_origin_type|point_
target_type|billing_frequency |billing_server_id |cdr_application_type
|error_code |event_processing_category |file_id_serv |liability_redirect_
indicator |no_bill |pass_through |point_tax_code_type_origin |point_tax_
code_type_target |rating_db_id |settlement_record_flag |split_row_num
|split_row_count |sys_accumulator_count |sys_balance_count |timetype_count
|home_zone |annotation |app_info |balance_usage_order |segmentation_keys
|seqnum_rate_usage |seqnum_rate_usage_overrides |tariff_charge_info |tax_
info |bill_period |billed_account_currency |customer_tag |ext_tracking_id
|external_id |flag_full_tax |location_indicator_party_a |location_
indicator_party_b |point_origin |point_target |point_tax_code_origin
|point_tax_code_target |rate_currency |subscriber_currency |trans_id |pre_
iso_code|gsm_provider_id|network_porting_prefix|actual_originating_
number|actual_destination_number|acct_accum0_info|acct_accum1_info|acct_
accum2_info|acct_accum3_info|acct_accum4_info|acct_accum5_info|acct_
accum6_info|acct_accum7_info|acct_accum8_info|acct_accum9_info|acct_
accum10_info|acct_accum11_info|acct_accum12_info|acct_accum13_info|acct_
accum14_info|acct_accum15_info|acct_accum16_info|acct_accum17_info|acct_
accum18_info|acct_accum19_info|acct_accum20_info|acct_accum21_info|acct_
accum22_info|acct_accum23_info|acct_accum24_info|acct_accum25_info|acct_
accum26_info|acct_accum27_info|acct_accum28_info|acct_accum29_info|acct_
bal0_info|acct_bal1_info|acct_bal2_info|acct_bal3_info|acct_bal4_
info|acct_bal5_info|acct_bal6_info|acct_bal7_info|acct_bal8_info|acct_
bal9_info|acct_bal10_info|acct_bal11_info|acct_bal12_info|acct_bal13_
info|acct_bal14_info|acct_bal15_info|acct_bal16_info|acct_bal17_info|acct_
bal18_info|acct_bal19_info|acct_bal20_info|acct_bal21_info|acct_bal22_
info|acct_bal23_info|acct_bal24_info|acct_bal25_info|acct_bal26_info|acct_
bal27_info|acct_bal28_info|acct_bal29_info|acct_bal30_info|acct_bal31_
info|acct_bal32_info|acct_bal33_info|acct_bal34_info|acct_bal35_info|acct_
bal36_info|acct_bal37_info|acct_bal38_info|acct_bal39_info|accum0_
info|accum1_info|accum2_info|accum3_info|accum4_info|accum5_info|accum6_
info|accum7_info|accum8_info|accum9_info|accum10_info|accum11_
info|accum12_info|accum13_info|accum14_info|accum15_info|accum16_
info|accum17_info|accum18_info|accum19_info|accum20_info|accum21_
info|accum22_info|accum23_info|accum24_info|accum25_info|accum26_
info|accum27_info|accum28_info|accum29_info|bal0_info|bal1_info|bal2_
```

```
info|bal3_info|bal4_info|bal5_info|bal6_info|bal7_info|bal8_info|bal9_
info|bal10_info|bal11_info|bal12_info|bal13_info|bal14_info|bal15_
info|bal16_info|bal17_info|bal18_info|bal19_info|bal20_info|bal21_
info|bal22_info|bal23_info|bal24_info|bal25_info|bal26_info|bal27_
info|bal28_info|bal29_info|bal30_info|bal31_info|bal32_info|bal33_
info|bal34_info|bal35_info|bal36_info|bal37_info|bal38_info|bal39_info
*|TRAI|Group|DataType |Record Count |Groups Count
|URT1|1|20090210190700|NULL DATETIME|NULL DATETIME|20090212132251|NULL
DATETIME|NULL
DATETIME|600|600|0|0|0.0|0.0|0|0|0|99|0|30049|30012|0|0|0|538|11|350|33300
009|101|0|1|0|50|0|30044|51000012|10|0|434|0|0|1|0|2|1|1|0|1|2|0|-
1|0|7|0|0|0|0|0|0|0|3|3|8|0|1|4|0|0|0|0|0|9|0|0|1|7|5|1|0|
|8^0^0~0^0~0^0^0.000000~0^0.000000^600.000000^2~600.000000^0~600.000000^0~
0.000000|[19~434][0][0]|2~1~0^-1~0~1~1^1~0^-1~-1~0~0~0~0^0~-1^0~0^-
1^2~1~~~~~1~~~~~~~~~~~~~~~~^-1~-1~~1~~-1~~-1~~1~~-1~~-
1|0~0~0||(19~17~30.500000~99~1.000000~)(0~)(0~)|0|M01|USD|99902 001
||8101223|0|||8101223|8100011|||USD|USD||USD||(null)|(null)|(null)||||||||
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||119~28.0000
00~0.000000|120~0.000000~0.000000|121~0.000000~0.000000|122~0.000000~0.000
000|123~0.000000~0.000000|124~0.000000~0.000000|125~0.000000~0.000000|||||
||||||||||||||||||434~1~33.000000~1~0^19~30.50~0.00~30.50^0~0.00~0.00~0.0
0^0~0.00~0.00~0.00|444~1~0.000000~2~0^19~0.00~0.00~0.00^0~0.00~0.00~0.00^0
~0.00~0.00~0.00|437~1~2.000000~1~0^19~0.00~0.00~0.00^0~0.00~0.00~0.00^0~0.
00~0.00~0.00|447~1~100.000000~4~0^19~0.00~0.00~0.00^0~0.00~0.00~0.00^0~0.0
0~0.00~0.00|449~1~100.000000~3~0^19~0.00~0.00~0.00^0~0.00~0.00~0.00^0~0.00
~0.00~0.00||||||||||||||||||||||||||||||||||
|TRAI|2|GFR_FILETRAILER|1|1
```

Example of Output for Standard Mode

```
File Name :[200902121527.USAGE_RECORD_MAIN_2A.09.538.09.03.0.200.1]
Trailer Size :[24]
Format :[ CURRENT - COMPRESSED]
FileType: LTP_EX_USAGE_FILE Type_code: 200 Format: 1 HeaderSize: 8 Record
Headers: YES
Data Supported: GFR_FILETRAILER GFR_DATETRAILER GFR_BLANK USAGE_RECORD urc_
FileTrailer
Allowed Data :[GFR_FILETRAILER,GFR_DATETRAILER,GFR_BLANK,USAGE_RECORD,urc_
FileTrailer]
DataType :[GFR_FILETRAILER]
Record Count :[1]
Groups (logical record) Count :[1]
---------------------------------
*** Logical Record # 1
*** Record # 1:
*** DataType USAGE_RECORD
-----------------------------------------------
originate_datetime :[20090210190700]
second_dt :[NULL DATETIME]
terminate_datetime :[NULL DATETIME]
```

```
usage_processing_datetime :[20090212132251]
roundedoriginateDatetime :[NULL DATETIME]
roundedterminateDatetime :[NULL DATETIME]
rated_units :[600]
total_usage :[600]
billed_account_tml_change :[0]
billed_account_tml_value :[0]
uncharged_amount_postpaid :[0.0]
uncharged_amount_prepaid :[0.0]
last_unit_rdisc_amt_prepaid :[0]
last_unit_rdisc_amt_postpaid :[0]
rawduration :[0]
account_no :[99]
aggr_usage_id :[0]
aut_id :[30049]
initial_aut_id :[30012]
clear_cause :[0]
discount_item_id :[0]
discount_offer_id :[0]
extract_file_id :[538]
file_id :[11]
msg_id :[350]
msg_id2 :[33300009]
open_item_id :[101]
owning_account_no :[0]
provider_id :[1]
reseller_id :[0]
subscr_no :[50]
target_account_no :[0]
tariff_plan_id :[30044]
tariff_plan_offer_id :[51000012]
usage_plan_id :[10]
user_subscr_no :[0]
last_charged_balance_id :[434]
bundle_id :[0]
roundedduration :[0]
application_id :[1]
application_subtype :[0]
billing_unit_type :[2]
external_id_type :[1]
rev_rcv_cost_ctr :[1]
subscr_no_resets :[0]
units_currency_code :[1]
usage_unit_type :[2]
```

```
user_subscr_no_resets :[0]
utc_offset :[-1]
equip_class :[0]
timezone :[7]
roundingmethod :[0]
originateDatetimemsec :[0]
terminateDatetimemsec :[0]
roundedoriginateDatetimemsec :[0]
roundedterminateDatetimemsec :[0]
point_origin_type :[0]
point_target_type :[0]
billing_frequency :[3]
billing_server_id :[3]
cdr_application_type :[8]
error_code :[0]
event_processing_category :[1]
file_id_serv :[4]
liability_redirect_indicator :[0]
no_bill :[0]
pass_through :[0]
point_tax_code_type_origin :[0]
point_tax_code_type_target :[0]
rating_db_id :[9]
settlement_record_flag :[0]
split_row_num :[0]
split_row_count :[1]
sys_accumulator_count :[7]
sys_balance_count :[5]
timetype_count :[1]
home_zone :[0]
annotation :[ ]
app_info
:[8^0^0~0^0~0^0^0.000000~0^0.000000^600.000000^2~600.000000^0~600.000000^0
~0.000000]
balance_usage_order :[[19~434][0][0]]
segmentation_keys :[2~1~0^-1~0~1~1^1~0^-1~-1~0~0~0~0^0~-1^0~0^-
1^2~1~~~~~1~~~~~~~~~~~~~~~~^-1~-1~-1~-1~-1~-1~-1~-1]
seqnum_rate_usage :[0~0~0]
seqnum_rate_usage_overrides :[]
tariff_charge_info :[(19~17~30.500000~99~1.000000~)(0~)(0~)]
tax_info :[0]
bill_period :[M01]
billed_account_currency :[USD]
customer_tag :[99902 001 ]
ext_tracking_id :[]
```

```
external_id :[8101223]
flag_full_tax :[0]
location_indicator_party_a :[]
location_indicator_party_b :[]
point_origin :[8101223]
point_target :[8100011]
point_tax_code_origin :[]
point_tax_code_target :[]
rate_currency :[USD]
subscriber_currency :[USD]
trans_id :[]
pre_iso_code :[USD]
gsm_provider_id :[]
network_porting_prefix :[(null)]
actual_originating_number :[(null)]
actual_destination_number :[(null)]
accum0 _info :[119~28.000000~0.000000]
accum1 _info :[120~0.000000~0.000000]
accum2 _info :[121~0.000000~0.000000]
accum3 _info :[122~0.000000~0.000000]
accum4 _info :[123~0.000000~0.000000]
accum5 _info :[124~0.000000~0.000000]
accum6 _info :[125~0.000000~0.000000]
bal0 _info
:[434~1~33.000000~1~0^19~30.50~0.00~30.50^0~0.00~0.00~0.00^0~0.00~0.00~0.0
0]
bal1 _info
:[444~1~0.000000~2~0^19~0.00~0.00~0.00^0~0.00~0.00~0.00^0~0.00~0.00~0.00]
bal2 _info
:[437~1~2.000000~1~0^19~0.00~0.00~0.00^0~0.00~0.00~0.00^0~0.00~0.00~0.00]
bal3 _info
:[447~1~100.000000~4~0^19~0.00~0.00~0.00^0~0.00~0.00~0.00^0~0.00~0.00~0.00
]
bal4 _info
:[449~1~100.000000~3~0^19~0.00~0.00~0.00^0~0.00~0.00~0.00^0~0.00~0.00~0.00
]
-------------------------------------------------
*** Logical Record # 2
*** Record # 2:
DataType :[GFR_FILETRAILER]
Record Count :[1]
Groups (logical record) Count :[1]
Done with file
```

URE Basic Flow

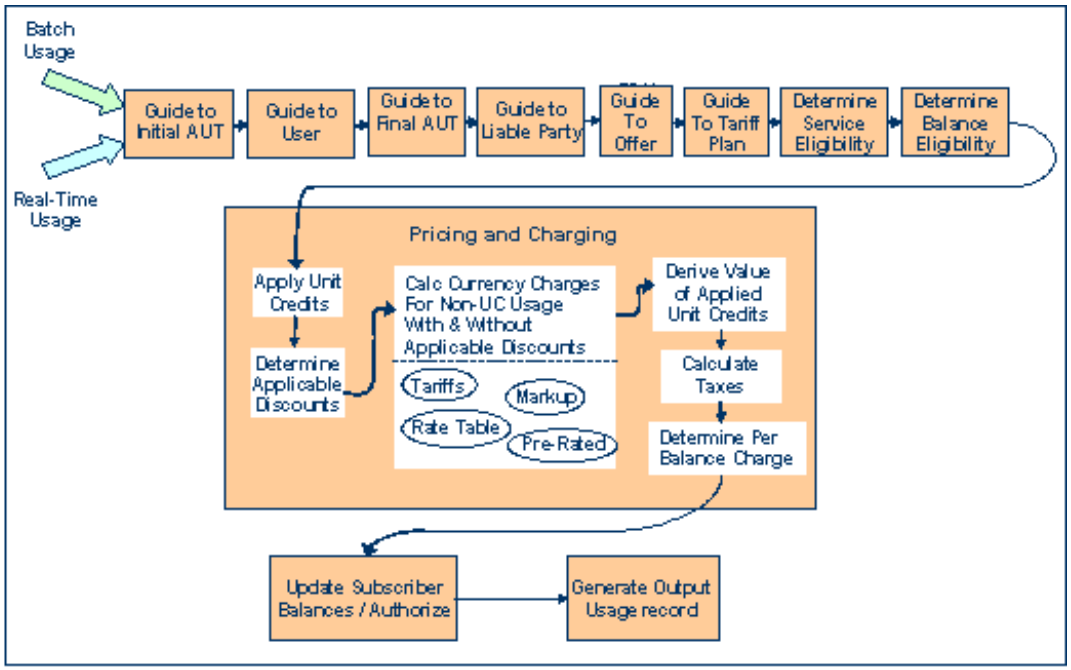
The process flow of the URE applies to rating, pricing, and charging of all usage, whether it enters Comverse ONE online from real-time signaling or offline, as CDRs.

NOTE The business logic associated with the URE process flow is described in the document, *Product Catalog Overview*.

Figure 3 below shows the basic Unified rating flow:

NOTE The instructions for invoking the URE processes are contained in the document, *Operations Reference*.

Figure 3 URE Overall Flow



1. The URE receives usage information, either from a real-time interface such as a switch or from a mediation device as offline CDRs.
2. The usage receives an initial AUT. External mediation provides initial AUT as part of CDR input. For real-time usage, the initial AUT is intrinsic to network interface applications.
3. Based on the information received in the input, as well as configuration of the initial AUT, the URE derives the subscriber using the service (that is, the user).
4. Based on the initial AUT and configured Segmentation Keys, initial AUT is mapped to final AUT.
5. If the user is eligible for the usage, the URE determines the liable party for the usage based on the subscriber's liability redirection template and the final AUT. In the event of liability redirection, balances and possibly rates from the liable account are used to fund the usage. Otherwise, the subscriber's balances are used. See Chapter 7, “Guide to Liable Party,” in this manual for more detail about how the URE determines liability.

6. Based on the user and the Final AUT, the URE determines the offer to which this usage is associated.
7. The URE guides the final AUT to the Tariff Plan, including any Tariff Plan overrides.
8. The URE determines service eligibility by validating that a Tariff Plan exists with underlying defined rates for the final AUT and that the subscriber is in a valid state.

   A positive exit from this step indicates that the only thing that could prevent this usage is a lack of funds.
9. The URE determines balance eligibility based on Liable party, Offer , Balance Type (real or shadow), and balance definitions.
10. For each time period in each AUT:
    - Apply unit credits
    - Calculate monetary charges (with and without applicable discounts)
    - Derive value for unit credits
    - Calculate tax charges
    - Determine per balance charge
    - Update charged balances and accumulators. If real-time, in-progress usage, authorize it and skip next step
    - Generate Output Usage Record.

Each of these steps and capabilities is described in detail in the remainder of the document.

Guiding steps take place only at the start of transaction, in case of a session-based transaction.

The details of how to configure the URE for online and offline processing are contained in the document, *Operations Reference*. These descriptions include guidelines for configuring the URE to handle traffic from different lines of business (for example, mobile in online mode, and fixed line in offline mode.)

Figure 4 URE Flow for Initial Authorization With No Reservations/Charging

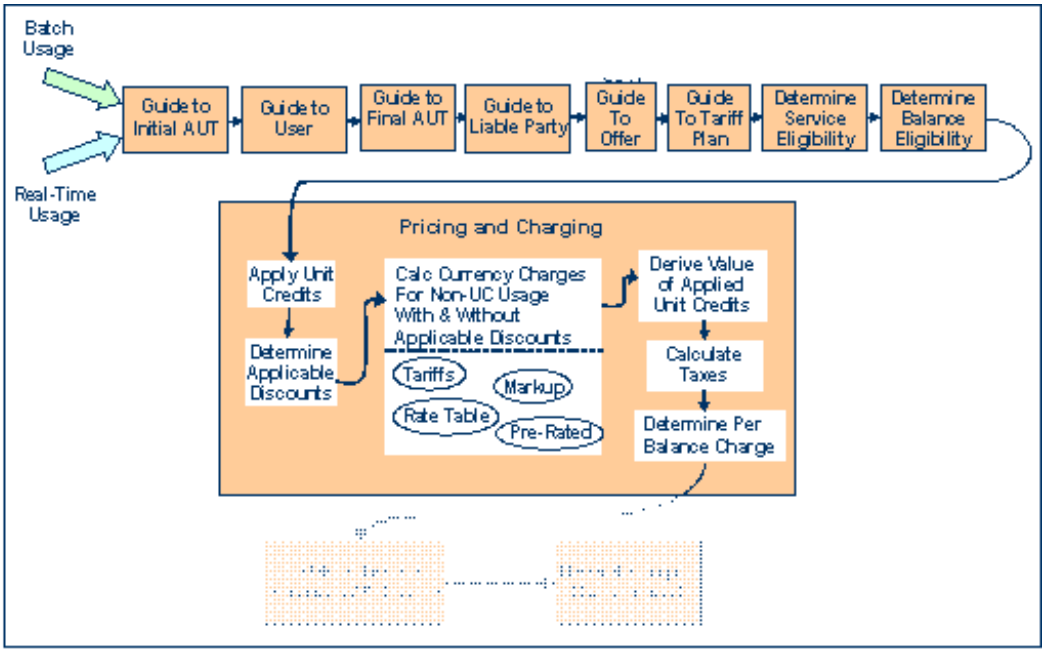


Figure 5 URE Flow for Initial Authorization With Reservations/Charging

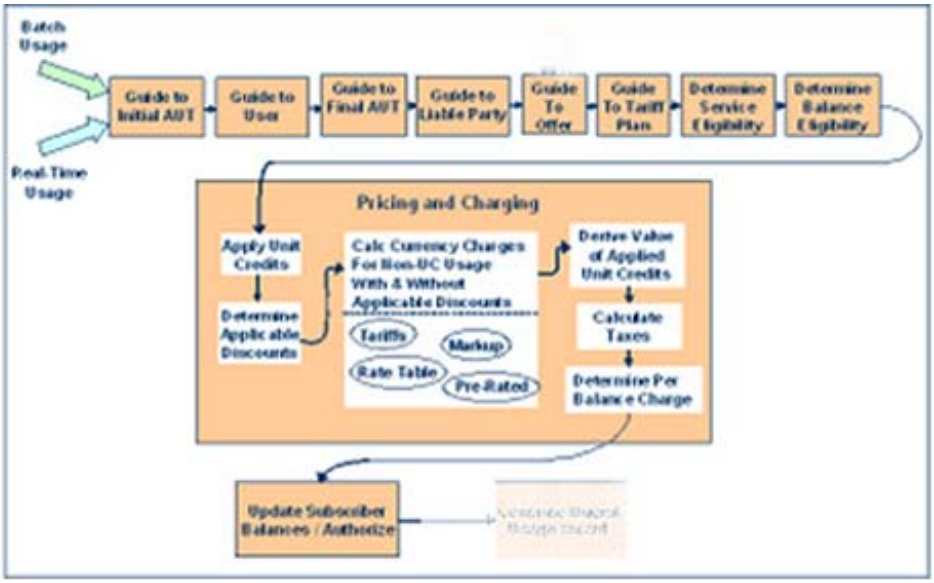
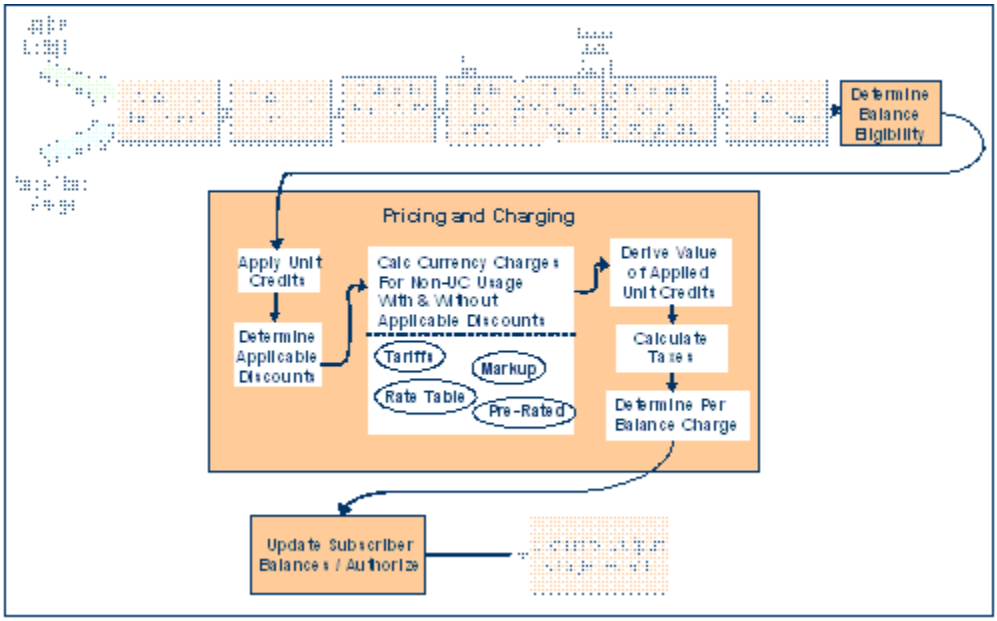


Figure 6 Unified Rating Flow for Extend Authorization



URE Simulator

The URE Simulator simulates normal voice calls. You invoke the simulator on the command line, with a file name as an input argument; the input file provides data in the form of a test scenario. Use this tool to test the URE during implementation of the system. The Simulator can be extended to support such scenarios as Diameter and GPRS session charging, event charging, offline charging, and prerated usage charging.

To run the Simulator, issue the following commands:

```
/home/omni/bin/ure -U -ratingdb 9 - instance 2 -S & simulator_input_file_name
omd URE_2_U1
```

Set the mask as follows:

```
#setm, 0xffffffff
```

Run the Simulator once with the following command:

```
URE2_U1, RUN-SIMULATOR
```

Input File

The test input is an input file that contains the following:

```
-[BEGIN CASE]
-FILLER=CALL_STARTABLE;
-SUBSCRIBER_NO=29993;
-SUBSCRIBER_NO_RESETS=0;
-RANGE=0;
-MODE=Online;
-MAJOR_VERSION=1;
-MINOR_VERSION=0;
-REF_NUM=1;
```

```
-ORIGINATOR=APP_1;
-APPLICATION_TYPE=1; #Enum,1-CALL_PROCESSOR,2-PMT,3-USSD,4-GPRS,5-OSA,6-
DIAMETER,7-OFFLINE
-INIT_AUT=30016;
-START_TIME=2001-11-12 18:31:// strptime format
-DURATION=10; // in seconds
-A_NUMBER=85618888;
-B_NUMBER=7327324444;
-LIA=1000100010001003;
-LIB=1000100010001004;
-LR_CALL_TYPE=1;
-COMMAND=InitialAuth,ExtendAuth,
-[END CASE]
```

Test Output

Running the command produces the following output:

```
•TEST CASE ID: 0
•LONG USAGE RECORD (1 of 1)
•-------------------------------------------------
•SUBSCRIBER: 39
•SUBSCRIBER RESETS: 2
•ACCOUNT NUMBER: 29000
•TARGET ACCOUNT: 10399
•APPLICATION TYPE: 6
•LOCATION PARTY A: 856
•LOCATION PARTY B: ABCD123
•PRIMARY OFFER ID: 4
•TARIFF PLAN ID: 0
•TARIFF PLAN OFFER ID: 0
•TARIFF INFO: tariff1Id~MonetaryCharge~ChargeType~ConvertionRate
•TARIFF INFO: (0~)(0~)(0~)
•TOTAL USAGE: 3
•CLEAR CAUSE: 7000
•INITIAL AUT: 100
•FINAL AUT: 1
•TAX INFO: 0
•BALANCE USAGE ORDER: [21][22][0]
•BALANCES DETAILS
•-------------------------------------------------
•balId~Payment_mode~Total_bal~bal_unit~targetId^timeType1~base_
charge~discount~net_charge
•BALANCE 1 TOTAL: 30.0000
•BALANCE 1:
21~1~100.000000~1~0^21~10.0000~0.0000~15.0000^22~2.0000~0.0000~15.0000^0~0.0000~0.
0000~0.0000
•BALANCE 2 TOTAL: 10.0000
```

```
•BALANCE 2:
22~1~95.000000~2~0^21~10.0000~0.0000~15.0000^22~0.0000~0.0000~0.0000^0~0.0000~0.00
00~0.0000
•APPLICATION INFO FORMAT
•application_type^osa_activity_type~osa_descript~osa_merchantId~session_
desc~accountId^correlationId~correlation_type^application_desc^osa_
item~subtype^param_confirm_id~param_
conract^QOS^parm1~parm2~parm3~parm4~parm5^info_param^lr_call_type~message_
type^currency
•Application info: 6^test_call~Osa App~mchId1~o01~79001^2~18^Osa App^OSAItem
```

URE API Framework

The URE API framework provides the method-based APIs the other modules use to process rating requests that enter the system from message or file based interfaces.

Selective Loading of URE Modules

The URE API framework is responsible for loading and invoking URE modules. By default all modules are loaded. Selective module loading provides selective URE functionality.

The URE modules considered for selective loading are:

- Guiding
- Pricing
- BalanceManagement
- Charging
- CCAP

For online and offline modes, only online or offline modules are loaded based on the mode in which URE is to run. For instance, CCAP must be loaded for offline usage processing. All other URE modules are always loaded. A shared library section in the configuration file lists all the URE modules to be loaded.

All the modules that are loaded provide a method to instantiate a singleton object for those modules. On creation of that module's object instance, the URE API framework initializes the module's abstract interface pointer to point to this object instance. By default the module's abstract interface pointer points to a dummy object instance.

If a module is not loaded and an interface method is called, the dummy object instance throws an Unsupported Method exception for each method called. The `UreApi` framework class handles the exception considering that partcular module is not loaded.

If the module is loaded and an interface method is called, the actual object instance is called and the method performs the required function.

To load the modules, the URE process invokes the ModuleManager function `LoadModules()`.

Configuration File

```
MODULE_PATH=/home/omni/library
#
# Core Module Section
# Format: Core URE Module
Section=Modules
GuidingModule
```

```
PricingModule
ChargingModule
BalanceManagementModule
#
# offline URE
ccap

# Plugin Section
# Format: PluginName
Section=Plugins
LoadTimeTypeInfoPlugin
#
#
```

Communications (COM)

The module that initially brings usage information into the system is the Communications module (COM). For offline usage processing only. COM takes input files in offline usage format or in OR format. COM takes input records from a mediation device such as a switch and passes them to Audit and Control.

COM Inputs and Outputs

COM transfers usage files from mediation devices to a configured location for processing. COM is configured to transfer usage files to local directory and insert an entry for each new usage file into `FILE_STATUS/FILES_TO_PROCESS` tables appropriately. COM also supports transport of files around the system or to an external destination (such as an outside vendor) using a variety of configurable transfer mechanisms.

The information essential to rating is:

- Origin of call
- When call starts
- Duration of call

COM also uses some CDR information.

COM Process Flow

COM informs the system that a file has arrived and passes control to Audit and Control. COM moves files from directory to directory, connects via FTP to another machine, and starts the Audit and Control process.

COM inserts the initial `FILE_STATUS` entry for new input files. COM generates a unique file_id for all new files. For new files introduced via COM, the `file_id_serv` value of the Unscaled or ORP server id in the `SERVER_DEFINITION` table; for example, while the `file_type=0`, Unscaled Server Id may be `4` and ORP Server Id may be `12`

CMCAP

CMCAP picks up new usage files introduced via COM from the `FILES_TO_PROCESS` table and then the `FILE_STATUS` table, which comes from usage source (based on `ext_source_id`) .

CMCAP, processes the input usage file, guiding each CDR to the Rating Server (SDP). The `RAW_USAGE_FIELD_MAPPING` table is used by CMCAP to map offline usage input record fields to C1 internal fields.

CMCAP has four primary roles:

- routing/segmenting of data to the appropriate database for further processing
- detecting duplicate usage records in the databases
- setting up audit trail records in the databases
- parsing data from raw input into a common record format, appending some relevant data to those records, and sorting data for better processing performance in subsequent modules.

Routing/segmenting data by database results in an output file for each target database corresponding to each input file. The output file preserves the input file ID but is assigned a `target_db_id` that indicates the file's target database. Routing by database simplifies subsequent processing by limiting database connections.

Parsing input files in CMCAP from external formats to a single common format provides early detection of file problems.

This routing is done for the following reasons:

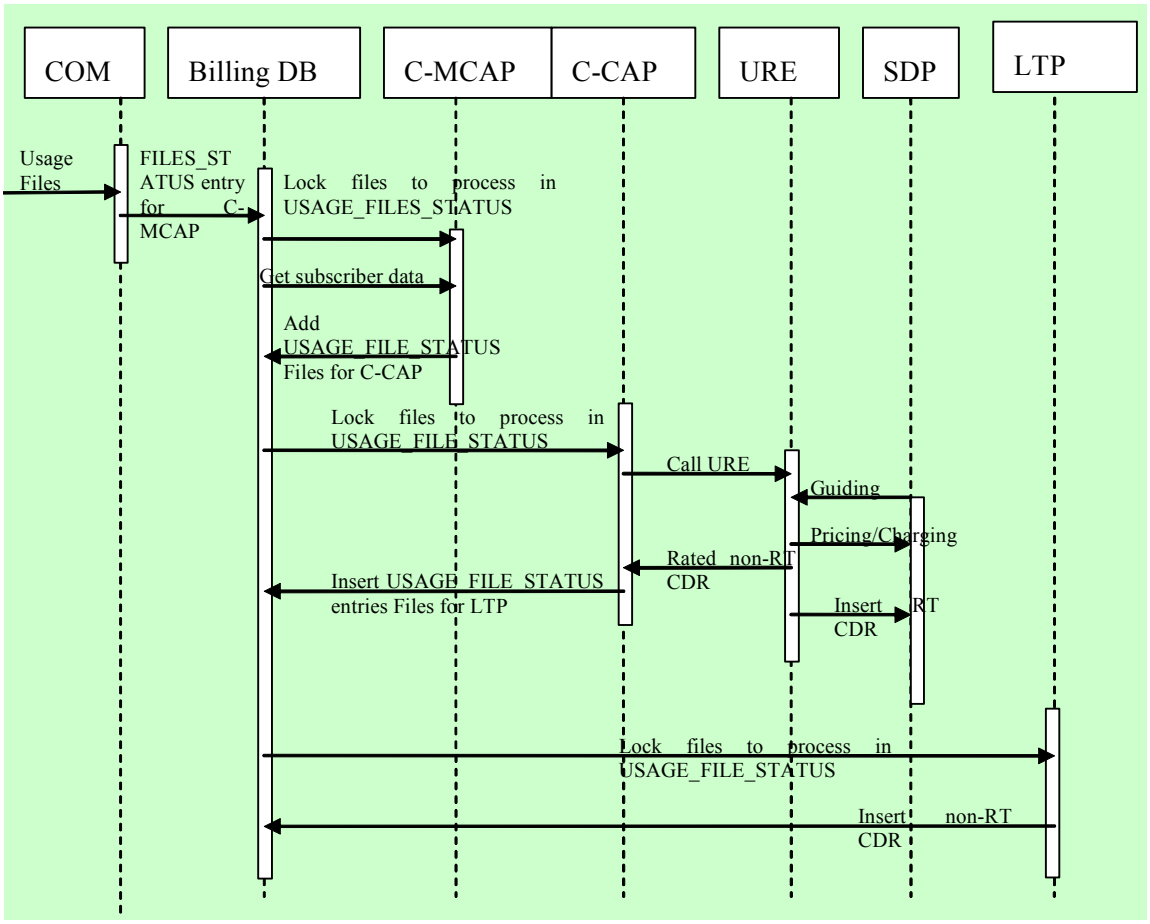
- grouping the data by database simplifies subsequent processing because it requires fewer Database connections
- subsequent processing can process files sequentially against a single database so that tracking processing progress is transactional with processing.
- subsequent processing can be optimized further by array database interaction, which is possible only when all work occurs against a single database.

CMCAP runs on the Unscaled server and/or ORP server.

The Comverse ONE solution offline usage file subsystem processes after-the-fact usage events, such as outage records generated by SLUs, or offline records generated by Switch/DM records.

The following sequence diagram gives the basic offline processing flow:

Figure 7 Sequence diagram of URE offline processing flow



C-CAP

C-CAP is the URE offline mode rating process. It shares the online URE executable; however, it runs as a batch process.

Each C-CAP process connects to one SDP and processes usage files that contain only CDRs for subscribers in that SDP. C-CAP reads in the files generated by CMCAP using internal data record format and processes the records.

C-CAP performs the following functions:

- invokes URE APIs to guide, price, and charge normal and error CDRs in batch
- invokes rerating module APIs to process rerating records from URC.
- invokes Outage Record processing APIs to reprocess outage records as needed.
- uses the `USAGE_FILE_STATUS` and `USAGE_FILES_TO_PROCESS` tables for file tracking
- transfers usage files from remote host to local host through FTP when needed
- uses the `USAGE_FILE_PROCESS_STATE` table to recover from failures

File input/output is based on the data format, similar to the format in the existing GFR data input/ooutput library.

Basic C-CAP Processing Flow

- lock a usage file for processing
- read CDRs from usage file
- Look up subscriber information in batch
- derive LIA/LIB, initial AUT for outage records
- guide CDRs to service
- price CDRs
- start a database transaction
- update balances and insert CDRs into `USAGE_RECORD_MAIN`
- update `USAGE_FILE_PROCESS_STATE` with number of CDRs processed
- commit database transaction

Tables

Depending on the source of the input files, CMCAP parses usage files based on `RAW_USAGE_FIELD_MAPPING` entries (for FX-CDR format) or parses usage files based on fixed for mat for OR (Outage Record format), and generates files in internal format for C-CAP to process. C-CAP reads in the files generated by CMCAP using internal data record format and processes the records.

Input Files

CMCAP creates files that have two types of data records for C-CAP to process:

- Usage format

  These files are the output of mediation; representing multiple usage type
- Outage record format (ORP)

  These files represent real-time usage that took place during downtime; they are recorded for offline processing so as to recapture revenue

Other modules that produce similar input files for C-CAP are MIUB, URC, and LTP.

Output Files

C-CAP output files contain error CDRs, liability redirection CDRs, or rerating CDRs. LTP processes these files as follows:

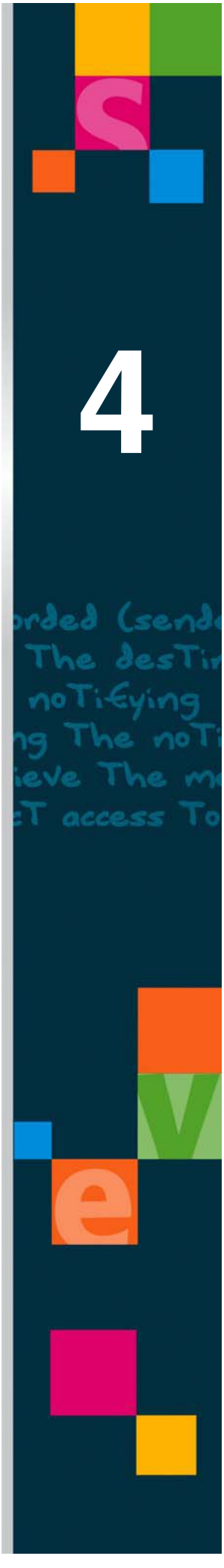
- inserts error CDRs into `CDR_DATA_WORK`
- inserts liability redirection CDRs in a file for the instance of C-CAP running on the liability party's SDP
- processes files containing rerating CDRs so as to reconcile rerating CDRs in the Billing Database.

File Location

Directories where usage files are stored are configured in `HOST_CONTACTS`. C-CAP transfers files from remote host to local host, using FTP if necessary. Files ready for processing are located in the `host_ready` directory on the local host. Files successfully processed by C-CAP are stored in the `host_done` directory. Error files are placed in the `host_error` directory. CCAP output files are placed in `host_output`.

Chapter 4

Audit and Control



Audit and Control provide the customer with a way to prevent loss of revenue that might otherwise occur when records fail to process correctly for some reason. Audit and Control make it possible to track the progress of records through the system during processing, detecting processing errors or anomalies. This facility gives you a way to find out what happened to the original file after it entered the system. The tools used for investigation are counts and status information.

Usage file audit trail is the ability to follow usage files input into the system and determine how many of the CDRs in each file are processed successfully, how many take errors, and how many of the errors are eventually corrected or written off.

An Audit trail is particularly important in managing records that do not process correctly. Records that do not process correctly represent lost revenue because they cannot be billed until they are recovered and processed successfully. In addition, independent auditors of Comverse ONE would expect tracking and Audting for CDRs processed.

Errors that take place during the rating process are logged and tracked so that they can be resolved without revenue loss. Each CDR has an audit trail that shows how it has been rated, corrected, and re-rated as many times as necessary to complete processing. After files enter the internal system, auditing makes manual intervention unnecessary except to inspect logs to identify records that must be re-rated and to correct errors.

Control means that all files are tracked throughout the system using a single file identifier, which ensures end-to-end integrity.

The system flags usage activity with the way the activity enters the system, either off-line or real time.

- Database tables
- Log files
- OMD buffer to assist administrative personnel in real time

Audit and Control Processing

The Communications module (COM) takes records from the input directory and puts an entry into the `FILE_STATUS` table, giving each CDR an ID consisting of a `file_id` and `file_server_id` key. CMCAP posts the input usage file and breaks it into records that end up on differnt machines. The Audit trail collects counts about what happens to these records. *Counts* are numbers of records distributed to database tables. Each CDR or usage record is grouped by counts that indicate which database table a record has been sent to.

Counts are in the following three categories:

- CDRs active in the database, in processing
- CDRs currently unprocessed in temporary files
- useful historical information

Some things are counted because they are potentially useful historical information:

- how many times records have been rerated
- how many records have been rerated
- how many corrected records have been moved from `CDR_DATA_WORK` to `CDR_DATA` (corrected errors)

Current CDRs

Current CDRs are those currently active in database tables. These are either unbilled CDRs`CDR_UNBILLED`, free CDRs in `CDR_PASSTHROUGH` or `CDR_OUTCOLLECT`, or CDRs in `CDR_DATA_WORK` as a result of processing errors.

Figure 8 below depicts the whole Audit and Control process. To make it easier to understand the audit trail, the process is broken down into four parts in thefigures that follow.

- Input file processing
- Error processing
- Rerating processing
- ORP processing

When the whole process is complete, Audit and Control data is collected together in the `USAGE_FILE_COUNTS` table.

The client does not directly inspect this table or any of the tables that collect counts while files are in processing, but those counts are reflected in `USAGE_FILE_COUNTS` and can be inspected by way of a `JOIN` of the `FILE_STATUS` table to `USAGE_FILE_COUNTS_VIEW`.

Information of interest includes the number of records in a given state compared to. the number still in processing (for example if processing seems to be taking unusually long), the number of files resulting in processing errors, and where in the processing path files are.

Audit and Control tracks input files that enter the system from COM that inserts in the `FILE_STATUS` table. Other usage records that Audit and Control tracks ore lockbox records and deferred payments.

The purpose of an audit trail is to track where all records end up during processing or records still in process. The reason for keeping historical counts is to provide information for analysis in case something major goes wrong.

Figure 8 State/Flow Diagram of Audit Control Processing

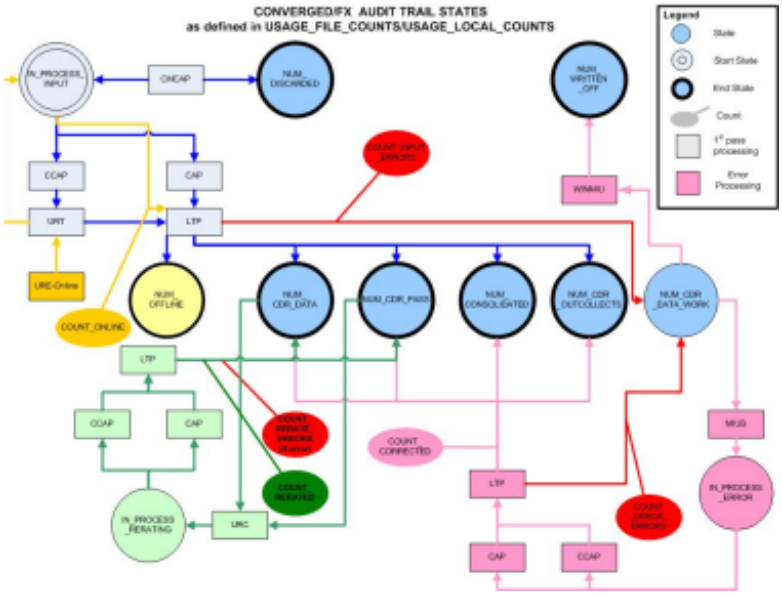


Figure 9 Normal Input Processing

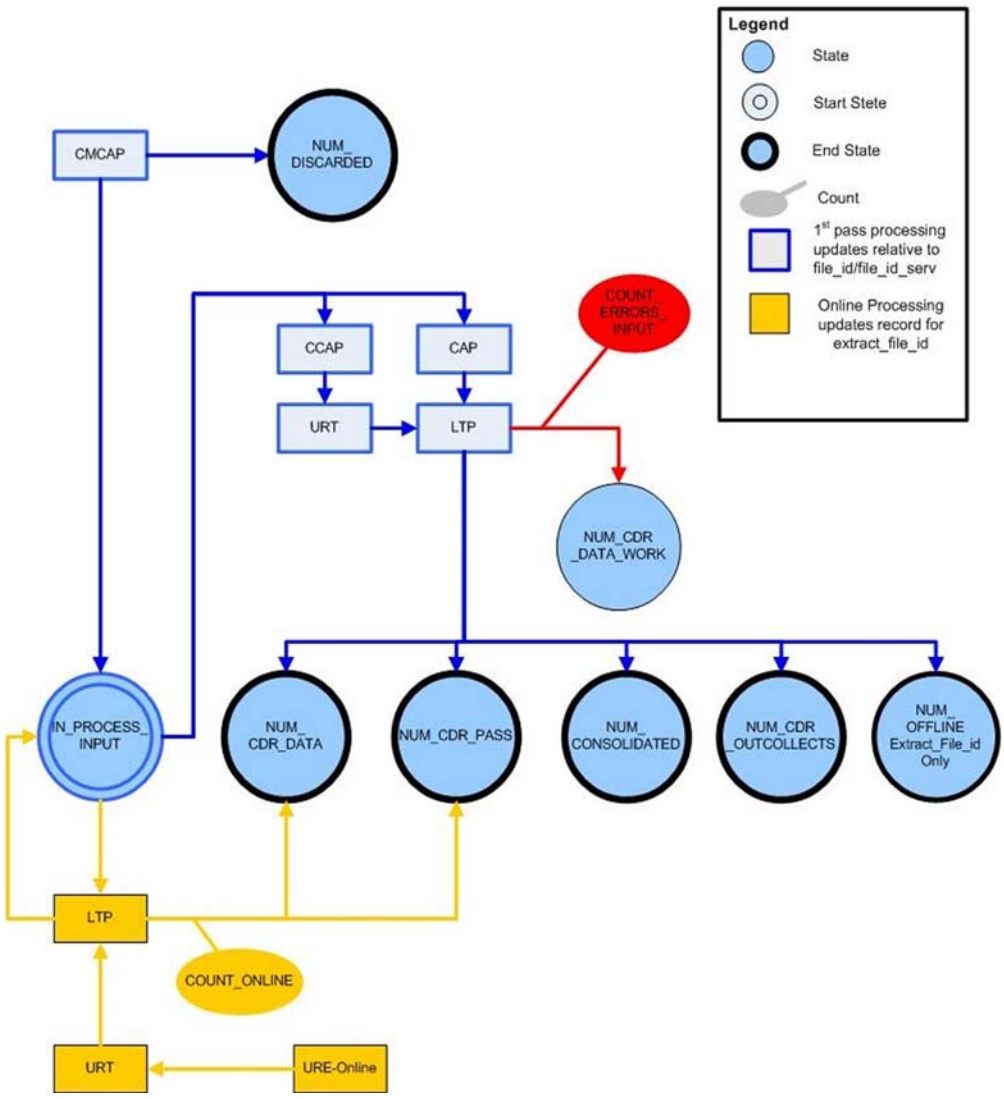


Figure 9 above shows detail of the flow of control for input files after they have entered the system.

- Duplicate files are discarded. Audit and control maintains a count of the number of files discarded.
- Remaining files go to CCAP and if processing is normal pass to URT.
- URT sends files to LTP for insertion into the Billing Database. Audit and control counts the number of files successfully processed. The URE deletes records from the Rating Database at the end of each day via a purge process that runs daily, for instance at 10:00 PM (in advance of heavy processing loads of various kinds that occur after midnight).
- Yellow boxes depict same process for online files or extraction files. Extraction files contain records only from file soucres; URT extracts files from the Rating database. Records from file sources must be tracked back to the extraction file; counts of these are in `NUM_OFFLINE`.
- CCAP sends files that error out to LTP for inserting into `CDR_DATA_WORK` where they await correction and reprocessing.

Audit and control keeps counts of errored files in `NUM_CDR_DATA_WORK`, shown in diagram above with thin line around circle because the errored files are not in a final state. Another table, `COUNT_ERRORS_INPUT`, counts total errors, incrementing until processing is complete.

Rerating

Since CCAP does not isert rerated usage records into the Rating database, the counts for rerating are maintained in `NUM_CDR_DATA` and `NUM_CDR_PASS`. If rerating results in errors the URE returns to the original valid rated record. Either a record rerates successully or falls back to the original.

Figure 10 Rerating

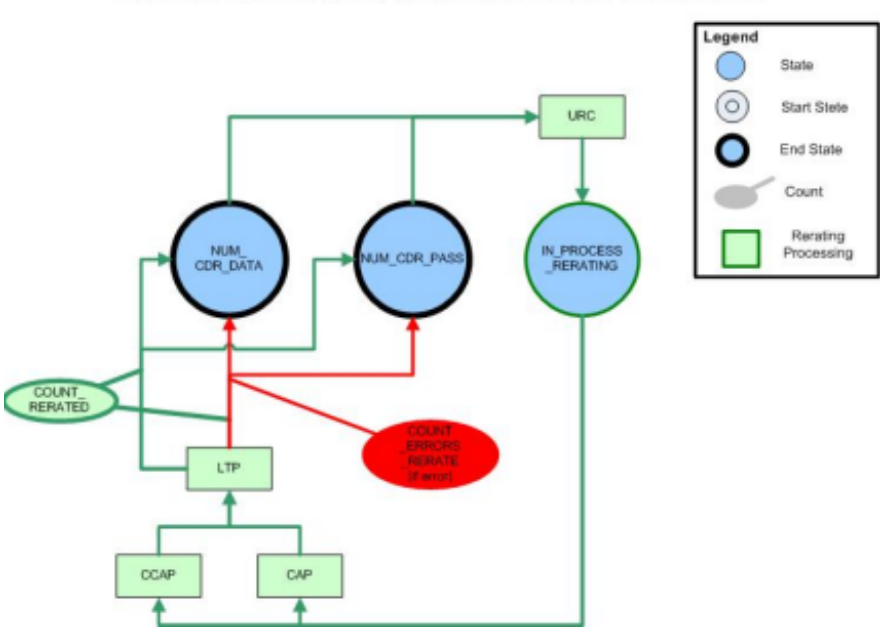
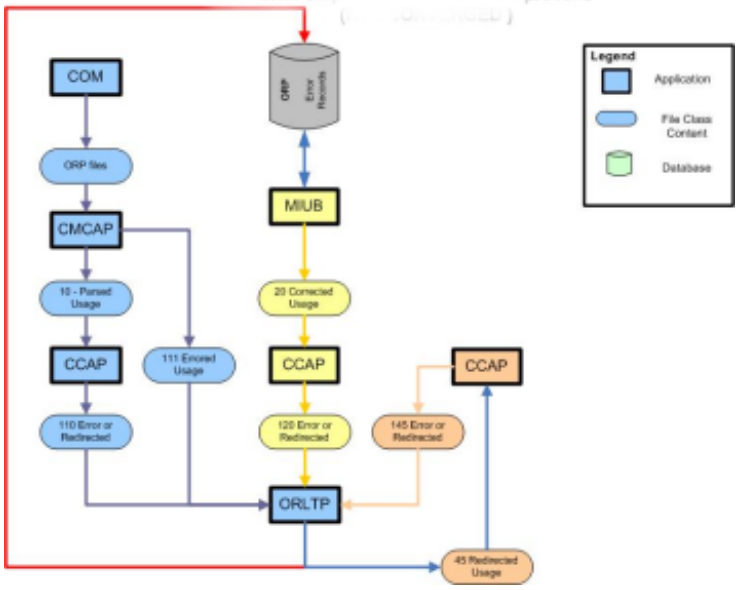


Figure 11 ORP processing



Counts for Current CDRs

Audit and Control maintains the following counts for current CDRs:

- `num_cdr_data`: the number of CDRs in the `CDR_DATA` table that are also in the `CDR_UNBILLED` table
- `num_cdr_data_work`: number of CDRs in the `CDR_DATA_WORK` table, which must either be reprocessed successfully or written off
- `num_cdr_outcollects`: number of CDRs targeted to outside vendors in the `CDR_OUTCOLLECT` table
- `num_cdr_pass`: number of CDRs in `CDR_PASSTHROUGH`
- `num_offline`: number of records procressed by offline URE
- `num_written_off`: number of records written off with WINMIU

Historical Counts

Historical counts are maintained for analysis in the event that something major goes wrong during processing.

Rerating

CCAP does not insert rerated usage records into the Rating database. Instead, these go to `NUM_CDR_DATA` or `NUM_CDR_PASS`. If rerating results in an error, processing returns to the original valid rated record. A record either rerates successfully or processing returns to the original record.

Finalization

It is easy to determine that a given input file has been "finalized" by establishing that the number of input CDRs matches the sum of the following

- number of successfully processed CDRs
- number of free, number of outcollects
- number of errored CDRs corrected
- number of errored CDRs written off

The records in a file are finalized when they have been processed successfully. That is, all the records in the file have been processed successfully *once*. Processing of the file is complete. Once it is finalized, a file can't be "unfinalized."

FILE_STATUS Table

- `file_status=1`: New file is ready for processing
- `file_status=2`: CMCAP locks file
- `file_status=4`: Processing complete
- `file_status=10`: Finalized

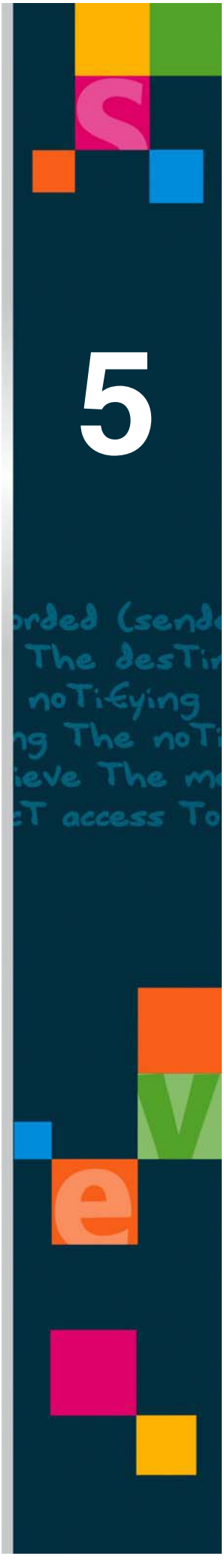
If the `file_status` is not equal to 10, look at `FILE_STATUS` table for numbers lower than ten.

Customer View

The client or customer inspects Audit and Control through a `JOIN` of the `FILE_STATUS` table to the view `USAGE_COUNTS_VIEW`. With this view you can determine whether or not recrods from the original files have been processed successfully. For example, you can determine whether the records of the input file are in the correct file, or whether half of them are in the error file, or whether 50,000 records still in processing. Based on information on states and counts available through this view you can determine what happened to a file.

Chapter 5

Guiding to User



What Is Guiding to User?

Guiding to user means determining which user some usage is assigned to.

The user and the liable party are not necessarily the same, because charges are billed to the actual subscriber of an account. Liability redirection and/or shadow balances allow different accounts to pay for usage.

Upstream applications pass to the URE the external id, external id type, and activity usage type (AUT) in order for the URE to guide to the user. Applications are required to pass additional information depending on the request type.

The application that processes offline usage uses a mapping table to find the location of these fields on the CDR.

Real-time applications must pass the MSISDN (or the appropriate information) to the URE as the external id.

When MSISDN is the External ID, real-time applications normalize the MISISDN values using number manipulation scripts before passing the MISISDN value to the URE as the external id. Applications must pass the external id as well as type.

URE Actions In Guiding to User

The URE uses the external id, external id type (or application id), and AUT from the application request to find the subscriber.

Guiding to user involves the following steps:

1. The URE queries the RT/HA catalog external id/subscriber id mapping table. If the subscriber id was passed to the URE, it skips to step three. The internal subscriber number is a generated sequence of two numbers: `subscriber_no` and `subscriber_no_resets`.
2. The URE confirms that the transaction date of a call is between the active and inactive dates of the external id. If it is MSISDN-based lookup, it won't query the EIEM table and do a direct MSISDM-based lookup.

   For off-line transactions only, if the transaction date falls outside the active and inactive dates of the subscriber, URE reevaluates using the `AUT.network_delay` and `LATE_GUIDING_DELAY` system parameters.

   Transaction date >= external id active date - `AUT.network_delay`

   Transaction date < external id inactive date + `AUT.network_delay`
3. URE takes the SDP server id from the RA/HT catalog database.
4. The URE looks up the subscriber information including the subscriber start and stop dates.
5. The URE checks the transaction and process date of the record against the subscriber start and stop dates.

   For off-line transactions only, if the transaction and processing dates fall outside the active and inactive dates of the subscriber, URE will reevaluate using the `AUT.network_delay` and `LATE_GUIDING_DELAY` system parameter.

   Transaction date > subscriber id active date - `AUT.network_delay`

   Transaction date < subscriber inactive date + `AUT.network_delay`

   Processing date > subscriber active date - `LATE_GUIDING_DELAY`

   Processing date < subscriber inactive date + `LATE_GUIDING_DELAY`

   If the record does not satisfy the above criteria the Unified rater will reject or put the record in error.
6. The URE checks the fraud lock status of the subscriber.

If the subscriber is in Fraud lock the Unified Rater will reject or put the record in error.

7. The URE can also get the paying and primary offer information at this point. But that should be done only if it can be combined in a single query. There are opportunities later in the process flow to find the same information.

Number Portability Functionality

Number Portability is a network feature that allows phone numbers that previously were in the domain of one network operator to be ported to another network operator. This allows a subscriber to keep his phone number when moving to a different operator.

While number portability is a boon to consumers, it requires additional processing for many network elements, including Comverse ONE, as these elements cannot determine the network owner of a particular number solely based on number ranges.

Number portability can be based on location, operator, service, convergence, or all of the above. Comverse ONE supports *operator-based* portability, which makes it possible for a mobile subscriber or fixed telephony subscriber to shift from one mobile (or fixed) service provider to another in the same area and retain his original number.

This sections below describe how the URE supports number portability functionality.

Number Portability in Rating

In networks without number portability, Comverse ONE uses the existing location logic which is based on number ranges to differentiate between calls to different networks.

> For example, all numbers `10`*`nnnnnnnnn`* through `19`*`nnnnnnnnn`* might belong to network operator #1, `20`*`nnnnnnnnn`* through `29`*`nnnnnnnnn`* belong to network operator #2, and so on.

In networks with number portability, this logic to identify numbers is inadequate, as any number may be ported to another network operator.

With number portability functionality enabled, Comverse ONE receives the porting information from the network as part of normal signaling. It processes this porting information to allow for differentiated pricing based on the owner of a number.

Number Normalization

Comverse ONE contains several number-based features, like Friends & Family, Barred Numbers, and Emergency Numbers, wherein we match a phone number against a list and do some special processing if there is a match.

Comverse ONE employs string-matching of a phone number against a list, meaning the digits must be an exact match to what is provisioned in the list.

> Example: Even though the phone number `18566082752` is really the same phone number as `8566082752` (same number minus the country code "`1`"), and could be the same as `6082752` (same number minus country code and area code). This string-matching logic will not detect that these are the same numbers and potentially fail to match a number in the list.
>
> When a ported number is received from the network with a porting prefix it surely won't match entries in these lists.

To handle this scenario, Comverse ONE has added a capability to normalize numbers before checking for matches against a list.

Number normalization functionality is implemented in Comverse ONE independent of whether or not the number portability feature is enabled in the operator's Comverse ONE deployment.

Number normalization employs the same basic approach and functionality that is used to normalize numbers for Calling Circles.

The number normalization feature addresses two categories of number normalization:

- Category 1: Includes Friends&Family, FDA, FOA, Barred Number, and Emergency Numbers (conditionally; controlled by the EMEG_CALL_NORM_NUM_ENABLED system parameter; see the section, "Related Functionality for Number Portability" below).
- Category 2: Includes Calling Circle, Intra-hierarchy / On-Net.

Number normalization can be accomplished through the following approach:

- A set of rules and patterns are provisioned in the Rating DB and the B-number is translated based on these rules.
- After the number is translated as above, add the respective prefix, if provisioned for that category.

  (These rules and patterns are provisioned in the NUMBER_TRANSLATION_KEY/REF/VALUES tables in the Product Catalog. See the *Product Catalog User Guide* for details.)

Usage Record Generation

The URE populates three CDR_DATA fields which are populated in corresponding fields in Usage Records and Call History records:

NETWORK_PORTING_PREFIX

ACTUAL_ORIGINATING_NUMBER

ACTUAL_DESTINATION_NUMBER

For details on these fields, see Table 11, "Available CDR Fields" starting on page 31.

Related Functionality for Number Portability

In Comverse ONE, various aspects of number portability functionality are enabled and controlled by the following system parameters. For details on each of these system parameters, see Table 29, "System Parameters" starting on page 235.

- The PREFIX_MNP_ENABLED system parameter enables number portability functionality.
- The NUMBER_NORMALIZATION_METHOD system parameter controls which approach, if any, is employed in Comverse ONE to normalize phone numbers.
- The EMEG_CALL_NORM_NUM_ENABLED system parameter indicates whether number normalization needs to be done for Emergency number lookup.
- The USSDCB_BNUM_LKP system parameter dictates whether or not B-number query is performed for USSD Callbacks On/Off-Net.
- The NP_FFCHECK_ONNET system parameter dictates whether or not to provide Friends & Family tariff to On-Net subscribers only.

Internal Number Portability Database

For this Comverse ONE release, the URE has read access to the internal number portability database (which is in actuality, a table in the master Rating DB named PORTABLE_NUMBER).

The configuration parameters for this function are only available when the system parameter NpEnabled = Yes and the parameter NP Lookup Per Usage Source = Internal.

The number portability capabilities described for this release are applied to usage regardless of the rating interface it is received on, including online and offline. Additionally, neither payment mode (Prepaid, Postpaid or Converged) nor deployment mode affects these number portability capabilities.

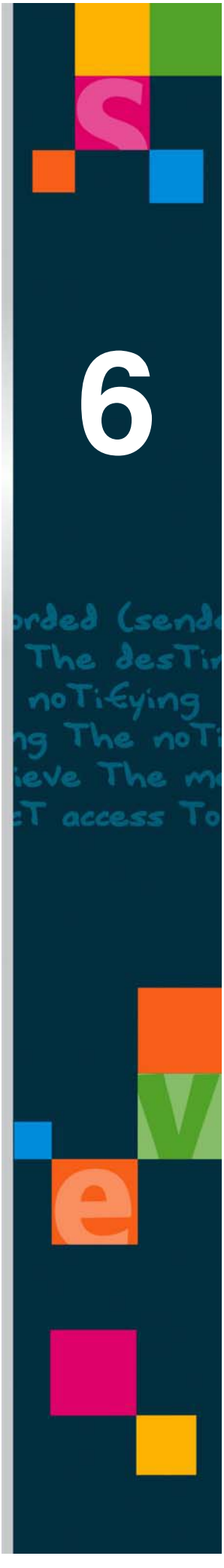
This release provides a new database utility, scheduled to run nightly via the UPM, which automatically loads data provided by the operator into the internal number portability database. See the *Operations Reference* for details on this functionality.

CAP3SMS Enhancements

For this feature, the URE supports processing from the internal number portability database for usage across the CAP3SMS interface. This processing includes all internal number portability database functionality described in the section immediately above.

Chapter 6

Activity Usage Type (AUT)



Activity Usage Type (AUT)

An *activity* is a network event such as a voice call or SMS. Activity is also known as a *usage event*. The Activity Usage Type (AUT) uniquely identifies the type of usage and ultimately affects or controls its rating. The Comverse ONE solution supports both activity and tariff segmentation keys. In Comverse ONE, the URE uses segmentation keys to determine final AUT and guide to the appropriate tariff plan.

Initial AUT

To qualify for URE processing, a usage must have an initial AUT. An application that invokes the URE assigns an initial AUT to all usage. Initial AUTs come either from the processing of signaling messages or from external mediation devices. The initial AUT value can be derived from a value hard-coded in the external application, configured, or provisioned.

The AUT contains the minimum information necessary to uniquely identify the usage for further processing within the URE. This information includes activity attributes and segmentation keys. In Comverse ONE, for online usages, the `initial_aut_id` is derived from the `application_id`, `subtype_id` and `unit_id` fields from the `AUT_INITIAL_REF` table. For offline FX-styled usages, the `initial_aut_id` is an input from the FX `USAGE_RECORD` and the URE then gets information from the specified `initial_aut_id` field from the `AUT_INITIAL_REF` table.

An AUT contains the following information:

- type of usage (that is, application, subtype, or usage type)
- units in which to measure the usage (such as minutes or bytes)
- segmentation Keys to determine final AUT and/or intended to be recorded in the internally generated usage record used by downstream processes
- an indication if this usage is pre-rated or unrated
- specification whether the user should be derived from the A, B, or C-number in the received input record

AUTs contain no direct rating configuration. Direct rating configuration, including reservation configuration, is part of the tariff plan.

Product Catalog populates the underlying data models the URE uses.

Table 20 shows the basic fields in the Activity Usage Type.

Table 20 Basic Common Fields in AUT

Attributes	Required	Populated to Rating Data Model	Additional Information
Application	Y		Application/Subtype/Unit triplet must be unique
Subtype	Y		
Unit type	Y		Units in which usage is measured, such as minutes or bytes
Desscription_ code	Y		FURTHER INFO TO COME FROM DIT-4 Database
is_initial	Y		
is_prerated	Y Default=0		
Network_delay	Y Default=0		

Table 20 Basic Common Fields in AUT (Continued)

Attributes	Required	Populated to Rating Data Model	Additional Information
Guide_to	Y Default=0		
Bill_aggr_level	Y Default=0		
Point_category	Y Default=0		
Origin_ country_dial_ code_req	Y Default=0		
Derive_ jusrisdiction	Y Default=0		
Derive_ distance_units	Y Default=0		
Vh_minor_ threshold	Y Default=0		
Distance_units_ inidicator	Y Default=0		
Consolidated_ usage	Y Default=0		

Final AUT

Initial AUTs are mapped to Final AUTs using activity segmentation keys. A *segmentation key* is an abstract key consisting of one or more elementary keys. Final AUT is then associated to a Tariff Plan that ultimately specifies how to price the usage.

Derivation Using Segmentation Keys

Each Initial AUT has a configuration stating which segmentation keys to use in mapping it to Final AUT. Operator-configured segmentation keys are configured system-wide in Product Catalog using expressions. The following is an example of the syntax of an expression for configuring a segmentation key:

```
Key Value: (Attribute1 = Value1) OR (Attribute1 = Value2) AND
    (Attribute2 = Value 3) OR (Attribute7 = Value4) -> [Attribute1 = Value1]
```

Table 21 lists Segmentation Keys.

Table 21 Segmentation Keys

Segmentation Key	Attribute	Additional Information
Account	Default: Account Category, Regulatory ID, VIP Code	Operator can select additional fields from list of subscriber attributes
Subscriber	Default: Class of Service, Subscriber Class, Subscriber Type	Operator can select additional fields from list of subscriber attributes
Market, Market Code	Provider Class	

Table 21 Segmentation Keys (Continued)

Segmentation Key	Attribute	Additional Information
Location	Location Relationship (Point Class Origin, Point Class Target), Distance Band ID, Zone Class	
Access Method	Calling Card	
Special Feature	F&F, Charging Group (Calling Circle, VPN/CUG)	
Offline Rating Configurator	Default: Bill Class	Operator configurable

Account, subscriber, and offline rating configurable segmentation keys are all operator extensible, meaning that the operator can define additional components to the segmentation key.

When deriving segmentation key values, each segmentation key will ultimately derive to a single value, based on the characteristics of the usage and the subscriber/account.

At this point, priority comes into play, as the value derived will be the highest priority expression to which a logical match is found. (Note that a lower number is a higher priority; that is, priority 1 is the highest priority, 2 is the next priority, and so on.)

In mapping from Initial AUT to Final AUT, there is also a priority configuration. The first criteria is the number of non-matching (that is, “don’t care”) keys.If there are multiple rows with the same number of matches, then the configurable row priority is used to determine which one of the rows to use.

Initial AUT is mapped to a different Final AUT if the configured segmentation key values are met; otherwise the default Final AUT for the Initial AUT is picked up.

Free Usage

Either of the following conditions can classify a usage as free usage:

- AUT defined as "free"
- CDR/Usage completion code (`comp_status/clear_cause`); completion code comes in on the completed activity record

Particular completion status codes could be defined as "free & save" (CDRs go to `CDR_PASSTHROUGH`) or "free & discard" (CDRs are discarded;. often used for busy/no answer).

- Bill_class (comes in on the activity record; often used for bandwidth (passthrough and keep), QoS, and the like).
- Particular `bill_class` (passthrough and quit) values can be defined as free.

The first condition, AUT configuration, depends on operator provisioning. However, determining the other two conditions, CDR/Usage completion code and Bill_Class, requires additional URE that the URE check the CDR/Usage completion code and Bill_Class from the input record to determine whether they match the free usage criteria.

When mapping to final subtype is complete, the URE classifies the usage as free usage if any of the following conditions apply:

- Final AUT configured as free usage
- Iinput usage completion code configured for `CDR_PASSTHROUGH`
- IInput bill class configured for `CDR_PASSTHROUGH`

Friends and Family

If the Called number (for originating Calls) or the calling number (for terminating Calls) exists in the subscriber's Friends & Family list, the Friends & Family special segmentation key is set to `true`. This allows differentiated rating.

VPN Service Supporting Closed User Groups

In the Comverse ONE 3.5 TR1.0 and subsequent releases, the URE supports a VPN service which provides a way for subscribers to call one another using a Short Code. The VPN feature supports the establishing of Closed User Groups (CUGs).

With the VPN/CUG feature enabled, if the operator's subscriber dials the Short Code and the Short Code is not an emergency number or access number, then the calling subscriber number is searched for its existence in different CUGs. Once the CUG is identified, the rating logic makes a search for the called Short Code in the same CUG. If the called Short Code is found in the same CUG, the rating logic determines the complete dialed number for that Short Code and the call is considered to be a VPN call. Before allowing this call, the CUG member restrictions are considered. If the CUG restriction is NULL and member restriction is ALL/INTRA CUG, member restriction is applied. If CUG restriction is not-null, then CUG restriction will be applied as ALL/INTRA_CUG.

Based on restriction, the call made by the member of the CUG is either allowed or disallowed. If the call is allowed, the Short Code dialed is looked up in the Barred-Allowed list. If the complete number is dialed by the CUG member, then the complete number is looked up in the Barred-Allowed list. Note that a complete number call will not be considered to be a CUG/VPN call.

If the number is not barred and with both parties' complete number available, the rating logic derives the Final AUT associated to the new CUG Segmentation key for intra-CUG calls.

After the Final AUT is determined, liability redirection is used to determine the liable party; if the liable party is found in the same CUG as the dialed Short Code, the Final AUT of an intra-CUG call is used; if the liable party is not part of the same CUG then the call is not allowed.

If at CUG level Max_On_Net or Max_Off_net duration are defined, then call duration is set to these values depending on whether the CUG member makes a call inside / outside the CUG. It should be noted that if call duration is defined at offer_level and CUG level then the call duration allowed is LOWER than that of offer_level and CUG level maximum.

Configuration in Product Catalog

Following is a list of some of the basic functionality that can be configured for Closed User Groups. This list is not inclusive of every function for CUGs, but is included here to give an overview of the CUG functionality that the URE supports:

- each CUG includes a collection of members and has its own private numbering plan
- members are assigned a Short Code
- members can access each other via the Short Code
- access restrictions can be defined for members
- the CUG members can get special rates for intra-CUG calls, similar to Friends & Family
- max call duration restriction can be set for intra-CUG calls

CUG configuration and management is accomplished in the Product Catalog. See the *Product Catalog User Guide* for details.

URE Support for the Feature

This section describes the basic functions performed in the Rating module in support of the VPN feature:

- The Short Code is checked for emergency number. If it is an emergency number it is handled as an emergency call and not a VPN call. When the Short Code is not an emergency number, the account request is sent with VPN enabled.
- The Short Code is checked for access numb er. If it is an access number it is handled as an access number call and not a VPN call. When the Short Code is not an access number, the account request is sent with VPN enabled.
- For all VPN calls, the calling subscriber number is searched for its existence in different CUGs.
- Once the CUG is identified, the rating logic makes a search for the called Short Code in the same CUG.
- If the called Short Code is found in the same CUG, the URE determines the complete dialed number for that Short Code and is considered as a VPN call.
- Before allowing the call, CUG member restrictions are checked.
- If the CUG restriction is NULL and member restriction is ALL/INTRA_CUG, memeber restriction is applied. If the CUG restriction is not-null, then CUG restricion will be applied as ALL/INTRA_CUG.
- Based on restriction, the call made by the a member of the CUG is either allowed or disallowed.
- When the call is allowed, the Short Code if dialed is looked up in the Barred-Allowed list. If the complete number is dialed by the CUG member then the complete number is looked up in the Barred-Allowed list.
- If the pattern of the Short Code or complete number (whichever is looked up in the Barred-Allowed list) is barred, the entire table containing the rows of the same CUG will check for a special pattern which allows this particular number to be allowed.
- If the number is only as barred, then the call will not be allowed. If at least the special pattern is allowed, then the call wil be allowed to continue futhur.
- Now with both parties' complete number available, the rating logic derives the Final AUT associated to the new CUG Segmentation key for intra-CUG calls.
- After the Final AUT is determined, the existing rating logic for liability redirection is used to determine the liable party.
- After the liable party is determined and the liable party is found in the same CUG as the dialed Short Code, the Final AUT of an intra-CUG call is used.
- If the liable party is not part of the same CUG as the dialed Short Code, then the call is not allowed.
- While setting the Call Duration and sending to IPF, if the CUG member has initiated a call inside/outside the CUG responsible, this duration will not be offer_level duration but instead Max_On Net or Max_Off_Net duration for that CUG. After this duration is used the call will disconnect.

URE Support for Enhanced CUG Functionality

In the 3.5 RT TR 3.0 release, the URE supports the following enhancements in the Comverse ONE VPN Closed User Groups feature:

- Add support of Super CUGs
- Include non Comverse ONE subscribers as CUG members
- Add support for CUG Global Table

Super CUG

A Super CUG is similar to a normal CUG in that it has a CUG name and a CUG Id. But instead of having individual subscribers or destination numbers as members, its members are CUGs.

The Super CUG defines a group of CUGs that will partner together and defines how the partner CUGs will access each other. Along with the list of the member CUGs, the Super CUG defines the access codes that are used to access the partner CUGs.

For example, a Super CUG in a company might consist of three member CUGs: Human Resource, Finance and Sales, each with their own 3-digit CUG access code. In this example, a member of the Human Resource CUG can be reached by members of the partner CUGs by dialing that CUG's access code followed by the defined short code of the CUG member.

The URE supports this functionality in the following ways:

- For Inter-CUG calls, rating applies VPN tariff/rates if configured
- Activity history and CDRs will indicate if the activity is Inter-CUG call. History and CDR will also include access code plus short code dialed for Inter CUG calls

Include Non-Comverse ONE Subscribers as CUG Members

In this release, Comverse ONE supports adding and removing of non-Comverse ONE subscribers from a CUG. Activity usages, both online and offline, from a Comverse ONE subscriber to a non-C1 subscriber CUG member will be processed and rated in the same manner as usages to a C1 subscriber CUG member. Special VPN/CUG rates will be applied, if configured and applicable.

CUG Global Numbers

In this release, Comverse ONE is enhanced to support CUG Global numbers, phone numbers that can be dialed by any CUG member regardless of their CUG access type. Even users restricted to only Intra-CUG calls can dial any numbers in this list. For example, all subscribers can be allowed to dial 411 or customer care.

Rating supports this functionality as follows:

- Rating is enhanced to allow all CUG members irrespective of their access type to make calls to numbers configured as CUG Global Numbers. Standard rates will be applied for such calls; they are not eligible for special VPN rate.
- C1 will support VPN feature for calling cards and calls via IVR. Special VPN rates will apply for such calls.
- C1 will support VPN rating for offline usage. Intra and Inter CUG usage will be supported for offline usage.

Call History and CDR Changes

The URE populates the CDR records with the ShortDialNumber and the CugCode, and these fields are ultimately added to the Usage and Call History records in the Rating DB.

These two added fields, `CUG_CODE` and `SHORT_DIAL_NUMBER`, are described in Table 11, "Available CDR Fields" starting on page 31.

System Parameter

The `VPN_FLAG` system parameter which enables this VPN feature is detailed in Table 29, "System Parameters" starting on page 235.

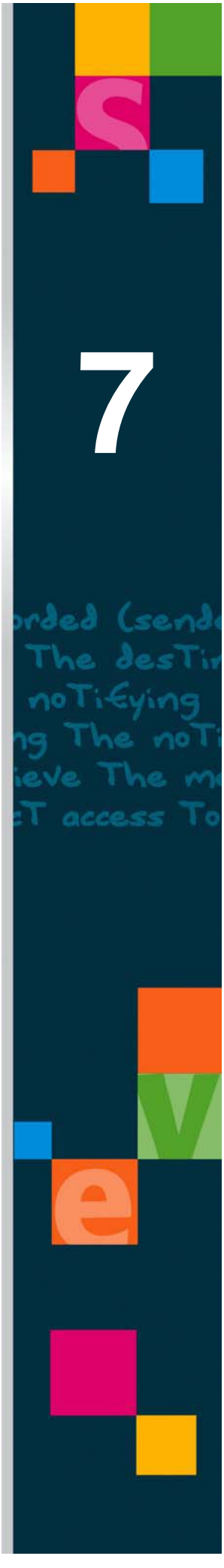
URE Account Activation for Unified Card

This section describes the enhancements that are needed in URE to support associating a preloaded single subscriber account to a Unified Card when that card is used for the first time to make a calling card call.

This capability is to support the use of a Unified Card as a Calling Card. When a Unified Card is used for the FIRST TIME to make a calling card call, an account must be created. Upon first call to the appropriate access number, one of the pre-loaded temporary single subscriber accounts is selected that has the same Primary Offer as that of the Unified Card. The External ID from the Unified Card is swapped with the Temporary External ID value on the preloaded account, and the account is moved to "Active" state. Once this has been successfully completed the subscriber is connected to their destination.

Chapter 7

Guide to Liable Party



What Is a Liable Party?

The *liable party* is the account responsible for a charge. Strictly speaking, the subscriber's owning account is the liable entity. The Comverse ONE solution supports *charge redirection*, which means assigning responsibility for charges to a subscriber other than the one that directly incurs the charge.

Comverse ONE supports four kinds of charge redirection:

- Shadow Balances
- Account to Account Liability Redirection
- Subscriber to Account Liability Redirection
- Subscriber to Shadow Subscriber Liability Redirection

Shadow Balances

A *shadow balance* is a "pointer" from a subscriber balance to an account.

Just like a regular balance, a shadow balance has an inclusion/exclusion list, a value, and can have a minimum. It is typically decremented as usage takes place.

Like any other balance, a shadow balance can be consumed until it has no more funds available. However, because the shadow balance is really a pointer to another balance, its use is also limited by the available funds in the source (pointed to) balance as well.

As a result, the available amount of an eligible shadow balance is normally the lower of the available shadow balance (current value - minimum value) and the available balance it points to (directed balance current value - directed balance minimum value). Since the directed balance is always an account balance, the account balance minimum is taken from the highest-priority account offer that instantiated that balance.

All shadow balances must point to real balances in the same account.

If the shadow balance points to anything other than the direct parent, the usage cannot use the subscriber's Shadow AND Real Balances. Usage is either totally paid for via Shadow Balances (terminating when Shadow Balances are exhausted), or totally paid for via Real Balances (terminating when the Real Balances are exhausted).

Liable Party Redirection

The other three types of charge redirection are *liable party redirections*. The following three types of liabiilt redirection all support configurable criteria that define what charges are redirected to what account / shadow subscriber.

- account to account
- subscriber to account
- subscriber to shadow subscriber

These rules can be set up by the Operator, CSR, or potentially even an end user.

Account to Account Liability Redirection

Account to account liability redirection has two potential purposes:

- direct account-level charges from one account to another. Account-level charges are typically RCs and NRCs, which do not include usage charges.

- direct subscriber-level usage and/or non-usage charges to a different account, saving the trouble of configuring the liability redirect rule for each subscriber directly associated to the account.

You set a configuration option in the account to account liability redirection rule that indicates whether the rule applies only to the account, or to the account and *all* subscribers within the account.

In account to account liability redirection, rates (or charges) always come from the original subscriber (for usage or subscriber-level RCs/NRCs), or from the original account (for account-level RCs/NRCs); however, the charges are deducted from the liable (target) account balances, using the target account's balance availability and Balance Charge Order.

If the target account lacks funds to pay for the usage, the usage is denied (for real-time authorization), or errored (for non-real-time processing).

The target account can be within or outside of the user's account hierarchy.

Subscriber to Account Liability Redirection

Subscriber to account liability redirection directs subscriber-level usage and/or non-usage charges to a different account.

In subscriber to account liability redirection, the rates (or charges) always come from the original subscriber (for usage or subscriber-level RCs/NRCs); however, the charges are deducted from the liable (target) account balances, using the target account's balance availability and Balance Charge Order.

If the target account does not have enough funds to pay for the usage, the usage is denied (when real-time authorization is used), or errored (for after-the-fact processing).

The target account can be within or outside of the user's account hierarchy.

Shadow Subscriber

In Comverse ONE, a shadow subscriber is created as a by-product of liability redirection when the liability redirection requires customized target rating or target liability. It is created under the target account with a reference to the original subscriber. Ideally, original and shadow subscriber can be on two different SDP. Internally, the original subscriber and any associated shadow subscriber have independent life cycle. The shadow subscriber has its own primary offer/bundle and/or supplementary offers. Also, the shadow subscriber can have same/new network services that do not exist on the original subscriber.

Assumptions for Shadow Subscriber

- we create a shadow subscriber *only* during liability redirection, when the original subscriber needs to redirect liability to target account with payer rates that is "rated by Target"
- shadow subscriber shares the same unique external ids (for example, MSISDN, and so on) and inventory with real subscriber
- shadow subscriber can be owned by any account in the system
- one original subscriber can have several shadow subscribers
- one shadow subscriber can be associated only with one original subscriber
- a shadow subscriber cannot have another shadow subscriber

Subscriber to Shadow Subscriber Liability Redirection

Subscriber to shadow subscriber liability redirection directs subscriber-level usage and/or non-usage charges to a different subscriber known as the *shadow subscriber*.

In subscriber to shadow subscriber liability redirection, = usage rates always come from the shadow subscriber, while the charges for RCs/NRCs (or charges) always come from the original subscriber. Charges are deducted from the shadow subscriber balances, using the shadow subscriber's balance availability and balance charge order.

If the shadow subscriber does not have enough funds to pay for the usage, or if the shadow subscriber does not allow the usage, the usage is denied (when real-time authorization is used), or errored (for after-the-fact processing).

The target shadow subscriber can be within or outside of the user's account hierarchy.

Liability Redirection Rules and Criteria

Liability redirection is determined by configurable rules and criteria. Account to account, subscriber to account, and subscriber to shadow subscriber liability redirection are configured into rules, which can be assigned to an account (account to account) or to a subscriber (subscriber to account, subscriber to shadow subscriber).

Each rule defines conditions for liability redirection, as well as the target account/shadow subscriber to use when the conditions are met.

The following criteria (conditions) are supported:

- Usage, including specific AUT, Group of AUTs (not sure if this will be Activity group, Usage Group, or something new), ALL usage, specific RC ID, ALL RCs, specific NRC ID, or ALL NRCs.
- B-Number: The destination number for a call, SMS, and so on.
- The Liability Redirection calendar has two time types: `LR_ON` and `LR_OFF`.

Guiding a Service to a Liable Party

Guiding is the process of parsing a real-time or offline usage record, identifying the account to be billed for that usage, and associating the the usage record with that account in the Billing Database. There can only be a single Liable party for any usage. During a usage, the liable party never changes; that is, the party determined to be liable at the beginning of the usage remains liable for the entire usage. Once a liable party is determined, either the usage is paid for by the liable party or the usage is rejected, errored. URE does NOT look for another Liable party with enough funds to pay for the usage.

Overlapping Rules are allowed. For example, Rule 1 says to redirect all local calls to Acct2. Rule 2 says to redirect all off-peaks calls to Acct2. Local calls are therefore directed to Acct2 during off-peak usage.

Comverse ONE supports configurable priority for each of the three types of Liability Redirection, so as to determine the order in which the rules are examined.

To handle overlapping criteria within a type, Comverse ONE supports a configurable priority for each rule within rule types, defined for subscriber/account.

URE Processing of Liability Redirection

As URE processes usage, it checks for liability redirection using the configured priority.

Note that for account to account rules, URE must look at the subscriber's Owning Account, as these rules are provisioned at the account level only.

Subscriber to account and subscriber to shadow subscriber rules are found at the using subscriber.

If URE finds no matching rule, the using subscriber is considered the liable party, and his rates, balances, and so on are used.

If URE finds a matching rule, liability is redirected based on that rule. Note that if it turns out that the new liable party cannot perform the usage, due to no funds, not configured rates, suspended subscriber, and so on, the usage is denied or errored.

Processing for Shadow Subscriber that Participates in a Calling Circle

A call that guides to a shadow subscriber that participates in a calling circle receives appropriate rating considerations because of its circle membership. This section describes that basic URE processing scenario.

In the very initial guiding steps to the real subscriber, the application selects ALL circle memberships for the real subscriber and ALL its shadows, and then passes to URE. URE passes that full payload around for all processing of all calls, even though only a subset of circles (those on a designated DB) will be relevant on any given call.

Processing continues as normal to the real subscriber, and then liability redirection is evaluated, and if applicable, processing is handed over to the appropriate URE instance depending on which SDP the shadow subscriber is located.

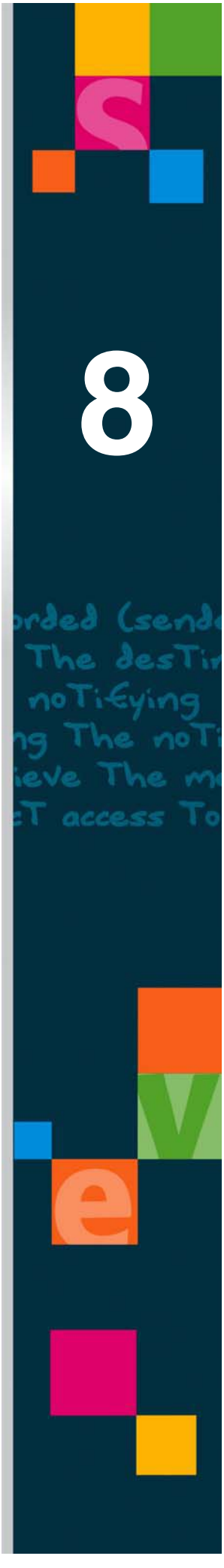
For online calls the flow is: OPPS gets real subscriber information from the SDP (in this example, SDP = 9), on which is being used the corresponding `URE_Q` instance. OPPS then requests fall startable from `URE_U9`. `URE_U9` determines the liable party during the Guideing process. If the shadow subscriber is on a different SDP (in this example, SDP = 10), then processing is handed over to `URE_U10`. In the case of Recharge of the shadow subscriber, the account request iis directly forwarded from one `URE_Q` instance to another if present on a different SDP.

Once the call has been guided to the Liable subscriber (real or shadow) context in which the call will be rated and charged, URE looks again at the collection of circle memberships collected in step one, looking specifically for one that matches on `subscr_no/subscr_no_resets` of the subscriber context. If one matches, then the call is considered to have an originator that is a circle member; if not, no calling circle rating benefits are applicable.

The processing flow continues as normal, checking to see if the destination number of the call is also in the circle, and applying/skipping special pricing considerations as appropriate based on the result of the check.

Chapter 8

Guide to Offer



Once the final AUT has been determined, the applicable *offer* must be derived. Since the same AUT can exist in multiple offers for one subscriber, the URE must select the most appropriate offer based on offer precedence rules. In order to determine whether usage is prepaid or postpaid, it is necessary first to determine which offer is to be used.

Once the URE derives the offer associated with a particular usage (including any overrides), it uses this offer for the duration of the usage.

Offer Priority

Offer precedence rules are the following:

- Offers outside the UpSell Template always have higher priority than offers within the UpSell Template.
- The relative priority of multiple offers outside the UpSell Template is decided by date/time, with more recent offers taking higher priority than older ones.
- Should several offers outide the UpSell Template have the same date/time, their relative priority is decided by Offer ID, with highest Offer ID having highest priority.

Tarriff Plan Priority

The UpSell Template, which is instantiated at each subscriber/account, contains the relative priority of each offer/bundle attached to a subscriber. This priority is known as the Tariff Plan Priority.

Eligibility

Service eligibility is the first level of authorization. The URE checks whether the user meets all eligibility requirements for this service, except funds sufficient to cover the charges.

This validation includes:

- verification that the user has an offer (and associated Tariff Plan) allowing the usage and defining rates (done in previous steps)
- verification that the user is in an appropriate state to allow the usage

If validation steps fail, batch input records are sent to error files, and real-time usage is denied.

A positive exit from this step indicates that the only thing that could block this usage is insufficient funds.

Balance eligibility is the second level of authorization. The URE determines balance eligibility based on liable party, offer (online or offline), balance type (real or shadow), and balance definitions.

For offline records, subscriber states are checked at the time of the service, and for online records, at the current or processing time. The URE supports checking the subscriber state for online transactions.

Because offline transactions have already occurred, they are billed to the subscriber regardless of the subscriber status. The URE does not need to check subscriber status for offline transactions. Except for the dependency described in the paragraph below, the URE allows all offline transactions for subscribers in postactive, or suspended states. Account state is *not* taken into consideration for eligibility. The URE uses only the subscriber state. The account state is considered only in the redirection to account case.

If the configuration flag `IGNORE_SUBSCRIBER_STATE_FOR_OFFLINE_CHARGING` is set to `N`, then a usage record with subscriber status of Not Yet Created, Pre-Active or Fraud will not be

processed by the URE but will instead be errored. If this configuration flag is set to `Y`, then the URE will process the usage record.

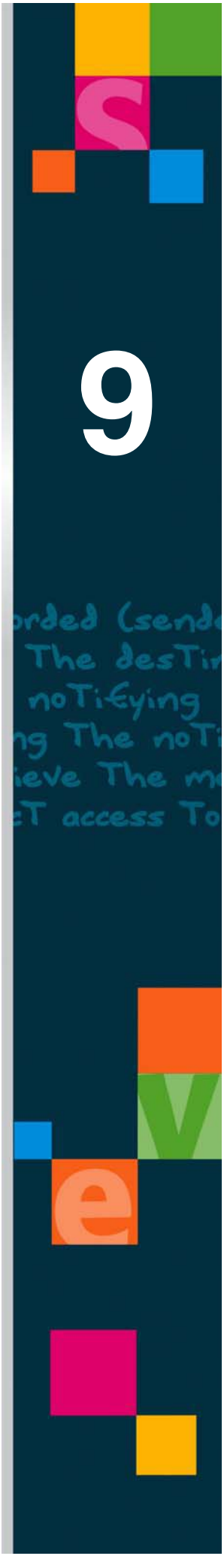
Table 22 summarizes the guiding requirements for subscriber states.

Table 22 Subscriber States

Pre-Active State	Active State	Post-Active States
Configurable (Online)	Guide (Online)	Configurable (Online)
Guide (Offline)	Guide (Offline)	Guide (Offline)

Chapter 9

Tariff Plans



Tariff Plan

After offers have been found for all final AUTs, their associated *tariff plans*, which contain the actual charging information, can be derived. A tariff plan includes:

- rating keys
- rates
- tax configuration
- reservation information,
- usage credit configuration
- discount eligible configuration

Comverse ONE supports three types of Tariff Plan:

- Regular Tariff
- Advanced Tariff
- Markup: markup rating

Regular tariff plans contain tariff currency sets.

Tariff Currency Set or Rate

A *tariff currency set* is a currency and one or more tariffs that are to be used when that currency is selected. In general, the selected currency matches the subscriber's currency, although they need not match. In cases where a tariff plan currency does not match the subscriber's currency, the tariff currency set that matches the tariff plan currency is used.

Mapping AUT to Tariff Plan

Each offer contains zero or more usage plans. A usage plan contains one or more usage items. A usage item contains one final AUT and one Tariff plan.

AUT and Offer

The combination of final AUT and offer points to a specific Tariff plan.

Tariff Plan Override

The tariff plan can be overridden by a tariff plan override. A tariff plan can be overridden based on subscriber and usage attributes defined in the tariff plan override rules, which have the form:

<Old Tariff Plan> <Override Rule> <New Tariff Plan> <Priority>

The Priority field determines priority when criteria overlap.

Tariff Plan Override Criteria

A Rule can be made up of multiple criteria. These include:

- Balances
- Home Zone
- Longevity
- Birthday

- Anniversary
- Happy Hour
- Favorite Area
- Dialed Number Prefix

Once the final AUT is mapped to a Tariff Plan, the URE finds the Tariff Currency Set or rate that matches the subscriber currency. If one is found, URE uses the rate and no conversion is required. If no matching currency is found, URE uses the currency of the Tariff Plan. In this case, it is necessary to convert to the subscriber's currency.

URE supports currency conversion based on tariff currency and subscriber currency. Tariff set currency and tariff plan currency are used only to find the right tariffs.

Bill on Send

Bill on Send calculates the duration of voice calls (including network forwarded calls) from the when the caller presses *send* to when the call is disconnected (send - disconnect). Because ComverseONE receives no information as to exactly what time the caller presses the *send* button, the send time is when the call first appears in the system. Bill on Send permits you to base reservations and charging on one of two settings:

- Call Bridged: base reservation and charging on the funds in the account at the time the call is answered.
- Call Offered: base reservation and charging on the funds in the account at the time the call is initiated. (Enable Bill on Send.)

Call duration is identical for OPPS calls with or without precall announcement. This feature is also supported for outage record processing of OPPS and NCF calls. Network operators configure this feature with Product Catalog.

Bill on Send calculates call duration only of answered calls. Call duration of unanswered calls is '0' and they are not billed.

Using Tariff Sets to Implement Telescoping Charges

The Comverse ONE operator can configure and implement complex pricing for usage, by configuring concurrent tariffs as part of a tariff set. When concurrent tariffs are configured as part of a tariff set, the resulting charge rate is the sum of the charge rates of all tariffs in the set. For example, if the price for a long distance call consists of an airtime charge of $0.25 per 60 seconds and a toll charge of $0.51 for every 45 seconds, this can be configured with concurrent tariffs in a tariff set in order to set the usage price of this long distance call at $0.93 per minute.

The following sub-sections provide two examples of how one might use multiple concurrent tariffs to implement telescoping charging, in which the charge for the call lessens as the length of the call extends.

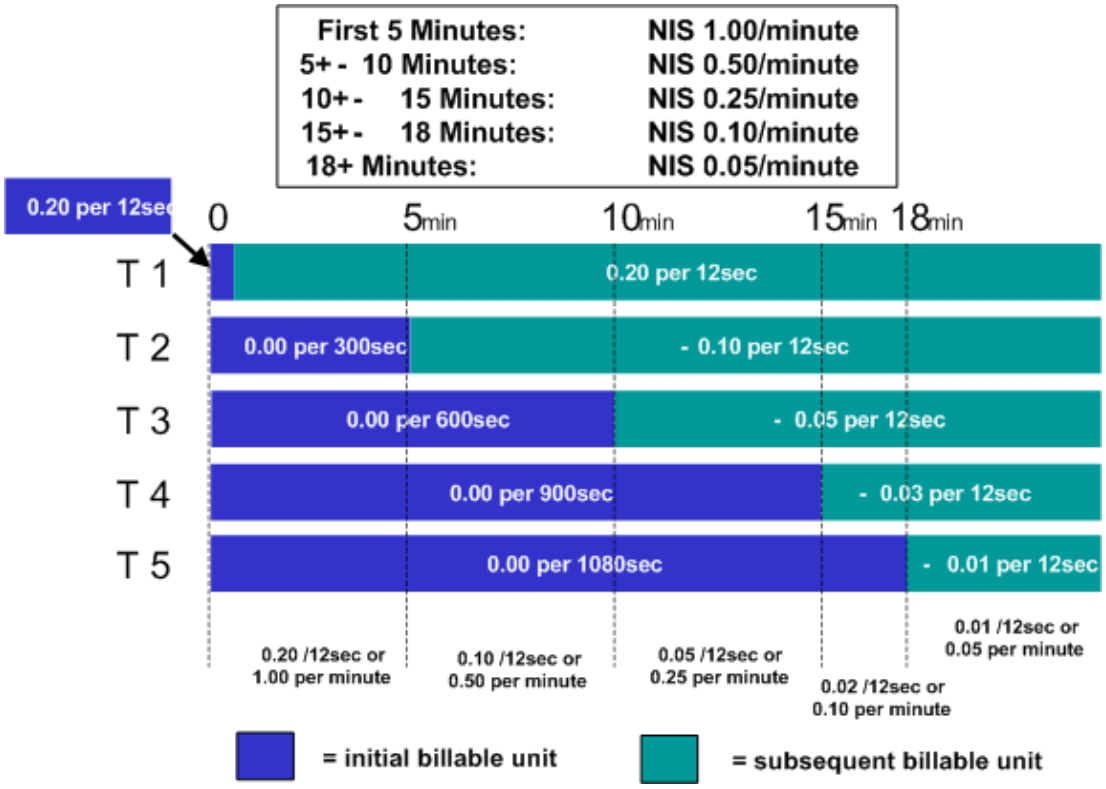
Example 1:

In this first example, the operator wishes to configure a telescoping charge having these elements:

- Charge Units: Always 12 seconds
- Currency: NIS (Israeli New Shekel)
- Charge Rate 00:01 -> 5:00 minutes: NIS 1.00 per minute
- Charge Rate 5:01 -> 10:00 minutes: NIS 0.50 per minute
- Charge Rate 10:01 -> 15:00 minutes: NIS 0.25 per minute
- Charge Rate 15:01 -> 18:00 minutes: NIS 0.10 per minute

- Charge Rate 18:01 minutes and beyond: NIS 0.05 per minute

The following diagram illustrates this scenario:



The five tariffs in the tariff set would then be configured as follows:

Tariff 1: Currency: Shekel
First Charge Unit Duration: 12 sec — First Charge Unit: 0.20
Additional Charge Unit Duration:12 sec — Additional Charge Unit: 0.20

Tariff 2: Currency: Shekel
First Charge Unit Duration: 300 sec — First Charge Unit: 0.00
Additional Charge Unit Duration:12 sec — Additional Charge Unit: -0.10

Tariff 3: Currency: Shekel
First Charge Unit Duration: 600 sec — First Charge Unit: 0.00
Additional Charge Unit Duration:12 sec — Additional Charge Unit: -0.05

Tariff 4: Currency: Shekel
First Charge Unit Duration: 900 sec — First Charge Unit: 0.00
Additional Charge Unit Duration:12 sec — Additional Charge Unit: -0.03

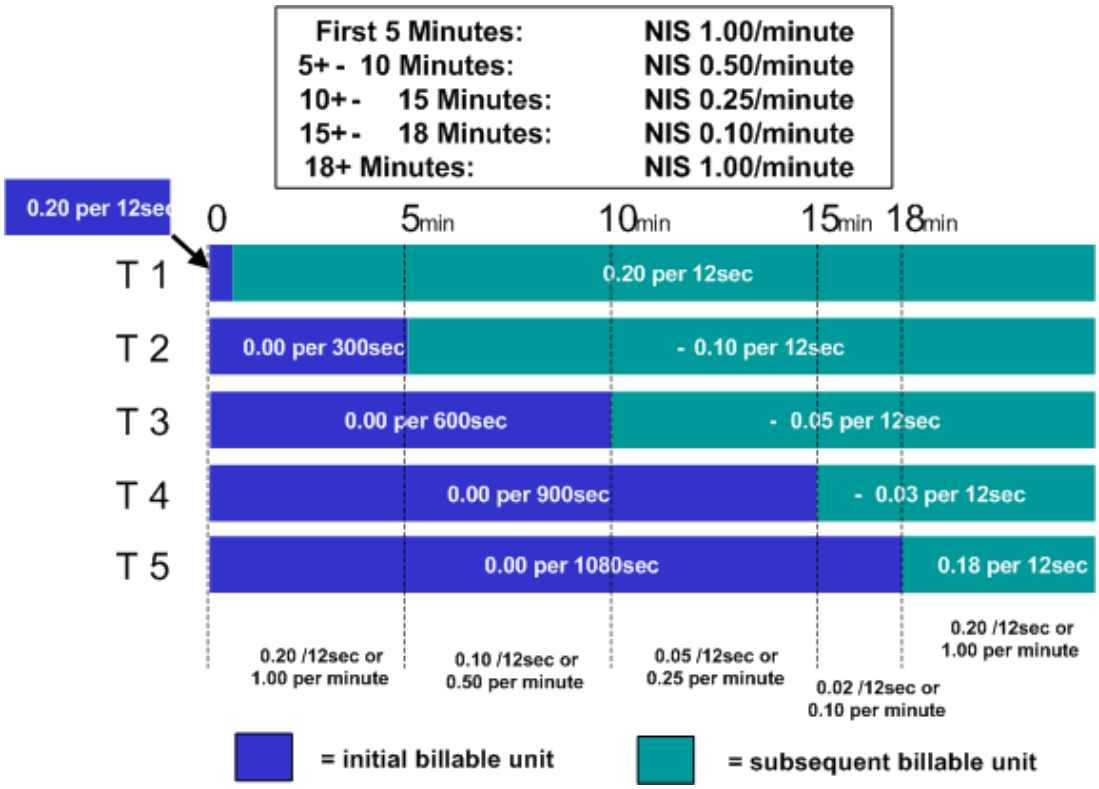
Tariff 5: Currency: Shekel
First Charge Unit Duration: 1080 sec — First Charge Unit: 0.00
Additional Charge Unit Duration:12 sec — Additional Charge Unit: -0.01

Example 2:

In this second example, the operator wishes to configure a slightly different telescoping charge, whereby the rate returns to NIS 1.00 after 18 minutes. This example telescoping charge has these elements:

- Charge Units: Always 12 seconds
- Currency: NIS (Israeli New Shekel)
- Charge Rate 00:01 -> 5:00 minutes: NIS 1.00 per minute
- Charge Rate 5:01 -> 10:00 minutes: NIS 0.50 per minute
- Charge Rate 10:01 -> 15:00 minutes: NIS 0.25 per minute
- Charge Rate 15:01 -> 18:00 minutes: NIS 0.10 per minute
- Charge Rate 18:01 minutes and beyond: NIS 1.00 per minute

The following diagram illustrates this second scenario:



The five tariffs in the tariff set would then be configured as follows:

Tariff 1: Currency: Shekel
First Charge Unit Duration: 12 sec First Charge Unit: 0.20
Additional Charge Unit Duration:12 sec Additional Charge Unit: 0.20

Tariff 2: Currency: Shekel
First Charge Unit Duration: 300 sec First Charge Unit: 0.00
Additional Charge Unit Duration:12 sec Additional Charge Unit: -0.10

Tariff 3: Currency: Shekel
First Charge Unit Duration: 600 sec First Charge Unit: 0.00
Additional Charge Unit Duration:12 sec Additional Charge Unit: -0.05

Tariff 4: Currency: Shekel
First Charge Unit Duration: 900 sec First Charge Unit: 0.00
Additional Charge Unit Duration:12 sec Additional Charge Unit: -0.03

Tariff 5: Currency: Shekel

First Charge Unit Duration: 1080 sec	First Charge Unit: 0.00
Additional Charge Unit Duration:12 sec	Additional Charge Unit: 0.18

Discount on Negative Tariff

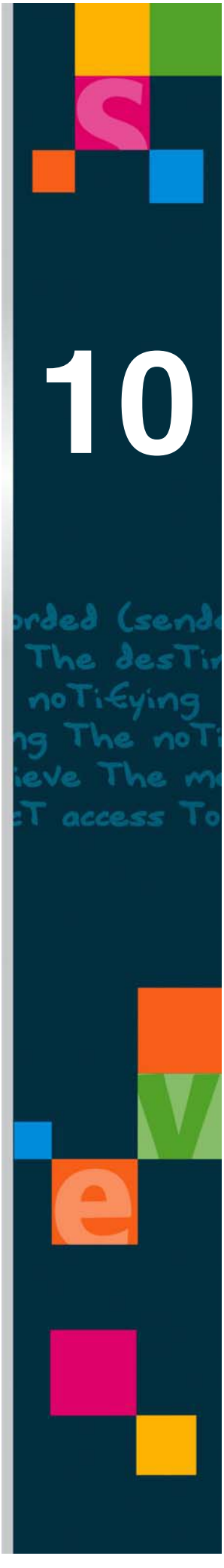
As described in the examples above, negative tariff discounts can be used to offset positive charges as part of telescoping charging support; that is, a negative tariff is a means to reduce the charges for usage after a certain amount of usage has been consumed.

Rating allows application of a percent discount to a negative tariff and/or a negative charge to "reduce the negativity" of the charge. A 10 percent discount on a -$0.40 charge results in a less negative charge of -$0.36 (add 10% of $0.40 to -$0.40). A discount applied to a negative charge is reported as negative. In contrast to negative tariff discounts, fixed discount amounts are never applied to usage charges at or below zero, so they never take the overall usage charge below zero.

Mis-provisioning of this could result in discounting overall negative charges, thereby reducing the amount credited for the usage.

Chapter 10

Balance Eligibility



What is Balance Eligibility?

Balance eligibility defines:

- What subscriber/account balances can be charged for this usage
- How much of each eligible balance can be used

Because charges can be split across multiple balances, the URE must determine what balances are eligible to charged for the usage, as well as how much money can be charged against each eligible balance.

The remainder of this section describes how the URE accomplishes this.

Determining Eligible Balances and Amounts

Balance eligibility is derived from the configuration of the subscriber, liable account/shadow subscriber, and the usage itself.

The subscriber configuration contains information on what balances are available to the subscriber, balance inclusions/exclusions, balance type (prepaid/postpaid/shadow), offer type (prepaid/postpaid/both), and liability redirection rules.

In case of liability redirection, the liable account configuration contains information about what balances are available to the account, balance inclusions/exclusions, available balance amounts, and balance type (prepaid/postpaid/shadow).

With respect to usage, both the AUT and the time categorization (Rate Period/Time Type) are important, because they are compared to the balance inclusion/exclusion configuration to determine if the balance can be used to fund the usage activity.

In the Comverse ONE solution most balance attributes are defined in offers, allowing for conflicting or overlapping characteristics.

Certain balance attributes must be consistent across all offers instantiated at the subscriber / account level; these include units, type (prepaid/postpaid/both). real or shadow, and so on. Some other balance attributes, such as minimum value, maximum value, inclusion/exclusion configuration, and so on., are allowed to vary across multiple Offers. For example, in the Comverse ONE solution, Offer1 might specify Bal1 to have a Max Value of 100, a Min Value of 0, and to include voice calls during peak hours, while Offer2 specifies that Bal1 has Max Value of 90, a Min Value of -10, and includes international voice calls only during weekend hours.

Furthermore, each Offer has its own Balance Charge Order definition.

So the question is how the URE determines, for any usage, which Balances to use, what Balance properties (such as Min value) to use, and what the Balance Charge Order is to be.

Determining Balance Order and Balance Amounts

The overriding principle is that any usage must not be limited to using only balances instantiated by the guided-to offer. That is, any balance instantiated by any offer must be available to any usage (based on the balance attributes).

The URE approach can be summarized as follows:

- Any Balance instantiated by any offer is available to any usage
- In order to resolve conflicts in balance configuration, all balances instantiated in offers at a subscriber / account level are ranked in a priority order

- The priority order of subscriber balances is based on the guided-to offer, the offer balance priority configured in the subscriber's Upsell Template, and the Balance Charge Order in the offers
- Balances from the guided-to offer have the highest priority, with the Balance Charge Order of the guided-to offer determining the relative priority of these balances
- The remaining Balances are taken in the relative offer priority order, based on the Balance Priority from the Upsell Template. Some offers can be outside upsell template (that is, these offers are not defined in upsell template), in which case, the offer priority is guided-offer, offers outside upsell template, offers defined in upsell template; offers instantiated outside of the UpSell Template always have higher priority than offers within the UpSell template
- In each offer, the Offer Balance Charge Order determines the relative priority of the Balances
- The priority order of account balances is based on the Balance Priority in the Account Upsell Compatibility Template (the account-level equivalent of Upsell Template), and the Balance Charge Order configured in the offers
- When using liability redirection to an account, balances are taken in the relative offer priority order, based on the Offer Balance Priority from the Account Upsell Compatibility Template
- In each Offer, the Offer Balance Charge Order is used to determine the relative priority of the Balances
- When using an account balance as the target of a Shadow Balance, the balance properties are based on the highest priority instantiation of that balance to the account. The balance attributes (Min Value, Max Value, Inclusion / Exclusion, and so on) from the highest priority instantiation of the balance are used.

Balance Inclusion/Exclusion

Balance Exclusion/Inclusion checks two associations, AUT and Timetype. The design meets description such as, “This balance is eligible for all voice during peak."

Balance Attribute Priorities

(to be added)

Balance Available Amounts

When shadow balances and Total Monetary Liability (TML) are both used, for an eligible postpaid currency balance, the available amount is the lower of the (Shadow Balance Value - Shadow Balance Minimum), (Directed to Balance Value - Directed to Balance Minimum), and (TML Max - TML Value).

After determining that one or more balances are eligible for a usage, the URE must then determine how much of each eligible balance is available.

In general this is a sequential operation that must be performed on each eligible balance. Ultimately the available amounts are the sum totals of the eligible and available unit credit balances and eligible and available monetary balances.

As a general rule, the available amount for each Balance is the difference between the Balance Value, and the Balance Minimum.

For any subscriber-level usage, the Balance Minimum is taken from the Offer being used. For account balances, the balance minimum is taken from the highest-priority account offer that instantiated that balance. This allows any balance to have multiple minimums, based on the usage performed.

Total Monetary Liability (TML)

Total Monetary Liability (TML) is an Account-level control used to limit total currency usage in postpaid Balances. It is not a balance, in that it does not really contain any funds. It is just a running limit of all postpaid currency charges in the Account and at the subscribers directly associated with the account. The functionality that TMLs supply is to provide another limit for postpaid currency usage. That is, when a TML is configured, the available amount for any postpaid currency balance is the lower of the available balance amount (Balance Value - Balance Minimum), and the TML available amount (TML Max - TML Value).

The TML can be used to limit the use of postpaid currency balances in the Account, and Subscriber-level currency balances for all Subscribers directly associated to the Account.

For an eligible postpaid balance, when shadow balances and TMLs are both used, the available amount is the lower of the (Shadow Balance Value - Shadow Balance Minimum). (Directed to Balance Value - Directed to Balance Minimum) and (TML Max - TML Value).

TMLs do *not* directly limit shadow balance usage unless they "cover" the real monetary balance to which the shadow balance points.

Balances Versus Total Monetary Liability (TML)

Just like a Balance, a TML has a value. However, unlike Balances, TMLs are incremented as currency usage takes place and decremented as payments are made.

Credit Limits

The Comverse ONE solution employs *cyclical balances*, which are balances that are periodically reset to a specified value. All shadow balances are cyclical, as are postpaid currency balances.

A *credit limit* is a value the operator sets on a balance in order to limit the amount of exposure or risk for the subscriber/account.

In general, credit limits are the values to which balances are reset on a periodic basis. So, for example, an operator who wishes to limit a subscriber's monthly use of a balance can set a credit limit on that balance, as well as a cycle period and a reset date. At the reset date, the balance value is reset to the credit limit value.

The responsibility for resetting the balance to the credit/spending limit is outside the URE.

Credit limits in themselves have no direct affect on rating, because the URE just uses whatever balance values are defined. The only indirect effect is that resetting the balance to the credit/spending limit is done by a DB-stored procedure and nightly batch job, which could lead to errors should URE attempt to use the balance before the batch reset process has occurred.

Balance Eligibility Statistics and Measurements

The URE keeps counts of the following:

- number of balance eligibility requests received
- number of successful balance eligibility requests serviced (successfully found balances, even if none were eligible)
- number of unsuccessful balance eligibility requests serviced (could not obtain balance information)

Reservation Handling and Balance Resets

Reservations are taken against balances. An amount of units is set aside from the total balance amount to pay for an ongoing activity.

When a reservation amount runs out, another reservation is taken. Reservations reduce the available amount of balance. When an activity ends, activity amount deducted from the total amount. The amount of unused reservationis returned to available amount.

Table 23 describes reservation balance reset input parameters used by the URE.

Table 23 URE Reservation Balance Reset Input Parameters

Name	Datatype	Description
I_subscr_no	ACCOUNT_SUBSCRIBER.SUBSCR_NO%TYPE	The subscriber number
I_subscr_no_resets	ACCOUNT_SUBSCRIBER.SUBSCR_NO_ RESETS%TYPE	The subscriber number resets value
I_account_no	ACCOUNT_SUBSCRIBER.ACCOUNT_ NO%TYPE	The account
Io_no_of_balances	ACCOUNT_SUBSCRIBER.NO_OF_ BALANCES%TYPE	The number of balances
I_rowid	ROWID	Reservation

Table 24 describes reservation balance reset output parameters used by the URE.

Table 24 URE Reservation Balance Reset Output Parameters

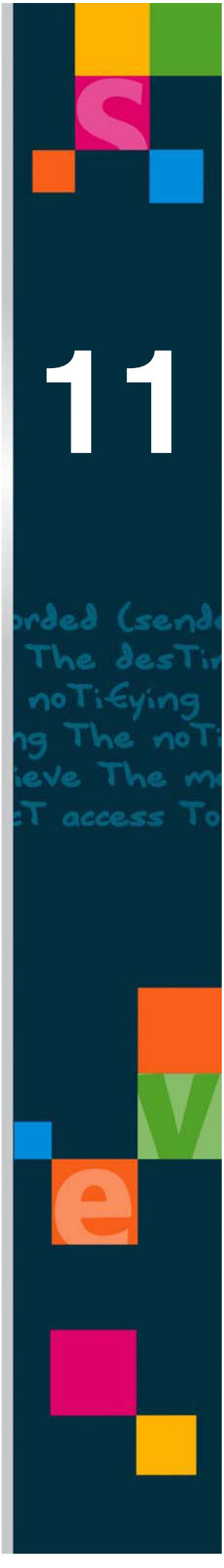
Io_no_of_ balances	ACCOUNT_SUBSCRIBER.NO_OF_ BALANCES%TYPE	Number of balances
O_balance_ id	NUMBER	Balance ids
O_tot_cons_ bal	NUMBER	Total amount consumed
Io_ret_code	NUMBER	Returns error code in case of any failures 0 =-Success Oracle Errors (negative): For any data issues and code issues
Io_ret_msg	VARCHAR2	Return Error Message in case of any failures

A balance is reset when its value reaches zero, whether because of an RC set award, a balance confiscation, or a postpaid running balance cyclical reset.

For more information about balance reservations see the *Product Catalog User Guide*.

Chapter 11

Pricing



Pricing Overview

In order to determine the charge for usage, the URE must determine the price. Different factors affect the price, so the URE follows a sequence of steps to find how to price a particular usage. The overall flow of pricing phase of rating is as follows:

1. Get time types for usage
2. Apply unit credits
3. Calculate monetary charges, including the value of unit credits and discount. Note that for authorization or reservation purposes, it is unnecessarty to determine Base Charge, the value of unit credits, or the value of discount
   - Base charge (exclusive of unit credits and discounts
   - Unit credited charge (includes unit credits, excludes discounts)
   - Net charge (includes unit credits and discount)
     - Value of Unit Credits
     - Value of discount
   - Determine per balance charges
4. Calculate taxes on net monetary charge.
5. Apply unit credits to balance charges from step 3
6. Distribute total net charge and taxes to monetary balances based on balance charge order.

Determining Available Balances

The *available amount* of a balance is the amount of the balance that exceeds the minimum balance. For subscriber-level usage, the minimum balance is defined in the current Offer. For account balances, the minimum balance is taken from the highest-priority Account Offer that instantiates the balance. Any balance can have *multiple* minimums that vary with the usage.

Time Types

The URE calculates pricing according to a time/rate period known as the *time type*. Before any pricing calculation takes place, the URE determines the time types for the CDR (or for the authorization chunk if in the authorization path). The time types are associated with the type of tariff plan.

It is possible for the time type, or at least the initial time type, to be derived early in the URE flow; that is, in order to guide to liable party (based on time type) for balance eligibility. If the time types are already known at the start of pricing, they need not be derived again. If only the initial time type is known, the URE is able to lookup subsequent time types as needed.

Only duration type activities (activities whose units are a type of duration) have multiple time types. Activities based on units other than duration have an initial time type based on the activity start date/time.

If the time type(s) still must be derived (are not already known):

- If the Tariff Plan type is advance, lookup of time types requires that the necessary offline rating keys have already been derived. The URE looks at the offline rating key fields on the Tariff Plan and derives those (other than `rate_period`) needed but not yet known. Some of the needed offline rating keys may have been derived when deriving segmentation keys (guiding to Final AUT). For those not yet known, it is necessary to call out to offline to derive them. Once the necessary rating keys are derived, derive the time types for the activity based on the activity start date/time and number of units (or if authorization, for authorization chunk size).
- If the tariff plan type is regular or markup, derive the time types from calendar.

Requirements:

- Comverse ONE solution time types:
  - For regular Tariff Plan types, the time types are the time types in the calendar associated with the tariff plan.
  - For activities based on duration units, the activity can cross multiple time types.
  - The initial time type is based on the activity start date/time. A second (or more) time type applies only if the duration of the activity extends beyond the end of the initial time type.

    In other words, once a time type is selected for an activity, that time period is in effect until either the activity ends or the time period ends. Only if the activity extends beyond the end of a time period do we look for the next time type. We never look for a better time type before a selected time type ends.

    Example: Time type 1 = 8:00am - 6:00pm, time type 2 = 2:00pm - 8:00pm. Call starts at 1:50pm and matches time type 1. Since time type 1 does not end until 6:00pm, time type 2 is not considered for this call until 6:00pm (that is, we do not check at 2:00pm whether time type 2 is a better match than time type 1).
- Deriving time types for Tariff Plan types
  - For Tariff Plan types, the time types are derived by lookup into the calendar associated with the tariff plan. The definition of default rate period is not reconciled with time type.
- Deriving time types for markup tariff plan types
  - Derivation of time types for markup tariff plan types is done in the same manner as for Tariff Plan types.

Once we have a list of (1 or more) time types, the remaining Pricing steps are done per time type; that is, the URE loops over the time types and Apply Unit Credits, Calculate Currency Charge, Calculate Taxes, and Determine Balance Charges per time type.

Applying Unit Credits

Unit credits are nonmonetary balances such as free minutes that are associated with usage types.

If unit credits are available and apply to the usage type, they are applied before currency balances are decremented.

For example, for a local voice call rated at $0.05/minute, the user has 10 free anytime minutes and a $20.00 available monetary balance. If the call lasts 20 minutes, 10 free minutes are used first and the 10 remaining minutes are charged at the set rate. So a 20 minute call is paid by 10 free minutes + $0.50.

If multiple unit balances are available, the Unit Credit is applied using the balance charge order mechanism as currency balances (although Unit Credit Balances always come before currency Balances).

Unit credits do not apply to the following activities that do not affect balances:

- Final AUT is non-billable
- Markup rating (tariff plan type is markup)

  For pre-rated activities, unit credits apply only as a whole; in other words, only if the unit credits available equal or exceed the charged units for the activity. Pre-rated activities cannot be partially paid for by unit credits. See “Unit Credit Limitations” in this chapter for detail.

  Online and offline rating differ in certain respects when applying unit credits.

- Online rating:

  If both unit balances and currency balances are to be charged for the usage, that is, if the available unit credit is insufficient to cover the usage, when calculating the Credited Unit Charge and Net Charge, the FCC of the tariffs is bypassed and the charge starts from the ACC of the tariffs.

  For example: local voice call rated with regular tariff: $1.00/3 minutes, $0.20/minute. The call lasts 20 minutes. The user has 10 free minutes and $10 to use. We'll charge the 10 free minutes first, and then the remaining 10 minutes are charged as $0.20/minute. So the final charge = 10 free minutes + $2.

  Even if the available unit credits do not cover the full FCC period the FCC tariff is not applied. Using the example above, if there was only one unit credit then the final charge equals 1 free minute + $3.80 (19 *$0.20).

  Whether or not to allow unit credits is configurable.
- Online rating:

  Allow non-monetary balances (applying UC) or not is defined in tariff level.
- Offline rating:

  Allow non-monetary balances (applying UC) or not is defined in tariff plan level.

  Apply UC as which unit type C.
- Online rating:

  Unit credits are applied only to unit balances of the same unit type as the activity unit type, that is, only a "second" balance can be used for an activity measured as seconds, only a "minute" balance could be used for an activity measured as minutes.
- Offline rating:

  There are three unit types for usage: raw unit, rate unit, and billing unit. Unit Credits are applied based on billing unit type.

  This means before UCs can beapplied, the billing unit type must be determined. So if tariff plan type = Offline, lookup the rate(s) to be used to price the monetary charge for this call. Based on this information, we determine the billing units type for the call, and this is the units chunk size used to charge units balances for tariff plan types.

  From a performance standpoint, it may be better for tariff plan types to actually price the time period segment of the activity (not just lookup the rate). This gives us both the billing unit type and the credited unit charge. If activity is fully covered by unit credits, then we already have the value of the unit credits, and if no unit credits are applied, we already have the monetary price for the credited unit charge. In the case of partially covered by unit credits, we determine the credited unit charge and price accordingly.

  Since an activity can cross time periods and different rates can be used for different time periods, billing units type can change during a call. Assume tariff plan type, and assume 30 minute call with first 10 minutes during peak and last 20 minutes during off-peak. Assume that the billing units type for the peak rate = minutes and the billing units type for off-peak = seconds. When we rate the 10 minutes for the peak period, we charge units balances using minutes, and when we rate the 20 minutes for off-peak, we charge units balances using seconds. The billing units type (charging chunk size) is the same for unit credits and monetary charge within each rating loop iteration.

Unit Credit Limitations

Unit Credits apply to prerated events only if the available Unit Credits are high enough to cover the entire event. Unit Credits cannot apply to only part of a prerated event.

For example, a ten-minute call has a prerated charge equal to $1.23. This charge can be paid for from Unit Credits only if there are ten or more minutes available in one or more Minutes Balances.

If so, the call is paid for by minutes balance and monetary charge = $0.00.

But if only seven available minutes exist in the balances, then no part of the call is paid for via Unit Credits.

The reason is we have no way to determine the monetary charge for the non-credited three minutes. For prerated activity usage types, unit credits have to be all-or-nothing.

Determining Eligible Discounts

This step determines if there are eligible discounts to apply to the usage and their discount percent/vector (the discount % associated with any Accumulator value).

A discount can be applied after the Accumulator reaches the discount threshold. The discount applies only to monetary charges. (For full details about discounts, see Chapter 14, “Promotions,” in this manual.)

For Offline rating, it is necessary to look up/derive the discount vector (amount of discount for first x units, amount of discount for next y units and so on, that is, units a - b gets x%, b+1 - c gets y% and so on).

For example, assume a discount for an international call is configured as: if total usage reaches 100 minutes, get 10% discount for minutes over 100; if total usage reaches 200 minutes, get 20% discount for minutes over 200. Then the discount vector is like: minutes 0 - 100, 0% discount (no discount); minutes 101 - 200, 10% discount; minutes 201 - *, 20% discount.

Whether or not to allow the discount is configurable is defined in tariff level for online rating. For offline, it is in tariff plan level.

Discount Limitatons

Similar restrictions apply to discounts because the original amount per unit is unknown. Prerated usage can be entitled to a discount based on first unit of the activity; a single discount rate applies to the entire prerated event.

The URE applies discounts as it rates the call; that is, a call can cross a threshold with the result that the discount changes over the units of the call. However, since the URE didn't rate the call to begin with, it cannot apply differing discount amounts to different units of the call.

For example, suppose after 200 minutes in the month, a customer gets a 10% discount on all subsequent minutes, and the customer has already used 195 minutes this month. The next prerated CDR is for 20 minutes with a charge equal to $2.03. This implies that the last 15 minutes of the 20 minute call is eligible for the10% discount.

However, because the URE does not know how the prerated charge amount was calculated, it cannot apply a partial discount. A a result, the call gets no discount. Note that if the URE had rated the call, the 6th - 20th minute would have received a discount. However, the next prerated activity of the same type gets the 10% discount.

Another example is if a discount gives 10% off on the first 200 minutes in the month and then 0% discount for the rest of the month. Again, the customer used 195 minutes and they make a call for 20 minutes. In this case, the entire call receives the 10% discount since the discount is based on the first unit's eligibility.

Ultimately whether or not a prerated usage is eligible for discount is determined by the configuration of the associated Tariff Plan.

Prerated usage can be counted toward award Accumulation (based on the configuration of the Accumulator).

Repricing Options

There are three options to pricing prerated usage: do not calculate a new price, price based on the amount, and price based on the units. The pricing option is defined in the tariff plan.

If the usage price is recalculated, the original amount is carried through to the output record.

Pricing on the original amount allows the price to increase or decrease by a configurable percentage.

Tariff rating can be enhanced to support prerated pricing on the amount. The original amount is temporarily substituted into the units field and the tariffs or rates applied to the original amount. After the calculation the original unit amount is restored.

Pricing based on the number of units functions like normal rating.

Pricing based on units is still subject to prerated unit credits and discount limitations detailed above.

Calculating Monetary Charges

To accomplish the charge, invoice, and so on, the URE needs to provide the following monetary charges for each priced activity:

- Base charge
- Credited Units charge
- Net charge
- Value of unit credits
- Value of discount

Base Charge

The Base Charge is the non-discounted charge for all units, which does NOT take unit credits or discount into account. That is, the activity is priced as if no applicable UC and no applicable discount.

Base Charge is calculated by time type. In case of a usage split, Base Charge is calculated by time type for each CDR.

For example, for a 10-minute call rated at $0.20/minute, the user has a 90% anytime discount, 5 anytime minutes and $20 available to use. The Base Charge is calculated with no discount and no anytime minutes used, therefore the base charge = 10 * 0.20 = $2.

All monetary charges must be in the currency of the user's balances. If the currency of the defined rate differs from the currency of the user's monetary balances, the first base charge is in the currency of the tariff. Then a currency conversion is necessary to convert the first base charge from currency of tariffs to the currency of balances. The currency conversion rates are defined across the system.

As the above example indicates, if the rate is defined as $0.20 dollar/minute, the Base Charge is first calculated as $2.0 dollars. If the user has 1000 rubles available, then dollars must be converted to rubles in order to charge properly. If the conversion rate between dollar and ruble is 1 dollar = 30 rubles, the final base charge = $2.0 * 30 = $60 rubles.

The Base Charge does *not* include charges from settlement tariffs. In fact, none of the monetary charges include settlement tariff charges.

Credited Unit Charge

The *Credited Unit charge* is the non-discounted charge for remaining units not covered by unit credits, which does *not* take discount into account. That is, the activity is priced as if there were no applicable discount. The Credited Unit Charge is calculated by time type.

As in the above example, a 10-minute call is rated at $0.20/minute; the user has a 90% anytime discount, 5 anytime minutes and $20 available to use. The credited unit charge is calculated with no discount to use, so credited unit charge = (10-5) * 0.20 = $1.

See the section "Base Charge," on page 181 for currency conversion. The Credited Unit Charge must be in the currency of the tariffs. If the currency of tariffs is different from the currency of balances, we need to convert the calculated charge from tariff currency to balance currency.

Net Charge

The *Net Charge* is the discounted charge for the remaining units not covered by unit credits, which takes both unit credits and discount into account. I.e the activity is priced as it is and this is the charge (plus taxes, if applicable) that is debited from the user's balances.

Net Charge is calculated by time type. If there is usage split, Net Charge is calculated by time type for each CDR.

Net Charge is the only charge to be distributed to the user's eligible balances based on balance eligibility and available balance amount, because itis the charge that is debited from the user's balances. After calculating Net Charge, the charge is distributed to eligible balances as balance charge orders.

See the section, "Base Charge," on page 181 for currency conversion. The Credited Unit Charge is normally in the currency of the tariffs. If the currency of tariffs differs from that of balances, conversion of the calculated charge from tariff currency to balance currency is necessary.

As in the previous example, a 10-minute call is rated at $0.20/minute, the user has a 90% anytime discount, 5 anytime minutes and $20.00 available. The Net Charge is calculated as it is charged to the currency balance, net charge = $1 *(100%- 90%) = $0.9.

Value of Unit Credits

The *value of unit credits* is the currency value of the unit credits applied. It is the difference between the charges for the activity, assuming that the user has no available unit credits, and the charge for the activity if the available unit credits are applied.

The value of unit credits is calculated by unit balance and time type. In case of a usage split, it is calculated as by unit balance and time type for each CDR.

In simplest terms, if unit credit is consumed only from 1 unit balance:

total value of unit credits = Base Charge - Credited Unit Charge

If unit credits are consumed from multiple unit balances, however, the total value of unit credits is prorated for each balance. That is, if a total of 10 units are consumed, 1 unit from balance X and 9 units from balance Y, the value of UC for balance X = 10% * (total value of UC); value of UC for balance Y = 90% * (total value of UC).

For example, a 10 minute-call is paid for by 3 night and weekend minutes, 5 anytime minutes, and $0.22. If the charge for a 10-minute call with no available unit credits is $1.00, the value of the unit credits equals $0.78. Since 8 unit credits are applied (3 from 1 balance and 5 from another), all the unit credits in this case have the same value: $0.78/8 = $0.0975. Since two unit balances are consumed, the value of unit credits per balance would be:

1. 3 unit credits from night and weekend minutes with value = $0.2925, plus
2. 5 unit credits from anytime minutes with value = $0.4875.

Value of Discount

The *value of discount* is the currency value of the discount applied. It is the difference between the charges for the activity, assuming that the user has no available discount, and the charge for the activity with the applicable discount applied.

The value of discount is calculated by discount plan and time type. If there is usage split, then it is calculated as by discount plan and time type for each CDR.

In simplest terms, if only one discount is applied:

value of discount = Credited unit charge - net charge.

As in the above example, a 10 minute call rated at $0.20/minute, the user has a 90% anytime discount, 5 anytime minutes and $20 available balance. We know the credited unit charge = (10 - 5) minutes * $0.20/minute = $1.0, the net charge = $1.0 * (1 - 90%) = $0.10. So the value of discount = $1.0 - $0.10 = $0.90.

Multiple discounts on a single CDR segment are NOT supported and thus out of scope for this section.

An example of calculating the above monetary charges:

Assume:

- Tariff1 = FCC $0.10/minute, ACC = $0.10/minute, allows non-monetary balances, allow discount.
- Tariff2 = FCC $0.05/minute, ACC = $0.05/minute, does not allow non-monetary balances, does not allow discount.
- Discount: minute 0-10, no discount; minutes 11-20, 10% discount; 21-*, 20% discount.
- No taxes.
- User has 10 minutes units balance available. User makes a 30 minute call:

Result:

10 minutes charged to minutes balance (for tariff 1).

Tariff1:

- Base = 30 * $0.10 = $3.00.
- Credited unit Charge = $2.00 (10 minutes credited)
- Net = $1.70 (minutes 11-20: $1.00*90%, minutes 21-30: $1.00*80%).

Tariff2:

- Base = 30 * $0.05 = $1.50.
- Credited unit Charge = $1.50 (does not allow non-monetary balances)
- Net = $1.50 (does not allow discount).
  - Total charge details thus =
- Base charge = $4.50 ($3.00 from tariff1 + $1.50 from tariff2).
- Credited unit Charge = $3.50 ($2.00 from tariff1 + $1.50 from tariff2).
- Net charge = $3.20 ($1.70 from tariff1 and $1.50 from tariff2).
- Value of UC = $1.00 ($4.50 base charge - $3.50 credited unit charge).
- Value of discounts = $0.30 ($3.50 credited unit charge - $3.20 net charge).
- tax = $0 (no tax)

Monetary Charges for Pre-Rated Activities

The URE supports several pricing options for pre-rated usage. These pricing options are configured in the Tariff Plan (see the *Product Catalog User Guide* for specifics on this). These

repricing options are subject to the "all-or-nothing" limitation for applying unit credits to pre-rated activity (see the section, "Unit Credit Limitations," on page 179).

The following pricing options can be configured in a Tariff Plan:

- Don't Reprice

  The URE uses the pre-rated price passed in as part of the AUT.
- Reprice Based on Original Amount

  The URE does not use the passed-in price but instead reprices the usage based on a configured rate applied to the pre-rated charge. This pricing option can be used, for example, to configure a surcharge by using Concurrent Tariffs.
- Reprice Based on Consumed Units

  The URE does not used the passed-in price but instead reprices the usage based on the consumed units. This pricing method is the same as the typical unrated usage where the price is based on the number of units consumed by the usage.

The monetary charges for these pricing methods are calculated as follows:

- Pre-rated usage that does not reprice:
  - Base charge = pre-rated charge passed in as part of the AUT
  - Credited unit charge = 0 (if unit credits are used) or base charge (if unit credits are not used)
  - Net charge = credited unit charge * discount
- Pre-rated usage that is repriced by applying a rate to the pre-rated charge

  For example, a pre-rated charge of $0.01 repriced with a rate of $0.015 gives a 50% surcharge.

  The URE code provides calculation for minor currency conversion.
  - Base charge = repriced pre-rated charge (that is, the result of applying a rate to the pre-rated charge)
  - Credited unit charge = 0 (if unit credits are used) or base charge (if unit credits are not used)
  - Net charge = credited unit charge * discount
- Pre-rated usage that is repriced based on consumed units
  - Base charge = non-discounted charge for all units (no unit credits, no discount)
  - Credited unit charge = 0 (if unit credits are used) or base charge (if unit credits are not used)
  - Net charge = credited unit charge * discount
- Pre-rated markup activity
  - Base charge = marked-up pre-rated charge (result of applying markup to pre-rated charge)
  - Credited unit charge = base charge (unit credits are not allowed)
  - Net charge = credited unit charge (discount is not allowed)

Table Configuration for Pre-Rated Pricing

The following describes the configuration for pre-rated priciing in two database reference tables:

- `AUT_FINAL_REF` table
  - `is_prerated` field

    `1` = yes

    `0` = no

Exception: In Payment server, when the message type is `apply_charge` or `apply_currency_charge`, the AUT is always guided to pre-rated; it doesn't matter if this field is set to 0 or 1.

- `TARIFF_PLAN_REF` table
  - `reprice_prerated` field

    `0` = don't reprice

    `1` = reprice based on amount

    `2` = reprice based on units

Calculating Taxes on Net Charges

The URE calls Unified Taxation to determine the tax amount on the net charge.

Note that in general, the *Taxation Guide* specifies the system-wide approach to taxation. Rating is just one user of this feature.

Input to Unified Taxation

The Unified Rater passes enough information to the Unified Taxation to find the tax amount. i.e. AUT type, Charge amount, Account Category, and provider id. Taxation finds the AUT specific tax information and geocodes to calculate tax.

In the case of Extend Authorization request, the Unified Rater passes the charge of the extension and the total charge of the extension plus original charges. Taxation needs the total charge to support banded tax rates. Taxation passes back the tax on the extended charge.

If the Unified Rater is processing an Extend Authorization or Finish Existing Authorization, taxation expects the tax information derived in the Initial Authorization request from the Unified Rater.

Since both Unified Taxation and the URE are stateless, tax information must be passed back to the application after the initial request. It is up to the upstream application to pass the tax information on the Extend or Finish Existing Authorization request. Output from Unified Taxation passes back the tax amount and all tax information required to create the output CDR record and populate `CDR_DATA` and `CDR_DATA_TAX`.

Taxation does not calculate third party or Vertex tax for Initial Authorization or extend authorization requests. This is to support the low latency requirement. However, universal taxes are calculated for these request types.

However, this could lead to an "over-authorization" situation, where the caller does not have enough money to cover the cost of a call. Over-authorization is an accepted limitation.

Third party tax is calculated for the entire call during the finish request.

See the *Taxation Guid*e for detailed information.

Balances

If one usage event applies charges against multiple monetary balances, the tax amount is prorated for each balance. For example if there is $4 tax on $40 usage and $10 of that charge is against Balance A and $30 of the charge is against balance B, the tax is prorated for $1 to balance A and $3 to balance B.

Special Taxes

Binned taxes are not supported in the URE. Binned taxes are only available to post paid usage and are calculated at bill time.

Incremental tiered taxes are supported by Unified Rater for pre and post paid usage.

Bulk incremental taxes are supported on prepaid usage.

Partial Reservations

The URE calculates the appropriate tax amount for partial reservations. The URE must either to reverse engineer the tax rates to figure out the tax for each value in the Partial Reservation matrix or call Taxation for every row in the Partial Reservation matrix.

Currency Conversion

Comverse ONE supports a system-wide approach to currency conversion as follows:

- Product Catalog
- An Offer has a currency attribute.
- An offer can have tariffs plans with multiple currencies
- Tariff plan (TP) has a currency attribute , which is for default currency rate
- TP can have multiple set of Tariff Sets defined in different currencies
- TP must have Tariff Set defined in Default currency which defined at TP level
- EachTariff Set has a currency attribute
- If concurrent tariff needed then each set can have up to a maximum of five tariffs
- Offer can have a tariff plan whose rateis defined in a different currency than the offer currency
- Offer has awards/bonus plan's accumulator and threshold definitions using the offer's currency
- Monetary Balances defined in PC do not have currency codes attached to them
- Balances have initial / Min. / Max or any other monetary attributes defined in Offer currency
- CSM
- Subscriber has its own currency code
- Account has its own billing currency
- Subscriber and account currencies can be different
- During instantiation time
- Offer currency and subscriber currency MUST match
- All balances, Accumulators, threshold as part of the offer are set according to subscriber currency
- It is assumed that balance notification thresholds are defined in the subscriber's currency

Tariff Currency Set

For simple and concurrent Tariff Plans, Comverse ONE introduces the Tariff Currency Set. See Chapter 9 in this manual for details. Once Final AUT is mapped to a Tariff plan, the URE does the following:

- Finds the Tariff Currency Set or Rate that matches subscriber currency; if one is found use the rate(s) and no conversion is required
- If no Tariff Currency Set or Rate is found in the subscriber's currency, the URE uses the currency of the Tariff Plan, and finds the Tariff Currency Set or Rate associated with it. Note that a rate conversion is required to convert the taroff currency to the subscriber's currency.
- Supports only the currency conversion with the conversion rate active on start date/timeof the usage.
- All rated usage records include the original rates, the conversion rate, and the converted charges amounts based on the subscriber's currency
- Account currency can be different than subscriber's, so checking against the TML of account may require a currency conversion

Example #1:

Subscriber 1234567, with currency of USD, performs usage which guides to TP1

URE chooses TP1 Tariff Currency Set USD (matches subscriber currency), and uses Tariff T1. No conversion required.

Example #2:

Subscriber 1234567, with currency of EUR, performs usage which guides to TP1

URE chooses TP1 Tariff Currency Set EUR (matches subscriber currency), and uses Tariff T2. No conversion required.

Example #3:

Subscriber 1234567, with currency of RUB, performs usage which guides to TP1

Since there is no Tariff Currency Set matching the subscriber's RUB currency, URE chooses TP1 Tariff Currency Set CAD (matches the Tariff Plan currency), and uses Tariff T3. Since T3 is in CAD, and the subscriber's currency is RUB, a conversion from CAD to RUB is performed.

Example #4:

Subscriber 1234567, with currency of RUB, performs usage which guides to TP2

Since there is no Tariff Currency Set matching the subscriber's RUB currency, URE chooses TP2 Tariff Currency Set CAD (matches the Tariff Plan currency), and uses Tariffs T21 - T25. Tariffs T21, T23, T24, and T24 are converted from CAD to RUB, and Tariff T22 is converted from EUR to RUB.

Example #5:

Subscriber 1234567, with currency of RUB, performs usage which guides to TP3

Advanced Tariff Plans do not have Tariff Currency Sets. So using the Rating Keys, URE looks for a rate for RUB currency. If found, the RUB rate is used.

If an RUB rate is not found, URE looks for a Rate for CAD currency (the currency of the Tariff Plan). If found, the CAD rate is used, and converted to RUB (the subscriber currency).

If no RUB rate is found, the usage is rejected (real-time authorization), or errored (batch usage processing)

Other Currency Conversion

In addition to the conversion of the rate into the subscriber / account currency (as described in the previous section), URE supports other rate conversion.

The assumptions regarding the mixing and matching of currencies are as follows:

- A subscriber has only 1 currency code, and all monetary balances owned by the subscriber are in the same currency.
- Monetary shadow balance are in this same (subscriber) currency and it points to a real balance with the same currency.
  - Subscriber X has currency C1, all subscriber X's monetary balances are in currency C1 and all subscriber X's monetary shadow balances point to real balances which are also in currency C1.
- An account has only 1 currency code, and all monetary Balances attached directly to the account, and TML (if used), are in the same currency.
- The subscriber's currency is not necessarily the same as the owning account's currency. In fact, and owning account could have multiple subscribers, each with a different currency
- A given billing CDR output from URE has a single currency that is, all monetary amounts on the CDR are in same currency.

- This is the user's (using subscriber's) currency; or the shadow subscriber's currency if the charge was redirected to a shadow subscriber.

- The billing CDR output from URE does not need to be in the currency for the billed (liable) account. The invoicing module converts the charges to the billing currency.

The scenarios where currency conversion is needed are as follows:

- Rate conversion - from currency of provisioned rate to currency of entity being charged (as discussed in the previous section).
- Account TML conversion - conversion of monetary charges at subscriber to account TML currency.

Whenever performing currency conversion, the conversion rate used remains constant throughout the entire usage, and must be the rate in effect at the start of the processing of the usage.

Additionally, whenever a conversion is performed, the resultant output record must contain the original amount and currency, as well as the converted amount and currency.

Monetary Charges for Activities over Multiple Authorizations

If the activity spreads over several authorizations, how to calculate the monetary charges for extending existing authorization?

Monetary charges are calculated for each reservation trunk independently; that is, the pricing for each reservation starts from that reservation. For usage amount, because the reservation trunk may not be a multiplicity of charging unit, for extending existing authorization, there may be paid usage from last authorization (carryover). The carryover from last authorization is considered applicable unit balance with first charge priority when extending the existing authorization.

Example:

Tariff = $1.00/120 seconds, $0.20/60 seconds. Requested reservation amount = 200 seconds. Assume no UC and enough available monetary balances.

1st reservation for 200 seconds: reserved fund = $1.00 (FCC) + 2 * $0.20 (2 ACC) = $1.40. $1.40 is actually paid for 120 seconds (FCA) + 2 * 60 seconds (2 ACA) = 240 seconds. So the requested 200 seconds is granted and there is a 40-second carry over for the next reservation.

2nd reservation for 200 seconds: there are 40 seconds carry over from the 1st reservation, this 40 seconds carryover is used as unit balance and then we must reserve fund for the remaining unpaid 200-40 = 160 seconds. So the reserved fund = 3 * $0.20 (3 ACC) = $0.60. $0.60 is actually paid for 3 * 60 seconds (3 ACA) = 180 seconds. So the requested 200 seconds are granted and there are 20 seconds carry over for the next reservation.

- Offline

  The charge is calculated from the beginning of the activity, for extending existing authorization, the charge from last authorization is deducted from the new calculation and t the remainder is the additional charge for extended authorization.

  First reservation is correct; user is authorized for 200 seconds at a cost of $1.40 (i.e. $1.40 reserved from balance).

  On 2nd reservation (1st extend reservation), the goal is to extend for another 200 seconds. So we price 400 seconds (not just the "additional" amount). In this case, 400 seconds costs $1.00 (FCC) for 1st 120 seconds, + $1.00 (5 * 60-seconds) = $2.00. This $2.00 "covers" 420 seconds, but that is not really relevant. User needs $2.00 to pay for 400 seconds (requested authorization), and thus far has been authorized for 200 seconds at cost of $1.40. Thus we reserve an additional $0.60 ($2.00 - $1.40 previously reserved) and as long as there is available balance for this reservation, user is authorized for an additional 200 seconds.

Time Type Change

All monetary charges are calculated according to time type. The URE charges in full units and then charges the remaining usage in next time type.

For tariff rating, if a duration-based activity crosses a time type boundary, the user is charged as full charging unit in the first time type and the remaining usage is charged in the next time type.

Tariff and concurrent tariff plans use Calendar capability. Advanced Tariff Plans use Rate Periods.

- Online rating applies the FCC of the tariff from the first time type to the monetary charges. The FCC of the tariffs from subsequent time types is not applied and the monetary charges are calculated starting from ACC.
- Offline rating applies only the fixed charge amount from the first time period. The fixed charge amount for the rates from subsequent time periods are not applied to the monetary charge.

Examples of Time Type Change Calculation

- Online rates by tariff:

  Peak time tariff = $1.00/120 seconds, $0.20/30 seconds;

  Off-peak time tariff = $0.50/180 seconds, $0.10/60 seconds;

  Reservation amount = 60 seconds;
- Offline similar (not identical) rates:

  Peak rate: billing units type = 30 seconds, fixed charge = $1.00, rate band1 = $0.00/30-seconds for 1st 4 billing units (4 * 30-seconds = 120 seconds), plus $0.20/30-seconds for each additional 30-second block.

  Off peak rate: billing units type = minute, fixed charge = $0.50, rate band1 = $0.00/min for 1st 3 minutes, plus $0.10/minute for each additional minute.

  Assuming rounding_method = round units up (122 seconds charged for 3 minutes).

  A call 122 seconds long that starts 2 seconds before the end of peak time.
- Online:

  Peak time: although call lasts 2 seconds in peak time, charge to FCC as a full unit, which is actually paid for 120 seconds. The charge = $1.00 for first 120 seconds.

  Off-peak time: remaining usage = 122 - 120 = 2 seconds, charged to off-peak time. Since FCC is paid in 1st time type, charge in 2nd time type starts from ACC. So charge = $0.10/60 seconds * ceil(2 seconds /60 seconds) = $0.10 for last 2 seconds

  The total charge for the call = $1.00 + $0.10 = $1.10
- Offline:

  Peak: $1.00 + $0.00 for 1st 30 seconds

  Off-peak, 30 seconds paid for at peak rate, so charge for remaining 92 seconds. Starting using 1st minute in band1 rate 2 minutes at band1 rate = 2 * $0.00/minute = $0.00

  Total = $1.00

  CAVEAT: USAGE_TYPES.rate_minimum_duration (description = "If 1, round to first rate band. If 0, do not round. If 2, for support of explicit minimum rate.").

A call 122 seconds long that starts 120 seconds before the end of peak time:

- Online:

  Peak time: charge to FCC as a full unit, which is paid for the first 120 seconds in peak time. So charge = $1.00 for first 120 seconds.

  Off-peak time: remaining usage = 122 - 120 = 2 seconds, which is charged to off-peak time. Since FCC is paid in 1st time type, charge in 2nd time type starts from ACC. So charge = $0.10/60 seconds * ceil(2 seconds /60 seconds) = $0.10.

The total charge for the call = $1.00 + $0.10 = $1.10

- Offline:

  Peak: $1.00 + $0.00 for 4 * 30-seconds

  Off-peak, 120 seconds paid for at peak rate, so charge for remaining 2 seconds. Starting using 3rd minute in band1 rate 1 minute at band1 rate = 1 * $0.00/minute = $0.00.

  Total = $1.00.

  If the call is 122 seconds long and starts 121 seconds before the end of peak time:

- Online:

  Peak time: charge to FCC for first 120 seconds, then charge to ACC as a full unit for the next 1 second in peak time, which is actually paid for 30 seconds. So charge = $1.00 + $0.20 = $1.20 for total 120+30 = 150 seconds.

  Off-peak time: since $1.20 in peak time is already paid for 150 seconds, so remaining usage = 0 seconds. So charge = $0.

  The total charge for the call = $1.20 + $0 = $1.20

- Offline:

  Peak: $1.00 + $0.00 for 4 * 30-seconds (all of band1) plus 1 * $0.20 (remaining 2 seconds rounded up to full 30-seconds charged at peak rate because the 30-second billing units block begins during peak time period) = $1.20.

  Off-peak, 150 seconds paid for at peak rate, so 0 seconds remain to be charged. No off-peak component to the charge.

  Total = $1.20.

A call 122 seconds long starts exactly 122 seconds before the end of peak time:

- Online:

  Peak time: charge to FCC for first 120 seconds, then charge to ACC as a full unit for the next 2 seconds. So charge = $1.00 + $0.20 = $1.20.

  Off-peak time: no usage in off-peak time. So charge = $0.

  The total charge for the call = $1.20 + $0 = $1.20

- Offline:

  Peak: $1.00 + $0.00 for 4 * 30-seconds (all of band1) plus 1 * $0.20 (remaining 2 seconds rounded up to full 30-seconds charged at peak rate because the 30-second billing units block begins during peak time period) = $1.20.

  Off-peak, 150 seconds paid for at peak rate, so 0 seconds remain to be charged. No off-peak component to the charge.

  Total = $1.20.

With this approach, if tariffs are the same for two time types, the charge is consistent.

Further Examples

Peak time: tariff = $1.00/120 seconds, $0.20/30 seconds;

Off peak time: tariff = $1.00/120 seconds, $0.20/30 seconds

Reservation amount = 60 seconds

if call is 122 seconds long and starts 20 seconds before the end of peak time

If the call is 122 seconds long and does not cross midnight time types, the charge = $1.00 (FCC) + $0.20 (1 ACC) = $1.20

- Online:

  The call is charged as $1.00 (FCC before midnight) + $0.20 (1 ACC after midnight) = $1.20.

- Offline:

Rates Table may or may not produce same result as tariff pricing (see discussion above), but rate table rating is consistent for usage spanning time periods with the same rates (such as spanning midnight). If a charge spans multiple time periods with the same rate, the total charge is the same as if the charge did not span multiple time periods.

Unit Rounding

Online and offline have different mechanisms for unit and unit rounding. Generally speaking, online has three units for one usage type, while offline has a mix number of units for one activity; online always rounds up, while offline rounds as configured options. The URE retains both types of functionality for backward compatibility.

Both online and offline processing have in common one unit type that is a key attribute of the activity or usage type, In online, it is the activity unit type. Two activities with the same applicationID, same subtypeID, but different unitTypeID are treated as two different activities. In offline rating, it is the raw unit type. A given type of activity that uses different raw unit types has two different usage types. For the URE, therefore, unit type is a key attribute in AUT definition. For online rating, it is equivalent to the existing activity unit type. For offline rating, it is equivalent to raw unit type. Two AUTs with different unit types but with identical other attributes are two different AUTs.

- Offline:

  A usage type (AUT) is associated with 3 unit types:

  - Raw unit type: This is the unit type on the input CDR, which is also the unit type of AUT in unified rater.
  - Billing unit type: This is the block of units that user is billed for, which is defined in rate table or usage type.
  - Rating unit type: This is the units in which the rate is defined, which is defined in rate table.

Examples of Unit Rounding

For a voice call, the usage is 66 seconds, the rate is defined as $0.20 per minute and the user is billed as 30 seconds. So in this case, the raw unit type is second, billing unit type is 30 seconds and the rating unit type is minute.

While processing a usage record, first the usage in raw_unit is converted to usage in billing_unit (rounding happens here, so the rounding_method is applied.), then the rate in rating_unit is converted to rate in billing_unit (with high precision, no rounding.), then the charge = usage in billing_unit * rate in billing_unit.

Rounding method is defined per usage type (AUT) in USAGE_TYPE table as following:

- case 1.0 = no rounding (not applicable to Usage_Type)
- case 2.1 = round down
- case 3.2 = round up
- case 4.3 = round nearest (exactly .5 rounds down)
- case 5.4 = round nearest (exactly .5 rounds up)

Further Examples

For a local voice call the rate is defined as $0.20 per minute, the user is billed as 30 seconds. A call lasts 75 seconds. First $0.20/minute is converted as per 30 seconds = $0.10/30 seconds. Then 75 seconds is converted to 30 seconds unit = 2.5 billing units, apply rounding then:

- round down: 2.5 rounds to 2, charge = 2 * $0.10 = $0.20.
- round up: 2.5 rounds to 3, charge = 3 * $0.10 = $0.30.

- round nearest down: 2.5 rounds to 2, charge = 2 * $0.10 = $0.20
- round nearest up: 2.5 rounds to 3, charge = 3 * $0.10 = $0.30.

For one usage type, there may be different rate, and possibly different rate units type, and possibly different billing units type, but *not* different rounding method. That is, the rounding method is configured in theAUT for URE.

Online defines only one unit type for each activity. Tariff Plan/Tariffs also have the unit type as an attribute. And only tariff plan/tariffs with the same unit type as the activity unit type could be used for rating/pricing.

But online has a "charging unit" concept, similar to the offline billing unit and also the rating unit since the charging unit is used for both rating and charging. Charging unit is derived from tariff(s) and/or charge_unit_size(COS).

As the tariff definition:

First_Consumption_Charge (FCC) PER First_Consumption_Amount (FCA) &&

Additional_Consumption_Charge (ACC) PER Additional_Consumption_Amount (ACA)

So here we have 2 charging units: FCA and ACA. If the usage is less than the FCA, then FCA is the charging unit. If the usage is more than the FCA, then ACA is the charging unit.

Also a charge_unit_size could be defined in COS (offer) for each activity unit type, which is used as the charging unit when applying the non-monetary balances (UC).

For example, for a voice call, the tariff is defined as $1.0/120 seconds & $0.1/60seconds, the charge_unit_size is defined as 30seconds. Then the activity unit type (raw_unit) = second, charging unit (rating_unit/billing_unit) = 120 seconds / 60 seconds / 30 seconds.

Assume the user has enough seconds balances, then charging unit = 30seconds (charge_unit_size).

Assume the user had NO second balances. If the call usage <= 120 seconds, then charging_unit = 120 sec (FCA). If the call usage > 120, the charging_unit = 60 sec (ACA).

Considering online concurrent tariffs, there may have a bunch of different charging unit types for one activity during one single time type. (The billing/rating units could only vary in different time types. In a single time type, the billing/rating unit type is fixed.) And also the charging unit depends on the usage amount and which balance to use (unit or currency).

Since online doesn't have a clear concept of billing unit or rating unit, so to rate or charge an activity in online, there is no direct unit conversion, the unit conversion is blended with the rating/charging.

As for rounding method, there is no specific rounding method defined for a specific activity in online. In general, it rounds up. Online supports different rounding methods.The only exception is that when user is in low balance (i.e. the activity is startable but the available balances can not cover the whole usage amount), the Last_Consumption_Rule is applied. The Last_Consumption_ Rule is defined in offer level (COS) as following:

- Pay_Full (like rounding up)
- Padded (like rounding down)
- Prorate

For example, tariff = $1/60seconds & $1/30seconds (FCA=60sec, ACA=30sec), user has only $3.5 available balance:

- Padded: the activity can last up to 150sec (60+30*3);
- Pay_Full: the activity can last up to 120sec (60+30*2);
- Prorate: the activity can last up to 135sec (60+30*2+15).

Time and Duration Rounding

In the Comverse ONE v3.5 and subsequent releases, the previously-employed second granularity for both time and duration calculation has been replaced with millisecond granularity. Five different rounding methods have been introduced that define the rounding processing for time and duration of usage events, to either second or tenths-of-second values. The five rounding methods are:

- rounding up method
- truncation method
- round to nearest method
- financial rounding method
- truncation before duration calculation method

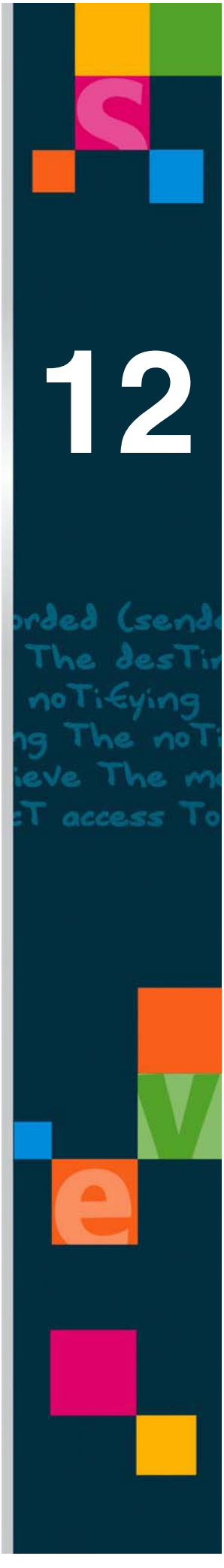
These values can be configured in the Product Catalog. See the *Product Catalog User Guide* for the details on how to set the values for these rounding methods.

Three new parameters have been added to the `SYSTEM_PARAMETERS` table for the Rating module. The rounding method is defaulted to `TRUNCATE_BEFORE_DURATION_CALCULATION` (value=5). When any change is made to this rounding method in Product Catalog, these values are updated in `SYSTEM_PARAMETERS` table for the URE to use in time calculations. (See chapter 18 in this document for details about the three new `MILLISECOND_ROUNDING_*` parameters in the `SYSTEM_PARAMETERS` table.)

When performing rating processing, the URE takes the rounding-related input from system configuration and applies the rounding accordingly. Once the millisecond processing is completed, the URE provides an output covering both the raw and rounded times and durations, to a structure. This structure is available for the downstream URE modules for further processing, and for the applications to record the rounding results in a CDR file, in billing records, as well as in call history.

Chapter 12

Rerating



Overview

Rerating is the ability to recalculate charges for previously rated or charged activities such as voice calls, data sessions, SMS, and so on. The following are possible reasons for rerating :

- To comply with retroactive rate change, which may be caused by regulatory decisions
- To correct faulty configurations, which could include such things as the wrong tariff, wrong calendar, or wrong location setup
- To deal with CDRs received in a sequence that differs from the order in which the transaction occurred
- Billing period change
- Backdating a rate plan for a subscriber

Rerating selects unbilled usage and re-applies rates and pricing, re-guiding usage if necessary. The URC module collects unbilled usage data from such tables as `CDR_DATA`, sorting and packaging the data into files, having C-CAP pick up and process those files and then call the URE to refund the original charge and apply new pricing to the usage. LTP then applies the rerated usage data to the database.

The rerating process involves the following steps:

1. Trigger rerating by initiating a rerating request
2. Identify and collect records and pre-processing
3. Subscriber record and store rerating histories
4. Identify applicable service data and calculate the re-rated charges

Rerating is either *basic* or *standard*.

- Basic rerating

  Consider only directly affected records. Each record is re-rated individually with a delta recorded for each activity. The deltas of all affected records are tallied and the subscriber record is updated with the total.
- Standard rerating

  Consider all records for an individual subscriber within a period that includes all activities not directly affected.

In Comverse ONE the initial data comes from the `CDR_DATA` table. If in addition re-guiding is necessary, it may be necessary to apply usage to a different account or subscriber on a different database server than the original one.

Rerating Triggers

Rerating requests can come from CSRs or service provision staff.

- Service provision staff manually request rerating using the `insert_rerate.csh` tool. For example, as a result of subscriber complaints, Service Provision Staff realize that there has been an error in a tariff, set at 10 cents/minute when it should have been 9 cents/minute. To correct the error, the Service Provision Staff has to provision a correct tariff and then issue a rerating request.
- CSR triggers rerating requests manually using the `insert_rerate.csh` tool. For example, a subscriber complains that he is not assigned a particular rate plan when it should have been assigned a few days ago. The CSR must back-date the effective date of the rate-plan for the subscriber. Once a CSR back-dates the rate plans, all transactions occurring after the supposed effective date of the rate plan would have to be re-rated to ensure correct charging or invoicing.

The Comverse ONE solution provides the following tool in \bin to generate a rerating request:

insert_rerate.csh

Usage:

```
insert_rerate.csh [user] [password] [instance] [rerate_mode]
[rerate_table] [sql_query]
```

Example:

```
insert_rerate.csh myuser mypassword instance 1 0 'CMF.account_no = 5'
```

rerate_mode: 1 = Basic, 2 = Standard. Use 1 for offline

rerate_table: 0 = CDR_UNBILLED, 1 = CDR_PASSTHROUGH.

The table RERATE__REQUEST is a queue for rerating requests.

Rerating Criteria

Many scenarios can trigger rerating; as a result it is very difficult to determine which subscriber and transactions have been affected and must be re-rated. The following list describes as many scenarios as possible, but it is not and could not be a complete list.

- Retroactive Rate Change

  Rates are retroactively changed mainly as the result of a regulatory decision. For example, a tax bill enforced by government requires application of a tax over the previous six months.
- Bad configuration

  The scope of bad configuration could be very extensive. To name a few:
  - Provisioning staff make mistakes in provisioning tariff. For example, a tariff in production reads $0.10/60Sec when it should be $0.09/60Sec.
  - Provisioning staff make mistakes in provisioning calendar. For example, a tariff plan in production is associated with a wrong calendar or a calendar in production is associated with wrong time type (is off-peak when should be peak)
  - Configuration files related to Location Resolution is wrong. For example, when supposed to use cell-id to resolve A-Location, a number is used instead.
  - Subtype translation provisioning error. For example, a long-distance voice call subtype along with F&F special feature is translated to normal-long-distance-voice instead of F&F-long-distance-voice.
  - Wrong paying parties identified because provision errors.
  - Special feature discounts not applied because of wrong provisioning

  Bad configuration could happen anywhere in the Comverse ONE system and any configuration parameters related to billing could make rerating being necessary.
- Rating Schema

  Sometimes the rating schema itself might cause rerating to occor. For example, in the case of tiered rating, while a subscriber's usage is under 100 minutes, the rate might be 10 cents aminute, but when usage exceeds 100 minutes, the rate goes downbe 9 cents a minute.
- CDRs out of order

  When events are processed in the orderin which URE receives them, rather than in the order tf occurrence, promotional balances can be applied to wrong CDR.
- Billing period Change

  Signing up for promotion or promotion plan changes during a billing period can make rerating necessary because the subscriber might accumulate enough usage to cross threshold for this billing period, or the accumulator may not have been set up.

Free units have been over consumed when billing period change/for the under consumed case, just reset free unit

- Backdating a rate plan for a subscriber

  A CSR could back-date asubscriber's rate plan because the service order placed by the subscriber was not processed in a timely fashion or CSR could back-date the rate plan for promotion purposes.

Criteria for Identifying Subscribers and Transactions Affected

Since many scenarios can cause rerating, it is critical to identify which subscriber and what transactions rerating affects. Promotional balances, balance charge order, and account hierarchy make it more difficult to determine which subscribers/transactions are affected.

- Rerating one subscriber's activity can affect other subscribers in the same group; they share spending limit, for example; the same is true for any shared resources
- Rerating one subscriber's activities affects others who have a liability redirection relationship with the subscriber
- Rerating one subscriber's activities can affect other subscribers who share accumulators
- Rerating one transaction can affect any subsequent transactions even ones that do not directly relate to the transaction being re-rated
- Any monetary transactions such as recharge, recurring charge, refund, and the time when these happen can affect rerating result
- Any attribute related to rating changes in a subscriber record can affect rerating. For example, a subscriber who bought a la Cart service or changed class of service during the period when transactions needs to be re-rated.
- All accumulations must be re-processed. Any bonus/discount as the result of accumulation must also be re-calculated.
- Any group, F&F, and Calling Circle, related changes could affect rerating. With online, we do NOT know what his F&F at earlier point is. In offline, an operator can set up bonus and discount induced by special features to be retroactive, which would require re-ratng.
- Expiration of balances and expiration of free units can affect rerating
- Any on-going activities after rerating request initiated may also need to be re-rated
- Offline rerating is restricted to unbilled call data, involving only a single bill cycle of data. However, by delaying bill generation or by backing out bills, it is possible to re-rate call records for multiple bill cycles. Online balances and accumulations are actively reset at the balance expiration or refresh/reset interval so rerating calls that were originally rated before the balance was reset would cause problems in the accumulations and potentially cause problems in the refreshed balances. rerating usage that affects online balances and accumulations that have been refreshed/reset requires different handling of the rerating.

Records Collection and Preprocessing

Collecting records from several sources can involve one process or several processes, since it is possible that some records are in the SDP while others are in the Billing Database. All records that include real-time CDRs and histories are in the Billing Database; however, CDRs may be in flight (transfer still in progress).

Usually records collection and pre-processing happen once a rerating request is de-queued.

One simple (maybe most complex depending on how you look at it) way to do rerating is to always identify a period in which rerating happens, and get all events including usage, recharge, recurring charge, refund, and any other adjustment that may affect rating and re-do all of them. Note that I used re-do, not re-rate, here. This process would include the following steps that the following list is not complete as some of the steps are covered in the later section.

- A virtual subscriber record must be restored using records gathered more for real time subscribers
- The records integrity (did we get all the records? How do we know we get all records) should be verified. The first and last record should be able to reconcile if we retrieved all the records. If the rerating is based on incomplete records, it would make matter worse.
- The records should be sorted according to the order they happen
- Re-rate the usage records and re-apply balance adjustments in the order they happen

In order to support balance-sharing and liability redirection, the Comverse ONE solution introduces the concept of a *rerating cluster*, a group of subscribers or accounts that either share balance or have a liability re-direction relation. The entire rerating cluster is considered when re-rate is needed. In order to ensure accuracy, all records for one subscriber are processed by the same process to ensureb that they are processed in the order of occurrence. Otherwise, promotion balance (free credit unit) might be applied to wrong transaction.

Subscriber Update

After processing of a subscriber's records is complete, the subscriber record must be updated and the subscriber balance adjusted. Rerating processes generate records indicating why the subscriber's balances are being adjusted and by how much.

When errors occur during rerating, in addition to logging the error and raising alarms, a decision must be made as to whether rerating for this particular subscriber should go forward or be rolled back.

Presentation of the Result

Comverse ONE subscribers query their balances rather frequently. If difference in balance as the result of rerating is noticed by a subscriber, CSR, when contacted, may have to explain why his balance has been adjusted. In FCD, there are no clear market requirements regarding this aspect. Records are generated to indicate reasons for the adjustment. Furthermore, it's desirable to have more detailed records to indicate details of rerating. These detailed records minimally include reason for adjustment, original charges, adjusted charges, differences between original charges and adjusted charges, original tariff, and adjusted tariff.

Usage Record Collector (URC)

In the Comverse ONE solution, Unified Record Collection (URC) identifies usage records and gathers them from the Billing Database. URC sorts records according to Rating Database, account, subscriber, and transaction time to different files, which are transferred to C-CAP.

The URC module initiates a rerating task, collects and sorts usage data to be re-rated, and writes the sorted usage to files in a standard usage record format for C-CAP to process. C-CAP calls the URE to do the actual rerating and update balance information, then creates usage output files so that LTP can insert the rerated records into the database.

URC communicates with Customer databases. URC uses the `SERVER_DEFINITION` table to find out whether it is talking to a History or Customer database.

The `RERATE_REQUEST` table represents the overall control point for all rerating requests. There is a Master entry in this table, and URC generates sub-request records in `RERATE_REQUEST` to represent each usage file created for a Master rerate request, and allow for recovery and auditing. The individual original and newly rerated versions of usage are linked by entries in `CDR_RERATED`.

Recharging

Comverse ONE monitors external recharges. If recharges are found to be failing due to system failures (for example, CCWS or SDP is down), an alarm is raised. Alarms must be cleared once recharges are successful or system failures have been recovered.

This feature enables system administrators, in a timely manner, to determine if recharges are failing due to system errors so corrective action can be taken.

Recharge errors that occur for operational reasons, such as subscriber not found or class of service not found, do not raise an alarm.

Mid-Session Rate Change

There are a number of mid-session service events (that is, re-authorization triggers) which could affect the rating of the current service usage. Some examples of activities that can change the tariff are: subscriber's change of location (for example, roaming from one Service GPRS Support Node [SGSN] to another SGSN), change of Quality of Service during a data session, and change of session type (for example, voice to video). All of these are very likely scenarios for an operator. Comverse ONE is enhanced to support mid-session re-authorization capability.

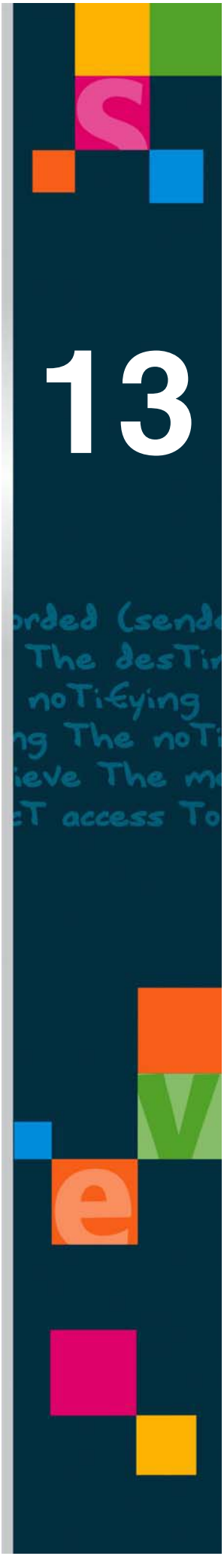
To support mid-session rate change, the URE is enhanced to support a new invocation for mid-session rate change. This invocation is triggered by an application request for re-rate, upon receiving the same request from the network client. This invocation is used to indicate a new segment within a session.

When the URE receives this invocation, it performs the following functions:

- If the new information leads to a different Final AUT (FAUT). this means a rate change. URE will close the existing segment and start a new segment, treating it as if the new segment was a totally new but related usage.
- If the new information leads to the same Final AUT, URE processes the next reservation with the same Rating object and treats the request as part of the same ConsumeExtend. In the case where the same Final AUT is being derived but the Initial AUT (IAUT) is different, only the most recent IAUT and related information are recorded, and then written later into the usage record.
- In URE, each new segment is treated like a separate but related usage event, priced as if it started at time zero (or volume zero), with no carryover of information. (For example, the Wi-Fi segment price is based on the rate for 0 to 150 seconds.)
- Based upon the different Final AUTs for different segments, Event Accumulators can be configured to count (or to not count) continuation segments.
- The Output Usage Record for each segment of a session contains a common Session ID. This Session ID is the only mandated common data among all segments of a session.

Chapter 13

Charging Precision



Charge Precision

Charge precision means the number of digits allowed in the number as a whole and *scale* refers to the number of digits to the right to the decimal point. The number of digits to the right of the decimal must be set at install time and cannot later be changed; the number of digits after the decimal must be the same for all currencies. Display precision refers to the ways values are represented when displayed on the Customer Care and IU GUI. The internal precision used by the system is different; Product Catalog defaults to internal precision.

In the Rating domain, the system parameter, `MAX_DBL_DIGIT` is used to control internal calculation precision. This parameter can't be set with a value greater than `6`.

The Comverse ONE solution supports a single currency precision and a single non-currency precision. Both are fixed (8.6 for currency; 14.0 for non-currency). The UI and APIs enforce input/output based on the precisions and on the unit type of the balance.

- The number of digits used to represent currencies cannot vary by currency
- The number of digits following the decimal point can be any value from 0 to 8
- The number of digits after the decimal point should not be less than smallest currency denomination; for example, for 1/100th based currencies (such asUSD), digits to the right of the decimal should not be set to less than 2

Care should be taken to avoid setting this value too small when there are small charge amounts. But if deployment wants each individual charge and the tax on each individual charge rounded to the nearest cent (1/100ths currency denomination), then simply define only 2 digits to right of decimal (but be careful about charges crossing time period boundary and/or consuming from more than 1 balance because we record charge details per balance per time period).

Charge Precision in GUIs

Accounts displayed in Customer Care GUIs (including self-care), Product Catalog, and Error Investigation Unit GUIs:

- Customer Care and IU GUIs default to display precision. Product Catalog GUI defaults to full precision.
- GUIs allow for configuration parameters to change default precision
- GUIs toggle between display precision and full precision

Charge Precision in External Data Feeds (JNL)

JNL output feeds round monetary values to external/display precision.

Charge Precision in Reports

Reports round monetary values to external/display precision.

Charge Precision in Collections

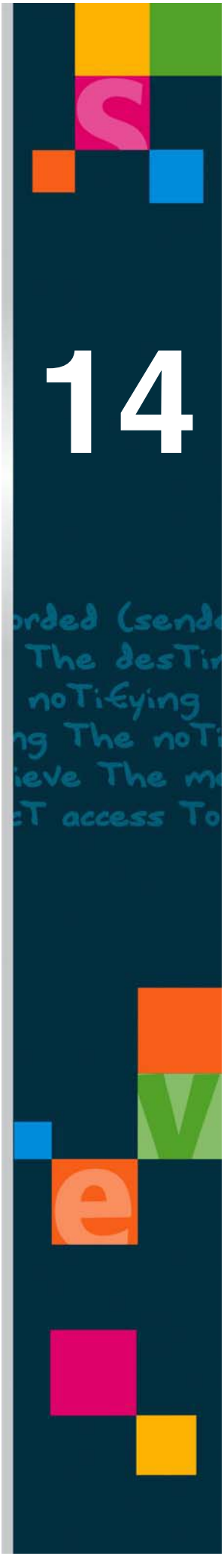
Collections round monetary values to external/display precision.

API Precision Specifications

The Unified API uses full precsion and accepts and provides monetary values with explicit decimal point.

Chapter 14

Promotions



Features of the Promotions Module

The Promotions module includes:

- Override Tariff
- Qualified Accumulation
- Rate of Accumulation
- Reset Accumulator
- Multiple Balance Award
- Nested Accumulators
- Deferred Award

Override Tariff

A tariff plan override allows you to change a tariff based on a key (for example, balance, birthday, happy hour, and so on). The URE uses the original tariff plan ID and expression value, which it maps to the overridden tariff plan ID.

The tariff plan override template is based on rule templates configured in Product Catalog. In Product Catalog, you configure segmentation keys and rule templates. Product Catalog supports configuring of rating/billing elements (offers, bundles, plans, items, and so on) combined with segmentation keys and rule templates.

If usage is guided to the old tariff plan and the conditions in the override rule are met, the URE uses the new tariff plan instead.

A tariff plan override template can provide multiple overrides for the same old tariff plan, or multiple overrides for different tariff plans.

Since rules criteria can overlap, each row has a priority that determines the sequence of evaluation until the first match is found. When a match is found, the specified new tariff plan is used. In the absence of a matching rule, the old tariff plan is used.

The row format in the tariff plan override template is:

```
<Old Tariff Plan> <Override Rule> <New Tariff Plan> <Priority>
```

Override Rule

An *override rule* is a named expression composed of subscriber and usage criteria.

You can specify a named override rule as part of a tariff plan or discount plan override.

Choose criteria from the following:

- Balances: One or more subscriber Balances, with a single operator (<. ?, =, , >) and a single value

  For example, Balance12 > 15
- Home Zone: Boolean, Did the usage occur within the subscriber's Home Zone?

  For example, Home Zone = True
- Longevity: a single operator (<. ?, =, , >) and a single value with Units of Days

  For example, Longevity 60 Days
- Birthday: Boolean, is the usage on the subscriber's Birthday?

  For example, Birthday = True
- Anniversary: Boolean, is the usage on the subscriber's Anniversary?

  For example, Anniversary = True

- Happy Hour: Boolean, is the usage within the subscriber's Happy Hour?

  For example, Happy Hour = True
- Favorite Area (LIB): Boolean, is the destination number in the subscriber's Favorite Area?

  For example, Favorite Area = True
- Favorite URL: Boolean, is the URL in the subscriber's Favorite URL List?

  For example, Favorite URL = True
- Dialed Number Prefix: with a single operator (=) and a single string value

  For example, Prefix = #122#

One or more criteria may be combined with logical operators in an override rule.

For example:

```
Override Rule OR1: (Balance15 ? 21.3) AND (Happy Hour = TRUE)
Override Rule OR2: (Birthday = TRUE) OR (Favorite URL Area = TRUE)
```

A criterion that is not specified is ignored. Override Rule OR1 "doesn't care" whether the usage occurred on the subscriber's Birthday or Anniversary, whether Favorite Area or Favorite URL was used, and so on.

Any criteria specified must be matched exactly.

For example, if Override Rule OR1 is specified, and the usage occurs during the subscriber's Happy Hour, but the subscriber does not have Balance15, the Rule is not met (because condition Balance15 ? 21.3 was not met).

Similarly, if the subscriber's Balance15 value was 10, but the subscriber did not have Happy Hour provisioned, the Rule is considered not met (because condition Happy Hour = TRUE) was not met.

However, using Override Rule OR2, if the usage occurred on the subscriber's Birthday, but the usage was a voice call (so favorite URL is not applicable, meaning it was not met), the Rule conditions would be considered as being met, because the OR operator was used.

Promotion Plans

A *promotion plan* is either a bonus plan or discount plan. A promotion plan has three functional parts: an accumulator, a unit credit (bonus) plan, and a discount plan. Discounts and bonuses are granted after a certain number of points accumulate.

Accumulators

Accumulation is based on activity. An accumulator counts points the customer collects for such activities as events, usage, money spent, or recharging a balance (adding money to it); the accumulator adds points for all these activities. Accumulation starts after activity reaches a preset threshold. After accumulating a certain number of points, the user receives an award or discount for the activity. There is an option to reset the accumulator at a specified frequency or threshold. That is, it does not get reset after an award but resets based on the configuration specified in the accumulator and/or bonus and/or discount plan thresholds.

If before a call, thresholds are already crossed, no bonus will be applied to those thresholds. However, if before a call, thresholds are crossed, a discount will be applied with respect to the last threshold crossed.

If a call crosses midnight, then the accumulators are changed.

When configurating accumulators as part of promotion plans in Comverse ONE, the operator must take into account one aspect of accumulator design: in Comverse ONE, each accumulator attached to a subscriber is one single instance, and if there are two or more simultaneous activities using the same accumulator they each affect the accumulator value.
As an example, if subscriber A makes a *conference call* with subscriber B and C, and both legs of the conference call qualify for accumulation, the accumulator value increases from both calls simultaneously. Thus the accumulator reaches its threshold much earlier than expected. This can be cause unexpected results, especially when using accumulators configured in the Product Catalog with Reset Primary Accumulator.

Inclusion/Exclusion Criteria

Inclusion criteria consists of activity type (for instance voice call, GPRS) and time type (for instance, peak hours, midnight). Only usage that matches the inclusion criterion, and fails to match any exclusion criteria, is accumulated. Also, as soon as the minimum threshold is reached, all the usage is accumulated up to the maximum threshold, including usage before the minimum. Example of exclusion criteria: no accumulation during off-peak hours.

Like accumulators, discount plans can also be included or excluded.

Qualified Accumulator

A *qualified accumulator* qualifies, or limits, accumulation for a particular usage, in terms of currency charges or units consumed. For recharge accumulation, qualify based on the amount of recharge. The qualified accumulator is treated like another Inclusion/exclusion criterion for accumulators.

Qualified usage accumulation has two thresholds:

- Minimum amount to be eligible to accumulate: accumulate nothing until usage reaches a configured threshold (the minimum consumption threshold)
- Maximum amount to accumulate: accumulate up to the threshold but no further after reaching it. If a maximum threshold is not mentioned, then the usage can accumulate to any value.

For non-currency usage accumulators, thresholds always match the units of the usage, independent of actual charges. Only usage with units greater than or equal to the minimum consumption threshold are accumulated. If no minimum is defined, it is assumed to be zero. Only usage units up to but not including the maxium accumulation threshold are accumulated.

The accumulator contains a *qualifier*, which is a set of attributes that define the conditions for accumulation: type of activity, threshold value, and a relational operator (or equivalent). An accumulator with a qualifier increments only if the qualifier condition is satisfied.

Attributes define qualification criteria, such as a recharge of $25.00 or more, or usage of 60 minutes or more, used by promotion plans. A *qualification criteria set* is a group of expressions that include an activity type, a threshold value, and a relational operator.

Comverse ONE supports three types of accumulators: Normal, Recharge, and Budget Limit. Each of these three types can count three types of units: usage (seconds, bytes, and so on), currency (monetary charges), and event (counting per activity). Rate of accumulation is another characteristic of an accumulator. Rate of accumulation is described in the section, "Rate of Accumulation," on page 213.

Nested Accumulators

The Comverse ONE solution supports nested accumulators, where multiple accumulators are used to determine awards. Accumulators are attached to bonus/discount plans, and bonus/discount plans are attached to promotion plans. Awards take place only after accumulation reaches all the conditions in nested accumulators. After crossing all nested thresholds (specified in the promotion plan for each accumulator) the award is granted to subscriber balance. No award is granted for individual threshold crossing.

You can use nested accumulators to form complex expressions. All conditions must be met in order to consider the threshold reached. The maximum number of nested accumulators is five. A promotion plan has a *primary* accumulator, and multiple (up to 4) additional *qualifying* accumulators.

You can provision one or more qualifying accumulators for each row in the promotion plan. Awards are granted only after the thresholds of all the nested accumulators are crossed.

The primary accumulator value or any accumulator value will increase only if it satisfies all the criteria, like inclusion/exclusion and qualification rules. It is not necessarily true that the primary accumulator's value will always increase.

Both bonus and discount are controlled by all accumulators in the nested list. In the processing of qualified accumulators, for discount the accumulator value should cross the threshold value, and for bonus the accumulator should meet or cross the threshold value.

Here the discount is controlled by the value of `ACC_P`. The URE logic is that when processing any usage for which this discount plan has been assigned, it uses the value of `ACC_P` to determine the appropriate discount level.

Nested Accumulators give resellers more flexibility in promotion plans, because they can combine different usages into a single condition.

For example, instead of just awarding when the subscriber performs $50 of data usage, they give the award when the subscriber performs $50 of data usage which included at least 5 SMSs or 50kb or browsing, or both.

Suppose a reseller wanted to implement the following discount promotion for data usage:

On a monthly basis:

Whenever a subscriber reaches $50 of data usage, we get a 1% discount on voice calls

When the subscriber reaches $100 of data usage, and has performed at least 5 MMSs or downloaded 5 RingBack Tones, the discount increases to 5%.

However, if the subscriber reaches $100 of data usage, and has performed at least 5 MMSs AND downloaded 5 RingBack Tones, the discount increases to 10%.

When the subscriber reaches $150 of data usage, regardless of how many MMSs or Ringback tones have been used, the discount increases to 15%.

When the subscriber reaches $200 of usage, the discount goes away.

This would require a Discount Plan with three Accumulators.

The Primary Accumulator `ACC_P` measures amount spent on data usage

The two Qualifying Accumulators, `ACC_M` and `ACC_R`, measure number of MMSs and Ringback tones.

The table below shows how the plan would be configured.

Table 25 Qualified Accumulater

Primary Accumulator Threshold	Threshold 2	Threshold 3	Discount
ACC_P			
50.00	0	0	1 %
99.00	0	5	5 %
100.00	5	0	5 %
100.01	5	5	10 %
150.00	0	0	15%
200.00	0	0	0

Rate of Accumulation

An attribute in the accumulator entity controls the rate of accumulation. Always this attribute value is greater than 0. If the value is in between 0 and 1 (excluding the boundary), then accumulation is done in decelerated mode. If the value is greater than 1, then the accumulation is done in accelerated mode. The value of 1 indicates the constant accumulation. Below mentioned are some examples.

- On January, subscriber enrolls in a promotion - Earn 5 mileage points for every $1.00 usage
  - It brings in a new accumulator with multiplier of 5 and no reset point
- Subscriber spends $2.35 on 8th January and accumulator in incremented by 11.75 (2.35 x 5)
  - On January 12th subscriber spends another $4.10 and accumulator is incremented to 32.25 (11.75 + 4.1 x 5 = 32.25)

Accumulator Behavior When Shadow Balance Is Involved

The Comverse ONE URE handles accumulators in the following ways when shadow balance is involved in the usage event:

- Usage from shadow balances increases the accumulator at the target account, and not at the subscriber account
- Offers and Provisioning is based on the original subscriber
- Because a discount is not applied to an account, so the discount is not applicable when a shadow balance is involved
- A bonus is applicable for both account and subscriber, and so it is applied to the target account balance

Accumulator Behavior When Liability Redirection Is Involved

The Comverse ONE URE handles accumulators in the following ways when liability redirection is involved in the usage event:

- During liability redirection to shadow subscriber:
  - The accumulator is incremented at the shadow subscriber. Thus discount and bonus are applicable for the shadow subscriber.
- During liability redirection to account:
  - Rating is done based on the subscriber's offer, but the accumulator is incremented at the target account (meaning, where the rating is charged). Thus, the bonus is applicable at the target account.

- A discount is applicable for the call charge (that is, if the subscriber's accumulator is greater than any threshold already).

- During liablity redirection, account to account:
  - Rating is done based on the subscriber's offer, but the accumulator is incremented at the target account (meaning, where the rating is charged). Thus, the bonus is applicable at the target account.
  - A discount is applicable for the call charge (that is, if the subscriber's accumulator is greater than any threshold already).
  - NOTE: Accumulation is always done at the destination (that is, the charged entity).

Bonuses

A *bonus* is either monetary or nonmonetary. A bonus of any kind is like a credit. There can be two types of bonus: immediate and deferred. An immediate bonus is available to a subscriber immediately after the call, and a deferred bonus is available after the specified deferred time. For example, a customer uses 1000 minutes and receives a bonus credit of $2.00. A nonmonetary bonus would be something like a future discount on service: after the customer accumulates 1000 minutes of usage, the plan offers a percentage discount on future usage. A bonus can also be an offer award (that is, an offer the customer is awarded for reaching a threshold).

Percentage-Based Bonuses for Usage Activity

The Comverse ONE 3.5 RT TR1.0 release introduces the percentage-based bonuses for usage activity feature. This feature enhances the Comverse ONE product to have the capability to automatically award either percentage monetary bonus(es) or percentage unit bonus(es) to the subscriber at the end of an activity. The amount of the bonus will be based on a variable percentage related to the value of the accumulator associated with the bonus plan.

With this feature, the Mobile Services Provider is able to market variable bonuses to their subscribers that will typically increase with increased activity usage, and thus encourage expanded subscriber usage of services.

This new feature is only applicable for Normal type accumulators with count type of Usage as Unit or Currency. The awarded balance must have the same unit type as the accumulator unit type.

For example:

- If the accumulator count type is Usage Unit and Unit type is Seconds, the percentage-based bonus can only be applied to Second balances.
- If the accumulator count type is Currency, the percentage-based bonus can only be applied to currency balances.

The configuration of these bonus plans is done in the Product Catalog. See the ***Product Catalog User Guide*** for directions on how to accomplish this.

The URE is enhanced to apply the percentage-based bonus at the end of a usage activity when the feature is enabled and when such a bonus has been configured in the Product Catalog.

In the Rating domain the `ALLOW_ACT_END_PC_BONUS` system parameter is used to enable or disable the functionality of this feature. See Table 29, "System Parameters" for details on this system parameter.

Discounts

A *discount* is always monetary because the only thing that can be discounted is a charge. For example, after 1000 SMS, a 10 % discount is offered for all current calls as well as future calls.

Percentage Awards

A percentage award is a discount given for usage or recharge.

Fixed Amount Discount

The Comverse ONE solution discount plan contains a flag to indicate the type of discount: discount in % or fixed amount discount. After crossing a discount threshold the subscriber is eligible to get a discount. A fixed amount discount plan gives an award to subscriber balance after crossing the associated threshold, for every completed activity.

A fixed discount is similar to a percentage discount; it is the ability to five a fixed currency amount as the discount. There can be more than one fixed discount award per activity if there is more than one threshold. After usage crosses a predefined threshold, an award is granted. Only one fixed discount award is granted per activity. Comverse ONE does not support non-monetary discounts. The discount is applied only to the part of the call that occurs after the configured threshold is reached. Comverse ONE supports negative discounts as well.

Reset Accumulator

A promotion plan can be configured so that reset of an accumulator can happen in two ways:

- During an activity, if the reset flag is enabled for bonus/discount and the accumulator value crosses the last threshold, the URE resets the accumulator value to the current accumulator value; that is, the last threshold value. The accumulator value after reset can be anything.
- The accumulator can be reset to its end type. For example, an accumulator end type can be weekly, in which case the accumulator will be reset after the week. Other end types are: activity end (the reset occurs at the end of each activity), daily, monthly, quarterly, yearly, and a “never reset” option as well.

Comverse ONE introduces a new promotion plan attribute that indicates whether or not the plan can reset an associated accumulator. When this flag is enabled in the promotion plan, the accumulator is reset after the award.

From the provisioning point of view it is advised not to associate a resettable accumulator to multiple promotion plans.

An accumulator with multiple thresholds configures the reset threshold in the associated promotion plan to the last (highest maximum) threshold points. If the reset threshold point is lower than the last threshold, any thresholds point beyond the reset point are not reachable.

Example:

Promotion plan resets an associated accumulator for every 60 minutes of voice activity and awards 1 SMS. This simplifies the provisioning of a promotion plan with thresholds 60, 120, 180, 240, and so on.

On January 1, subscriber enrolls in a promotion - 1 free SMS for every 100 minutes of voice activity

- Subscriber crosses 100 minutes threshold on January 15 and gets 1 free SMS
  - URE resets the accumulator associated with this promotion
- Subscriber again crosses 100 minutes threshold on January 20 and gets 1 free SMS
  - URE resets the accumulator associated with this promotion

- Subscriber again crosses 100 minutes threshold on February 22 and gets 1 free SMS
  - URE resets the accumulator associated with this promotion

Deferred Awards

When usage reaches a grant activation date, add grants to the balance. When a grant expires distribute consumption across grants based on previously configured rule, and delete the record of the expired grant.

Multiple Awards

The bonus plan entity in the Comverse ONE solution is enhanced to award multiple balances of different unit types. Multiple awards can be associated with an accumulator threshold in the bonus plan, and each award contains the following attributes: target balance, unit-type, award details, notification information, award expiration, and offset details. On crossing an accumulator threshold associated awards are awarded to corresponding subscriber balances. Following example describes the multiple balance award scenarios:

On January, subscriber enrolls in a bonus promotion - Earn 1 free SMS and 10 free minutes for 200 minutes of voice activity this month

Subscriber crosses 200 minutes threshold in 25th January and gets 1 free SMS and 10 free minutes of usage to corresponding balances

On February 1st accumulator is reset to zero.

Real-Time Balances

Real-time awards and credits apply units from a nonmonetary balance to a call/event, which adheres to the concept of unit credit. An award is not only nonmonetary; a unit credit can be monetary as well.

Comverse ONE unit credits include the following:

- assign monetary value to free units so that they can be journaled correctly
- cycle dependent free units plans without rollover
- cycle dependent free units plans with simple unrestricted rollover
- cycle independent free units plans
- basic free units restrictions
- free units plan order, when more than 1 free units plan applies, with the restriction that all ordering must be achievable without enhancements to `COS_BALANCE_ORDER`
- basic bonus free units
- free units plan charges
- prorating free units on activation
- maximum limits per subscriber
- present free units on invoice
- shared free units at account level, just not at group level. This is possible via both shadow balances and liability redirection.
- retroactive activation (scoped in via Infrastructure FRS's Rerating)
- pro-ration on disconnection if it does not require Rerating
- pro-ration on bill cycle change if it does not require Rerating
- monetary unit credits
- daily, weekly, off cycle free units

- incremental unit credits, but only if they can be expressed as a bonus plan
- advanced promotions
- promotion based on subscriber attributes
- age, religion, ethnicity, and 7 more
- operator can define and provision up to 10 configurable attributes
- each attribute has a value pair, Attribute ID/Name and threshold value
- "Happy Hour" promotion
- all local calls are free during your choosing of two consecutive hours
- predefined attribute with "Happy Hour" value
- no change to the calendar. Activity behaves based on the "Maintain Tariff" flag in the TP. If the activity is to be discounted during Happy Hour, the threshold value identifies the period and rating / charging logic assume this period as another "time type" in the calendar. Note that the period is different for different subscribers based on their selection of Happy Hour interval. The Tariffs are the same as specified in the original TP with % discount identified in the Discount Plan. Balances are eligible based on the time types identified in the original TP calendar.
- loyalty based promotion
- subscribers with more than 180 days of active state
- Predefined Attribute" with value "Last Activation Date"
- threshold values defined as Today - x days, Today - y days, and so on
- promotion based on combination of attributes
- subscriber with six months of active status gets 10% of discount on all services per month once they talk for 100 minutes on LD calls
- get 1-ribbon for every 10 minutes of LD call and 10 SMS. Cash in ribbon for gifts
- multiple discount plans with a common accumulator
- multiple balance awards
- it is possible to associate multiple balances to the same threshold. When usage crosses the threshold multiple grants of different unit tpes are awarded.
- multiple awards
- a balance can hold multiple awards, each with its own validity period and source of award (recharge, bonus, and so on). The order in whichdeferred awards to usage are applied can be confgured, for example, use in the firs order, use in the firs inactive order, and so on. The award awarded by a particular bonus plan is always the same unit-type, such as currency, SMS, Octets, and Seconds. In the Comverse ONE solution, bonus plan awards multiple balances of different unit types. Product Catalog allows associating multiple balance awards with every accumulator threshold. Each balance award associated with the accumulator threshold contains these attributes- target balance, unit-type, award details, notification information, award expiration and offset details.
- complimentary awards
- nested accumulators include different usage activities. For example, the plan grants a customer who has 1000 minutes of calls and 100 SMS a bonus of $2.00.
- the bonus plan entity in the Comverse ONE solution supports awards to multiple balances of different unit types. Multiple awards can be associated with an accumulator threshold in the bonus plan, and each award contains the following attributes: target balance, unit-type, award details, notification information, award expiration, and offset details. On crossing an accumulator threshold associated awards are awarded to corresponding subscriber balances. Following example describes the multiple balance award scenarios.
- on January, subscriber enrolls in a bonus promotion - Earn 1 free SMS and 10 free minutes for 200 minutes of voice activity this month

- subscriber crosses 200 minutes threshold in 25th January and gets 1 free SMS and 10 free minutes of usage to corresponding balances
- on February 1st accumulator is reset to zero

Real Time only

Market Offer Group

In this release, a key attribute (Market Offer Group) has been added which is a required field on both Account and Subscriber. This attribute is also added to the Recharge Control Table, Voucher definitions and Access Number definitions.

Market Offer Group is essentially a division within the Reseller to give an added dimension to a single reseller. Market Offer Group is an additional matching criteria which can affect, for example, the method in which a recharge is applied to a subscriber or account.

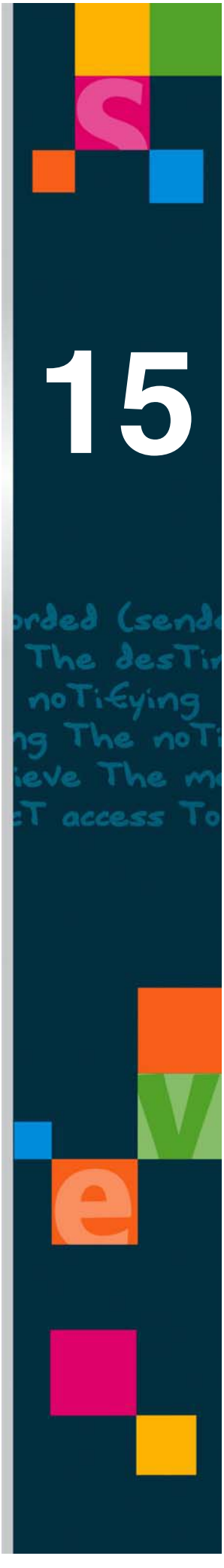
This feature allows subscribers in the same account hierarchy to belong to different Market Offer Groups (which correspond to the now-obsolete RTB term, 'service providers').

Market Offer Group can be set to a value of "`ANY`" (that is, a wildcard value).

The `MARKET_OFFER_GROUP` system parameter which enables this functionality is described in Table 29, "System Parameters" starting on page 235.

Chapter 15

Error Handling



The URE supports error handling and reporting. The Offline URE sends files that encounter errors during processing to the CDR_DATA_WORK table, from which they must be removed, corrected, and reprocessed.

If an error occurs during the authorization flow, the URE denies authorization. If an error occurs in the extend-authorization flow, the URE denies extend-authorization.

Audit levels can be configured to different levels of detail to suit the needs of different groups of users. For detailed information about the URE audit and control process, see Chapter 4 of this manual, entitled "Audit and Control."

Table 26 describes audit levels.

Table 26 Audit levels

Level	Detail
Basic	Provides table and field information used by Operator admin personnel
Moderate	Provides table and field information and SQL statements used by Comverse support staff or experienced client staff
Significant	Provides table and field information, SQL statements, and specific function calls used by Comverse development personnel

Error codes refer to one of the following functional areas. Table 27 below lists error codes and describes their meaning.

- General URE
- Pricing
- Pricing: reservation
- Pricing: consumption
- Balance Management
- Usage Record Generation
- Promotion
- Guiding
- Charging

This check and handling of errors can be invoked at any later time during pricing if an error other than a missing rate error occurs during pricing (a missing rate error receives special handling). Regardless when in pricing an error occurs, the error handling steps described here apply.

The only special error case is a missing rate error; here the AUT.use_default_rate_type value for missing rates takes precedence. If the AUT is configured to apply the default rate when the standard rate is missing, the default rate is applied and treated as if no error has occurred. This special case is addressed in the section "Calculating Monetary Charges." If a missing rate error occurs, and it is the only error on the activity, and if the AUT is not configured to apply default rate in the case of missing rate, the URE follows logic based on whether AUT is configured to apply default rate in case of an error (as above).

For an error other than a missing rate error, where the AUT is configured to apply the default rate to errors, and if the default rate is missing, the URE sets an appropriate error code on the CDR (an error code indicating that default rate is missing), if there is still an available error code, and sets the price to zero, releases reservations (if any), creates a history and error CDR, and returns results.

Table 27 gives error codes for the URE.

Table 27 URE Error Codes

Error Code	Description
URE_OK	
URE_NOK	URE Generic Error
URE_DB_ERROR	Database error
URE_PAYMENT_SERVICE_UNAVAILABLE	Payment service unavailable
URE_DB_ERROR_UPDATE_RETRY	
URE_TSP_ERROR	TSP Client Exception
URE_INVALID_INPUT	
URE_RESV_CLEANUP_NEEDED	
PRICING_PARTIAL_RESERVATION,	
PRICING_NO_RESERVATION	Insufficient balance
PRICING_OVER_RESERVATION	
PRICING_CONSUMPTION_FAILED	
PRICING_CONSUMPTION_INSUFFICIENT	Payment insufficient balance
PRICING_INVALID_USAGE_AMOUNT	
PRICING_MISSING_RATE,	Tariff not found
BM_BAL_NOT_FOUND,	
GUIDING_NO_SUCH_SUBSCRIBER	
GUIDING_SUBSCRIBER_INACTIVE	Needed for ECI
GUIDING_NCF_TPPS	
DUPLICATE_REQUEST	For OCS duplicate detection of
GUIDING_SERVICE_ELIGIBLE,	
GUIDING_SERVICE_INELIGIBLE_FRAUD_LOCK	
GUIDING_SERVICE_INELIGIBLE_IDLE	
GUIDING_SERVICE_INELIGIBLE_SUSPENDED	
GUIDING_USAGE_FREE	
GUIDING_USAGE_NOT_FREE	
GUIDING_FAILED	Invalid guiding input, missing data
CHARGING_TERMINATE_FOR_CURRENCY_ CHANGE	
CHARGING_DB_RECORD_LOCKED_RETRY	
CHARGING_DB_ERROR	
CHARGING_ACCOUNT_SUSPENDE	
URE_OFFER_CHANGE_TERMINATION	
miu_error_code1=152	Invalid Id, Id Type and Trans dt combination
miu_error_code1=3010	Required field missing
miu_error_code1=15234	Reserved for Future URE/Rating

Message Investigation Units (MIU and WIN_MIU)

The Message Processing Investigation Unit (WIN-MIU) is a Windows-based user interface that allows users to review incomplete (`miu_disp_status` = 1) records in the `CDR_DATA_WORK` table,

modify those records, LTP creates CDR_DATA_WORK entries for soft errors with a status of "incomplete" and a disposition code of "new record."

The Message Investigation Unit Batch (MIU) is a UNIX-based batch process that processes CDR_DATA_WORK rows without any correction.

See the *Billing Operations Guide* for instructions on using WIN_MIU and MIU.

WIN_MIU

If rating or tax configuration or system parameters are changed while WIN_MIU is running, WIN_MIU does not pick up the new data. You must close and re-launch WIN_MIU if this happens.

Modifying a Record

Whenever a WIN_MIU user modifies a record, WIN_MIU marks the original record complete (miu_disp_status=0) and inserts the modified record into CDR_DATA_WORK with incomplete status. Thus a usage record ID (msg_id/msg_id2) can select the entire history of modified versions of that record — one incomplete entry (the current one) and any number of complete entries.

WIN_MIU, through LTP, stores the timestamp, disposition (miu_disp_code, see Table 28, on page 223), any notes the user added to the message, and other error, record, and work queue information in the CDR_DATA_WORK record as well.

Uncorrectable Usage Messages

WIN_MIU never deletes records, but an WIN_MIU user can mark a record uncorrectable (miu_disp_code 3). Uncorrectable records are complete and do not subsequently appear in WIN_MIU.

Table 28 Disposition Codes

Code	Description
0	New record; initially failed guiding or rating, status is 1. For missing rate errors miu_notes is populated with rate key values for the usage message and the rate key values used in the failed rate lookup.
1	Incorrect; modified by a user but still fails guiding or rating, status is 1.
2	Released; successfully guided and rated (whether corrected or not); status is 0.
3	Uncorrectable; status is 0.
4	Held; placed on a hold queue for later correction.
5	User; placed on a user queue for later correction by a specific user.

MIU Batch Processing (MIUB)

MIUB processes CDR_DATA_WORK rows without any correction. Since no correction is involved MIU does not insert audit rows into CDR_DATA_WORK. However, if a record is already corrected MIUB creates a file for CCAP to process.

If appropriate, MIUB updates the error codes for uncorrected records in CDR_DATA_WORK.

Error usage files are created by MIUB and sent to CCAP for processing. CCAP does some special processing for MIUB files, primarily preserving the msg_id* key and the file_id, file_id_serv for CDRs from MIUB files. The general flow for error usage file (MIUB file) processing is as follows:

MIUB selects errored CDRs for reprocessing from CDR_DATA_WORK. For each selected CDR, MIUB writes the CDR to a file.

MIUB preserves the original file_id and file_id_serv from the CDR. The file_id and file_id_serv from the CDR_DATA_WORK row is written to the MIUB file without change. Files created by MIUB can therefore have many CDRs each with different file_id and file_id_serv. These do not match the file_id and file_id_serv of the MIUB file itself.

In one transaction, MIUB:

- decrements the num_cdr_data_work column in each of the appropriate USAGE_LOCAL_COUNTS rows for the CDR records being reprocessed
- inserts a row into USAGE_FILE_STATUS in the same transaction for the file being reprocessed. By definition, any recs not accounted for are "in process".

C-CAP

C-CAP looks in the USAGE_FILE_STATUS table for usage files to process. This is described above in the normal input usage file processing flow.

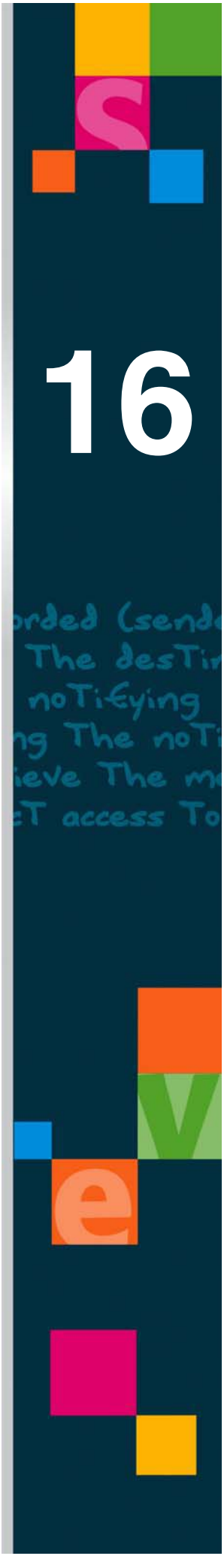
For CDRs from MIUB files, CAP preserves the file_id/file_id_serv, so that if the CDR errors out again, it is clearly associated with the original instance of the CDR and the original input file.

For each MIUB file C-CAP processes, C-CAP creates two output files, as for normal input files:

- In converged mode, successfully processed records will be inserted into the Rating DB first, and then transferred by URT/LTP to the Customer DB.
- For CDRs that errored out again to be inserted into the Admin Database CDR tables (file_class = UFS_LTP_MIUB_FILE).

Chapter 16

Long Term Persistence



Long Term Persistence (LTP)

The Long Term Persistence (LTP) module is the server process that commits rated records (usage, MTR, or Recharge history) to the Billing database. LTP processes the data files generated by the URT, URR, MHT, and RCT, and inserts them into the Billing database. The records are inserted in the Rating DB by the URE, but URT is the tool used to generate files with whichLTP does transfer work.

LTP bulk inserts usage records into the Billing database in an extremely efficient manner. LTP can either update the database one usage record at a time using the **SQL INSERT** command, or with batches of records using the **array insert** (Oracle) command. This is controlled by the COPY_MODE (LTP) system parameter (0 for single insert, 2 for **array insert** (Oracle only)). If **array insert** is used, the BATCH_INSERT_SIZE (LTP) system parameter specifies the number of records in a batch.

Batch mode is recommended for the COPY_MODE system parameter (either **bcp** or **array insert**) since it boosts performance. However, even if the COPY_MODE system parameter is not set, LTP still picks up the correct copy mode according to the type of database it connects to (2 for Oracle). Use the single insert mode for special circumstances such as during debugging..

Below are the components of LTP:

A. Using gfr_frame as the major framework of LTP, it reuses the original gfr_frame for LTP in Comverse ONE.

B. Using gfr_refresh as the initialization component of LTP, it initializes some system parameters and environment variables, such Rating and Billing Database information, connection pools, and so on.

C. Extracted file reader, reads usage files that are extracted from SDP

D. Lookups of usage related data do not exist in SDP. LTP analyzes or calculates out usage-related data values from records such as base_amt or amount. LTP performs complicated calucations to work out these values.

E. CCAP usage files reader, it reuses the ccbs_cdr_io with some fields changing.

F. Billing Database insertion, inserts CCAP usage records or SDP usage records into revised tables.

G. Updating extract file status on SDP, LTP updates EXTRACT_AUDIT_CONTROL table to indicate that record transfer is complete. LTP does not move records on the Rating DB.
URT is a tool for extracting records from usage record tables to files processed by LTP later. URT runs the purge daily to remove all un-processed records or processed records that produced errors into the USAGE_RECORD_HIST table on HIST db.

H. Audit trail and rollup for offline processing, Rerating and error message file, it tracks the tables of USAGE_FILE_STATUS series.

I. Duplicated key processing.

J. Error scenario for invalid data in usage files from SDP. If errors occurred in LTP processing, LTP does FTP again for files with extract_file_status = 6 (FTP error) in the EXTRACT_AUDIT_CONTROL table. Extract action is not executed again, otherwise the records with error status would get purged to HIST database .

For online and offline processing modes, components A, B, F, I are involved.

In the Comverse ONE solution, LTP gets the extracted usage record messages from Rating Database on SDP and inserts them into Billing Database. Components C, D, G, and J are specific for this mode.

The save_LR application has been added to process liability redirection records and re-guided records.

LTP reads and processes files input from C-CAP, updating audit trail counters as needed (discussed in *Audit and Control*, Chaper 4). When LTP reads a redirected record, it creates a new output file for C-CAP based on the redirected server_id (if a file does not already exist), writes the record in the same format to the output file, and later marks this file as ready to process by C-CAP (on the new server).

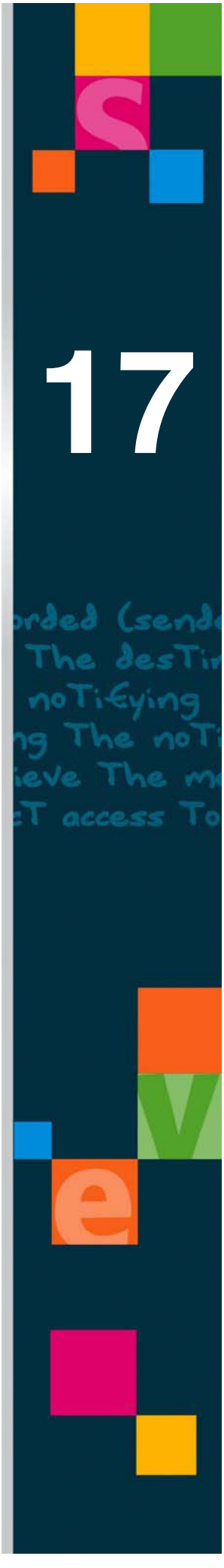
The new file has a file type of `UFS_LTP_REDIRECT_FILE`.

The `USAGE_FILE_CLASS` which LTP is using now, is below:

```
{
UFS_CAP_CMCAP_FILE  10
UFS_LTP_MCAP_FILE   110
UFS_CAP_MIUB_FILE   20
UFS_LTP_MIUB_FILE   120
UFS_LTP_REDIRECT_FILE       45
UFS_LTP_CCAP_REDIRECT_FILE  145
UFS_LTP_CMCAP_FILE  111
UFS_CAP_URC_FILE    40
UFS_LTP_URC_FILE    140
UFS_LTP_EX_USAGE_FILE  200
UFS_LTP_EX_RECH_FILE   210
UFS_LTP_EX_MTR_FILE    220
UFS_URT_ERR_FILE  520
UFS_MTR_ERR_FILE  530
UFS_RECH_ERR_FILE 540
}
```

Chapter 17

Archiving



Usage File Archive (UFA)

Comverse ONE introduces a new utility module, Usage File Archive (UFA), to move old finalized rows from USAGE_FILE_STATUS (USF) to USAGE_FILE_STATUS_HISTORY (USFH), and USAGE_FILE_COUNTS (USFC) to USAGE_FILE_COUNTS_HISTORY (USFCH), in order to archive them.

The following list of tables are archived/purged by UFA:

- FILE_STATUS
- USAGE_FILE_COUNTS
- USAGE_FILE_COUNTS_HISTORY
- USAGE_LOCAL_COUNTS
- USAGE_LOCAL_ROLLUP
- USAGE_FILE_STATUS
- USAGE_FILE_STATUS_HISTORY

The UFA Command

Invoke UFA with the following command:

$> **UFA *<process_name>* *<admin_server_id>***

where:

<process_name> is the process name to be run (example: **ufa01**)

<admin_server_id> is the Server Id of BLUS (on Converged = **4**) or ORP (on Real-time = **12**) DB

UFA runs either on unscaled or ORP servers in batch mode.

Example commands:

$> **UFA ufa01 4 // on unscaled, or**

$> **UFA ufa01 12 // on ORP**

UFA Processing

UFA locates all usage files that have been completely finalized by LTP (identified by a file_status = 10) in the FILE_STATUS table whose date is greater than or equal to the archive date set; for usage files on both unscaled servers and ORP servers an optional parameter indicates the age of the files to be moved. The default archive date is 30 days.

For each such usage file, UFA moves the FILE_STATUS row and all corresponding rows in USAGE_FILE_STATUS (that is, all rows that have the same file_id and file_id_serv) into the new USAGE_FILE_STATUS_HISTORY table. It moves all the relevant rows in USAGE_FILE_COUNTS into USAGE_FILE_COUNTS_HISTORY. It moves USAGE_FILE_STATUS to USAGE_FILE_STATUS_HISTORY with the additional where clause:

```
file_class in (
UFS_CAP_MCAP_FILE = 10,
UFS_CAP_MIUB_FILE = 20,
UFS_CAP_RPU_FILE = 30,
UFS_CAP_URC_FILE = 40,
UFS_CAP_REDIRECT_FILE = 45,
UFS_LTP_MCAP_FILE = 110,
UFS_LTP_MIUB_FILE = 120,
UFS_LTP_RPU_FILE = 130,
UFS_LTP_URC_FILE = 140,
```

```
UFS_LTP_REDIRECT_FILE = 145,
UFS_LTP_EX_USAGE_FILE = 200,
UFS_LTP_EX_RECH_FILE = 210,
UFS_LTP_EX_MTR_FILE = 220,
UFS_PREPAID_ERR_FILE = 510)
```

and file_status in (4=DONE , 10=COMPLETE)

UFA verifiies that all `USAGE_LOCAL_ROLLUP` rows that have the same `file_id` and `file_id_serv` values have been rolled up, and then deletes those rows from the `USAGE_LOCAL_ROLLUP` tables.

Then it deletes `USAGE_LOCAL_COUNTS` on the Admin server, and deletes `FILE_STATUS`.

Finally UFA deletes the two `USAGE*HISTORY` tables where (`SYSDAT`E - file_process_dt) >= `PURGE_AFTER_N_DAYS` if running on unscaled server, or it deletes the two `USAGE*HISTORY` tables where (`SYSDATE` - file_process_dt) >= `OR_PURGE_AFTER_N_DAYS` if running on the ORP server.

UFA System Parameters

Use the following system parameter for UFA.

Module/Parameter name:

```
UFA/USE_INLINE = 1 or 0
```

For usage files on unscaled server:

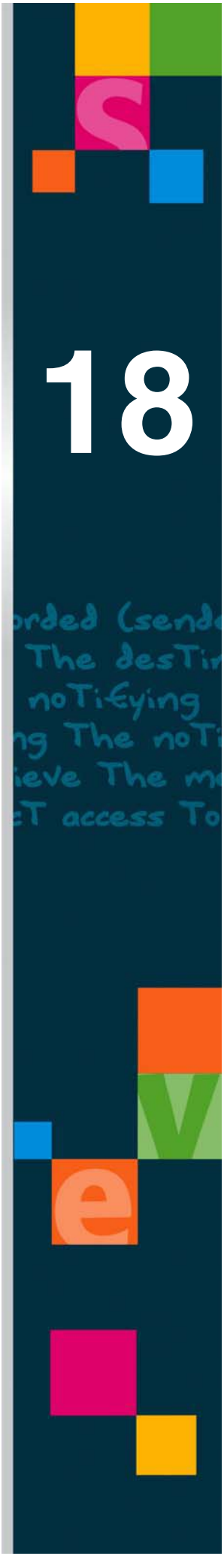
```
UFA/ARCHIVE_DAYS = xx  [default = 30]
UFA/PURGE_AFTER_N_DAYS = xx [default = 60]
```

For usage files on ORP server

```
UFA/OR_ARCHIVE_DAYS = xx [default = 30]
UFA/OR_PURGE_AFTER_N_DAYS = xx [default = 30]
```

Chapter 18

System Parameters



System Parameters

Table 29 describes the system parameters related to the URE. This table provides an alphabetical list of parameters configurable for rating only; other parameters are listed in the *Billing Technical Reference*.

Table 29 System Parameters

Module	Parameter Name	Integer Value	Character Value	Description
	ACCESS_NOA	0	0	0 = Use existing NOA; 1 = Force NOA to National; 2= Force NOA to International
	CHRG_ACCESS_DN	0	0	0 = Billing on access number; 1 = Billing on translated destination number
	CIRC_GRG_START	101	101	Calling Circle Group starting range (nonmodifiable)
	CREDITLIMIT	0	0	1 = Credit Limit feature enabled; 0 = disabled
	FORCE_ANN_MB	0	0	1 = For group member IVR info server call, when fund source is MB and SL, force announcing member balance; 0 = Existing behavior
	GRANT_CONS_SORT_ORDER	1	1	Used in synchronization of awards and their associated balances while adjusting consumption amount from grants. F=First, L=Last, E=Expired, G=Granted, U=Used. Valid Values: 1 = LEFU, 2 = FEFU, 3 = FGFU, 4 = LGFU
	HomeZone_flag	180	180	For Home Zone Feature: 0 = off/disabled, 1 = on/enabled
	HUC_0_VALIDITY	0	0	Allow zero validity voucher: 0 = do not allow; 1 = allow
	IGNORE_BAL_MIN_OFFLINE_CHARGING	0	0	When set, off-line URE always charges for usage regardless of balance availability: 0 = disable, 1= enable
	IGNORE_SUBSCR_STATE_OFFLN_CHRG	1	1	0 = disable, 1 = enable
	INHIBIT_EXP_EXT	0	0	Inhibit Non-Core Balance Extensions When Reward = 0: 0-Allow expiry extension, 1-inhibit expiry extension
	K_FUNDIAL	0	0	Turn System-wide Kyivstar FunDial support; 0 = off 1 = on

Table 29 System Parameters (Continued)

Module	Parameter Name	Integer Value	Character Value	Description
	MAX_ACCUMULATORS_SUB	30	30	Maximum number of accumulators supported at subscriber level; (min = 7, max = 30). Once increased, these values cannot be decreased.
	MAX_ALCS_SUB	30	39	Maximum number of alcs that can be subscribed by the subscriber; (min = 0, max = 10). Once increased, these values cannot be decreased.
	MAX_BALANCES_SUB	0	0	Maximum number of balances supported at subscriber level; (min = 10, max = 20). Once increased, values cannot be decreased.
	MF_ANN_BYTESMS	0	0	Indicator to support multiform SMS/byte balance announcements; 0 = off/disabled, 1 = on/enabled
	MT_VALIDATION	0	0	Determines whether the ECI checks MT-Subscriber state before charging for MO-MT activity; 0 = disable, 1 = enable, 2 = enable interim.
	NONCORE_EXP_MTR	0	0	0 = Display NON Core Balance Expire MTR as negative (default, existing behavior), 1 = display NON Core Balance Expire MTR as positive
	NUM_BALANCES_FOR_MOST_SUB	4	10	Number of balances majority of subscriber has; (min = 1, max = 20)
	NUM_SPEND_LIMITS_FOR_MOST_SUB	0	0	Number of spending limits majority of subscriber has; (min = 0, max = 20)
	OCS_CHARGE_CODE	9999	9999	Default charge code
	OCS_OTH_LOC		DIAMETER_B_DEFAULT	Diameter OCS default subscriber location
	OCS_OTH_LOC_TYPE	2	2	Li Relation, possible values: 1(UNLISTED), 1(HANDSET_MAP), 2(TELEPHONE), 3(MSRN), 4(CELL_ID), 5(MSC_ID), 6(SGSN_ID), 7(IP_ADDRESS)
	OCS_SERVICE_CODE	999	999	Default service code

Table 29 System Parameters (Continued)

Module	Parameter Name	Integer Value	Character Value	Description
	OCS_SUB_LOC_TYPE	2	2	Li Relation, possible values: 1(UNLISTED), 1(HANDSET_ MAP), 2(TELEPHONE), 3(MSRN), 4(CELL_ID), 5(MSC_ ID), 6(SGSN_ID), 7(IP_ ADDRESS)
	On-NetFandF	0	0	For ECI FandF On-Net validation for SMS and MMS: 0 = off/disabled; 1 = on/enabled
	ON-NETVALIDATE			For ECI On-Net and Off-Net Determination: NULL = OFF/Disabled; Values = ON/Enabled
	PC_UPDLASTCHGDT	0	0	Based on actual apply day, PC should be applied or retry on subsequent days. 0 = process subs only on apply day and update Last_charge_dt; 1 = Process Subs within the PC period, when not applied on actual apply day
	PLUGIN_TRC_BTCH		N	NG trace flag to indicate whether to run trace for batch processes
	PLUGIN_TRC_FLAG		ENABLED_ CALLS	NG trace level flag for DBMS_ TRACE package
	PLUGIN_TRC_SAVE		N	NG trace flag to indicate whether to save trace data to a file or discard
	PMT_QTEL_FIX	0	0	Support QTEL request for MSCID manipulation; 0 = disable, 1= enable
	RT_RESV_CLNUP	1	1	Determines whether realtime reservation cleanup at SLF is enabled; 0 = off/disabled; 1 = on/enabled
	RT_RESV_DELAY	1	1	Amount of delay to be used for cleaning up Expired reservations from SLF in realtime MinVal 60/MaxVal 600
	THIRD_PARTY_TAX_POST_ EVENT	0	0	When set, offline URE always charges for usage regardless of the balance availability: 0 = disable, 1= enable
	VM_PC_COS_CHG	0	0	Recurring Charge COS Change only for Vimplcom; 0 = default, 1 = new behavior for VM
BIP	TRA_SWITCH	4		BIP TRA switch

Table 29 System Parameters (Continued)

Module	Parameter Name	Integer Value	Character Value	Description
CBS	SUPPORT_TML_IN_RT	1	NULL	Enables and disables the postpaid offer and balance in RT mode feature. 0 - disabled, 1 = enabled
JNL	ALLOW_BALANCE_ MISMATCH	1		0 = swap disallowed if old offer/bundle contains nonzero balances not in the new offer/bundle, 1 = swap allowed if old offer/bundle contains nonzero balances not in the new offer/bundle
JNL	DEFAULT_TML_MODE	1	1	Enable/disable TML
JNL	MTR_BOOKING_METHOD	1		0 = Do *not* book MTRs. 1 (default) = Book all MTRs during Type 3 runs. 2 = Book *billed* MTRs during Type 1 runs; do *not* book *billable* MTRs during Type 3 runs; book *unbillable* MTRs during Type 3 runs.
JNL	MTR_BOOKING_METHOD	1		Enable JNL to book MTRs
JNL	RECHARGE_BOOKING_ METHOD	1		Enable JNL to book recharges
JNL	SUPPRESSED_UNBILLED_RC	1		0= JNL will book unbilled Recurring Charges in the feed file. 1= JNL will book unbilled Recurring Charges in the JNL_ DETAIL rows but *not* in the feed file itself.
MCAP	FIELD_DELIMITER			To be used for OR record format
RTNG	1_BONUS_MTR	0	0	0 = Generate one MTR per bonus awarded; 1= Generate one MTR per bonus-awarding activity (flag applies to bonus plans using "activity_end" accumulator only)
RTNG	ACCUMULATOR_CHG	1	1	0 = Accumulator Change disabled; 1 = accumulator change enabled
RTNG	ALLOW_ACT_END_PC_BONUS	0	0	To support % bonus at the end of activity feature. 0 = disabled (Do not allow activity end % bonus.) 1 = enabled (Allow % bonus at the end of activity.)
RTNG	Audit Logging	0	0	Audit Logging
RTNG	AWI_ENABLED	0	0	1 = on, 0 = off

Table 29 System Parameters (Continued)

Module	Parameter Name	Integer Value	Character Value	Description
RTNG	BAL_PLAY_ALWAYS	0	0	For play zero non-core applicable balance(s), 0 = OFF/disabled, 1 = ON/enabled
RTNG	BAL_TRANSFER	0	0	Flag to determine if the balance transfer is allowed or not. 0 = balance transfer NOT allowed. 1 = balance transfer allowed
RTNG	BLKADD_COSBONUS	0	0	0 = Disable the bulk provisioning of COS bonus plans to members of existing COS, 1 = Enable the bulk Provisioning of COS bonus plans to members of existing COS
RTNG	ByPassIVRU	0	0	For ByPassIVRU: 0 = off/disabled, 1 = on/enabled
RTNG	CALL_CIRC_ENB	1	1	Calling Circle flag; 0 = disable, 1= enable
RTNG	CALL_CIRC_SDP	9		Calling Circle SDP Number
RTNG	CALL_CIRC_URE_INST	9		For URE to identify Calling Circle SDP Id
RTNG	CALLING_CARD_PREFIX	44	44	A prefix used by ASU-IVRU to route a "UNIFIED_CARD " type call to SLU
RTNG	CAP3SMSALLOWED	1	0	0 = CAP3 SMS not supported, 1 = CAP3 SMS supported
RTNG	CDR_NOTIF_LANGUAGE	1	1	When set, offline URE always charges for usage regardless of state of subscriber: 0 = disable, 1= enable
RTNG	CHANGE_SP_ALLOW	0	0	Global Flag to indicate whether Service Provider can be changed or not. 0 = not allowed, 1= allowed
RTNG	CHG_NOTIF_ALLWD	1	0	Charge notification allowed. 0 = NO, 1 = YES
RTNG	CIRC_GRP_END	200	200	Calling Circle Group ending range (nonmodifiable)
RTNG	CntOPPSNCFMPC	0	0	0 = no/do not count, 1 = yes/count
RTNG	CONV_RECHARGE_VOUCHER	1	0	Voucher language code, by default it is in English
RTNG	CONVERGED_NonPCO	3	3	Expected Range = 0~256
RTNG	CONVERGED_Pre_PCO	81	81	Expected Range = 0~256

Table 29 System Parameters (Continued)

Module	Parameter Name	Integer Value	Character Value	Description
RTNG	DEFAULT_FACE_OFFSET	10	10	Any Idle state (state = 1) subscriber will be transferred to the number provisioned in this field. It could be a language server or admin server phone numberv
RTNG	DelInAnyState	0	0	Subscribers delete; 0 = Delete only in final state, 1 = Delete in any state
RTNG	DISCOUNT_ORDER		F	Controls order in which special feature discounts are applied; G = Group Discount, F = Friends and Family, C= Calling Circle
RTNG	DisServFeeState	0		0 = Diseble prevention of state change; 1 = enable prevention of state change
RTNG	EMEG_CALL_NUM_NORM_ ENABLED	0	0	Indicates whether number normalization needs to be done for Emergency number lookup. 0 = no number normalization required for emergency number lookup 1 = a normalized phone number will be used to look up an emergency number Default value is 0.
RTNG	EMGCALL_DISCARD_USAGE_ REC	1	1	Expected Range = 0~256
RTNG	EXT_CHARGE_CODE	0	0	0 = Not using an external source for CHARGE CODE data, 1 = Using External source for CHARGE CODE data
RTNG	EXTCDR_ENABLE	1	1	Extract MTR and RH to CDR Format, Value = 1/0; 1 means on, 0 or NULL means off
RTNG	FandF Phonebook History	1	1	1 = FandF phonebook history enabled, 0 = disabled
RTNG	Fast Recharge	2626	2626	0 = Accumulator Change Disabled; 1 = Accumulator Change enabled
RTNG	FC_CHARGECODE	1006	1006	Charge code for the calls without an associated activity (application, final subtype)
RTNG	FC_SERVICECODE	1006	1006	Service code for calls without an associated activity (application, final subtype)

Table 29 System Parameters (Continued)

Module	Parameter Name	Integer Value	Character Value	Description
RTNG	FEATURE_REQUEST	0		0 for existing functionality (Feature Request not supported); 1 to enable support of Feature Requests (for this feature, affects whether the USSD_SLF registers with WINA in addition to registering with USSD_IPF
RTNG	FirstCallIntercept			A prefix used by ASU-IVRU to route a "CALLING_CARD" type call to SLU
RTNG	GA_HIST_LIMIT	10	10	Limits the number of GA histories retrieved via CCWS
RTNG	GPRS_CDR	1	1	For GPRS CDR; 0 = OFF/disabled, 1 = ON/enabled
RTNG	GPRS_ENABLED	1	1	
RTNG	LOOKUP_OUTSIDE_ RANGEMAP			Real time application send request to URE for MSISDN Lookup outside the Range Map 0 = disabled 1= enabled
Real Time only RTNG	MARKET_OFFER_GROUP	0	0	Enables and disables the market offer group feature 0 = disabled, 1 = enabled Default value is disabled
RTNG	MAX_COMPATIBLE_ALCS	4	4	Number of maximum compatible ALCS of COS; (min = 0, max = 50)
RTNG	MAX_DBL_DIGITS	6	4	Max number of internally supported decimal places (*N*)
RTNG	MAX_EXT_DIGITS	6	2	Precision for all other external display mechanisms, including CDRs, CCC display and CCWS support for currency related fields (*Z*). Configurable by operator, with max value of *N*
RTNG	MAX_NOTIF_DIGIT	3	2	Precision for USSD/SMS currency related tokens (*T*). Configurable by the Operator, with a max value of *N*
RTNG	MAX_PP_AMT	100	100	Maximum promised payment amount allowed
RTNG	MAX_PP_DAY	10	10	Maximum promised Payment duration
RTNG	MI_FEATREQ_SWIT	0		1 = Feature requests supported, 0 = not supported
RTNG	MI_INFOCUS_ONLY	0	0	1= IVR operations support for other identities, 0 = not supported

Table 29 System Parameters (Continued)

Module	Parameter Name	Integer Value	Character Value	Description
RTNG	MI_NUM_IDS	1	1	1= Multiple identities disabled, 2-7 = Multiple Identities is enabled with *N* identities possible
RTNG	MI_USSD_SWITCH	0	0	0 = Multiple Identities does not support USSD, 1 = Multiple Identities USSD supported
RTNG	MILLISECOND_ROUNDING_METHOD_1	1-5		Used when raw duration is < MILLISECOND_ROUNDING_THRESHOLD value. ROUND_UP_ROUNDING=1 TRUNCATE_ROUNDING=2 ROUND_TO_NEAREST_ROUNDING=3 FINANCIAL_ROUNDING=4 TRUNCATE_BEFORE_DURATION_CALCULATION=5 Default value = 5. Can be configured in Product Catalog.
RTNG	MILLISECOND_ROUNDING_METHOD_2	1-5		Used when raw duration is > MILLISECOND_ROUNDING_THRESHOLD value. ROUND_UP_ROUNDING=1 TRUNCATE_ROUNDING=2 ROUND_TO_NEAREST_ROUNDING=3 FINANCIAL_ROUNDING=4 TRUNCATE_BEFORE_DURATION_CALCULATION=5 Default value = 5. Can be configured in Product Catalog.
RTNG	MILLISECOND_ROUNDING_THRESHOLD	0		Defines rounding threshold for both time and duration calculations for usage events. Can be configured in Product Catalog.
RTNG	MIN_TRANS	0	0	For Mobile ID Number translation; 0 = not enabled, 1 = enabled
RTNG	MTR_NEG_CREDIT	0	0	0 = Display bonus credit in MTR as positive; 1 = Display bonus credit in MTR as negative
RTNG	MTR_POSTPAID_MONITORY_BAL_RESETS	0		Indicator if the reset cyclic limit job is combined with non core exp job. 1 = YES (DEFAULT) 0-NOIndicator if the reset cyclic limit job generates MTR for postpaid monetary bals. 0 = NO
RTNG	MTR_SHADOW_BAL_RESETS	1	0	Indicator if the reset cyclic limit job generates MTR for shadows bals. 0 = NO (DEFAULT) 1 = YES
RTNG	MULTILANGUAGE	1	0	Multilanguage support for SMS and USSD notification and responses; (0 = Off, 1 = On
RTNG	MultiPartyCall	1	0	0 = off/disabled, 1 = on/enabled

Table 29 System Parameters (Continued)

Module	Parameter Name	Integer Value	Character Value	Description
RTNG	NEGATIVE_CHARGE	1	1	Determines whether subscriber gets credit for negative charge. 0 = NO, 1 = YES
RTNG	NESTED_ACCUMULATOR	0		Indicates if the service provider supports nested accumulators. O = NO, 1 = YES
RTNG	netw_call_fwd	1	0	For Network CallFwd 0 = off/disabled, 1 = on/enabled
RTNG	NONCORENULLBALS	1	1	Value of non-core balance of a subscriber created in the active state by HIA when not specified in the command line.; 1 = NULLS, 0 = COS values
RTNG	NP_Emt_Dft_Pfx	0		
RTNG	NP_Emt_Ip	0	0	IP address of EMT external number portability database server address
RTNG	NP_Emt_Port	0	0	Port number of EMT external number portability database server address
RTNG	NP_Emt_TimeOut	0	0	The time out value we are willing to wait for a number portability query
RTNG	NP_FFCHECK_ONNET	0	0	Check on-net to provide F&F tariff to on-net subscriber only. 0 = disabled, 1 = enabled. Default value is disabled.
RTNG	NP_INtrface_Typ	0	0	Default prefix will be used if the EMT external number portability database server is down
RTNG	NpEnabled	0	0	Globally enable. 1= disable, 0 = all NP functionality
RTNG	NpLookupAllMSC	0	0	Globally enables or disables NP lookup (but NOT redirection) even if the serving MSC is NOT on the MSC whitelist; 0 = disabled ,1 = enabled
RTNG	NpOrigBLookup	0	0	NP lookup of B-Number for originating calls
RTNG	NpOrigRedirect	0	0	NP redirection of B-Number for originating calls
RTNG	NpSmsMoBLookup	0	0	NP lookup of B-Number for mobile-to-mobile SMS
RTNG	NpSmsMtALookup	0	0	Np lookup of A-Number for application to mobile SMS
RTNG	NpTermALookup	0	0	NP lookup of A-Number for terminating calls

Table 29 System Parameters (Continued)

Module	Parameter Name	Integer Value	Character Value	Description
RTNG	NUM_ACCUMULATORS_FOR_MOST_SUB	7	7	Number of accumulators majority of subscriber has; (min = 0, max = 30)
RTNG	NUM_ALCS_FOR_MOST_SUB	5	5	Number of ALCSs majority of subscriber has; (Min = 0, Max = 10)
RTNG	NUM_BONUS_PLANS_FOR_MOST_SUB	7	7	Number of bonus plans majority of subscriber has;; (min = 0, max = 30)
RTNG	NUMBER_NORMALIZATION_METHOD	0	0	Indicates which method is used to normalize numbers. 0 = no method 1 = the patterns defined in Rating DB 2 = the number normalization script. Default value = no method.
RTNG	OCS_CDR	1	1	OCS CDR enable = 1; disable = 0
RTNG	OCS_ENABLED	1	1	Diameter OCS possible values; enable = 1, disable = 0;
RTNG	OCS_SUB_LOC		DIAMETER_A_DEFAULT	Diameter OCS default subscriber location
RTNG	ODD_ChargeId	5	5	Expected Range = 0~256
RTNG	ORP_ALWYS_CHARG	0	0	0 = OFF/disabled, 1 = ON/enabled; ON means ORP usage is charged regardless of the subscriber\222s current conditions even if this means a negative balance as a result
RTNG	ORP_CDR	1	1	Offline record process CDR. 0 = off/disabled, 1 = enabled for ORP CDR
RTNG	OSA_CDR	1	1	For OSA CDR; 0 = OFF/disabled, 1 = ON/enabled
RTNG	OSA_ENABLED	1	1	
RTNG	OSA_Sub_Lookup	0	0	0 = MSISDN based subscriber lookup for OSA, 1 = IMSI based subscriber lookup for OSA
RTNG	OTH_SYS_RECH	1	1	Other System Recharge Mode. 0 - Open Item, 1 - Balance Forward
RTNG	PMT_CDR	1	1	For PmtServer CDR; 0 = OFF/disabled, 1 = ON/enabled
RTNG	PMT_CDR_UNSUCC	0	0	0 = OFF, 1 = ON. Generate CDRs for unsuccessful attempts
RTNG	PMT_XML_4_PP	0	0	Send Payment XML for PrePaid Subscribers to FTS. 1=Yes; 0 = No

Table 29 System Parameters (Continued)

Module	Parameter Name	Integer Value	Character Value	Description
RTNG	PO_SWAP_NOTIF	0	0	Primary Offer change notification allowed. 0 = no, 1 = yes
RTNG	Post_NonPCO	3	3	Expected Range = 0~256
RTNG	POSTPD_BAL_MGMT	0	0	Postpaid balance management indicator. Determines if credit limit balance needs to be reset. 0 = Balance is NOT reset. 1 = Balance is reset.
RTNG	PP_MTR_CHGCD	1008	1008	Charge code for Promised Payment Reversal MTR
RTNG	PP_RECHG_CHGCD	1007	1007	Charge code for Promised Payment Recharge
RTNG	Pre_NonPCO	2	2	Expected Range = 0~256
RTNG	Pre_PCO	82	82	Expected Range = 0~256
RTNG	PreAnnSumCurBal	0	0	0 = Use core balance to compare with precall threshold, 1 = Use total currency balance to compare with precall threshold
RTNG	PREFIX_MNP_ENABLED	0	0	Indicates whether prefix-based number portability is supported. 0 = disabled, 1 = enabled. Default value is disabled.
RTNG	PSVR_AC_CG_TP	1	1	ECI apply charge charge type
RTNG	PSVR_AC_CH_CD			ECI apply charge charge code
RTNG	PSVR_AC_SV_CD			ECI apply charge service code
RTNG	PSVRCP_AC_BR_TP	11	11	PMTSVRCP apply charge bearer type
RTNG	PSVRCP_AC_CG_TP	1	1	Content provider apply charge charge type
RTNG	PSVRCP_AC_CH_CD			Content provider apply charge charge code
RTNG	PSVRCP_AC_SV_CD			Content provider apply charge service code
RTNG	REMOVE_OFFER_INST_OFFSET	0		Defines in days how long an inactive offer(and its accumulators/balances) will be kept before removed from Account/Subscriber definition
RTNG	REMOVE_TERMINATED_ SUBSCR_OFFSET	0	0	To support voucher currency conversion, 1 = ON/enabled, 0 = OFF/Disabled
RTNG	RESET_BAL_JOB_WITH_NON_ CORE_EXP	0	0	0 = keep emergency calls usage record 1 = discard emergency calls usage record
RTNG	RETRIEVE_DAYS	1	1	

Table 29 System Parameters (Continued)

Module	Parameter Name	Integer Value	Character Value	Description
RTNG	REVENU_REC_TYPE	1	1	Revenue recovery processing option; 0 = none, 1 = automatic internal, 2 = external
RTNG	REWARD_AMT_FLAG	0	0	Include RCT amount in the Accumulation along with Face Value. 0 = Face Value;, 1 = Face Value + RCT
RTNG	ROAMING_MSC_IDS			Miscellaneous roaming IDs
RTNG	Session_Logging	0	0	Session_Logging
RTNG	SKIP_DISC_GROSS_CHGS_CHECK	1		
RTNG	SMS_CDR	1	1	For SMS CDR; 0 = OFF/disabled, 1 = ON/enabled
RTNG	SPLIT_POSTPAID	0	0	0 = Disable the Split Recharge for Postpaid, 1 = Enable the Split Recharge for Postpaid
RTNG	SUSPEND_TO_ACTV	0	0	0 = Do not allow update from suspended to active without service fee, 1= Allow update from suspended to active without service fee
RTNG	SuspSubInfoPrmt	0	0	0 = disable/play regular InfoServAnnounc, 1 = enable/play suspendSub InfoServAnnounc
RTNG	TARIFF_DIGIT	7	4	Maximum number of internally supported tariff precision decimal places (N)
RTNG	TELEPHONE_PREFIX			A prefix used by ASU-IVRU to route a "TELEPHONE" type call to SLU
RTNG	UBP_NOTIF_AWARD	3	0	For UBP near awards; 0 = OFF/no notification, 1 = ON/award notification only, 3 = ON/award and near award notification
RTNG	UNIFIED_CARD_PREFIX			A prefix used by ASU-IVRU to route a "UNIFIED_CARD " type call to SLU
RTNG	USE_GLOBAL_USSD_RESPONSE	1		Flag used to send USSD message in sub language feature. 0=From offer-based USSD; 1=From Global table.
RTNG	USED_CARD_EVENT	1	1	0 = Disable/Event Generation for Used Recharge Card not supported,1 = Enable/Event Generation for Used Recharge Card Supported

Table 29 System Parameters (Continued)

Module	Parameter Name	Integer Value	Character Value	Description
RTNG	USSD_ANUM_TRANS		([0-9]+)$0	Regular expression for USSD A number translation, $0 is used
RTNG	USSD_BNUM_TRANS		^[0+]{1,2}([0-9]+)$0	Regular expression for USSD B number translation, $0 is used
RTNG	USSD_CALLBACK	0	0	For USSD callback: 0 = off/disabled, 1= on/enabled
RTNG	USSD_CDR	0	1	For USSD CDR;: 0 = OFF/disabled, 1 = ON/enabled
RTNG	ussd_flag	1	0	For ussd feature
RTNG	USSDCB_BNUM_LKP	0	0	USSD CB On/Off-net Validation functionality. B-number query will be performed if this feature is in effect. 0 = disabled, 1 = enabled. Default value is disabled.
RTNG	UUCODE	1	0	For UUEncoding: 0 = OFF/disable, 1 = ON/enable
RTNG	VOICE_CDR	1	1	For Voice CDR; 0 = OFF/disabled, 1 = ON/enabled
RTNG	VOUCHER_CONFIG_ LANGUAGE	1	0	The default value for face offset to be used in Non Voucher Recharge
RTNG	VPN_FLAG	1	1	This enables and disables the VPN feature. 0 = VPN disabled, 1 = VPN standard enabled Default value is enabled.
RTR	SAPI_UNITTEST_ACCTSEGID	0		AcctSegId when security is off
TAX	TRA_SWITCH	4		TAX TRA switch
URT	INC_EXC_GBL_LOC	0	0	0 = Do not Include external global location table. 1= Include external global location table

Index