

InfraRate Functionality

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1. INFRRATE

InfraRate is a service-neutral rating engine that delivers powerful and convergent real-time rating, ensuring rapid time-to-market of new products. InfraRate is a stand-alone product capable of handling today's multilayered, complex usage and content scenarios, giving providers the tools to achieve real revenue assurance.

The InfraRate usage and event processing system is the system's back-end rating engine. The InfraRate module is responsible for the ongoing rating of usage records according to the appropriate customer and service information. Multiple instances of InfraRate installed on the same server can run in parallel to different InfraCare databases.

InfraRate receives usage information from data collectors, gateways, mediation software and other carriers or systems, validates and formats the information, identifies the subscriber to be billed and rates the usage according to the subscriber's specific price plan. The process is audited and controlled for maximum efficiency and error handling.

InfraRate performs processing activities in near real time, easily keeping pace with the most intensive of throughput flows. The rating database runs on an RDBMS server to access the InfraRate database, thus optimizing processing performance.

1.1 PROCESSING PHASES

In an InfraRate session, UDRs pass through several InfraRate processing phases: Acquisition, Guiding, Rating, Loading and Insertion. After successfully completing Acquisition, Guiding and Rating, the UDRs are stored and sent in a batch to the Loading and Insertion phases. Only UDRs that successfully pass one phase will be processed to the next one.

The following diagram illustrates the data flow for the InfraRate processing phases:

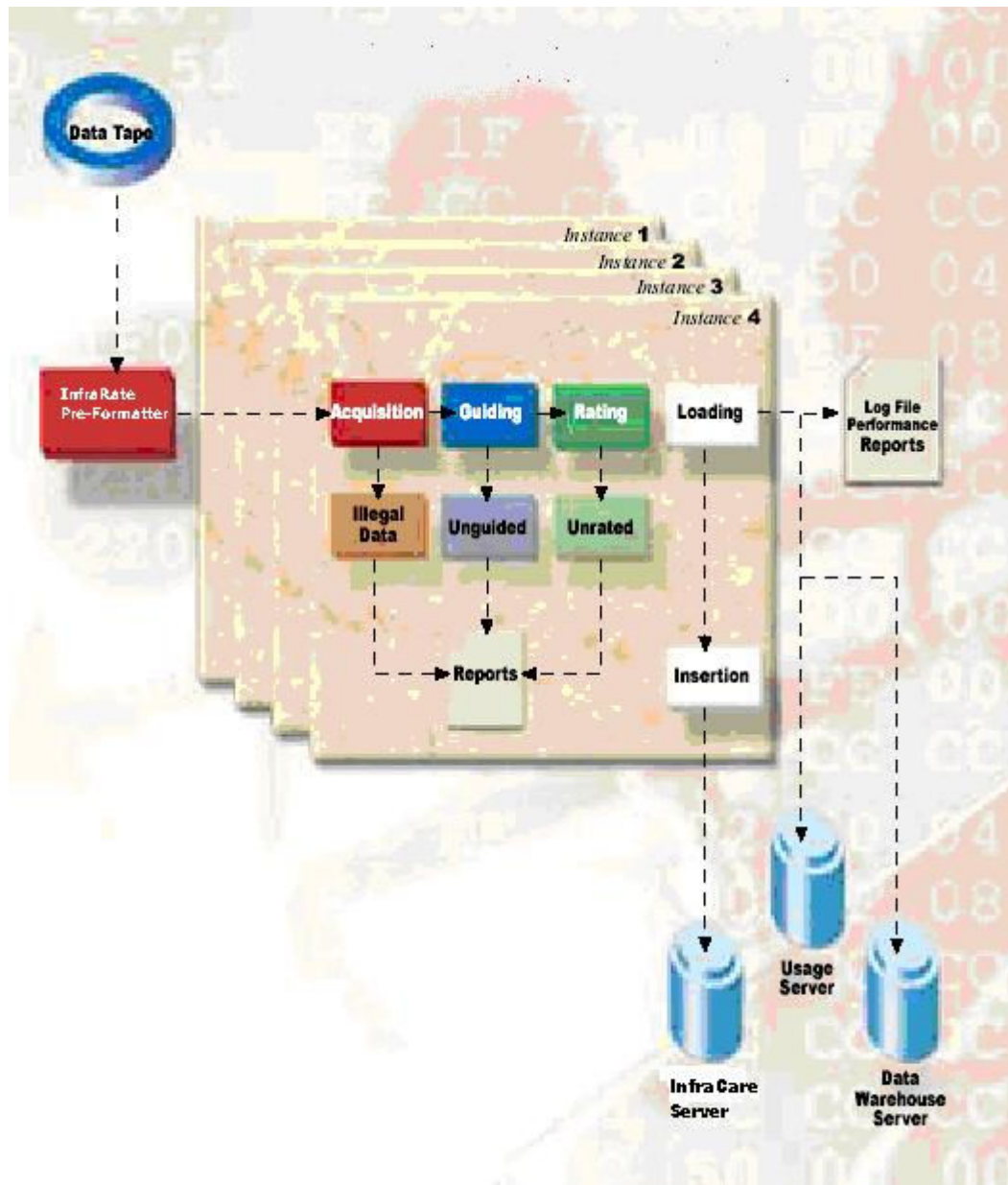


Figure 1: InfraRate Data Flow

1.1.1 ACQUISITION PHASE

The purpose of Acquisition is to read usage data (physical details of the UDR) from the external system (switch, log files), translate the buffer in a specific switch, and apply business rules.

Acquisition reads UDRs from various input channels, and validates and formats the records. This phase consists of stream interface and logical formatting. Acquisition is customized for every type of switch and usage in the system.

Acquisition includes the following operations:

- **Reading:** Incoming UDRs are read from various input channels.
- **Validation:** Record formats are automatically corrected where possible. Records that could not be read are offloaded to a backup directory to await re-input after the error condition is resolved.
- **Translation:** UDRs are translated into an InfraRate internal record format and stored in memory.
- **Duplicate Check:** UDRs are automatically checked for duplicates.

1.1.1.1 Reading

Acquisition reads incoming UDRs from various input channels – mediation software, data collectors, other carriers or systems. These are called data streams.

UDRs can be received in a wide variety of standard or non-standard formats from the originating mediation device or switch. The formats may be proprietary to the switch manufacturer (for example, Eriksson).

The protocol for transferring these UDRs may differ for each data stream. This enables standard flat files, FTP, RS232 and X.25 to be supported, as well as direct API calls to the data streaming receiving function.

A file mask can ensure that the processed UDRs conform to the expected UDR format, and that formats inappropriate to the current session are excluded from processing.

Note: This feature requires configuration.

1.1.1.2 Validation and Read Error Handling

Switches or collectors may record information incorrectly or with inconsistencies. UDRs that are read from different input sources must therefore be checked for errors, inconsistencies and missing information. Certain error conditions can be rectified immediately. More generally, erroneous records are offloaded to a backup directory. The backed up UDRs are not reread by the system. After the error condition is corrected (for example, the erroneous date/time filed is fixed), the records in the backup directory may be re-inputted into InfraRate for reprocessing.

Note: This feature requires configuration.

1.1.1.3 Duplicate Check

All UDRs and UDR files are checked for duplicates. InfraRate creates a key based on the key field for every UDR processed. The system checks for duplicate UDRs by checking the UDR read against the UDR key for previously processed UDRs. Duplicate UDRs are listed in a log and do not continue to the rating process.

1.1.2 GUIDING PHASE

Guiding is the InfraRate phase used to match the usage details to customers and rate plans contained in the database.

Guiding locates the information relevant to rating each UDR, and attaches the information to the individual usage records. It uses proxy information about resources, rate plans and customers, downloaded from the system's database and enables the handling of stored information offline. Guiding compares the information received in the usage record with the configuration information in the customer record (i.e., phone number, SIM card number). During the guiding process the tariff is identified using the service package defined for the using customer.

Guiding identifies the paying customer and the invoice to which the charge will be attributed.

Guiding looks up customer and rate plan information that was downloaded from the database. To ensure efficiency, the database is not directly involved in the lookup process. Rather, proxy files are used.

Guiding locates the following information for rating each UDR:

- Customer information for the resource user.
- Paying customer of the resource.
- Rate plan applied to the call. The rate plan is identified according to the rate plan defined in the paying customer's service package.

Guiding assigns UDRs to the appropriate bill period according to receipt date and customer billing properties. This provides effective cut-off control for revenue and expense recognition purposes.

UDRs that were previously guided can be re-guided to reflect changes in the system.

1.1.3 RATING PHASE

Rating calculates UDR charges according to the applicable customer rate plan, and adds these charges to individual UDRs. Rating calculates charges for airtime, toll time, and other applicable features for each UDR that successfully completes guiding. A separate calculation is made for each charge.

UDRs that were already successfully rated can be re-rated if they have been re-guided, or to reflect changes in rating tables.

UDRs that cannot be rated are placed in a file of unrated UDRs. InfraRate also creates an error log file listing rating errors. The error conditions can then be investigated and, if required, entries for resolving them made to the system.

After rating, post-rating modules can be used to perform further operations on the UDRs. For example, a post-rating module can be used to implement a localized call-based tax computation in a certain country. Taxes are calculated according to the tax rate of the originating call.

1.1.4 LOADING PHASE

Loading writes the billable UDRs with charges into the Fixed Usage Database table and summarizes them into temporary invoice details for further processing. After this phase, UDRs are available for customer service inquiries.

UDRs can be reloaded, overwriting the previously loaded UDRs in the Fixed Usage Database, to reflect changes due to re-guiding or re-rating. Alternatively, the Fixed Usage Database can be cleared and all UDRs can be loaded from scratch.

1.1.5 INSERTION PHASE

Insertion updates customer balances and pending invoice details. The detail records are then available for bill production or customer service inquiries. After the successful completion of this phase, the processed UDRs are available for bill production.

Other functions that can be triggered by Insertion include fraud detection activities and automatic requests for collection tasks according to credit limit.

1.2 RATING ENGINE

The rating engine is the heart of InfraRate. It converts UDR files to rated UDR files according to the rate plans in the rating database and the customers in the CRM database.

1.2.1 MODES

1.2.1.1 Regular Mode

InfraRate can be run manually in regular mode.

1.2.1.2 Process Automation Mode

In process automation mode, InfraRate can be configured to run at specific times or intervals.

1.2.2 ERROR LOGS

InfraRate produces detailed error logs for every phase in the rating process. The logs are produced in CSV format and contain detailed information that can be used to provide error resolution.

1.3 MONITOR

The InfraRate monitor is a Java-based application that is used to monitor InfraRate processing progress and statistics. The default monitoring measures the number of records processed and the time elapsed.

1.4 SCHEDULER

InfraRate includes a scheduler that allows InfraRate processes to be scheduled to run at specific times and intervals. The scheduler allows InfraRate to be run unattended at the optimum times to ensure the best possible performance.

1.5 RE-RATING AND ROLLBACK

The Re-rating module allows for fast and robust rollback and re-rating of usage and event records, enabling greater flexibility and control over business processes.

1.6 ABILITY TO RATE HIGH VOLUMES OF USAGE

One advantage of InfraRate is its ability to handle high volumes of usage in a short timeframe. On average, InfraRate can process over 100 million UDRs per day. Multiple instances of InfraRate can be run simultaneously, reducing processing time. Each instance of InfraRate is able to work on multiple processors in near real time to ensure maximum performance.

1.7 CONVERGENT RATING

InfraRate can rate any combination of products and services. Its service-neutral rating engine can process a high volume of usage records acquired from various external devices and gateways, handling simultaneous, multiple input streams, including the following services:

WIRELESS	UMTS, 3G, WAP, GSM, GPRS, Analog, Roaming
WIRESLINE VOICE	POTS, Long Distance, Premium Services, Prepaid, International
IP / DATA	ASP, X.25, Frame Relay, ATM, ISDN , xDSL, ISP, VoIP
VIDEO	Cable, Satellite, Pay-per-view, Video Conferencing, VDOoIP
UTILITIES	Gas, Electric, Water, Municipality services, Waste
VALUE-ADDED	Voice Mail, Firewall Management, Security Management Application Hosting, Web Hosting, IP VPN, Leasing

The system has the ability to rate usage and events; voice call records and data, including bytes, packets, circuit-switched minutes, and CIR (committed information rate).

2. INFRA RATE RATING MANAGEMENT

The InfraRate Rating Management module is used to configure customer rate plans.

2.1 MULTI-FEATURE RATING

InfraRate supports multi-feature rating. Rate plans can be based on several UDR fields. For example, if the UDR contains fields for QoS (Quality of Service), call duration, and call type, rate plans can be configured to include all of those fields in the workflow.

2.2 RATE PLAN MANAGEMENT

All of the rate plans that exist in the system are shown in the Rating Management window. Rate plans are easily managed through the Rating Management GUI.

2.2.1 CLONE RATE PLANS

In order to save time and simplify rate plans, the InfraRate Rating Management module enables the creation of a new rate plan by cloning an existing rate plan and updating the rate plans with the new rates.

2.2.2 RATE PLAN TYPES

InfraRate Rating Management supports various types of rate plans.

2.2.2.1 *Regular Rate Plans*

InfraRate supports normal rate plans based on usage charges to various destinations.

2.2.2.2 *Stepped Rate Plans*

InfraRate supports stepped rate plans based on units and time categories. See section **2.3 Rating Attributes** for more information.

2.2.3 RATE INTEGRITY CHECK

Rate Integrity Check (RIC) is a mechanism for validating rates by verifying different conditions. The RIC creates several reports in the InfraRate folder. Each report describes the type of check performed and the types of errors found.

RIC is able to find inconsistencies and errors regarding zones and countries, time categories, and unit categories.

2.3 RATING ATTRIBUTES

InfraRate Rating Management allows easy management of the different rating schemes used in a rate plan. InfraRate rates usage on the basis of time, zone, and unit. Times, zones, and units are fully configurable in the system. The flexibility to define time, zone, and unit is what makes InfraRate one of the most powerful rating engines on the market today.

2.3.1 FLEXIBLE TIME CATEGORIES

Rating Management enables the definition of different time categories, such as peak, off-peak, morning, weekends, etc. For each time category different rates can be applied. Examples of time categories are "Weekday prime", "Weekday evenings" and "Weekend". Schedules define the exact days and hours of the time category.

2.3.1.1 Changing Time Category

Changes in the time category may be traced during call rating. If a call overlaps two or more time categories, either the entire call may be rated according to the time category in which the call originated, or the rating of the call may be split according to multiple categories.

2.3.2 CONFIGURABLE ZONES

In addition to the time of day, rates can be based upon the destination. Zones are used to define similar usage destinations. All destinations in a zone have the same rate. In telephony rating, countries (based on their calling prefix) are linked to zones. Zones are groups of countries with the same rates. In non-telecom billing, zones can also be used to designate specific applications such as ASP software usage, WAP browsing and m-commerce applications. The mediation device will specify the zone and the correct rate will be applied.

After countries and zones are defined, countries can be assigned to zones. Calls can then be rated according to their corresponding origin and destination zones. It is possible to ensure a country code is not linked to more than one zone, if when defining zones the **Unlinked** option is used to display only countries that are not already linked.

2.3.2.1 Special Numbers

Zones can also be used to rate calls to special numbers, such as 800 or 900 calls.

2.3.3 VARIABLE UNITS

2.3.3.1 Unit Types

A unit type defines the measured units for any type of usage. This may be seconds, watts, bytes, etc., depending on the type of service being rated.

2.3.3.2 Flexible Unit Categories

Each unit category defines the steps in which usage can be rated. The Unit Category Attribute displays a list of unit categories for the current rate plan. Steps are defined as the number of units per time interval.

Categories are used to define the unit and increment used for rating. For example, to bill for the first 60 seconds of a call and then subsequently in 6 second intervals, two unit categories would need to be defined. The first category defines the billing for the first 60 seconds of usage. The second category defines subsequent units in six-second increments.

The Unit Category Attribute enables you to add new unit categories and to edit and delete selected unit categories.

2.3.4 ROUNDING

The rounding feature relates to the calculation of units during rating. A rounding option is chosen for each unit category defined. There are three options for rounding – Up, Down, or Equal.

2.3.5 INNOVATIVE RATES

Rates are defined in Rating Management, which defines usage rates for combinations of origin and destination zones, time categories, unit categories, and usage features.

The Rate Attribute enables the definition of the rates that will be applied for specified origin and destination zones, time categories, and unit categories.

New rates can be applied at a future date or become active immediately. Historical rate information is stored in the database.

2.3.5.1 Rate Items

Different rate items can be defined. Rate Items include surcharges, leg rates, setup fees, etc.

2.4 IMPORT AND EXPORTING

InfraRate enables rate plans to be imported and exported in XML format.

2.4.1 CONVERT UTILITY

InfraRate's Convert Utility application is used to convert rate files between CSV and XML formats.

2.4.2 SYNCHRONIZATION (TRANSFER) UTILITY

The Synchronization Utility updates the Customer Care database. This ensures that the rate plan information available to CSRs is the same as the information used by the rating engine.

2.5 RATING ITEM MANAGEMENT

Rating Management enables users to manage the various rating items in the system.

2.5.1 RATING ITEMS

With Rating Management, rating items can appear as chargeable details on an invoice and the relevant rates can be applied to the different items.

Further, Rating Management enables the addition of new rating items. After new rating items are added, rates can be applied to them in the Rate Attribute.

2.5.2 RATING LOOKUPS

The system enables the viewing and managing of the database lookup tables related to rating. Different items and names can easily be added and reconfigured. Multiple-languages are supported. Lookups are used to define items, zones, units, products, rate plan types, schedule types, and unit types.

2.6 CURRENCY EXCHANGE RATES

The system supports multiple currencies. Each currency can be defined with different types of rates, for example, representative, buy, sell, check, etc. These can be used to compute the different processes of transferring information from one rate to another.