# Oracle® Communications Billing and Revenue Management

## Implementing Roaming

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# Preface

This document provides information about rating roaming usage using Oracle Communications Billing and Revenue Management (BRM) TAP Roaming Manager.

## Audience

This document is intended for systems integrators, system administrators, database administrators, and other individuals who are responsible for maintaining BRM from release to release.

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# About Rating Roaming Events

This chapter provides an overview of rating roaming usage using Oracle Communications Billing and Revenue Management (BRM) TAP Roaming Manager.

## About Roaming

Roaming is the ability of a wireless network operator to provide services to mobile customers from another wireless network. For example, when a mobile customer makes a call from outside his home network, roaming allows him to access the same wireless services that he has with his home network provider through a visited wireless network operator.

A roaming agreement between the home network operator and the visited network operator defines the terms that enable each other's customers access to the wireless networks. The visited network operator records the activities performed by the roaming subscriber and then sends the call event details to the home network operator in the format agreed upon in the roaming agreement, usually Transferred Account Procedure (TAP) format. TAP is the process that allows a visited network operator to send call event detail records of roaming subscribers to their respective home network operators to be able to bill for the subscriber's roaming usage.

When the visited network operator sends a TAP file to the home network operator, after the initial TAP file is received, the home network operator expects more TAP files from the visited network operator.

If the visited network operator does not provide the TAP files for seven calendar days, the home network operator sends the Stop Return Returned Account Procedure (RAP) files to alert and notify the visited network operator that the TAP files have not been received for the last seven days.

> **Note:**
>
> The Stop Return RAP file is generated only if the home network operator has previously received, at a minimum, one TAP file from the visited network operator.

The Stop Return RAP file is generated every seven days, until a TAP file is received from the visited network operator.

The home network operator validates the data in the TAP files to ensure that it conforms to the TAP standard and to the terms of the roaming agreement. If the received TAP file contains any errors, the home network operator can reject the entire file or only the incorrect call event detail records. The incorrect file or records are returned to the visited network operator in a Returned Account Procedure (RAP) file.

RAP process is used to return rejected TAP files and records to the visited network operator for corrections. A RAP file contains the rejected TAP file or records and

additional data about the error, such as the error code or the error cause. The visited network operator corrects the errors and sends the corrected TAP file back to the home network operator.

The visited network operator bills the home network operator for the roaming subscriber's usage using a charge agreed upon in the roaming agreement. The home network operator settles the charges with the visited network operator as part of the *settlement process*.

The home network operator then aggregates the roaming charges and bills its own subscribers for their usage in the visited network.

TAP Roaming Manager supports TAP3 format. With TAP Roaming Manager, you can do the following:

- When your subscribers (*home subscribers*) make calls on another network, the other network operator rates their calls and sends you an invoice along with the call event details for the calls. You can charge your subscribers for their roaming usage, and settle the charges with the other network operator. In this case, you use TAP Roaming Manager to perform *incollect processing*. See "About Roaming Incollect Processing".
- When customers from another network (*visiting subscribers*) use your network, you can rate those calls. In this case, you use TAP Roaming Manager to perform *outcollect processing*. See "About Roaming Outcollect Processing".
- Use the settlement process to settle incollect and outcollect settlement. See "About Settling Roaming Charges".

# About Roaming Incollect Processing

You use roaming incollect processing to process TAP files that you receive from visited network operators. When your subscribers roam on a visited wireless network, the visited network operator records any activities that your subscribers perform on the visited network and sends you a TAP file describing your subscribers' call details and the charges for these activities.

Roaming incollect processing involves:

- Validating information in the TAP files to make sure there are no errors and all required call detail information is present. See "About Validating Roaming Usage Data".
- Rating or repricing the call event detail records in the TAP files so that you can bill your subscribers for their roaming usage. See "About Repricing Roaming Usage Events".
- Handling errors in TAP files and sending them back to the visited network for corrections. See "About Handling Rejected TAP Files".
- Performing settlement activities for your subscribers' roaming charges you received from the visited network operator. See "About Settling Roaming Charges".
- Generating the Stop Return RAP files and sending them to the visited network operators who have not provided the TAP files for seven calendar days. See "About Generating Stop Return RAP Files" for more information.

## About Validating Roaming Usage Data

Validation of roaming usage data involves validating the TAP file and information in the call event detail records to ensure they conform to the GSM TD 57 specifications and to the terms of the roaming agreement. This includes:

- Checking for correct syntax.
- Checking that all mandatory fields are present and contain the correct data.
- Verifying batch information such as total charges and total number of records.
- Checking that the files are received in the correct order.

To validate the TAP file, the following types of validations are performed:

- **TAP3 fatal error validation**

  TAP3 fatal error validation is performed first to ensure all required data is present and valid. For example, if the TAP file is missing a required block, the entire file is rejected and written to a RAP file.

- **TAP3 severe error validation**

  TAP3 severe error validation is performed if fatal error validation is successful. TAP records are validated to check for incorrect or missing reference data or content. For example, if a TAP record is missing a required field, the record is rejected and written to a RAP file, but all other TAP records in the file are processed.

## About Repricing Roaming Usage Events

When your subscribers use a roaming partner's network to access wireless services, the roaming partner network operator tracks their activities and rates the usage based on rates agreed upon in the roaming agreement between you and your roaming partner. Call event details received from your roaming partner network operators normally contain a charge for your subscribers' roaming usage based on this charge. This charge, referred to as the *incollect roaming charge*, is what you owe your roaming partner for your subscribers' usage of their wireless network.

You can choose to accept the charges passed in by your roaming partner and use them to bill your subscribers or you can reprice or mark up the records based on your subscribers' roaming subscription package or retail charge.

Repricing includes a combination of prerating, rating, post-rating, discounting, and recycling activities. The rated records are then loaded into the subscriber's account in the BRM database to impact the subscriber's account balance.

## About Generating Stop Return RAP Files

You use the Stop RAP Generator pipeline to generate Stop Return RAP files.

> **Note:**
>
> Ensure that you set up the Stop RAP Generator pipeline to generate Stop Return RAP files. See "Configuring the Stop RAP Generator Pipeline" for more information.

To generate Stop Return RAP files, use the Stop RAP Generator pipeline in conjunction with the **StopRapGen** utility. The **StopRapGen** utility collects the information required by the Stop RAP Generator pipeline to generate the Stop Return RAP files. Therefore, ensure that the output directory of the flat file generated by the **StopRapGen** utility is the same as the input directory for the Stop RAP Generator pipeline.

When you run the **StopRapGen** utility in conjunction with the Stop RAP Generator pipeline, Stop Return RAP files are created for the following:

- TAP files that were received by BRM and stored in the database more than seven days ago
- Stop Return RAP files that were sent more than seven days ago to the visited network operator

Additionally, the timestamp for when the Stop Return RAP file was sent is updated in the database.

# About Roaming Outcollect Processing

You use roaming outcollect processing to track and rate activities of subscribers from other wireless networks that roam on your network. Outcollect processing allows you to rate the visiting subscribers' roaming usage using InterCarrier Tariff rates and generate TAP files consisting of the visiting subscriber's call event detail records, which you send to your roaming partners along with an invoice to bill them for their subscribers' roaming usage.

Roaming outcollect processing involves:

- Splitting the call detail records (CDRs) from home subscribers and visiting subscribers. See "About Splitting Home CDRs from Visiting Subscribers' CDRs".
- Rating the visiting subscribers' roaming CDRs using InterCarrier Tariff rates specified in the roaming agreements and generating TAP files for each roaming partner. See "About Rating Visiting Subscribers' Roaming CDRs".
- Handling errors in TAP files returned back to you from your roaming partner for corrections. See "About Handling Rejected TAP Files".
- Performing settlement activities for charges accrued by the visiting subscribers on your network. See "About Settling Roaming Charges".

## About Splitting Home CDRs from Visiting Subscribers' CDRs

Some CDRs that you receive from the network switches are generated by your subscribers and some by visiting subscribers. The splitting process analyzes the CDRs and splits them into separate streams so that they can be rated by the appropriate rating pipeline.

- The rating pipeline processes the CDRs generated by your own subscribers.
- The outcollect rating pipeline processes the CDRs generated by visiting subscribers.

## About Rating Visiting Subscribers' Roaming CDRs

The outcollect rating process rates the visiting subscribers' roaming CDRs based on the InterCarrier Tariff rates agreed upon between you and your roaming partners in the respective roaming agreements. This charge, referred to as the *outcollect roaming charge*, is what your roaming partner owes you for their subscribers' usage of your wireless network.

If your roaming partners find errors in the TAP files, they reject the file or records and send them back to you in a RAP file for corrections.

# About Handling Rejected TAP Files

TAP files are validated by roaming partner network operators to ensure the data in the files are correct. TAP files and records that are rejected are sent to a RAP file.

- When you send TAP files with visiting subscribers' call event detail records to your roaming partner, your roaming partner generates RAP files consisting of the TAP files or call event detail records with errors and sends them back to you for corrections. RAP files received from your roaming partners are processed during outcollect processing.
- When your roaming partner sends you TAP files with your subscribers' call event detail records, you generate RAP files consisting of the TAP files or call event detail records with errors and send them back to your roaming partner for corrections. RAP files to be sent to your roaming partners are generated during incollect processing.

RAP files are generated according to the GSM TD 32 specifications and includes information such as the receiving network operator of the RAP file; an error code indicating a *fatal*, *severe*, or *missing* error; the rejected TAP file or call event detail records; and the RAP file sequence number.

The RAP file error code is determined as follows:

- If there are errors in the TAP file, a fatal error RAP file is created consisting of the TAP file.
- If the TAP file has a sequence number that is greater than the one expected, a missing error RAP file is created indicating the missing files.
- If there are errors in the TAP records, a severe error RAP file is created consisting of only the rejected records.

# About Settling Roaming Charges

Roaming partner network operators bill each other for the roaming activities of their subscribers using a process known as *settlement*. Two activities occur during settlement:

- Your roaming partner network operators bill you for your subscribers' usage of their wireless network. This is referred to as *incollect settlement*.

- You bill your roaming partner network operators for their subscribers' usage of your wireless network. This is referred to as *outcollect settlement*.

Settlement events are not rated during the settlement process; instead, the event balance impacts are loaded into the BRM database for settlement.

For each roaming partner network operator, a network operator account is created in the Pipeline Manager database and a corresponding roaming partner account is created in the BRM database. The network operator configuration in the Pipeline Manager database stores product offering information used to rate and reprice roaming events. The roaming partner account in the BRM database stores the incollect and outcollect settlement balance impacts used to bill the accounts.

When you run billing, for each roaming partner account, BRM billing opcodes read the settlement data and generate a bill for the total incollect charge amount (what you owe) and another bill for the total outcollect charge amount (what they owe). The amount that you owe your roaming partner network operator is the difference between the two.

# About Near Real-Time Roaming Data Exchange and Roaming Fraud Detection

Near Real-Time Roaming Data Exchange (NRTRDE) is the exchange of roaming usage data between roaming partners in near real time. Exchanging roaming usage data in near real time enables network operators to monitor roaming usages frequently and to detect any fraudulent behavior and take necessary actions to minimize revenue loss. For example, network operators may decide to deny or limit access to subscribers that have exceeded their daily usage threshold (fraud limit).

You can set up Pipeline Manager for generating roaming usage data for NRTRDE. Once you have set up Pipeline Manager as required, you can run roaming NRTRDE reports. See "Detecting Roaming Fraud Using NRTRDE " for more information.

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# About Settling Roaming Charges

This chapter describes how settlement events for roaming charges are created and managed in Oracle Communications Billing and Revenue Management (BRM).

Before reading this document, you should be familiar with:

- How home subscribers' roaming usage is processed. See "About Processing Home Subscribers' Roaming Usage".
- How visiting subscribers' roaming usage is processed. See "About Processing Visiting Subscribers' Roaming Usage".

## About Settlement Events

The settlement process creates settlement events with incollect roaming charges and outcollect roaming charges.

The settlement process stores incollect and outcollect settlement event records as individual events in the BRM database. This provides the following advantages:

- It gives you the ability to include the event details along with the aggregated total roaming charges when you bill or invoice your roaming partner network operators.
- It gives you the ability to generate reports based on the information stored in the settlement events.
- It gives you the ability to audit and analyze the event data and generate financial reports.

When you run billing, BRM billing opcodes read the settlement event data and generate a bill for the total incollect charge amount (what you owe) and another bill for the total outcollect charge amount (what they owe). The amount that you owe your roaming partner network operator is the difference between the two.

## How Settlement Events Are Created

Settlement events are created and used to bill and settle charges with your roaming partners.

### How Settlement Events for Incollect Roaming Charges Are Created

Using the information in the validation pipeline output file, the incollect settlement pipeline creates settlement events that are loaded into the BRM database and used to settle charges with your roaming partners.

The incollect settlement pipeline processes the input file as follows:

- The input module maps the contents of the file into an EDR container. For each EDR, it creates a DETAIL.ASS_ROAMING_EXT block and populates the SENDER and RECIPIENT fields. The sender is the network carrier (roaming

partner) sending the TAP file and the recipient is the network carrier receiving the TAP file. Information stored in this block is used later by the pipeline to identify the roaming partner account information in the BRM database.

- The ISC_ConsolidatedCP module removes all non '00' impact_category charge packets.

  The TAP input grammar creates individual charge packets as well as consolidated charge packets. However, the FCT_BillingRecord module considers all charge packets for creating balance packets. For this reason, the individual charge packets (non ‘00' impact category charge packets) are removed and only consolidated charge packets are considered so that the balance amounts in the balance packets are correct.

  This module also assigns the G/L Id to each consolidated charge packet based on the GL_CODE registry entry.

- The FCT_ServiceCode module maps external service codes to internal service codes.

  The FCT_ServiceCode module maps all external service codes to **/service/roaming/settlement/incollect** in the BRM database.

- The FCT_Account module uses the network operator account information in the pipeline in-memory cache to lookup the BRM account and associates the EDR with the BRM account and enriches the EDR with information related to the account service, charge offer, and bill. For information about setting up network operator accounts, see "Defining Roaming Partner Accounts in the BRM Database".

- The FCT_ItemAssign module assigns the bill item associated with the roaming partner account's incollect service to the EDR.

- The FCT_ExchangeRate module converts the charge amount in the charge packets, which is usually in SDR currency, to the subscriber's billing currency.

- The FCT_BillingRecord module creates the balance impact information from the charge amount provided in the EDR and associates this impact to the bill item. Balance impact information will contain the resource name, charge amount, bill item, and service information.

After the EDRs are enriched, the FCT_EnhancedSplitting module routes the EDRs to GPRS and GSM output streams. You use RE Loader to load the events into the BRM database. See "How Settlement Events Impact Roaming Partner Account Balance".

If there is any error in the settlement pipeline, the entire input file is suspended. See "About Handling Suspended Settlement Events".

## How Settlement Events for Outcollect Roaming Charges Are Created

Using the information in the outcollect TAP files, the outcollect settlement pipeline creates settlement events that are loaded into the BRM database and used for billing your roaming partners.

The outcollect settlement pipeline processes the outcollect TAP file as follows:

- The input module converts the outcollect TAP file back to EDR format and maps the TAP data to staging fields in the EDR container by using TAP input grammar.

- The ISC_TAP_0312_InMap module maps the data in the staging fields to business fields in the EDR container. For each EDR, it creates a

DETAIL.ASS_ROAMING_EXT block and populates the SENDER and RECIPIENT fields - The sender is the network carrier sending the TAP file and the recipient is the network carrier (roaming partner) receiving the TAP file. Information stored in this block is used later by the pipeline to identify the roaming partner account information in the BRM database.

- The ISC_ConsolidatedCP module removes all non '00' impact_category charge packets.

  The TAP input grammar creates individual charge packets as well as consolidated charge packets. However, the FCT_BillingRecord module considers all charge packets for creating balance packets. For this reason, the individual charge packets (non ‘00' impact category charge packets) are removed and only consolidated charge packets are considered so that the balance amounts in the balance packets are correct.

  This module also assigns the G/L Id to each consolidated charge packet based on the GL_CODE registry entry.

- The FCT_ServiceCode module maps external service codes to internal service codes.

  The FCT_ServiceCode module maps all external service codes to the **/service/roaming/settlement/outcollect** in the BRM database.

- The FCT_Account module uses the network operator account information in the pipeline in-memory cache to lookup the BRM account and associates the EDR with the BRM account and enriches the EDR with information related to the account service, charge offer, and bill. For information about setting up network operator accounts, see "Defining Roaming Partner Accounts in the BRM Database".

- The FCT_ItemAssign module assigns the bill item associated with the roaming partner account's outcollect service to the EDR.

- The FCT_ExchangeRate module converts the charge amount in the charge packets to SDR currency.

- The FCT_BillingRecord module creates the balance impact information from the charge amount provided in the EDR and associates this impact to the bill item. Balance impact information will contain the resource name, charge amount, bill item, and service information.

After the EDRs are enriched, the FCT_EnhancedSplitting module routes the EDRs to GPRS and GSM output streams. You use RE Loader to load the events into the BRM database. See "About Loading Settlement Events into the BRM Database".

If there is any error in the settlement pipeline, the entire outcollect TAP file is suspended. See "About Handling Suspended Settlement Events".

After the settlement pipeline has successfully processed the outcollect TAP file, it generates a corresponding TAP Header Information file that stores lookup information. TAP files maintain a Lookup Directory for some items in the callEventDetails block, that specifies the item value.

For example, a callEventDetail specifies callEventStartTimeStamp by using two fields: LocalTimeStamp and UtcTimeOffsetCode. UtcTimeOffsetCode is a numeric code that points to the NetworkInfo->UtcTimeOffsetInfo entry in the Lookup Directory that specifies UtcTimeOffset value.

Any required lookup information such as UTC Time Offsets is written to the TAP Header Information file. This lookup information is later used by the RAP processing pipeline to reconstruct and reprocess the rejected TAP records. Based on the constructed rejected TAP records, the RAP processing pipeline generates the corresponding settlement backout record. See "About Processing Rejected Outcollect TAP Files and Records".

# How Settlement Events Impact Roaming Partner Account Balance

Each roaming partner account in the BRM database is configured with two charge offers, one for incollect settlement and another for outcollect settlement: for example, RoamingIncollect and RoamingOutcollect. The **/service/settlement/roaming/incollect** service is selected for the RoamingIncollect charge offer and **/service/settlement/roaming/outcollect** service is selected for the RoamingOutcollect charge offer. Each charge offer is assigned a separate balance group and the balance groups are assigned separate bill units.

When incollect settlement events are loaded into the database, they are associated with the **/service/settlement/roaming/incollect** service and impact the bill unit for this service. The outcollect settlement events are associated with the **/service/settlement/roaming/outcollect** service and impact the bill unit for this service.

# About Loading Settlement Events into the BRM Database

The incollect and outcollect settlement pipelines send settlement events to separate output streams based on the event type. The output files are generated using the RE Loader output grammar. RE Loader reads the output file and loads each event as an object into the BRM database.

For example, the GSM events are loaded into the **/event/delayed/session/telco/gsm/roaming** object and the GPRS events are loaded into the **/event/delayed/session/telco/gprs/roaming** object.

The event object contains the roaming partner account and billing information.

Incollect settlement events are stored against the **/service/settlement/roaming/incollect** service object of the roaming partner account. As a result, all charges for incollect roaming events impact the roaming partner's bill unit associated with the **/service/settlement/roaming/incollect** service.

Outcollect settlement events are stored against the **/service/settlement/roaming/outcollect** service object of the roaming partner account. As a result, all charges for outcollect roaming events impact the roaming partner's bill unit associated with the **/service/settlement/roaming/outcollect** service.

For outcollect settlement events, RE Loader also creates a statistical record using the outcollect TAP file and stores the record in the **/batch/rel** object. This record contains the file name, sequence number in the header of the file, number of events in the file, and other information. Each **/event/delayed/session/telco/gsm/roaming** and **/event/delayed/session/telco/gprs/roaming** object created from the output file includes a link to the **/batch/rel** object. The information stored in the **/batch/rel** object is used to back out balance impacts of TAP records during RAP file processing.

After the events are loaded into the BRM database, you can run BRM billing to generate invoices and to settle the roaming charges with your roaming partners.

To configure RE Loader, see "Configuring Rated Event Loader to Load Settlement Events into the BRM Database".

# About Handling Suspended Settlement Events

It is possible for processing errors to occur in the settlement pipeline; for example, when the pipeline fails to associate the EDR with a roaming partner account.

The ISC_RollbackSettlement module checks for errors in the EDR. When there is an error, it notifies the Transaction Manager (TAM) to roll back the transactions in the settlement pipeline. The TAM then notifies the FCT_BatchSuspense module to suspend the entire input file. FCT_BatchSuspense creates a batch file that contains the input file name, location of the file, reason code specifying the reason the file was suspended, pipeline name specifying the pipeline that suspended the file, and the EDRs in the input file. This file is loaded into the BRM database by using SB Loader.

Using Suspense Management Center, you can query the suspended file and resubmit the file for processing. When the Pipeline Manager receives the resubmit request, the DAT_ResubmitBatch module routes the file back to the settlement pipeline that originally suspended the file for processing again.

To configure Suspense Manager for settlement, see:

- Configuring Suspense Manager for the Incollect Settlement Pipeline
- Configuring Suspense Manager for the Outcollect Settlement Pipeline

# About Validating the Bill Amount

You can perform a charge check on the TAP files received from your roaming partner network operators to validate them against the charges in the appropriate roaming agreement.

After incollect settlement events have been loaded into the BRM database, you can run billing, which will generate a bill for the incollect roaming charges. Use the information on this bill to validate the invoices issued by your roaming partner network operators.

# 3

# About Processing Home Subscribers' Roaming Usage

This chapter describes the roaming incollect process in Oracle Communications Billing and Revenue Management (BRM) for rating home subscribers' roaming usage.

## Understanding Roaming Incollect Architecture and Process Flow

You use roaming incollect processing to process TAP files that contain call event detail records (TAP records) for all roaming activities performed by your subscribers on your roaming partners' networks. The incollect process architecture primarily consists of the validation, reprice, and settlement pipelines. These pipelines perform the following tasks:

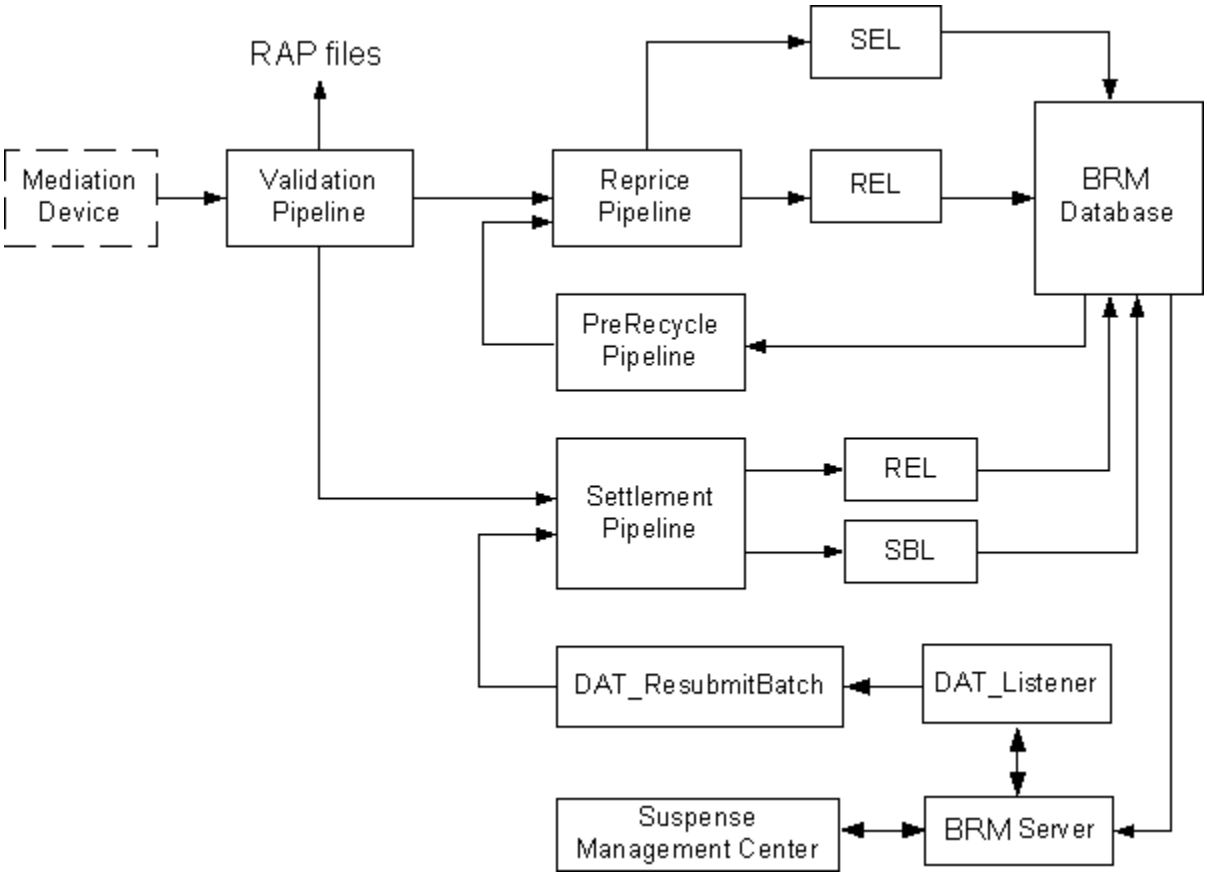
- The validation pipeline performs fatal error and severe error validations of the data in the incoming TAP files according to the GSM TD 57 standards.

  > **Note:**
  >
  > In the roaming registry file (*Pipeline_home***/conf/roaming.reg**, where *Pipeline_home* is the directory where Pipeline Manager is installed), the name of the validation pipeline is *TAPInProcessing*.

- The reprice pipeline rates the call event detail records in the TAP files using your subscriber's roaming package. The rated events are loaded into the BRM database and impact the subscriber's account balance.
- The settlement pipeline creates settlement events by associating the rated roaming usage events with the roaming partner accounts in the BRM database. The settlement events are loaded into the BRM database and impact your roaming partner's account balance.
- The Stop RAP Generator pipeline generates the Stop Return RAP files required to be sent to the visited network operator. The Stop Return RAP files sent to the visited network operator are loaded into the database.

Figure 3-1 depicts a high-level overview of the roaming incollect process architecture:

**Figure 3-1 Roaming Incollect Process Architecture**




As Figure 3-1 illustrates, incoming TAP files are handled during the incollect process as follows:

1. The validation pipeline converts the TAP records in the TAP files into event data record (EDR) format and performs fatal error and severe error validations of the TAP file. For each file, one of the following actions is taken:
   - If a fatal error validation failure occurs, the entire TAP file is rejected, and a fatal error RAP file is created.
   - If a severe error validation failure occurs, only those records that fail are rejected, and a severe error RAP file is created.
   - If the TAP file has a sequence number greater than the one expected, a missing error RAP file is created and the TAP file is processed.
   - TAP records that pass validation are sent to an output file. A copy of the output file is sent to the reprice and settlement pipelines for further processing.

   See "How Roaming Usage Data Is Validated" for more information.
2. The reprice pipeline processes the validation pipeline output file and rates the roaming usage events using the subscriber's roaming package. Rated events are loaded into the BRM database by RE Loader.

   If the reprice pipeline fails to rate an event, the event is suspended and loaded into the BRM database using Suspended Event (SE) Loader. Using Suspense

Management Center, the suspended events can be corrected and recycled to the reprice pipeline to be rated again.

See "About Charging Your Subscribers for Their Roaming Usage" for more information.

3. The settlement pipeline processes the validation output file and creates settlement events by associating the rated events with the roaming partner account in the BRM database. Settlement events are then loaded into the BRM database by RE Loader.

   If the settlement pipeline fails to create settlement events for any record, the pipeline rejects all the records in the file and the entire file is suspended and loaded into the BRM database. The suspended file can be corrected and recycled back to the settlement pipeline by using Suspense Manager.

   See "How Settlement Events for Incollect Roaming Charges Are Created" for more information.

4. The Stop RAP Generator pipeline collects information on the incoming TAP files using the **StopRapGen** utility and generates the Stop Return RAP files to be sent to those visited network operators who have not provided the TAP files in seven days. The Stop Return RAP files sent to the visited network operator are loaded into the database by the UpdateTapInfo_StopRapout iScript.

   See "About Generating Stop Return RAP Files" for more information.

For detailed information on configuring incollect processing, see "Setting Up Pipeline Manager for Roaming Incollect Processing".

# How Roaming Usage Data Is Validated

The validation pipeline processes TAP files as follows:

- TAP records are converted to event data record (EDR) format.

  The INP_GenericStream module provides the input interface to the validation pipeline using the TAP input grammar file. The input grammar converts call event detail records in TAP files to the internal EDR format and maps all call event detail fields (including mandatory, conditional, and optional fields) into staging fields in the EDR container.

- The sequence number of the incoming TAP file is validated to identify any duplicate or missing TAP files.

  Each TAP file is assigned an individual sequence number by the roaming partner from which the file originates. If the sequence number of the TAP file received is greater than the one expected, a missing error RAP file is created indicating the missing files.

  The Sequence Checker is an instance of the Sequencer module that validates the sequence number of the incoming TAP file for each roaming partner to identify duplicate or missing files. Using Pricing Center or Pipeline Configuration Center (PCC), you define a single instance of the Sequence Checker with multiple sequences. Each sequence corresponds to a roaming partner. You define each sequence by specifying a sequence key that is the same as the Sender ID (the roaming partner sending the file). Depending upon the roaming partner who sent the TAP file, the Sequence Checker selects the sequence based on the sequence key to validate the sequence number of the incoming TAP file.

- Data in the TAP file is validated.

The ISC_TAP_0312_Validations module performs fatal error and severe error validations. Severe error validation is performed only if fatal error validation was successful. It ensures that all the required blocks in the file and all the required fields in the call event details are present.

When it detects a fatal error, the ISC_TAP_0312_Validations module rejects the file and creates a fatal error RAP file and demands that the Transaction Manager (TAM) roll back all transactions and restore the original input file and the state of all the modules in the pipeline to how they were prior to starting the transaction.

> **Note:**
>
> In Pipeline Manager, any module that maintains a state has to register itself with the TAM. When a module demands that the TAM roll back transactions, the TAM then notifies all the registered modules to roll back their state.

When it detects a severe error, the ISC_TAP_0312_Validations module rejects the record and adds the error to the TAP Error Record block in the EDR container. See "About Validation Error Codes".

> **Note:**
>
> - Only call event detail records with errors are rejected; remaining call event detail records in the TAP file are processed normally.
> - By default, the validation pipeline does not check for duplicate call event detail records. If you need to perform duplicate checks for the roaming records, you can configure the FCT_DuplicateCheck module to perform duplicate checks.

- Data in the staging fields is mapped to the business fields in the EDR container.

  The ISC_TAP_0312_InMap module maps the data in the staging fields to business fields in the EDR container. Data from the **batchControlInfo**, **accountingInfo**, **networkInfo** blocks in the TAP file is mapped to the header record. Data from the **auditControlInfo** block of the TAP file is mapped to the trailer record. Data from the **callEventDetails** block in the TAP file is mapped to detail records.

- Rejected records are sent to the reject output stream.

  The FCT_Reject module evaluates the errors in the EDR container and sends rejected EDRs to the reject output stream. The reject output stream generates a severe error RAP file using RAP output grammar.

- Valid records are written to an output file for further processing by the reprice and settlement pipelines.

  The OUT_GenericStream module uses standard output grammar (BRM SOL42) to write valid EDRs to an output file.

  The output file created by OUT_GenericStream is sent to the reprice and the settlement pipelines simultaneously. This is done by using the Event Handler. When the output file is ready, the validation pipeline notifies the Event Handler

by sending it the EVT_OUTPUT_FILE_READY event. Upon receiving this event notification, the Event Handler launches the **move_incollect_roam.pl** script to copy the output file to the input directory of the reprice pipeline. When the copy is complete, the Event Handler moves the original output file to the input directory of the settlement pipeline.

For information about configuring the validation pipeline, see "Configuring the Validation Pipeline".

# About Validation Error Codes

When a TAP file validation failure occurs, Pipeline Manager reports an error code and a description of the error. The error codes are categorized as fatal (ERR_TAP3_FATAL), severe (ERR_TAP3_SEVERE), or warning (ERR_TAP3_WARNING). The description of the error includes the TAP field name, TAP field numeric ID, TD 57 error code, and a description of the failure.

The following is an example of a fatal validation error:

Pipeline Error Name:

```
ERR_TAP3_FATAL
```

Pipeline Error Description:

```
TAP Field Name: AccountingInfo, TAP Field Id: 15, TAP Error: 30, No Taxation
group present and batch contains taxes.
```

# TAP Validations That Are Not Supported

The ISC_TAP_0312_Validations module does not support all the TAP validations. For instance:

- Syntax error validations on Integer fields that are handled by the parser.
- Validations based on the roaming agreements.
- Validations that are not possible due to pipeline architecture limitations.

The following tables list the validations that are not performed by the ISC_TAP_0312_Validations module. You can implement these validations by writing your own custom iScript or by adding these validations to the ISC_TAP_0312_Validations module.

## Syntax Error Validations on Integer Fields

Table 3-1 lists the syntax error validations on integer fields. These validations are not supported.

**Table 3-1 Syntax Error Validations on Integer Fields**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| Action Code | 10 | SS | Severe | Syntax error. |
| Advised Charge | 10 | CONTENT | Severe | Syntax error. |
| Bearer Service Code | 10 | MOC, MTC | Severe | Syntax error. |
| Bearer Service Code | 11 | SS | Warning | Syntax error. |

**Table 3-1 (Cont.) Syntax Error Validations on Integer Fields**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| Call Event Details Count | 10 | AUDIT | Fatal | Syntax error. |
| Call Reference | 10 | MOC, MTC, SS, LCS | Severe | Syntax error. |
| Call Type Level 1 | 10 | MOC, GPRS | Severe | Syntax error. |
| Call Type Level 2 | 10 | MOC, GPRS | Severe | Syntax error. |
| Call Type Level 3 | 10 | MOC, GPRS | Severe | Syntax error. |
| Called Place | 10 | MOC | Warning | Syntax error. |
| Called Region | 10 | MOC | Warning | Syntax error. |
| CAMEL Invocation Fee | 10 | MOC, MTC, GPRS | Severe | Syntax error. |
| CAMEL Service Key | 10 | MOC, MTC, GPRS | Warning | Syntax error. |
| CAMEL Service Level | 10 | MOC, MTC, GPRS | Severe | Syntax error. |
| Cause For Termination | 10 | MOC, MTC, GPRS | Severe | Syntax error. |
| Cell Identity | 10 | MOC, MTC, SS, GPRS | Warning | Syntax error. |
| Charge | 10 | CALLS | Severe | Syntax error. |
| Charge Refund Indicator | 10 | CONTENT | Severe | Syntax error. |
| Chargeable Units | 10 | CALLS | Severe | Syntax error. |
| Charged Party Id Type | 10 | CONTENT | Severe | Syntax error. |
| Charged Party Status | 10 | SCU | Severe | Syntax error. |
| Charged Units | 10 | CALLS | Warning | Syntax error. |
| Charging ID | 10 | GPRS | Severe | Syntax error. |
| CLIR Status Indicator | 10 | MOC, MTC, SCU | Warning | Syntax error. |
| Commission | 10 | CONTENT | Severe | Syntax error. |
| Content Charging Point | 10 | CONTENT | Severe | Syntax error and more than one timestamp present within Content Transaction Basic Info. |
| Content Charging Point | 11 | CONTENT | Warning | Syntax error and only one timestamp present within Content Transaction Basic Info. |
| Content Provider Id Type | 10 | CONTENT | Warning | Syntax error. |
| Content Provider Id Type | 11 | LCS | Severe | Syntax error. |
| Content Provider Identifier | 10 | CONTENT | Warning | Syntax error. |
| Content Provider Name | 10 | CONTENT | Severe | Syntax error. |
| Content Transaction Code | 10 | CONTENT | Severe | Syntax error. |
| Content Transaction Type | 10 | CONTENT | Severe | Syntax error. |
| CSE Information | 10 | CALLS | Warning | Syntax error. |
| Customer Id Type | 10 | LCS | Severe | Syntax error. |
| Data Volume Incoming | 10 | GPRS, CONTENT | Severe | Syntax error. |
| Data Volume Outgoing | 10 | GPRS, CONTENT | Severe | Syntax error. |

**Table 3-1 (Cont.) Syntax Error Validations on Integer Fields**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| Default Call Handling Indicator | 10 | MOC, MTC, GPRS | Warning | Syntax error. |
| Discount Code | 10 | CALLS | Severe | Syntax error. |
| Discount Code | 11 | ACCTNG | Fatal | Syntax error. |
| Discount Rate | 10 | ACCTNG | Fatal | Syntax error. |
| Discount Value | 10 | CALLS | Severe | Syntax error. |
| Discountable Amount | 10 | CALLS | Severe | Syntax error. |
| Equipment Id | 10 | CONTENT | Warning | Syntax error. |
| Equipment Id Type | 10 | CONTENT, LCS | Warning | Syntax error. |
| Exchange Rate | 10 | ACCTNG | Fatal | Syntax error. |
| Exchange Rate Code | 10 | ACCTNG | Fatal | Syntax error. |
| Exchange Rate Code | 11 | CALLS | Severe | Syntax error. |
| Fixed Discount Value | 10 | ACCTNG | Fatal | Syntax error. |
| Fixed Network User Rate | 10 | MOC, MTC | Warning | Syntax error. |
| Home Id Type | 10 | CONTENT, LCS | Severe | Syntax error. |
| Home Identifier | 10 | CONTENT | Severe | Syntax error. |
| Home Location Description | 10 | CALLS | Warning | Syntax error. |
| IMS Signalling Context | 10 | GPRS | Severe | Syntax error. |
| ISP Id Type | 10 | CONTENT | Warning | Syntax error. |
| ISP Identifier | 10 | CONTENT | Warning | Syntax error. |
| Location Area Code | 10 | MOC, MTC, SS, GPRS | Warning | Syntax error. |
| Location Area Code | 10 | MOC, MTC, SS, GPRS | Warning | Syntax error. |
| Location Id Type | 10 | CONTENT | Warning | Syntax error. |
| Location Id Type | 10 | CONTENT | Warning | Syntax error. |
| Location Identifier | 10 | CONTENT | Warning | Syntax error. |
| Message Description | 10 | MESS DESC | Warning | Syntax error. |
| Message Description Code | 10 | MESS DESC, SCU | Warning | Syntax error. |
| Message Status | 10 | SCU | Severe | Syntax error. |
| Message Type | 10 | SCU | Severe | Syntax error. |
| Network Id Type | 10 | CONTENT | Warning | Syntax error. |
| Network Init. PDP Context | 10 | GPRS | Severe | Syntax error. |
| Number Of Decimal Places | 10 | ACCTNG | Fatal | Syntax error. |
| Object Type | 10 | CONTENT | Severe | Syntax error. |
| Paid Indicator | 10 | CONTENT | Severe | Syntax error. |

**Table 3-1 (Cont.) Syntax Error Validations on Integer Fields**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| Payment Method | 10 | CONTENT | Warning | Syntax error. |
| Priority Code | 10 | SCU | Severe | Syntax error. |
| Release Version Number | 10 | NOTIFICTN, BTCH CTRL | Fatal | Syntax error. |
| Serving Location Description | 10 | MOC, MTC, SS, GPRS | Severe | Syntax error. |
| SMS Destination Number | 10 | MOC | Severe | Syntax error. |
| SMS Originator | 10 | MTC | Warning | Syntax error. |
| Specification Version Number | 10 | NOTIFICTN, BTCH CTRL | Fatal | Syntax error. |
| TAP Decimal Places | 10 | ACCTNG | Fatal | Syntax error. |
| Tax Rate Code | 10 | ACCTNG | Fatal | Syntax error. |
| Tax Rate Code | 11 | CALLS | Severe | Syntax error. |
| Tax Value | 10 | CALLS | Severe | Syntax error. |
| Taxable Amount | 10 | CALLS | Severe | Syntax error. |
| Total Advised Charge | 10 | AUDIT | Fatal | Syntax error. |
| Total Advised Charge Refund | 10 | AUDIT | Fatal | Syntax error. |
| Total Call Event Duration | 10 | MOC, MTC, GPRS | Severe | Syntax error. |
| Total Charge | 10 | AUDIT | Fatal | Syntax error. |
| Total Charge Refund | 10 | AUDIT | Fatal | Syntax error. |
| Total Commission | 10 | AUDIT | Fatal | Syntax error. |
| Total Commission Refund | 10 | AUDIT | Fatal | Syntax error. |
| Total Data Volume | 10 | CONTENT | Severe | Syntax error. |
| Total Discount Refund | 10 | AUDIT | Fatal | Syntax error. |
| Total Discount Value | 10 | AUDIT | Fatal | Syntax error. |
| Total Tax Refund | 10 | AUDIT | Fatal | Syntax error. |
| Total Tax Value | 10 | AUDIT | Fatal | Syntax error. |
| Total Transaction Duration | 10 | CONTENT | Severe | Syntax error. |
| Transaction Authorisation Code | 10 | CONTENT | Warning | Syntax error. |
| Transaction Description Suppression | 10 | CONTENT | Warning | Syntax error. |
| Transaction Detail Description | 10 | CONTENT | Warning | Syntax error. |
| Transaction Identifier | 10 | CONTENT | Severe | Syntax error. |
| Transaction Short Description | 10 | CONTENT | Warning | Syntax error. |
| Transaction Status | 10 | CONTENT | Severe | Syntax error. |

**Table 3-1 (Cont.) Syntax Error Validations on Integer Fields**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| Transparency Indicator | 10 | MOC, MTC | Severe | Syntax error. |
| User Protocol Indicator | 10 | MOC, MTC | Severe | Syntax error. |
| UTC Time Offset Code | 10 | NETWORK | Fatal | Syntax error. |
| UTC Time Offset Code | 11 | CALLS | Severe | Syntax error. |

## Out-of-Range Validations on Date Fields

Table 3-2 lists the out-of-range validations on date fields. These validations are not supported.

**Table 3-2 Out-of-Range Validations on Date Fields**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| Actual Delivery Timestamp | 20 | CONTENT | Severe | Value out of range and timestamp referenced as Charging Point. |
| Actual Delivery Timestamp | 21 | CONTENT | Warning | Value out of range and timestamp not referenced as Charging Point. |
| Call Event Start Timestamp | 20 | MOC, MTC, GPRS | Severe | Value out of range. |
| Charge Detail Timestamp | 20 | CALLS | Severe | Value out of range. |
| Charging Timestamp | 20 | CALLS | Severe | Value out of range. |
| Completion Timestamp | 20 | SCU | Warning | Value out of range and charging point is 'D'. |
| Completion Timestamp | 21 | SCU | Severe | Value out of range and charging point is 'C' |
| Deposit Timestamp | 20 | SCU | Warning | Value out of range and charging point is 'C'. |
| Deposit Timestamp | 21 | SCU | Severe | Value out of range and charging point is 'D'. |
| Earliest Call Timestamp | 20 | AUDIT | Warning | Value out of range. |
| File Available Timestamp | 20 | BTCH CTRL | Fatal | Value out of range. |
| File Available Timestamp | 21 | NOTIFICTN | Warning | Value out of range. |
| File Creation Timestamp | 20 | NOTIFICTN, BTCH CTRL | Warning | Value out of range. |
| Latest Call Timestamp | 20 | AUDIT | Warning | Value out of range. |
| Order Placed Timestamp | 20 | CONTENT | Severe | Value out of range and timestamp referenced as Charging Point. |
| Order Placed Timestamp | 21 | CONTENT | Warning | Value out of range and timestamp not referenced as Charging Point. |

**Table 3-2 (Cont.) Out-of-Range Validations on Date Fields**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| PDP Context Start Timestamp | 20 | GPRS | Warning | Value out of range. |
| Requested Delivery Timestamp | 20 | CONTENT | Severe | Value out of range and timestamp referenced as Charging Point. |
| Requested Delivery Timestamp | 21 | CONTENT | Warning | Value out of range and timestamp not referenced as Charging Point. |
| Transfer Cut Off Timestamp | 20 | BTCH CTRL | Fatal | Value out of range. |

## Validations Involving Bilateral Agreement

Table 3-3 lists the validations involving bilateral agreement. These validations are not supported.

**Table 3-3 Validations Involving Bilateral Agreement**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| Accounting Information | 33 | TFBATCH | Fatal | Item TAP Currency not present and currency other than SDR specified in roaming agreement. |
| AUDIT Control Information | 36 | TFBATCH | Fatal | Item Total Tax Refund present and use of Content Transaction not bilaterally agreed. |
| AUDIT Control Information | 37 | TFBATCH | Fatal | Item Total Discount Refund present and use of Content Transaction not bilaterally agreed. |
| AUDIT Control Information | 38 | TFBATCH | Fatal | Group Total Advised Charge Value present and use of Content Transaction not bilaterally agreed. |
| Call Event Details | 32 | TFBATCH | Severe | Service Centre Usage present although not agreed bilaterally. |
| Call Event Details | 34 | TFBATCH | Severe | Content Transaction present although not agreed bilaterally. |
| Call Event Details | 35 | TFBATCH | Severe | GPRS Call present although not agreed bilaterally. |
| Call Event Details | 36 | TFBATCH | Severe | Location Service present although not agreed bilaterally |
| CAMEL Invocation Fee | 200 | MOC, MTC, GPRS | Severe | CAMEL Invocation Fee not in line with roaming agreement |
| CAMEL Service Used | 41 | MOC, MTC, GPRS | Severe | Tax Information missing within the group and CAMEL Invocation Fee is greater than zero and taxation is expected according to roaming agreement. |
| CAMEL Service Used | 42 | MOC, MTC, GPRS | Severe | Tax Information present within the group but not expected in accordance with roaming agreement for the call/event and Tax Value referenced within the group is greater than zero. |

**Table 3-3 (Cont.) Validations Involving Bilateral Agreement**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| CAMEL Service Used | 43 | MOC, MTC, GPRS | Warning | Tax Information present within the group but not expected in accordance with roaming agreement for the call/event and Tax Value referenced within the group is not greater than zero. |
| Charge | 100 | CALLS | Severe | Charge not in line with roaming agreement. |
| Charge Information | 34 | CALLS | Severe | Group Tax Information missing within group but expected in accordance with roaming agreement for that particular call. Tax Information group missing must be interpreted as Tax Value zero. |
| Charge Information | 35 | CALLS | Severe | Group Discount Information missing within group but expected in accordance with roaming agreement. |
| Charge Information | 38 | MOC, MTC | Severe | Breakout of Charge Types AIR (01) and/or TOLL (03) not present on a duration based charge, but expected in accordance with roaming agreement; i.e., only Charge Type 00 present within group. This validation rule can be applied only where bilaterally agreed between Sender and Recipient. |
| Charge Information | 39 | MOC, MTC | Severe | In accordance with roaming agreement, charges are defined in individual Charge Types, but the Charge for Charge Type 00 does not equal sum of Charges for the other Charge Types as stated within roaming agreement. This validation rule can be applied only where bilaterally agreed between Sender and Recipient. |
| Charge Information | 40 | CALLS | Severe | Group Tax Information present within group but not expected in accordance with roaming agreement for the call/event and Tax Value referenced within the group is greater than 0 (zero). |
| Charge Information | 41 | CALLS | Warning | Group Tax Information present within group but not expected in accordance with roaming agreement for the call/event and Tax Value referenced within the group is not greater than 0 (zero). |
| Chargeable Subscriber | 32 | MOC, MTC, SS, GPRS | Severe | MSISDN missing within group but expected in accordance with roaming agreement. |
| Charged Party Identifier | 200 | CONTENT | Severe | Item is an IMSI of a known network operator and initial characters are different from the network operator's MCC + MNC, or not as bilaterally agreed. |
| Customer Identifier | 200 | LCS | Severe | Item is an IMSI of a known network operator and initial characters are different from the network operator's MCC + MNC, or not as bilaterally agreed |
| Discount Code | 200 | CALLS | Severe | Referenced discount is not in line with roaming agreement. |
| Discountable Amount | 22 | CALLS | Severe | Discountable Amount is not in line with roaming agreement. |

**Table 3-3 (Cont.) Validations Involving Bilateral Agreement**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| Geographical Location | 31 | MOC, MTC, SS, GPRS | Severe | Serving BID missing within group but expected in accordance with roaming agreement. |
| Geographical Location | 32 | MOC, MTC, SS, GPRS | Severe | Serving Location Description missing within group but expected in accordance with roaming agreement |
| IMSI | 200 | CALLS | Severe | First characters are different from home operators MCC + MNC, or not as bilaterally agreed (e.g., if the recipient has not been allocated a MCC and MNC). |
| Location Information | 31 | MOC, MTC, SS, GPRS | Severe | Group Geographical Information missing but Serving BID expected in accordance with roaming agreement.This validation rule can be applied only where bilaterally agreed between Sender and Recipient. |
| Location Information | 32 | MOC, MTC, SS, GPRS | Severe | Group Geographical Information missing but Serving Location Description expected in accordance with roaming agreement.This validation rule can be applied only where bilaterally agreed between Sender and Recipient. |
| MSISDN | 10 | MOC, MTC, SS, GPRS | Warning | Syntax error and item MSISDN not expected in accordance with roaming agreement. |
| MSISDN | 20 | MOC, MTC, SS, GPRS | Warning | Number not represented in international format and MSISDN not expected in accordance with roaming agreement. |
| Operator Specific Information | 30 | ALL | Warning | Item is present without bilateral agreement |
| SCU Charge Type | 32 | SCU | Severe | Item Distance Charge Band Code missing within group and distance defined as a pricing parameter within SMS bilateral agreement. |
| Serving Network | 20 | MOC, MTC, SS, SCU, GPRS | Severe | Value out of range, i.e. it is neither a TADIG PMN Code nor a bilaterally agreed value. |
| TAP Currency | 200 | ACCTNG | Fatal | TAP Currency not in line with bilateral agreement. |
| Tax Rate Code | 200 | CALLS | Severe | The referenced Tax Rate is not in line with the roaming agreement at the corresponding call date. Note that, where variable tax rates apply to the call/event the exact validation of the tax rate may not be possible and, therefore, cannot be carried out. |
| Tax Value | 200 | CALLS | Severe | Tax Value is not in line with the roaming agreement at the corresponding call event date. |
| Taxable Amount | 100 | CALLS | Severe | Taxable Amount not in line with roaming agreement. |

## Validations that Require Additional Component Involvement

Table 3-4 lists the validations that require additional component involvement. These validations are not supported.

**Table 3-4 Validations that Require Additional Component Involvement**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| Actual Delivery Timestamp | 200 | CONTENT | Severe | Actual Delivery Timestamp before the commercial roaming start date for the specific service and the TAP file is not a test file and the timestamp is referenced as the Charging Point. |
| Batch Control Information | 37 | TFBATCH | Warning | File Sequence Number previously received and rejected with fatal error, therefore RAP File Sequence Number expected but not present. |
| Batch Control Information | 40 | TFBATCH | Warning | RAP File Sequence Number present although File Sequence Number has not previously been rejected with a fatal error (e.g. previously missing or new files). |
| Call Event Start Timestamp | 200 | MOC, MTC, GPRS | Severe | Call Event Start Timestamp before the commercial roaming start date for the specific network service and the TAP file is not a test file |
| Call Type Level 1 | 102 | MOC, GPRS | Severe | Item not specified according to how the call has been priced (as verified against the Sender's IOT). |
| Call Type Level 2 | 100 | MOC, GPRS | Severe | Item not specified according to how the call has been priced (as verified against the Sender's IOT). |
| Call Type Level 3 | 100 | MOC, GPRS | Severe | Item not specified according to how the call has been priced (as verified against the Sender's IOT). |
| Charging Timestamp | 200 | SS, LCS | Severe | Charging Timestamp before the commercial roaming start date for the specific service and the TAP file is not a test file. |
| Completion Timestamp | 200 | SCU | Severe | Completion Timestamp before the commercial roaming start date for the specific service and the TAP file is not a test file. |
| Content Transaction Basic Info | 31 | CONTENT | Severe | Item RAP File Sequence Number missing and Content Transaction previously received and rejected. |
| Content Transaction Basic Info | 32 | CONTENT | Warning | Item RAP File Sequence Number present and Content Transaction not previously received and rejected. |
| Content Transaction Basic Info | 33 | CONTENT | Warning | Item RAP File Sequence Number present and TAP transfer batch being resubmitted as corrected (having been previously rejected with fatal error). |
| Deposit Timestamp | 200 | SCU | Severe | Deposit Timestamp before the commercial roaming start date for the specific service and the TAP file is not a test file. |
| Exchange Rate | 200 | ACCTNG | Fatal | Exchange Rate less than expected and referenced by one or more Call Event Details. |
| Exchange Rate Code | 202 | CALLS | Warning | The Exchange Rate referenced by Exchange Rate Code in Call Event Details is greater than expected. |
| File Sequence Number | 200 | NOTIFICTN, BTCH CTRL | Warning | File sequence number of the received file is greater than that expected. |
| File Sequence Number | 201 | NOTIFICTN, BTCH CTRL | Fatal | File sequence number of the received file has already been received and successfully processed and the file is not a copy of the original file. |

**Table 3-4 (Cont.) Validations that Require Additional Component Involvement**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| GPRS Basic Call Information | 31 | GPRS | Severe | GPRS Call is being resubmitted and RAP File Sequence Number is missing within group. |
| GPRS Basic Call Information | 38 | GPRS | Warning | Item RAP File Sequence Number present and TAP transfer batch being resubmitted as corrected (having been previously rejected with fatal error). |
| GPRS Basic Call Information | 41 | GPRS | Warning | Item RAP File Sequence Number present and call not previously received and rejected. |
| Location Service | 32 | LCS | Severe | Item RAP File Sequence Number missing and Location Service previously received and rejected. |
| Location Service | 33 | LCS | Warning | Item RAP File Sequence Number present and Location Service not previously received and rejected. |
| Location Service | 34 | LCS | Warning | Item RAP File Sequence Number present and TAP transfer batch being resubmitted as corrected (having been previously rejected with fatal error). |
| MO Basic Call Information | 33 | MOC | Severe | Item RAP File Sequence Number missing and call previously received and rejected. |
| MO Basic Call Information | 34 | MOC | Warning | Item RAP File Sequence Number present and call not previously received and rejected. |
| MO Basic Call Information | 36 | MOC | Warning | Item RAP File Sequence Number present and TAP transfer batch being resubmitted as corrected (having been previously rejected with fatal error). |
| MT Basic Call Information | 33 | MTC | Severe | Item RAP File Sequence Number missing and call previously received and rejected. |
| MT Basic Call Information | 34 | MTC | Warning | Item RAP File Sequence Number present and call not previously received and rejected. |
| MT Basic Call Information | 35 | MTC | Warning | Item RAP File Sequence Number present and TAP transfer batch being resubmitted as corrected (having been previously rejected with fatal error). |
| Notification | 37 | | Warning | File Sequence Number previously received and rejected with fatal error, therefore RAP File Sequence Number expected but not present. |
| Notification | 38 | | Warning | RAP File Sequence Number present although File Sequence Number has not previously been rejected with a fatal error (e.g. previously missing or new files). |
| Order Placed Timestamp | 200 | CONTENT | Severe | Order Placed Timestamp before the commercial roaming start date for the specific service and the TAP file is not a test file. |
| Requested Delivery Timestamp | 200 | CONTENT | Severe | Requested Delivery Timestamp before the commercial roaming start date for the specific service and the TAP file is not a test file. |
| Service Centre Usage | 31 | SCU | Severe | Item RAP File Sequence Number missing and SCU previously received and rejected. |
| Service Centre Usage | 32 | SCU | Warning | Item RAP File Sequence Number present and SCU not previously received and rejected. |

**Table 3-4 (Cont.) Validations that Require Additional Component Involvement**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| Service Centre Usage | 37 | SCU | Warning | Item RAP File Sequence Number present and TAP transfer batch being resubmitted as corrected (having been previously rejected with fatal error). |
| Supplementary Service Event | 31 | SS | Severe | Item RAP File Sequence Number missing and SS previously received and rejected. |
| Supplementary Service Event | 32 | SS | Warning | Item RAP File Sequence Number present and SS not previously received and rejected. |
| Supplementary Service Event | 35 | SS | Warning | Item RAP File Sequence Number present and TAP transfer batch being resubmitted as corrected (having been previously rejected with fatal error). |
| Supplementary Service Used | 101 | SS | Severe | Invalid or non transferable Supplementary Service Code and Action code combination present within group. |

## Other Validations that Are not Supported

Table 3-5 lists other validations that are not supported.

**Table 3-5 Other Validations that Are not Supported**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| CAMEL Invocation Fee | 201 | MOC, MTC, GPRS | Severe | CAMEL Invocation Fee is greater than 0 (zero) and CAMEL call not expected. |
| CAMEL Service Used | 31 | MOC | Severe | CAMEL Destination Number missing within group although number was modified by CAMEL (logical group 3G CAMEL Destination). |
| CAMEL Service Used | 37 | GPRS | Severe | Group GPRS Destination missing within group although APN was modified by CAMEL (logical group 3G CAMEL Destination). |
| Charged Party Identifier | 10 | CONTENT | Severe | Syntax error. |
| Charged Party Identifier | 20 | CONTENT | Severe | Value out of range and item is a MSISDN. |
| Customer Identifier | 20 | LCS | Severe | Value out of range and item is a MSISDN. |
| Destination Network | 10 | SCU, MOC | Warning | Syntax error. |
| Destination Network | 20 | SCU, MOC | Warning | Value out of range. |
| Dialled Digits | 20 | MOC | Severe | Value out of range. |
| Discount Value | 22 | CALLS | Severe | Where the associated Discount Code relates to a Discount Rate, the Discount Value does not correspond to the Discountable Amount and Discount Rate. |

**Table 3-5 (Cont.) Other Validations that Are not Supported**

| TAP Field | Error Code | Traffic Type | Severity | Description |
|---|---|---|---|---|
| Distance Charge Band Code | 20 | SCU | Severe | Value out of range. |
| Equipment Id | 100 | CONTENT, LCS | Warning | Item content does not match Equipment Id Type. |
| ESN | 10 | MOC, MTC, SS, GPRS | Warning | Syntax error. |
| ESN | 20 | MOC, MTC, SS, GPRS | Warning | Value out of range. |
| GPRS Call | 200 | GPRS | Warning | Number of GPRS partials received exceeds limit defined by BARG in BA.12. |
| Home BID | 10 | CALLS | Warning | Syntax error. |
| Home BID | 20 | CALLS | Warning | Value out of range. |
| IMEI | 10 | MOC, MTC, SS, GPRS | Warning | Syntax error. |
| IMEI | 20 | MOC, MTC, SS, GPRS | Warning | Value out of range. |
| IMSI | 10 | CALLS | Severe | Syntax error. |
| IMSI | 20 | CALLS | Severe | Value out of range. |
| MDN | 10 | MOC, MTC, SS, GPRS | Warning | Syntax error. |
| MDN | 20 | MOC, MTC, SS, GPRS | Warning | Value out of range. |
| MIN | 20 | CALLS | Severe | Value out of range. |
| Network Access Identifier | 20 | GPRS | Severe | Value out of range. |
| Originating Network | 10 | MTC, SCU | Warning | Syntax error. |
| Originating Network | 20 | MTC, SCU | Warning | Value out of range. |
| Serving BID | 20 | MOC, MTC, SS, GPRS | Severe | Value out of range. |
| Serving BID | 21 | MOC, MTC, SS, GPRS | Severe | Value not assigned to Sender. |
| Supplementary Service Parameters | 10 | SS | Warning | Syntax error. |
| Supplementary Service Parameters | 20 | SS | Warning | Value out of range. |
| Tax Value | 22 | CALLS | Severe | Where the associated Tax Rate Code relates to a Tax Rate, the Tax Value does not correspond to the Taxable Amount (or Charge where no Taxable Amount present) and Tax Rate. |

## Transmitting TAP Files to the Validation Pipeline

When you receive TAP files from a clearing house or your roaming partner, you must put the files in the input directory of the validation pipeline for the pipeline to process them. If your mediation system does not automatically place the TAP files in this directory, you can configure a Batch Controller and write a custom Batch Handler to move the TAP files to the validation pipeline input directory.

# About Charging Your Subscribers for Their Roaming Usage

Normally, the call event detail records in a TAP file contains the roaming charge and the calculated tax amount that your roaming partner passes to you after having rated your subscribers' usage based on the agreement between you and your roaming partner.

To bill your subscribers for their roaming charges, you can choose to accept the charges and the tax amount passed in by your roaming partner and use them to bill your subscribers or you can reprice or mark up the roaming EDRs based on your subscribers' roaming subscription package or retail charge. See "Charging Your Subscribers for Their Roaming Usage".

To specify whether or not to apply the tax amount, you set the taxation flag in the roaming partner's account configuration. See "Choosing Whether to Apply Taxes for Roaming".

To rate the call event detail records, the reprice pipeline uses the same modules as the rating pipeline. For the list of modules used by the reprice pipeline, see "Configuring Reprice Pipeline Function Modules".

If the reprice pipeline is unable to process or rate the record due to errors such as incorrect rating configuration, the record is suspended and recycled using Suspense Manager. See "Processing EDRs Suspended by the Reprice Pipeline".

When the final charge calculation is complete, the IRL_EventTypeSplitting iRule routes the records to separate output streams based on the service type; for example, GSM and GPRS. The output module writes the records to an output file by using the RE Loader output grammar.

RE Loader reads the output file and loads each event into the BRM database. For instance, the GSM events are loaded into the **/event/delayed/session/telco/gsm** object and the GPRS events are loaded into the **/event/delayed/session/telco/gprs** object.

The event objects contain all data related to the event including your subscriber's rating and billing information and are associated with the **/service/telco/gsm** object, for GSM records, and **/service/telco/gprs** object, for GPRS records, of the subscriber's account. After the event objects are loaded into the database, you can run BRM billing to bill your subscribers for their roaming usage.

## Charging Your Subscribers for Their Roaming Usage

You can rerate the incollect data to bill your own subscribers for roaming usage. To do this, choose one of the following methods:

- **Passthrough rating**

The rated events delivered from other network operator costs are passed through to your retail billing system without being rated by you. This means that you assume the rating carried out by the other operator is correct.

- **Markup adding**

  A specified value is added to the wholesale charge delivered by another network operator. The markup can be an absolute value, such as $1.00, or a percentage, such as 15%. Markup adding is usually performed after having applied a tariff check and validated the rated events from another network operator.

- **Complete rating**

  The events are rated by using your pipeline configuration.

## Processing EDRs Suspended by the Reprice Pipeline

If the reprice pipeline is unable to rate an EDR, it sets the error in the EDR and suspends it. The FCT_Reject module evaluates the error and routes the EDR to the suspense output stream as specified by the **RejectStream** pipeline registry entry.

Using SE Loader, you load the suspended EDRs into the BRM database. Using Suspense Management Center, you can query the suspended events and make the necessary corrections. After the corrections are made, you can recycle the events for processing.

When Pipeline Manager receives the recycle request, the INP_Recycle module retrieves the suspended records from the BRM database and routes the events to the pre-recycle pipeline. The pre-recycle pipeline converts the suspended events back to EDR format and sends the EDRs back to the reprice pipeline for rating.

## Choosing Whether to Apply Taxes for Roaming

Your roaming partners will rate your subscribers' roaming usage and also calculate and apply the tax amount. You can choose whether or not to pass this tax charge on to your subscribers. You do this by setting the taxation flag in the network operator configuration. For more information, see "About Setting Up Network Operator Accounts".

During incollect processing, the DAT_InterConnect module retrieves the taxation flag value for each network operator from the Pipeline Manager database and stores this information in the in-memory cache.

When processing the EDRs, the ISC_ApplyTax module retrieves the PLMN ID for the network operator and passes this ID to the DAT_InterConnect module to get the taxation flag value for the network operator from the in-memory cache. If the taxation flag is set to **on**, the tax amount is passed to the subscriber; otherwise, the tax amount is ignored.

## About Processing Your Subscribers' Prepaid Roaming Charges

The TAP file may contain postpaid roaming activities in addition to the prepaid activities.

Postpaid records are processed by the reprice pipeline, to be repriced based on your subscriber's roaming subscription package, and by the settlement pipeline, for financial settlement with your roaming partner.

Unlike postpaid roaming activities, prepaid roaming activities are processed in real time. When a subscriber makes a prepaid call, the visited network operator sends the call data to the home network operator in real time. The home network operator rates the call and applies the balance impact in real time. The visited network operator also sends the roaming charges for the prepaid service to the home network operator in the TAP file.

Prepaid roaming activities are represented as CAMEL records in the TAP file. CAMEL records are processed by the settlement pipeline for financial settlement with your roaming partner. The settlement pipeline associates the CAMEL records with the roaming partner account and creates settlement records that are loaded into the BRM database.

> **Note:**
>
> By default, CAMEL records are also passed to the reprice pipeline even though it is prepaid and may not need repricing. This provides you the flexibility of how you want to process CAMEL records. For example, using custom iScripts, you may want to update CAMEL records to have zero balance, or you can choose to remove the records so that they are not processed by the reprice pipeline at all.

For more information about settling roaming charges, see "About Settling Roaming Charges".

## About Repricing Optimally Routed Calls

Optimal call routing provides for seamless routing of calls. For example, suppose a mobile subscriber A has established mobile service with network operator X, and mobile subscriber B has mobile service with network operator Y in different service areas. In this case, calls between subscriber A and subscriber B are long-distance calls. However, when one subscriber is in the service area of the other, the call is routed locally.

If a call is optimally routed, the **Destination Network** field is set in the TAP file. The TAP mapping iScript maps the destination network into the DETAIL.DESTINATION_NETWORK field in the EDR container.

When the EDR is processed in the reprice pipeline, you can verify the roaming charges for optimally routed calls and reprice them. You can do this by using a custom iScript or by defining price models to reprice the call based on the value defined in the destination network field and use model selector to choose the proper price model at the time of repricing.

4

# About Processing Visiting Subscribers' Roaming Usage

This chapter describes the roaming outcollect process in Oracle Communications Billing and Revenue Management (BRM) for rating visiting subscribers' roaming usage.

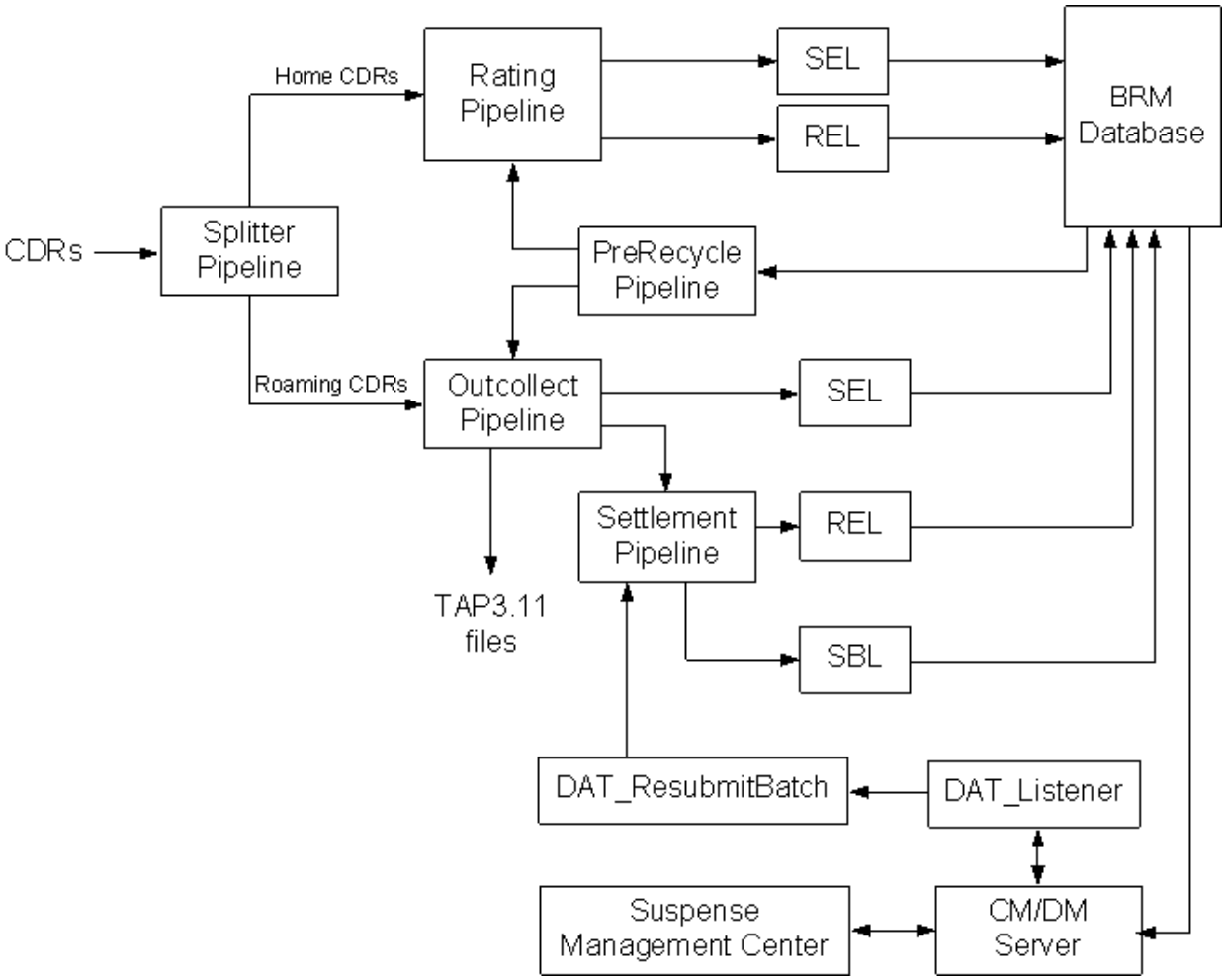
## Understanding Roaming Outcollect Architecture and Process Flow

You use roaming outcollect processing to process call detail records (CDRs) generated by visiting subscribers on your network. The outcollect process architecture primarily consists of the splitter, outcollect rating, and settlement pipelines. These pipelines perform the following tasks:

- The splitter pipeline separates home subscribers' CDRs from visiting subscribers' roaming CDRs.
- The outcollect rating pipeline rates the visiting subscribers' roaming CDRs based on InterCarrier Tariff rates and generates outcollect TAP files for each roaming partner.
- The settlement pipeline creates settlement events by associating visiting subscribers' roaming CDRs with corresponding roaming partner accounts in the BRM database. These settlement events are loaded into the BRM database and impact your roaming partners' account balance.

Figure 4-1 depicts a high-level overview of the roaming outcollect process architecture:

**Figure 4-1 Roaming Outcollect Process Architecture**




As Figure 4-1 illustrates, incoming CDRs are handled during the outcollect process as follows:

1. The splitter pipeline converts the CDRs into event data record (EDR) format and separates the EDRs into home subscribers' EDRs and visiting subscribers' roaming EDRs.
   - Home subscribers' EDRs are sent to the normal rating pipeline to be rated and loaded into the BRM database by RE Loader. If the rating pipeline fails to rate the EDR, the EDR is suspended and recycled by using Suspense Manager.
   - Visiting subscribers' roaming EDRs are sent to the outcollect rating pipeline to be rated.

   See "How Home CDRs Are Separated from Visiting Subscribers' CDRs" for more information.
2. The outcollect rating pipeline rates the visiting subscribers' roaming EDRs and generates outcollect TAP files, for each roaming partner network operator, that you send to your roaming partners for verification and billing purposes. A copy of the outcollect TAP file is forwarded to the settlement pipeline for further processing.

If the outcollect rating pipeline fails to rate the roaming EDR, the EDR is suspended and recycled by using Suspense Manager.

See "How Visiting Subscribers' Roaming CDRs Are Rated" for more information.

3. The settlement pipeline processes the outcollect TAP file and creates settlement events by associating the events with roaming partner accounts in the BRM database. Settlement events are loaded into the BRM database by RE Loader.

   If the settlement pipeline fails to create settlement events, the entire TAP file is suspended and loaded into the BRM database. The suspended TAP file can be corrected and recycled back to the settlement pipeline by using Suspense Manager.

   See "How Settlement Events for Incollect Roaming Charges Are Created" for more information.

For detailed information on configuring outcollect processing, see "Setting Up Pipeline Manager for Roaming Outcollect Processing".

# How Home CDRs Are Separated from Visiting Subscribers' CDRs

The splitter pipeline processes CDRs as follows:

- Incoming CDRs are converted to EDR format.

  The INP_GenericStream module provides the input interface to the splitter pipeline using BRM standard input grammar files. The input grammar converts CDRs into the internal EDR format that can be used by all BRM modules. If there are any errors, INP_GenericStream adds the error to the EDR container and sends the EDR to the reject stream.

- EDRs are separated into home and roaming EDRs.

  The FCT_EnhancedSplitting module separates the EDRs into home subscribers' EDRs and visiting subscribers' roaming EDRs so that they can be sent to the appropriate rating pipeline for processing.

  Home subscribers' EDRs are sent to the normal rating pipeline. Visiting subscribers' roaming EDRs are sent to the outcollect rating pipeline.

  You use Pricing Center or Pipeline Configuration Center (PCC) to define the splitting rules: for example, you can define a rule using the source network EDR field to send home and roaming EDRs to different output streams.

- EDRs are written to output files.

  The OUT_GenericStream module uses standard BRM SOL42 output grammar to write home and roaming EDRs to separate output files.

  As soon as the splitter pipeline generates the output files with the roaming EDRs, the outcollect rating pipeline retrieves the files and rates the roaming EDRs. See "How Visiting Subscribers' Roaming CDRs Are Rated" for more information.

> **Note:**
>
> - The splitter pipeline is optional. If your mediation system separates home CDRs from roaming CDRs before they are sent to the BRM billing system, you do not need to use the splitter pipeline.
> - By default, the splitter pipeline does not validate incoming CDRs. You can choose to implement validation by writing your own custom iScripts and using Suspense Manager to handle any CDRs that are suspended due to validation failures.

For information about configuring the splitter pipeline, see "Configuring the Splitter Pipeline".

## Transmitting CDRs to the Splitter Pipeline

External CDRs must be placed in the input directory of the splitter pipeline for the pipeline to process them. If your mediation system does not automatically place the CDRs in this directory, you can configure a Batch Controller and write a custom Batch Handler to move the CDRs to the splitter pipeline input directory.

# How Visiting Subscribers' Roaming CDRs Are Rated

The outcollect rating pipeline processes the roaming EDRs as follows:

- The contents of the splitter pipeline output file are mapped to the EDR container.

  The INP_GenericStream module uses BRM standard input grammar to parse the file and convert its contents into EDRs for rating.

- A package and charge offer are selected to rate the roaming EDR.

  Based on the roaming agreement you have with your roaming partner, you set up intercarrier tariffs and intercarrier charge offers. These packages and charge offers are stored in the following tables:

  - IFW_NETWORKOPER
  - IFW_NETWORKMODEL
  - IFW_ICPRODUCT
  - IFW_ICPRODUCT_GRP
  - IFW_ICPRODUCT_RATE
  - IFW_ICPRODUCT_CNF

  To find the correct price basis for rating the roaming event, the FCT_CarrierIcRating module searches these tables to determine the charge that applies to the roaming event. It then adds the charge and other information such as the network operator, zones for the A and B numbers, and so forth to the EDR container.

  For information on setting up intercarrier tariffs and intercarrier charge offers, see "Defining Roaming Partner Accounts in the BRM Database".

- The impact category is selected.

The FCT_PreRating module reads the EDR container to determine the phone number that originated the call, the destination phone number, and the start and end times of the call. Using this and other information in the EDR, this module determines the impact category and adds it to the EDR container along with supporting information on the zone model, service codes, and so forth.

- The EDR is rated and the result is rounded.

  The FCT_MainRating module evaluates the contents of the EDR and retrieves the appropriate pricing information from the pipeline database. It then calculates the charge amount for the event and adds information on the currency type and other rating characteristics. FCT_MainRating passes the EDR to the FCT_Rounding module, which rounds the charge amount.

- The charge for the event is converted from the local currency to Special Drawing Right (SDR) currency.

  The FCT_ExchangeRate module converts the amount in the charge packet to TAP currency (SDR).

- Basic service and supplementary service packets are added to the EDR container for GSM services.

  The ISC_MiscOutCollect module adds BASIC_SERVICE and SUPPLEMENTARY_SERVICE blocks to the EDR container for GSM services. This is done to ensure that the TAP file generated by the pipeline contains all the required information.

If the outcollect rating pipeline is unable to rate the EDR, the EDR is suspended. See "Processing EDRs Suspended by the Outcollect Rating Pipeline" for more information.

After the EDRs are rated, the output modules generate outcollect TAP files for each roaming partner. These files contain the rated EDRs (in TAP format) for that partner. Your roaming partner uses the outcollect TAP files to verify their subscribers' roaming usage against the bill you send them and to perform their own rating on the events to bill their subscribers.

The following steps are performed to create and route outcollect TAP files to roaming partner network operator output streams:

1. A sequence number is generated for the outcollect TAP file.

   Each outcollect TAP file is assigned a sequence number. Your roaming partner uses the sequence number to ensure that the TAP file you have sent them is not a duplicate and that there are no missing TAP files.

   The Sequence Generator is an instance of the Sequencer module that generates sequence numbers.

   Using Pricing Center or Pipeline Configuration Center (PCC), you define a Sequence Generator for each roaming partner. You define each sequence by specifying a unique sequence key that identifies the roaming partner. Depending upon the roaming partner receiving the TAP file, the Sequence Generator generates the sequence number based on the sequence key.

   A Sequence Generator can only be associated with one output stream. Because outcollect processing creates separate output streams for each roaming partner, a single Sequencer cannot be shared by multiple output streams. You must configure a Sequencer for each roaming partner output stream. For information on configuring sequence generation for your roaming partners, see "Configuring the Outcollect Rating Pipeline Input Processing".

2. The EDRs are written to the corresponding roaming partner output stream.

   The FCT_EnhancedSplitting module routes each rated EDR to the corresponding roaming partner output stream. You use Pricing Center or Pipeline Configuration Center (PCC) to define the splitting rules; for example, you can define a rule to route EDRs to different output streams based on the source network EDR field. The output module at each network operator output stream uses TAP output grammar to write the EDRs to output files. If FCT_EnhancedSplitting module is unable to route the EDR to an output stream, the EDR is routed to the suspense output stream.

When the outcollect TAP files are ready, the pipeline notifies the Event Handler by sending it the EVT_OUTPUT_FILE_READY event. Upon receiving this event notification, the Event Handler starts the **move_outcollectTap.pl** script, which copies the TAP files into the common directory (where all roaming partner network operator TAP files are stored until settlement events have been created) and moves the original outcollect TAP files to the settlement pipeline input directory for creating settlement events. See "About Settling Roaming Charges" for more information.

> **Note:**
>
> Settlement events are created to record the roaming charges and used to bill your roaming partners. DO NOT send the outcollect TAP files to your roaming partner network operators until settlement events and TAP Header information file have been successfully created by the settlement pipeline. Otherwise, billing errors can occur.

> **Note:**
>
> You must edit the **move_outcollectTap.pl** script to specify the common directory. By default, **move_outcollectTap.pl** copies the outcollect TAP files to the *Pipeline_home***/data/outcollect/tapout/common** directory and moves the original outcollect TAP files to the *Pipeline_home***/data/outcollect/settlement/in** directory. See "Configuring the Outcollect Rating Pipeline Input Processing" for more information.

For more information on configuring the outcollect rating pipeline, see "Configuring the Outcollect Rating Pipeline ".

## Processing EDRs Suspended by the Outcollect Rating Pipeline

If the outcollect rating pipeline is unable to rate an EDR, it sets the error in the EDR and suspends it. The FCT_Reject module evaluates the error and routes the EDR to the suspense output stream as specified by the **RejectStream** pipeline registry entry.

Using Suspended Event (SE) Loader, you load the suspended EDRs into the BRM database. Using Suspense Management Center, you can query the suspended events and make the necessary corrections. After the corrections are made, you can recycle the events for processing.

When Pipeline Manager receives the recycle request, the INP_Recycle module retrieves the suspended records from the BRM database and routes the events to the pre-recycle pipeline. The pre-recycle pipeline converts the suspended events back to EDR format and sends the EDRs back to the outcollect rating pipeline for rating.

## Transmitting Roaming EDRs to the Outcollect Rating Pipeline

In the default roaming registry, the outcollect rating pipeline's input stream is the same as the splitter pipeline's output stream. As soon as the splitter pipeline generates an output file, the outcollect rating pipeline processes the file.

You can choose to change the default behavior. For example, you can do any of the following:

- Transfer output files from the splitter pipeline to the outcollect rating pipeline at release intervals. For example, you might want to send roaming EDRs for rating twice a day.

  To transfer roaming EDRs from the splitter pipeline to the outcollect rating pipeline at release intervals, you can do the following:

  - Set up the outcollect rating pipeline's input stream to be different from the splitter pipeline's output stream.
  - Configure a Batch Controller and a Batch Handler to move the roaming EDRs from the splitter pipeline's output stream to the input stream of the outcollect rating pipeline at specific time intervals.
  - Set the **UnitsPerTranscation** registry entry to a high number. The **UnitsPerTransaction** entry determines the number of input files received by the pipeline and consequently the number of output files generated.
- Configure the outcollect rating pipeline to process the output files from the splitter pipeline only after a certain number of files have accumulated.

  To configure the outcollect rating pipeline to start processing after a certain number of input files has accumulated, you use the **UnitsPerTransaction** registry entry to specify the number of input files. For instance, when **UnitsPerTransaction** is set to **1**, the pipeline starts processing as soon as it receives one input file. However, if **UnitsPerTransaction** is set to **10**, the pipeline waits until ten input files are received before it starts to process them.

## About Generation of Notification Files when there Is No Roaming Activity

The outcollect rating pipeline generates notification files when there is no roaming activity by a roaming partner's subscribers. If the input file of the outcollect rating pipeline does not contain any roaming EDRs for a network operator configured in this pipeline, a notification file is generated.

The notification file informs your roaming partner that none of its subscribers have been roaming on your network. The notification file is generated based on the information in the EDR header and trailer records and does not contain any call detail records.

## About Sending Outcollect TAP Files to Your Roaming Partner

> **Note:**
>
> You send outcollect TAP files to your roaming partners only after settlement events and TAP Header information file have been successfully created by the settlement pipeline.

When the settlement pipeline finishes processing the outcollect TAP file, it notifies the Event Handler by sending it the EVT_OUTPUT_FILE_READY event. Upon receiving this event notification, the Event Handler starts the **move_TapSent.pl** script. This script identifies the corresponding outcollect TAP file previously stored in the common directory by the outcollect rating pipeline and moves the file to another pre-defined directory for sending the TAP file to your roaming partner or clearing house.

> **Note:**
>
> You must edit the **move_TapSent.pl** script to specify the common directory used for storing the outcollect TAP files and the directory used for sending the TAP files to your roaming partners or clearing house. By default, **move_TapSent.pl** uses the *Pipeline_home***/data/outcollect/tapout/common** directory as the common directory and moves the TAP files to the *Pipeline_home***/data/outcollect/tapout/sent** directory. See "Configuring the Outcollect Settlement Pipeline Input Processing".

# About Processing Rejected Outcollect TAP Files and Records

When you send outcollect TAP files to a roaming partner, the roaming partner validates the files to ensure there are no errors. If the validation fails, the partner generates a RAP file that includes the failed outcollect TAP file and records and sends it to you for corrections.

RAP file processing involves:

- Correcting and reprocessing the erroneous TAP files and records and generating new TAP files to send to your roaming partner.
- Backing out the balance impacts of settlement events associated with the erroneous TAP files and records that were previously recorded in the BRM database.

RAP files are handled by the RAP processing pipeline as follows:

- The RAP file is parsed by the input module and a RAP Acknowledgment file is generated that you send to your roaming partner. The file includes information about the network operator who sent the RAP file, network operator receiving

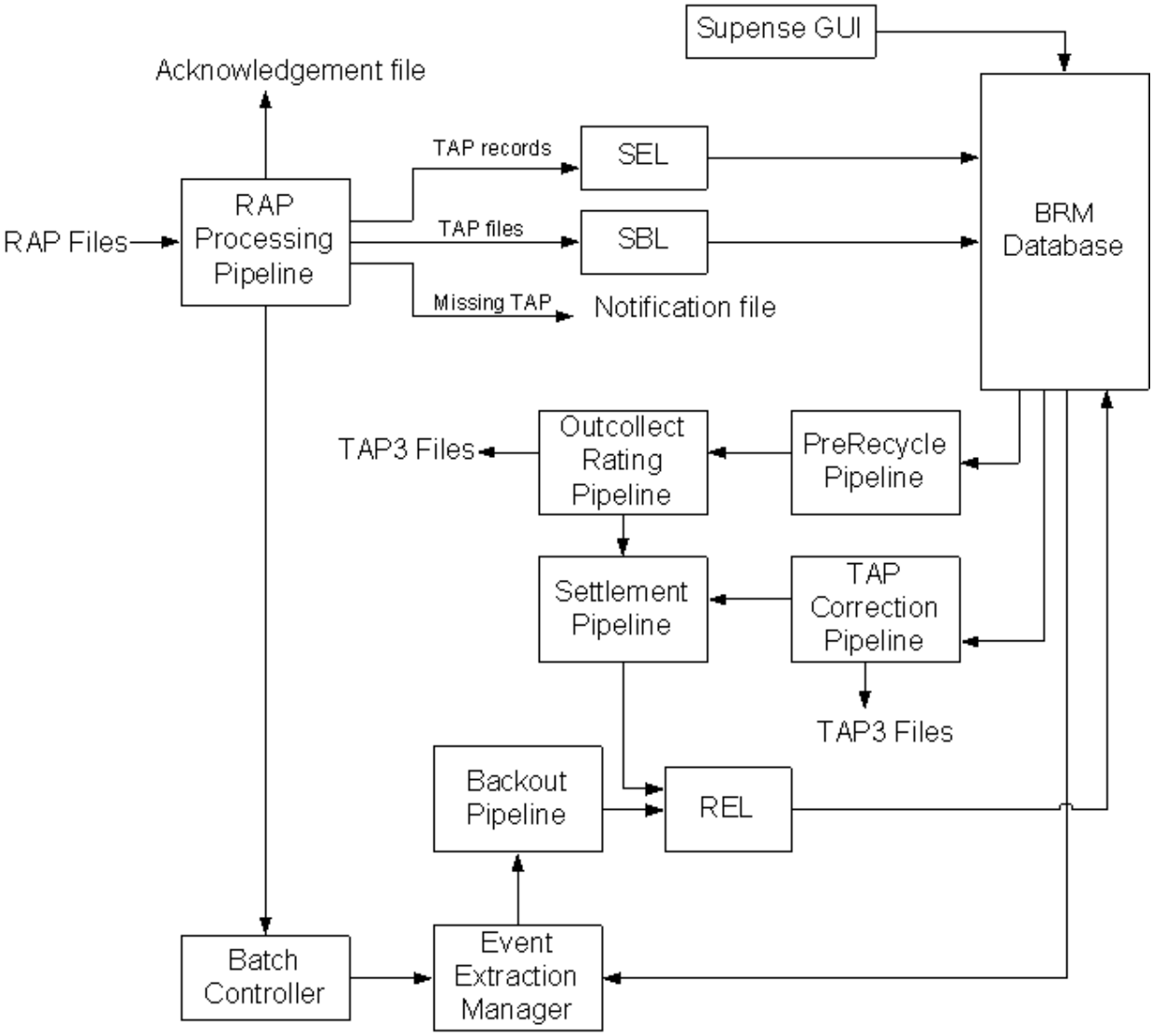
the file, RAP file sequence number, Acknowledgment file creation timestamp, and Acknowledgment file available timestamp.

- For a fatal error RAP file, the entire file is suspended and sent to the TAP correction pipeline for corrections. See "Error Correction for TAP Files with Fatal Errors" for more information.
- For a severe error RAP file, the records are suspended and sent to the outcollect rating pipeline for processing. See "Error Correction for TAP Files with Severe Errors" for more information.
- For a missing error RAP file, a set of TAP notification files is generated for each missing sequence number.
- To back out the balance impacts of the outcollect TAP file or records, the pipeline creates an ASCII file that specifies the extraction criteria for extracting settlement events associated with the TAP file or records. The **pin_event_extract** utility uses this file to extract the settlement events from the BRM database for backout-only rerating. See "Backing Out the Balance Impacts for the Rejected TAP Files and Records" for more information.

For information on configuring the RAP processing pipeline, see "Configuring the RAP Processing Pipeline".

Figure 4-2 depicts a high-level overview of the RAP processing architecture:

**Figure 4-2 RAP Processing Architecture**




# Error Correction for TAP Files with Fatal Errors

TAP files with fatal errors are processed by RAP processing pipeline as follows:

- The input module converts the contents of the TAP file back to EDR format and maps the contents to staging fields in the EDR container by using RAP input grammar.
- The ISC_RAP_0105_InMap module maps the data in the staging fields to business fields in the EDR container. It creates a header and a trailer EDR that contain information about the RAP file and a single detail EDR that contains information about the rejected outcollect TAP file.
- The ISC_DupRAPRecords module sends a copy of the detail EDR to an output stream. This output stream uses Event Extraction output grammar to write the EDRs to a file that is used by the **pin_event_extract** utility to extract settlement

events from the BRM database for backout-only rerating. See "Backing Out the Balance Impacts for the Rejected TAP Files and Records".

- The ISC_OverrideSuspenseParams module overrides the suspense parameters to recycle the suspended EDRs to the TAP correction pipeline.

The detail EDR is then routed to the suspense batch output stream. The suspense batch output stream writes the EDRs to a batch file. This batch file contains the TAP file name, location of the file, RAP error code, and the records in the TAP file. You load this file into the BRM database by using Suspended Batch (SB) Loader.

Using Suspense Management Center, you can query the suspended batch file to analyze the errors and resubmit the batch for processing. When Pipeline Manager receives the resubmit request, DAT_ResubmitBatch routes the batch file to the TAP correction pipeline.

In the TAP correction pipeline, the input mapping file maps the batch file into the EDR container. Using your own custom iScript, you implement the logic to make the necessary corrections by modifying and updating the EDR contents.

After the corrections have been made, the output module uses TAP output grammar to write the EDR to an output file, which includes the original outcollect TAP file sequence number and the original RAP file sequence number.

The TAP correction pipeline then notifies the Event Handler by sending it the EVT_OUTPUT_FILE_READY event. Upon receiving this event notification, the Event Handler launches the **move_outcollectTap.pl** script to copy the TAP file into the common directory (where all network operator outcollect TAP files are stored until settlement events have been created) and to move the TAP file to the settlement pipeline input directory for creating settlement events. See "About Settling Roaming Charges".

For information on configuring the TAP correction pipeline, see "Configuring the TAP Correction Pipeline".

## Error Correction for TAP Files with Severe Errors

TAP files with severe errors are processed by RAP processing pipeline as follows:

- The input module converts the call event detail records in the TAP file back to EDR format and maps the call event detail fields to staging fields in the EDR container by using RAP input grammar.
- The ISC_RAP_0105_InMap module maps the data in the staging fields to business fields in the EDR container. It uses the lookup information in the TAP Header Information file, and information in the RAP file to create header and trailer EDRs. For each call event detail record, it creates an instance of the detail EDR with the call event details.
- The ISC_DupRAPRecords module duplicates and sends a copy of the detail EDRs to the event extraction output stream. This output stream uses Event Extraction output grammar to write the EDRs to a file that is used by the **pin_event_extract** utility to extract settlement events from the BRM database for backout-only rerating. See "Backing Out the Balance Impacts for the Rejected TAP Files and Records" for more information.
- The ISC_OverrideSuspenseParams module overrides the suspense parameters to recycle the suspended EDRs to the outcollect rating pipeline.

The detail EDRs are routed to the suspense output stream. The suspense output stream writes the EDRs to a suspense file. You load this file into the BRM database by using SE Loader.

Using Suspense Management Center, you can query the suspended EDRs and make the necessary corrections. After the corrections are made, you can recycle the EDRs for processing. When Pipeline Manager receives the recycle request, the DAT_Recycle module retrieves the suspended events from the BRM database and routes the events to the pre-recycle pipeline.

The pre-recycle pipeline converts the suspended events back to EDR format and sends the EDRs to the outcollect rating pipeline input directory.

> **Note:**
>
> The outcollect rating pipeline input directory also contains new roaming EDRs sent from the splitter pipeline.

The outcollect rating pipeline rates the recycled EDRs and newly arriving EDRs and generates a new outcollect TAP file. See "How Visiting Subscribers' Roaming CDRs Are Rated" for more information.

The outcollect rating pipeline notifies the Event Handler by sending it the EVT_OUTPUT_FILE_READY event. Upon receiving this event notification, the Event Handler launches the **move_outcollectTap.pl** script to copy the outcollect TAP file into the common directory (where all network operator outcollect TAP files are stored until settlement events have been created) and to move the original outcollect TAP file to the settlement pipeline input directory for creating settlement events. See "About Settling Roaming Charges" for more information.

## Backing Out the Balance Impacts for the Rejected TAP Files and Records

The RAP processing pipeline creates an ASCII file that specifies the extraction criteria for extracting settlement events from the BRM database associated with the rejected outcollect TAP files and records.

For rejected TAP files, the ASCII file is created with a single record with the following information:

- Outcollect TAP file sequence number
- Network operator sending the TAP file
- Network operator receiving the TAP file

For rejected TAP records, an ASCII file is created that contains a record for each rejected TAP record. Each record contains the following information:

- Outcollect TAP file sequence number
- Network operator sending the TAP file
- Network operator receiving the TAP file
- MSISDN

- IMSI
- Call event start timestamp

To back out the settlement event balance impacts (applied to the roaming partner's account when the outcollect TAP file was originally created), you manually run the Event Extraction Manager and specify the ASCII file in the input parameter. Event Extraction Manager uses the information in the ASCII file to extract the settlement events from the BRM database and copies the event data to an output file in the standard BRM input format.

The backout pipeline processes the Event Extraction output file and creates shadow events to negate the balance impacts of the settlement events. The output module writes the shadow events to an output file using RE Loader output grammar. You use RE Loader to load the shadow events into the BRM database.

If the backout pipeline is unable to process the Event Extraction output file, it suspends the entire file. Using Suspense Management Center, you can resubmit the file for processing.

# Including Country Codes in TAP Output Files

BRM maps the EDR container field DETAIL.CALLED_COUNTRY_CODE into the CalledCountryCode field in the output TAP file. To ensure that the CalledCountryCode field has a valid value in cases where the country code is not present in the EDR, you specify a default country code in the **CalledCountryCode** registry entry of the TAP outcollect pipelines.

The value of this entry is a three-character country code, such as USA or GBR, that specifies the destination country code for an international call. For example:

```
ifw.Pipelines.OutCollectPipeline.CalledCountryCode = USA
```

# 5
# Setting Up Roaming for TAP

This chapter describes how to set up roaming in Oracle Communications Billing and Revenue Management (BRM) to rate Transferred Account Procedure (TAP) roaming usage events.

## Setting Up Roaming for TAP Roaming Usage Events

To set up roaming for incollect and outcollect processing, do the following:

1. Install supporting managers.
2. Use Pricing Center or Pipeline Configuration Center (PCC) to create network operator accounts in the Pipeline Manager database. When you create network operator accounts, you also define network models and interconnect charge offers for rating roaming usage. See "About Setting Up Network Operator Accounts".
3. Use Billing Care to create roaming partner accounts in the BRM database for storing settlement events and balance impacts. See "Defining Roaming Partner Accounts in the BRM Database".
4. Create charges for rating roaming usage. See "Defining Charges for Rating Roaming Usage".
5. Define configuration parameters that are used for settlement processing. See "Defining Configuration Parameters for Roaming".
6. Set up the default TAP currency. See "Setting Up the Default TAP Currency".
7. (Optional) Configure the roaming registry file to also support TAP 3.11. See "Setting Up TAP Roaming Manager to Support TAP 3.11".

   By default, TAP Roaming Manager is configured to support TAP 3.12.

## Defining Roaming Partner Accounts in the BRM Database

You use Billing Care to create roaming partner accounts in the BRM database for each roaming partner network operator, including yourself.

Roaming partner accounts are used to:

- Store your roaming partner network operator's contact and payment information.
- Store your roaming partner's subscribers' roaming events.
- Store roaming charges.
- Store your roaming partner network operator's Public Land Mobile Network (PLMN) ID as a service login.
- Store the Special Drawing Rights (SDR) fraud limits in the corresponding **/profile/acct_extrating** object.

> **Note:**
>
> Only one account can exist for a roaming partner network operator.

To create roaming partner accounts in the BRM database, do the following:

- Create a roaming package with incollect and outcollect charge offers with separate balance groups to store roaming charges. See "Creating a Roaming Package".
- Create roaming partner accounts using the roaming package. See "Creating Roaming Partner Accounts Using the Roaming Package".

## Creating a Roaming Package

To create a roaming package:

1. Create a charge offer for incollect settlement called RoamingIncollect with the service **/service/settlement/roaming/incollect**.
2. Create another charge offer for outcollect settlement called RoamingOutcollect with the service **/service/settlement/roaming/outcollect**.
3. Create a bundle for incollect settlement called RoamingIncollectBundle and add the **RoamingIncollect** charge offer to it.
4. Create another bundle for outcollect settlement called RoamingOutcollectBundle and add the **RoamingOutcollect** charge offer to it.
5. Create a roaming package called RoamingPackage by adding the bundles created in steps 3 and 4 to it.
6. Assign a balance group to the **RoamingIncollect** charge offer.
7. Assign a different balance group to the **RoamingOutcollect** charge offer.

> **Note:**
>
> You can refer to the sample roaming settlement package *BRM_home***PricingCenter\Sample_Price_Plans\RoamingSettlement Plan.ipl** file for sample settlement charge offers, bundles, and packages.
>
> For roaming to work correctly, the roaming incollect and outcollect charge offers must be assigned to different balance groups.

## Creating Roaming Partner Accounts Using the Roaming Package

To create the roaming partner account:

1. Purchase the roaming package.
2. Assign the balance group associated with **RoamingIncollect** to a bill unit.
3. Assign the balance group associated with **RoamingOutcollect** to a different bill unit.

> **Note:**
>
> You can choose to create a separate bill unit for each service or create one bill unit for both services. If you create one bill unit, the incollect and outcollect roaming charges will be summed up in one bill. By creating separate bill units, the incollect and outcollect roaming charges will be in separate bills.

## Defining Charges for Rating Roaming Usage

When you create the charge, you can choose to modify or replace the charge passed in the TAP records from your roaming partner network operator. You can increase the passed-in price by a percentage (for example, 15%) or by a fixed amount (for example, $1.00). You can also replace the passed-in price with an amount you enter.

## Defining Configuration Parameters for Roaming

Define the following configuration parameters:

1. Verify that the **/item/settlement/roaming** item type is defined in the **/config/item_types** storable object:

```
0 PIN_FLD_ITEM_TYPES           ARRAY [6] allocated 6, used 6
1     PIN_FLD_DESCR              STR [0] "Roaming Settlement"
1     PIN_FLD_ITEM_SUB_TYPE      STR [0] ""
1     PIN_FLD_ITEM_TAG           STR [0] "roaming_settlement"
1     PIN_FLD_ITEM_TYPE          STR [0] "/item/settlement/roaming"
1     PIN_FLD_PRECREATE          INT [0] 1
1     PIN_FLD_TYPE              ENUM [0] 2
```

   If the **/item/settlement/roaming** item type is not defined, load the *BRM_home*/**sys/data/pricing/example/config_item_types.xml** file into the BRM database by running the **load_config_item_types** utility.

2. Verify that the **roaming_settlement** item tag is defined in the **/config/item_tags** storable object:

```
0 PIN_FLD_ITEM_TAGS             ARRAY [6] allocated 3, used 3
1     PIN_FLD_EVENT_TYPE          STR [0] "/event/delayed/session/telco/*"
1     PIN_FLD_ITEM_TAG            STR [0] "roaming_settlement"
1     PIN_FLD_SERVICE_TYPE        STR [0] "/service/settlement/roaming/*"
```

   If the **roaming_settlement** item tag is not defined, load the *BRM_home*/**sys/data/pricing/example/config_item_tags.xml** file into the BRM database by running the **load_config_item_tags** utility.

3. Verify that the **/service/settlement/roaming/outcollect** and **/service/settlement/roaming/incollect** event types are defined in the **/config/event_map** storable object.

```
0 PIN_FLD_EVENT_MAP               ARRAY [10] allocated 2, used 2
1     PIN_FLD_PERMITTED             STR [0] "/service/settlement/roaming/
```

```
outcollect"
1     PIN_FLD_EVENTS                ARRAY [0] allocated 5, used 5
2         PIN_FLD_COUNT               INT [0] 0
2         PIN_FLD_EVENT_DESCR         STR [0] "Roaming Settlement Event"
2         PIN_FLD_EVENT_TYPE          STR [0] "/event/delayed/session/telco/roaming"
2         PIN_FLD_INDICATOR           INT [0] 0
2         PIN_FLD_UNIT               ENUM [0] 0
0 PIN_FLD_EVENT_MAP                 ARRAY [11] allocated 2, used 2
1     PIN_FLD_PERMITTED               STR [0] "/service/settlement/roaming/
incollect"
1     PIN_FLD_EVENTS                ARRAY [0] allocated 5, used 5
2         PIN_FLD_COUNT               INT [0] 0
2         PIN_FLD_EVENT_DESCR         STR [0] "Roaming Settlement Event"
2         PIN_FLD_EVENT_TYPE          STR [0] "/event/delayed/session/telco/roaming"
2         PIN_FLD_INDICATOR           INT [0] 0
2         PIN_FLD_UNIT               ENUM [0] 0
```

If the **/service/settlement/roaming/outcollect** and **/service/settlement/roaming/incollect** event types are not defined, edit the **pin_event_map** file and create the event mappings, and then run the **load_event_map** utility, which loads the event mappings into the BRM database.

4. Verify that the SDR currency resource is defined in the **/config/beid** storable object.

   If the SDR currency is not defined, use Resource Editor to define the currency.

5. Verify that the general ledger (G/L) ID used for tracking roaming charges (specified in the registry for ISC_ConsolidatedCP) is defined in the **/config/glid** storable object.

   If the G/L ID for roaming charges is not defined, edit the **pin_glid** file, and then run the **load_pin_glid** utility, which loads the G/L ID.

## Setting Up the Default TAP Currency

BRM roaming uses SDR as the default TAP currency. You can configure BRM to use a currency other than SDR as the default TAP currency.

To configure BRM to use a currency other than SDR as the default TAP currency:

1. Define the new default TAP currency resource.
2. Define the exchange rates for the new currency using Pricing Center or Pipeline Configuration Center (PCC).
3. Configure the new currency as the default TAP currency. See "Configuring the Default TAP Currency".

## Configuring the Default TAP Currency

To configure the default TAP currency:

1. Open the roaming registry file (*Pipeline_Home***/conf/roaming.reg**), where *Pipeline_Home* is the directory in which you installed Pipeline Manager.

2. For all instances of the FCT_ExchangeRate module in the roaming registry, change the **HomeCurrency** registry entry from **SDR** to the new default TAP currency.
3. In the TAP input processing pipeline, set the **TAPCurrency** registry entry to the new default TAP currency.
4. Save and close the file.

> **Note:**
>
> During TAP input file processing, if the TAP input file does not contain a currency in the **TapCurrency** field and if the **TAPCurrency** registry entry is set in the roaming registry file, the **TAPCurrency** value in the registry file is used as the default TAP currency. If the TAP input file does not contain a currency in the **TapCurrency** field and if the **TAPCurrency** registry entry is not set in the registry file, the default TAP currency is set to **SDR**.

## Setting Up TAP Roaming Manager to Support TAP 3.11

The TAP 3.12 installation directory includes the roaming registry file (*Pipeline_Home***/conf/roaming.reg**) that contains pipelines configured for processing TAP 3.12 files. To process both TAP 3.11 and TAP 3.12 files, you need to update the roaming registry file to contain similar pipeline sections configured for processing TAP 3.11 files.

For example, the pipelines section will contain two sections for the validation pipeline, one section named **TAPInProcessingPipeline**, for TAP 3.12 files, and another named **TAPInProcessingPipeline_0311**, for TAP 3.11 files. Each pipeline requires a separate input directory, and each pipeline requires a separate set of grammar files, mapping files, and iScripts.

To set up TAP Roaming Manager to support TAP 3.11:

1. Verify that duplicates of the specific files required to continue processing TAP 3.11 files were created at the start of the installation process.

   Table 5-1 lists the files that should have been duplicated at the start of the installation process.

**Table 5-1 Files Duplicated During Patch Set Installation**

| TAP 3.12 File Name | TAP 3.11 File Name |
|---|---|
| RAP_0105_AckOutGrammar.dsc | RAP_0105_AckOutGrammar_**0311**.dsc |
| RAP_0105_FatalReturn.dsc | RAP_0105_FatalReturn_**0311**.dsc |
| RAP_0105_InGrammar.dsc | RAP_0105_InGrammar_**0311**.dsc |
| RAP_0105_MissingReturn.dsc | RAP_0105_MissingReturn_**0311**.dsc |
| RAP_0105_OutGrammar.dsc | RAP_0105_OutGrammar_**0311**.dsc |
| RAP_0105_StopReturn.dsc | RAP_0105_StopReturn_**0311**.dsc |
| containerDesc.dsc | containerDesc_**0311**.dsc |

2. Open the *Pipeline_Home***/conf/roaming.reg** file.

3. Duplicate the TAP 3.12 pipelines (listed in the left-hand column of Table 5-2) and update the duplicated pipelines to use TAP 3.11 (as shown in the right-hand column of Table 5-2) by doing the following:

**Table 5-2 Pipelines Requiring Configuration**

| Pipeline Name and Data Provided for Use with TAP 3.12 | Pipeline Name and Data To Be Created for Use with TAP 3.11 |
|---|---|
| TAPCorrectionPipeline | TAPCorrectionPipeline_**0311** |
| RAPInProcessingPipeline | RAPInProcessingPipeline_**0311** |
| TAPOutCollectPipeline | TAPOutCollectPipeline_**0311** |
| TAPOutSettlementPipeline | TAPOutSettlementPipeline_**0311** |
| TAPInProcessingPipeline | TAPInProcessingPipeline_**0311** |
| StopRapGeneratorPipeline | StopRapGeneratorPipeline_**0311** |

> **Note:**
>
> The backup procedure during the installation used the extension **_0311** to rename the required TAP 3.11 files and to associate them with the TAP 3.11 version to which they belong.
>
> The following steps use that **_0311** name extension to update the **roaming.reg** file with the registry configuration appropriate for the processing of TAP 3.11 roaming usage events.
>
> If you chose a *different* naming structure for these files during the backup step, then, make sure that the **roaming.reg** file is updated to reflect *that* naming structure for proper processing of TAP 3.11 roaming usage events.

a. Find the section for each pipeline under **Pipelines**.

   For example, the section for TAPInProcessingPipeline is:

```
TAPInProcessingPipeline
    {
      Active = True
...
...
 } # END of Output
    } # END TAPInProcessingPipeline
```

b. Copy this entire section and paste it immediately under the original section.

c. Rename the copied section to the name (appropriate for TAP 3.11) in the right-hand column of Table 5-2.

   For example:

```
TAPInProcessingPipeline_0311
    {
      Active = True
```

```
...
...
 } # END of Output
    } # END TAPInProcessingPipeline_0311
```

You should now have two sections for that pipeline, the TAP 3.12 section followed by the duplicate (renamed) pipeline section for TAP 3.11. For example:

```
TAPInProcessingPipeline
    {
      Active = True
...
...
 } # END of Output
    } # END TAPInProcessingPipeline
TAPInProcessingpipeline_0311
    {
      Active = True
...
...
 } # END of Output
    } # END TAPInProcessingPipeline_0311
```

d. The newly-created section for the TAP 3.11 pipeline contains TAP 3.12 iScript, grammar, and container description file names (because of the copying), so you must change the iScript, grammar, and container description file names for TAP 3.11 processing (using the entries in Table 5-3).

   For example, change the **Grammar** registry entry for TAPInProcessingPipeline_**0311** from:

   ```
   Grammar = ./formatDesc/Formats/TAP3-NG/TAP_0312_InGrammar.dsc
   ```

   to

   ```
   Grammar = ./formatDesc/Formats/TAP3-NG/TAP_0311_InGrammar.dsc
   ```

   This makes the **Grammar** registry entry in the TAPInProcessingPipeline_**0311** section appropriate for processing TAP 3.11 roaming usage events:

   ```
   TAPInprocessingPipeline_0311
       {
         Active = True
   ...
   Grammar = ./formatDesc/Formats/TAP3-NG/TAP_0311_InGrammar.dsc
   ...
    } # END of Output
       } # END TAPInProcessingPipeline_0311
   ```

   Table 5-3 lists file names you need to change in the TAP 3.11 pipeline to set up iScript, grammar, and container description files appropriate for TAP 3.11.

> **Note:**
>
> Not all the file names are contained in a pipeline section. For example, neither the original nor the duplicate section for TAPCorrectionPipeline contains the ISC_TAP_0312_Validations iScript entry (which is used to validate TAP 3.12 input data).

**Table 5-3 Basic Configuration Data for Duplicated Pipelines**

| TAP 3.12 File Name | TAP 3.11 File Name |
|---|---|
| TAP_0312_OutGrammar.dsc | TAP_**0311**_OutGrammar.dsc |
| TAP_0312_InGrammar.dsc | TAP_**0311**_InGrammar.dsc |
| TAP_0312_Blocks.dsc | TAP_**0311**_Blocks.dsc |
| ISC_TAP_0312_Validations.isc | ISC_TAP_**0311**_Validations.isc |
| ISC_TAP_0312_InMap.isc | ISC_TAP_**0311**_InMap.isc |
| RAP_0105_AckOutGrammar.dsc | RAP_0105_AckOutGrammar_**0311**.dsc |
| RAP_0105_FatalReturn.dsc | RAP_0105_FatalReturn_**0311**.dsc |
| RAP_0105_InGrammar.dsc | RAP_0105_InGrammar_**0311**.dsc |
| RAP_0105_MissingReturn.dsc | RAP_0105_MissingReturn_**0311**.dsc |
| RAP_0105_OutGrammar.dsc | RAP_0105_OutGrammar_**0311**.dsc |
| RAP_0105_StopReturn.dsc | RAP_0105_StopReturn_**0311**.dsc |
| containerDesc.dsc | containerDesc_**0311**.dsc |

e. Configure the entry for **InputPath** in the **InputStream** section for the newly-created pipeline, as appropriate for TAP 3.11.

Change the following:

```
InputPath = ./data/incollect/tapin/in
```

to

```
InputPath = ./data/incollect/tapin/in_0311
```

For example:

```
InputStream
        {
         ModuleName = EXT_InFileManager
         Module
              {
                InputPath = ./data/incollect/tapin/in_0311
...
```

f. Configure the entry for **DonePath** in the **InputStream** section for the newly-created pipeline, as appropriate for TAP 3.11.

Change the following:

```
DonePath = ./data/incollect/tapin/done
```

to

```
DonePath = ./data/incollect/tapin/done_0311
```

For example:

```
InputStream
        {
         ModuleName = EXT_InFileManager
         Module
              {
                DonePath = ./data/incollect/tapin/done_0311
...
```

g. Configure the entry for **ErrorPath** in the **InputStream** section for the newly-created pipeline, as appropriate for TAP 3.11.

Change the following:

```
ErrorPath = ./data/incollect/tapin/error
```

to

```
ErrorPath = ./data/incollect/tapin/error_0311
```

For example:

```
InputStream
        {
         ModuleName = EXT_InFileManager
         Module
              {
                ErrorPath = ./data/incollect/tapin/error_0311
...
```

Repeat these steps for the remaining pipelines listed in Table 5-2.

4. Save and close the file.

# Verifying the Processing of Roaming Usage Events

To verify that TAP Roaming Manager processes roaming usage events correctly, check the following:

- The files are successfully processed and placed in the appropriate **out** processing directories.
- Error directories for errors
- Stream logs for errors

# Improving System Performance when Rating Roaming Events

When you process TAP records and other service events (for example, GSM) in parallel, it can affect your system's performance. This occurs when TAP records are older than the GSM records. For accounts that have changed, the system has to reload old and new account data constantly which results in increased database access. You can improve system performance by creating a separate Pipeline Manager instance to process the TAP records separately.

6

# Setting Up Pipeline Manager for Roaming Incollect Processing

This chapter describes how to configure Oracle Communications Billing and Revenue Management (BRM) Pipeline Manager for roaming incollect processing.

> **Note:**
>
> The following pipeline configuration applies to rating TAP roaming usage events only.

See "About Processing Home Subscribers' Roaming Usage" for more information about roaming incollect processing.

## Setting Up Roaming Incollect Processing Pipelines

Configure the following pipelines to set up roaming incollect processing:

- Configuring the Validation Pipeline
- Configuring the Reprice Pipeline
- Configuring the Incollect Settlement Pipeline
- Configuring the Stop RAP Generator Pipeline

### Configuring the Validation Pipeline

Configure the validation pipeline by performing the following tasks:

- Configuring the Validation Pipeline EDRFactory Registry
- Configuring the Validation Pipeline DataDescription Registry Section
- Configuring Validation Pipeline Input Processing
- Configuring Validation Pipeline Function Modules
- Configuring Validation Pipeline Output Processing

> **Note:**
>
> For an example of validation pipeline configuration, see *Pipeline_home*/**conf/roaming.reg**.

## Configuring the Validation Pipeline EDRFactory Registry

Set the **EDRFactory Description** entry to the TAP container description file as follows:

```
Description = ./formatDesc/Formats/TAP3-NG/containerDesc.dsc
```

## Configuring the Validation Pipeline DataDescription Registry Section

Configure the validation pipeline **DataDescription** registry section by setting the stream formats, input mapping, and output mapping as follows:

```
DataDescription
{
   Standard
   {
     ModuleName = Standard
     Module
     {
       StreamFormats
       {
         Generic = ./formatDesc/Formats/TAP3-NG/GenericBlocks.dsc
         TAP     = ./formatDesc/Formats/TAP3-NG/TAP_0312_Blocks.dsc
         RAP     = ./formatDesc/Formats/TAP3-NG/RAP_0105_Blocks.dsc
         SOL42   = ./formatDesc/Formats/Solution42/SOL42_V670_REL.dsc
       }
       InputMapping
       {
       }
       OutputMapping
       {
         SOL42   = ./formatDesc/Formats/Solution42/SOL42_V670_REL_OutMap.dsc
       }
     }
   }
}
```

## Configuring Validation Pipeline Input Processing

Configure input processing for the validation pipeline as follows:

1. (Optional) Configure a Batch Controller and a Batch Handler to send TAP files that you receive from the clearing house or your roaming partner to the input directory of the validation pipeline.

> **Note:**
>
> You do not need to configure a Batch Controller and a Batch Handler if your mediation system is set up to send incoming TAP files directly to the validation pipeline.

2. Configure sequence checking of incoming TAP files.

   a. Using Pricing Center or Pipeline Configuration Center (PCC), define a Sequence Checker with multiple sequences. Define each sequence by specifying a sequence key that is the same as the roaming partner ID.

   b. Edit the **SequencerPool** section of the pipeline registry.

      - Set the sequencer instance to the name of the Sequence Checker defined in step 2.a above.
      - Set the **SequencerType** registry entry to **Check**.

   c. Assign the Sequencer to the pipeline output controller.

      - Set the **Sequencer** registry entry in the pipeline output controller to the name of the Sequence Checker.

        The following is a sample configuration for a Sequence Checker called SEQ_CHECK_TAPIN:

```
SequencerPool
{
   SEQ_CHECK_TAPIN
   {
      Source = Database
      Controller
      {
         SequencerType = Check
         ReuseGap = True
         SequenceLength = 5
         DatabaseConnection = ifw.DataPool.Login
      }
   }
}
...
...
...
...
Output
{

     SequenceGeneration = Transaction
     Sequencer = SEQ_CHECK_TAPIN
}
```

3. Configure the INP_GenericStream input module, which maps TAP input data to staging fields in the EDR container using the TAP input grammar file.

   a. Set the **Grammar** entry to the name of the TAP input grammar description file:

```
Grammar = ./formatDesc/Formats/TAP3-NG/TAP_0312_InGrammar.dsc
```

   b. Configure the **EXT_InFileManager** registry entry to specify information about the input file.

## Configuring Validation Pipeline Function Modules

Configure the registry for the following modules:

- ISC_TAP_0312_Validations, which validates the TAP input data.
- ISC_TAP_0312_InMap, which maps TAP data from staging fields to the business fields in the EDR container.
- FCT_Reject, which sends invalid TAP records to the reject stream.
  - Set the **StreamMap** and **UseRejectStream** registry entries to the reject output stream.
- UpdateTapInfo_Tapin, which stores information about incoming TAP files in the IFW_TAPINFO table used by the **StopRapGen** utility.

## Configuring Validation Pipeline Output Processing

Configure output processing for the validation pipeline as follows:

1. Configure sequence generation for RAP files.
   a. Using Pricing Center or Pipeline Configuration Center (PCC), define a Sequence Generator.
   b. Edit the **SequencerPool** section of the registry.
      - Set the **SequencerInstance** registry entry to the name of the Sequence Checker defined in step 1.a above.
      - Set the **SequencerType** registry entry to **Generation**.
2. Configure a RAP output stream to write invalid TAP files and records to RAP files.
   a. Set the **Grammar** registry entry for the OUT_GenericStream module to the name of the RAP output grammar description file:

      ```
      Grammar = ./formatDesc/Formats/TAP3-NG/RAP_0105_OutGrammar.dsc
      ```

   b. Set the **Sequencer** registry entry for OUT_GenericStream to the Sequence Generator defined in step 11.a above.
3. Configure fatal RAP file generation by configuring the input module to write TAP files with a fatal error to a RAP file.
   a. Set the **RapOutStream** registry entry for the INP_GenericStream module to the RAP output stream.
   b. Set the **Sequencer** registry entry for INP_GenericStream to the Sequence Generator defined in step 11.a above.
4. Configure another output stream to write valid event data records (EDRs) to an output file to be processed by the reprice and incollect settlement pipelines.
   a. Set the **Grammar** registry entry for the OUT_GenericStream module to the BRM SOL42 output grammar description file:

      ```
      Grammar=./FormatDesc/Formats/Solution42/
      SOL42_V670_REL_OutGrammer.dsc
      ```

b. Configure the EXT_OutFileManager registry entry to specify output file information.

5. Configure Event Handler to send output files to the reprice and incollect settlement pipelines.

a. Add the **Events** subsection as shown below to the **EventHandler** registry:

```
EventHandler
{
   ModuleName      = EVT
   Module
   {
      Events
      {
ifw.Pipelines.TAPInProcessingPipeline.Output.OutputCollection.TAP
InProcessingOutput.Module.OutputStream.Module
         {
            EVT_OUTPUT_FILE_READY = ./bin/move_incollect_roam.pl
         }
      }
   }
}
```

where:

- *TAPInProcessingPipeline* is the name of the validation pipeline.
- *TAPInProcessingOutput* is the output stream for writing valid EDRs.

b. Edit the **move_incollect_roam.pl** script.

Edit the following line to specify the input directory of the reprice pipeline:

```
my $COPY_DIR = "$ENV{IFW_HOME}/data/incollect/reprice/in";
```

Edit the following line to specify the input directory of the incollect settlement pipeline:

```
my $MOVE_DIR = "$ENV{IFW_HOME}/data/incollect/settlement/in";
```

## Configuring the Reprice Pipeline

Configure the reprice pipeline by performing the following tasks:

- Configuring the Reprice Pipeline DataDescription Registry Section
- Configuring Reprice Pipeline Input Processing
- Configuring Validation Pipeline Function Modules
- Configuring Reprice Pipeline Output Processing
- Configuring DAT_InterConnect
- Configuring Rated Event Loader for the Reprice Pipeline
- Configuring Suspense Manager for the Reprice Pipeline

> **Note:**
>
> For an example of reprice pipeline configuration, see *Pipeline_home*/**conf/roaming.reg**.

## Configuring the Reprice Pipeline DataDescription Registry Section

Configure the reprice pipeline **DataDescription** registry section by setting the stream formats, input mapping, and output mapping as follows:

```
DataDescription
{
   Standard
   {
     ModuleName = Standard
     Module
     {
       StreamFormats
       {
         SOL42_FORINPUT = ./formatDesc/Formats/Solution42/SOL42_V670_REL_FORINPUT.dsc
         EVENT_LOADER = ./formatDesc/Formats/Solution42/V670_EVENT_LOADER.dsc
       }
       InputMapping
       {
         SOL42_FORINPUT = ./formatDesc/Formats/Solution42/SOL42_V670_REL_InMap.dsc
       }
       OutputMapping
       {
         EVENT_LOADER = ./formatDesc/Formats/Solution42/V670_EVENT_LOADER_OutMap.dsc
       }
     }
   }
}
```

## Configuring Reprice Pipeline Input Processing

Configure input processing for the reprice pipeline as follows:

1. Configure the INP_GenericStream input module, which maps the contents of the validation pipeline output file into EDR container fields.
   a. Set the **Grammar** registry entry to the standard BRM input grammar description file:

      ```
      Grammar = ./formatDesc/Formats/Solution42/
      SOL42_V670_REL_InGrammar.dsc
      ```

   b. Configure the **EXT_InFileManager** registry entry to specify input file information.

## Configuring Reprice Pipeline Function Modules

Configure the registry for the following modules:

- ISC_ConsolidatedCP, which removes all non-00 impact category charge packets and sets the General Ledger (G/L) ID.

  Use the **GL_CODE** entry to assign the G/L ID for the event balance impacts.
- FCT_ServiceCodeMap, which maps external service codes to internal service codes.
- FCT_UsageClassMap, which maps external codes for supplementary services, such as call forwarding, to internal usage classes.
- FCT_Account, which identifies the subscriber account that generated the event.
- ISC_ApplyTax, which checks whether incoming roaming charge tax amounts need to be passed on to the subscriber.
- FCT_Filter_Set, which adds system charge offers and discount offers to the subscriber's list of charge offers.
- FCT_CustomerRating, which supplies charges for the FCT_MainRating module.
- FCT_PreRating, which calculates zones and creates impact categories.
- FCT_USC_Map, which performs usage scenario mappings.
- FCT_MainRating, which performs the main rating functionality in the pipeline. You can rerate the call, do markup, passthrough, etc.
  - The total charge amount in the charge packets created by the input file should match the **wholesale_charged_amount** under the **detail** block.
  - Based on the rating charge offer, the rating module will create an **ASS_CBD** with one CP.
  - FCT_MainRating works on the **ASS_CBD** rating and **wholesale_charged_amount** markup and updates the **chargeamount** field in the CP under **ASS_CBD** created by CustomerRating.
- FCT_Rounding, which performs rounding of the charge value calculated by rating.
- FCT_ExchangeRate, which converts the TAP currency (SDR) to the subscriber's billing currency (for example, EURO). The exchange rate is determined based on the call time.
- FCT_DiscountAnalysis, which performs discounting analysis functions.
- FCT_PreDiscount, which determines the discount impact category.
- FCT_Discount, which calculates and applies discounts.
- FCT_Rounding, which rounds the discount value calculated by discounting.
- FCT_ApplyBalance, which adds discounts to the EDR balance.
- FCT_ItemAssign, which identifies an appropriate bill item to be assigned to the EDR.

- FCT_BillingRecord, which creates the balance impact information from the charge amount provided in the EDR and associates this impact to the bill item. Set the following entries:

  ```
  CurrencyType = B
  ChargeBreakDownRecord = 980
  ```

## Configuring Reprice Pipeline Output Processing

Configure output processing for the reprice pipeline as follows:

1. Configure routing of EDRs to separate output streams based on service type.
   a. For each service type, configure an output module to write rated EDRs to an output file. This file is loaded into the BRM database by Rated Event (RE) Loader.
      - Set the **Grammar** registry entry for OUT_GenericStream to the RE Loader output grammar description file:

        ```
        Grammar = ./formatDesc/Formats/Solution42/
        V670_EVENT_LOADER_OutGrammar.dsc
        ```

      - Configure the **EXT_OutFileManager** registry entry to specify output file information.
   b. Configure the IRL_EventTypeSplitting module to send EDRs to separate output streams based on service type.

## Configuring DAT_InterConnect

The DAT_InterConnect module provides network operator configuration information that is accessed by the ISC_ApplyTax module.

Configure the DAT_InterConnect module in the **DataPool** registry section. When you configure DAT_InterConnect, you specify database connection information to the BRM database.

## Configuring Rated Event Loader for the Reprice Pipeline

You must configure RE Loader to load events rated by the reprice pipeline into the BRM database. When you configure RE Loader, you specify information about how to connect to the BRM database, the location of the output file created by the reprice pipeline, how to process the events in the file, and so forth.

## Configuring Suspense Manager for the Reprice Pipeline

You must configure Suspense Manager pipeline components to process EDRs suspended by the reprice pipeline.

EDRs suspended by the reprice pipeline are processed by using the following Suspense Manager components:

- FCT_PreSuspense, which appends suspense-related information to the EDR.
- FCT_Reject, which sends suspended EDRs to the reject output stream.

- FCT_Suspense, which adds suspense reason and suspense subreason codes to the EDRs.
- Suspended Event (SE) Loader, which loads suspended events from the reject output stream into the BRM database.
- Suspense Management Center, which is used to query and edit the suspended events. After making the necessary corrections, you submit the suspended events to be recycled. When suspended events are submitted to be recycled, Suspense Management Center publishes a notification event that is queued in the BRM database to notify Pipeline Manager that events are ready to be recycled.
- DAT_Listener, which dequeues the notification event from the BRM database and notifies the DAT_Recycle module.
- DAT_Recycle, which creates a parameter file that allows the EXT_InEasyDB module to read suspended usage records associated with a recycle job. It also provides an interface for the INP_Recycle module to provide status updates about the EDR stream.
- The pre-recycle pipeline, which sends the EDRs to the reprice pipeline to be rated again.

## Configuring the Incollect Settlement Pipeline

Configure the incollect settlement pipeline by performing the following tasks:

- Configuring the Incollect Settlement Pipeline DataDescription Registry Section
- Configuring Incollect Settlement Pipeline Input Processing
- Configuring Incollect Settlement Pipeline Function Modules
- Configuring Incollect Settlement Pipeline Output Processing
- Configuring Rated Event Loader for the Incollect Settlement Pipeline
- Configuring Suspense Manager for the Incollect Settlement Pipeline

> **Note:**
>
> For an example of incollect settlement pipeline configuration, see *Pipeline_home***/conf/roaming.reg**.

### Configuring the Incollect Settlement Pipeline DataDescription Registry Section

Configure the incollect settlement pipeline **DataDescription** registry section by setting the stream formats, input mapping, and output mapping as follows:

```
DataDescription
{
   Standard
   {
     ModuleName = Standard
     Module
     {
       StreamFormats
```

```
      {
        SOL42_FORINPUT = ./formatDesc/Formats/Solution42/SOL42_V670_REL_FORINPUT.dsc
        EVENT_LOADER = ./formatDesc/Formats/Solution42/V670_EVENT_LOADER.dsc
      }
      InputMapping
      {
        SOL42_FORINPUT = ./formatDesc/Formats/Solution42/SOL42_V670_REL_InMap.dsc
      }
      OutputMapping
      {
        EVENT_LOADER = ./formatDesc/Formats/Solution42/V670_EVENT_LOADER_OutMap.dsc
      }
    }
  }
}
```

## Configuring Incollect Settlement Pipeline Input Processing

Configure input processing for the incollect settlement pipeline as follows:

1. Configure the INP_GenericStream input module, which maps the output file from the validation pipeline into EDR container fields:
   a. Set the **Grammar** registry entry to the BRM SOL42 input grammar description file:

```
Grammar = ./formatDesc/Formats/Solution42/SOL42_V670_REL_InGrammar.dsc
```

2. Configure the **EXT_InFileManager** registry entry to specify input file information.

## Configuring Incollect Settlement Pipeline Function Modules

Configure the registry for the following modules:

- ISC_ConsolidatedCP, which removes all non-00 impact category charge packets and sets the G/L ID.

  Use the **GL_CODE** entry to assign the G/L ID for incollect settlement event balance impacts.

- FCT_ServiceCodeMap, which maps external service codes to internal service codes. Set **MapGroup** as follows:

  ```
  MapGroup = INCOLLECT
  ```

- FCT_Account, which determines the roaming partner account and associates the EDR with this account.
- FCT_ExchangeRate, which converts charge amount in the charge packets to the subscriber's billing currency.
- FCT_ItemAssign, which assigns the bill item associated with the roaming partner account's incollect service to the EDR.

- FCT_BillingRecord, which creates the balance impact information from the charge amount provided in the EDR and associates this impact to the bill item. Set the following entries as follows:

  ```
  CurrencyType = B
  ChargeBreakDownRecord = 980
  ```

- ISC_RollbackSettlement, which rolls back transactions when an error occurs.

## Configuring Incollect Settlement Pipeline Output Processing

Configure output processing for the incollect settlement pipeline as follows:

1. Configure GPRS and GSM EDR splitting.
   a. Create a system brand called GSMR to associate with GSM EDRs; create a system brand called GPRSR to associate with GPRS EDRs.
   b. Define splitting rules and associate the rules with the system brands.
   c. Configure the FCT_EnhancedSplitting module and use the **SystemBrands** entry to map the system brands to the GPRS and GSM output streams as follows:

   ```
   ModuleName = FCT_EnhancedSplitting
   Module
   {
        Active = True
        DataConnection = ifw.DataPool.Login
        DefaultOutput = GSMOutput
        SystemBrands
        {
           GSMR = GSMOutput
           GPRSR = GPRSOutput
        }
   }
   ```

2. Configure an output stream to write GSM EDRs to an output file to be processed by RE Loader by configuring the OUT_GenericStream module as follows:
   a. Set **EventType** to **/event/delayed/session/telco/gsm/roaming**.
   b. Set the **Grammar** entry to the name of the RE Loader output grammar description file:

   ```
   Grammar = ./formatDesc/Formats/Solution42/
   V670_EVENT_LOADER_OutGrammar.dsc
   ```

   c. Configure the **EXT_OutFileManager** registry entry to specify output file information.
3. Configure another output stream to write GPRS EDRs to an output file to be processed by RE Loader by configuring the OUT_GenericStream module as follows:
   a. Set **EventType** to **/event/delayed/session/telco/gprs/roaming**.

b. Set the **Grammar** entry to the name of the RE Loader output grammar description file:

```
Grammar = ./formatDesc/Formats/Solution42/
V670_EVENT_LOADER_OutGrammar.dsc
```

c. Configure the **EXT_OutFileManager** registry entry to specify output file information.

## Configuring Rated Event Loader for the Incollect Settlement Pipeline

You must configure RE Loader to load settlement events into the BRM database. When you configure RE Loader, you specify information about how to connect to the BRM database, the location of the output files created by the incollect settlement pipeline, how to process the events in the output file, and so forth.

## Configuring Suspense Manager for the Incollect Settlement Pipeline

You must configure Suspense Manager pipeline components to process input files suspended by the incollect settlement pipeline.

Input files suspended by the incollect settlement pipeline are processed by using the following Suspense Manager components:

- FCT_BatchSuspense, which suspends the input file and creates a batch suspense file.
- Suspended Batch (SB) Loader, which loads the batch suspense file into the BRM database.
- Suspense Management Center, which is used to query and edit the batch suspense file. After making the necessary corrections, you submit the batch suspense file to be recycled. When the file is submitted for recycling, Suspense Management Center publishes a notification event to notify Pipeline Manager that the batch suspense file is ready for recycling.
- DAT_Listener, which dequeues the notification event from the BRM database and notifies the DAT_ResubmitBatch module.
- DAT_ResubmitBatch, which retrieves the suspended batch file from the BRM database and sends it to the incollect settlement pipeline for processing again.

# Configuring the Stop RAP Generator Pipeline

Configure the Stop RAP Generator pipeline by performing the following tasks:

- Configuring the Stop RAP Generator Pipeline EDRFactory Registry
- Configuring the Stop RAP Generator Pipeline DataDescription Registry Section
- Configuring Input Processing for the Stop RAP Generator Pipeline
- Configuring the Stop RAP Generator Pipeline Function Modules
- Configuring Output Processing for the Stop RAP Generator Pipeline

> **Note:**
>
> For an example of Stop RAP Generator pipeline configuration, see *Pipeline_home***/conf/roaming.reg**.

## Configuring the Stop RAP Generator Pipeline EDRFactory Registry

Configure the **EDRFactory Description** entry to the TAP container description file as follows:

```
Description = ./formatDesc/Formats/TAP3-NG/containerDesc.dsc
```

## Configuring the Stop RAP Generator Pipeline DataDescription Registry Section

Configure the Stop RAP Generator pipeline **DataDescription** registry section by setting the stream formats, input mapping, and output mapping as follows:

```
DataDescription
{
  Standard
  {
    ModuleName = Standard
    Module
    {
      StreamFormats
      {
        Stop_RAP = ./formatDesc/Formats/TAP3-NG/StopRapInfo.dsc
        Generic = ./formatDesc/Formats/TAP3-NG/GenericBlocks.dsc
        TAP3    = ./formatDesc/Formats/TAP3-NG/TAP_0312_Blocks.dsc
        RAP     = ./formatDesc/Formats/TAP3-NG/RAP_0105_Blocks.dsc
      }
      InputMapping
      {
        Mapping1 = ./iScriptLib/iScriptLib_Roaming/StopRapInfo_InMap.dsc
      }
      OutputMapping
      {
      }
    }
  }
}
```

## Configuring Input Processing for the Stop RAP Generator Pipeline

Configure input processing for the Stop RAP Generator pipeline as follows:

1. Ensure that the input to this pipeline is the file generated by the **StopRapGen** utility. (The pathname for the output directory of the flat file generated by the **StopRapGen** utility is the input directory of the Stop RAP Generator pipeline.)

2. Configure the INP_GenericStream input module, which maps data from the file generated by the **StopRapGen** utility to staging fields in the EDR container using the grammar file.
   a. Set the **Grammar** registry entry to the name of the input grammar description file:

      ```
      Grammar = ./formatDesc/Formats/TAP3-NG/StopRapInfo_InGrammar.dsc
      ```

   b. Configure the **EXT_InFileManager** registry entry to specify information about the input file.

## Configuring the Stop RAP Generator Pipeline Function Modules

Configure the registry for the UpdateTapInfo_StopRapout iScript. This iScript updates the information about the Stop Return RAP files that have been generated in the BRM database.

## Configuring Output Processing for the Stop RAP Generator Pipeline

Configure output processing for the Stop RAP Generator pipeline as follows:

1. Set the **Grammar** registry entry for the OUT_GenericStream module to the name of the RAP output grammar description file:

   ```
   Grammar = ./formatDesc/Formats/TAP3-NG/RAP_0105_OutGrammar.dsc
   ```

2. Set the **DeleteEmptyStream** registry entry to specify whether to delete empty output streams. The default is **True**. For example,

   ```
   DeleteEmptyStream = False
   ```

3. Set the **Sequencer** registry entry for OUT_GenericStream to the Sequence Generator:

   ```
   Sequencer = SEQ_GEN_RAPOUT
   ```

   where *SEQ_GEN_RAPOUT* is the Sequencer used for the RAP output stream of the validation pipeline.

   See "Configuring Validation Pipeline Output Processing" for more information.

4. Set the **StopRapStream** registry entry to **True**.

   ```
   StopRapStream = True
   ```

5. Configure the **EXT_OutFileManager** registry entry to specify output file information.

7

# Setting Up Pipeline Manager for Roaming Outcollect Processing

This chapter describes how to configure Oracle Communications Billing and Revenue Management (BRM) Pipeline Manager for roaming outcollect processing.

> **Note:**
>
> The following pipeline configuration applies to rating TAP roaming usage events only.

For more information about roaming outcollect processing, see "About Processing Visiting Subscribers' Roaming Usage".

## Setting Up Roaming Outcollect Processing Pipelines

Configure the following pipelines to set up roaming outcollect processing:

- Configuring the Splitter Pipeline
- Configuring the Outcollect Rating Pipeline
- Configuring the Outcollect Settlement Pipeline
- Configuring the RAP Processing Pipeline
- Configuring the TAP Correction Pipeline
- Configuring the Backout Pipeline

### Configuring the Splitter Pipeline

Configure the splitter pipeline by performing the following tasks:

- Configuring the Splitter Pipeline DataDescription Registry Section
- Configuring the Splitter Pipeline Input Processing
- Configuring the Splitter Pipeline Function Modules
- Configuring the Splitter Pipeline Output Processing

> **Note:**
>
> For an example of splitter pipeline configuration, see *Pipeline_home*/**conf/roaming.reg**.

## Configuring the Splitter Pipeline DataDescription Registry Section

Configure the splitter pipeline DataDescription registry section by setting the stream formats, input mapping, and output mapping as follows:

```
DataDescription
{
   Standard
   {
   ModuleName = Standard
   Module
   {
   StreamFormats
   {
     SOL42_FORINPUT     = ./formatDesc/Formats/Solution42/SOL42_V670_REL_FORINPUT.dsc
     SOL42              = ./formatDesc/Formats/Solution42/SOL42_V670_REL.dsc
   }
   InputMapping
   {
     SOL42_FORINPUT     = ./formatDesc/Formats/Solution42/SOL42_V670_REL_InMap.dsc
   }
   OutputMapping
   {
     SOL42              = ./formatDesc/Formats/Solution42/SOL42_V670_REL_OutMap.dsc
   }
   }
   }
}
```

## Configuring the Splitter Pipeline Input Processing

Configure input processing for the splitter pipeline as follows:

1. (Optional) Configure a Batch Controller and a Batch Handler to send call data records (CDRs) from your mediation system to the input directory of the splitting pipeline.

   > **Note:**
   >
   > You do not need to configure a Batch Controller and a Batch Handler if your mediation system is set up to send incoming CDRs directly to the splitter pipeline.

2. Configure the INP_GenericStream input module to map CDR fields to event data record (EDR) container fields:

   a. Set the **Grammar** registry entry to the standard BRM input grammar description file:

      ```
      Grammar = ./formatDesc/Formats/Solution42/
      SOL42_V670_REL_InGrammar.dsc
      ```

   b. Configure the **EXT_InFileManager** registry entry to specify information about the input file.

> **Note:**
>
> In the default *Pipeline_home***/conf/roaming.reg** registry file, the input format is the standard BRM input grammar. If you are using a different input format, you will need to modify the input grammar.
>
> For example:
>
> ```
> Grammar = ./formatDesc/Formats/Solution42/
> yourInputGrammarFile.dsc
> ```

## Configuring the Splitter Pipeline Function Modules

The splitter pipeline uses the FCT_EnhancedSplitting module to split EDRs into home and roaming EDRs. See "Configuring the Splitter Pipeline Input Processing".

## Configuring the Splitter Pipeline Output Processing

Configure output processing for the splitter pipeline as follows:

1. Configure routing home and roaming EDRs to different output streams as follows:
   a. Create a system brand called **HOME** to associate with home EDRs and a system brand called **ROAM** to associate with roaming EDRs.
   b. Define splitting rules and associate the rules with the system brands.
   c. Configure FCT_EnhancedSplitting and use the **SystemBrand** entry to map the system brands to the home and roaming EDR output streams as follows:

```
ModuleName = FCT_EnhancedSplitting
Module
{
     Active           = True
     DataConnection   = ifw.DataPool.Login
     DefaultOutput    = RoamOutput
     SystemBrands
     {
        HOME          = HomeOutput
        ROAM          = RoamOutput
     }
}
```

   The **DefaultOutput** entry specifies the default output stream for EDRs that do not match the splitting rules.

2. Configure an output stream to write home EDRs to an output file to be processed by the normal rating pipeline.
   a. Set the **Grammar** registry entry of the OUT_GenericStream module to the standard BRM output grammar description file:

```
Grammar=./FormatDesc/Solution42/SOL42_V670_REL_OutGrammar.dsc
```

   b. Configure **EXT_OutFileManager** to specify information about the output file.

3. Configure another output stream to write roaming EDRs to an output file to be processed by the outcollect rating pipeline.

a. Set the **Grammar** registry entry of the OUT_GenericStream module to the standard BRM output grammar description file:

```
Grammar=./FormatDesc/Solution42/SOL42_V670_REL_OutGrammar.dsc
```

b. Configure **EXT_OutFileManager** to specify information about the output file.

# Configuring the Outcollect Rating Pipeline

Configure the outcollect rating pipeline by performing the following tasks:

- Configuring the Outcollect Rating Pipeline DataDescription Registry Section
- Configuring the Outcollect Rating Pipeline Input Processing
- Configuring the Outcollect Rating Pipeline Function Modules
- Configuring the Outcollect Rating Pipeline Output Processing
- Configuring the DAT_InterConnect Module
- Configuring Suspense Manager for the Outcollect Rating Pipeline

> **Note:**
>
> For an example of outcollect rating pipeline configuration, see *Pipeline_home***/conf/roaming.reg**.

## Configuring the Outcollect Rating Pipeline DataDescription Registry Section

Configure the Outcollect rating pipeline DataDescription registry section by setting the stream formats, input mapping and output mapping as follows:

```
DataDescription
{
   Standard
   {
   ModuleName = Standard
   Module
   {
   StreamFormats
   {
     SOL42    = ./formatDesc/Formats/Solution42/SOL42_V670_REL_FORINPUT.dsc
     Generic  = ./formatDesc/Formats/TAP3-NG/GenericBlocks.dsc
     TAP      = ./formatDesc/Formats/TAP3-NG/TAP_0312_Blocks.dsc
   }
   InputMapping
   {
     SOL42    = ./formatDesc/Formats/Solution42/SOL42_V670_REL_InMap.dsc
   }
   OutputMapping
   {
   }
   }
   }
}
```

## Configuring the Outcollect Rating Pipeline Input Processing

Configure input processing for the outcollect rating pipeline as follows:

1. Configure the input stream.
   a. Set the **Grammar** registry entry for the INP_GenericStream module to the standard BRM input grammar description file:

      ```
      Grammar = ./formatDesc/Formats/Solution42/
      SOL42_V670_REL_InGrammar.dsc
      ```

   b. Configure **EXT_InFileManager** to specify information about the output file.

> **Note:**
>
> By default, the outcollect rating pipeline retrieves the roaming EDRs from the output directory of the splitter pipeline. Set **OutputPath**, **OutputPrefix,** and **OutputSuffix** to be the same as the splitter pipeline's output directory for roaming EDRs if you are implementing the default behavior.

## Configuring the Outcollect Rating Pipeline Function Modules

Configure the registry entries for the following modules:

- DAT_InterConnect, which provides network operator data for FCT_CarrierRating.
- FCT_CarrierIcRating, which adds roaming data to EDRs for rating by the FCT_PreRating and FCT_MainRating modules.
- FCT_PreRating, which calculates zones and creates impact categories.
- FCT_MainRating, which performs the main rating functionality in a pipeline.
- FCT_Rounding, which performs rounding for rating and discounting.
- FCT_ExchangeRate, which converts the charge amount to SDR currency. Use the **HomeCurrency** entry to set currency to SDR as follows:

  ```
  HomeCurrency = SDR
  ```

- ISC_MiscOutCollect, which adds BASIC_SERVICE and SUPPLEMENTARY_SERVICE blocks to the EDR container for GSM services.

## Configuring the Outcollect Rating Pipeline Output Processing

Configure output processing for the outcollect rating pipeline as follows:

1. Configure outcollect TAP file generation for each roaming partner.

   During outcollect processing, roaming EDRs are identified by roaming partner and routed to the output streams unique for each partner. This enables the EDRs for one roaming partner to be isolated from the EDRs for another partner. To support this, do the following:

a. Create a system brand for each roaming partner.

b. Define splitting rules for each roaming partner.

c. Configure FCT_EnhancedSplitting to route the rated EDRs to the corresponding network operator output stream using system brands.

> **Note:**
>
> You can use the Instances module to configure multiple system brands for FCT_EnhancedSplitting to route EDRs to multiple output streams.

If FCT_EnhancedSplitting is unable to route the EDR using the splitting rules, it sends it to the default output which is mapped to the suspense output stream.

In the following sample registry, OPR01 and OPR02 system brands are used to route EDRs to different output streams:

```
ModuleName = FCT_EnhancedSplitting
Module
{
Active           = True
DataConnection   = ifw.DataPool.Login
DefaultOutput    = SuspenseCreateOutput
SystemBrands
{
OPR01            = OPR01Output
OPR02            = OPR02Output
}
}
```

2. Configure sequence generation for outcollect TAP files.

a. Using Pricing Center or Pipeline Configuration Center (PCC), define a sequence generator for *each* roaming partner by entering a name and a unique sequence key.

b. Configure each Sequencer by editing the **SequencerPool** section of the registry.

> **Note:**
>
> You can use the Instances module to configure multiple sequencers for multiple roaming partners.

c. Set the **SequencerInstance** registry entry to the name of the sequence generator defined in step 2.a above.

d. Set the **SequencerType** registry entry to **Generation**.

The following sample configuration shows two Sequence Generators for NetworkOperator01 and NetworkOperator02.

```
SequencerPool
{
```

```
SEQ_GEN_TAPOUT_NetworkOperator01
{
     Source = Database
     Controller
     {
          SequencerType = Generation
          ReuseGap = True
          SequenceLength = 5
          DatabaseConnection = ifw.DataPool.Login
     }
}
SEQ_GEN_TAPOUT_NetworkOperator02
{
     Source = Database
     Controller
     {
          SequencerType = Generation
          ReuseGap = True
          SequenceLength = 5
          DatabaseConnection = ifw.DataPool.Login
     }
}
}
```

3. Configure an output stream for each roaming partner.

   For *each* roaming partner, configure the OUT_GenericStream module registry entries as follows:

> **Note:**
>
> You can use the Instances module to configure multiple output streams for multiple roaming partners.

   a. Set the **Grammar** registry entry to the TAP Output grammar description file:

      ```
      Grammar = ./formatDesc/Formats/TAP3-NG/TAP_0312_OutGrammar.dsc
      ```

   b. Set **Sequencer** to the name of the Sequence Generator for generating sequence number for this roaming partner.

   c. Set **Sender** to the network operator ID sending the outcollect TAP file.

   d. Set **Recipient** to the roaming partner receiving the outcollect TAP file.

   e. Configure **EXT_OutFileManager** to specify the output file information.

      The following example shows output stream configurations for NetworkOperator01 and NetworkOperator02:

```
NetworkOperator01Output
{
ModuleName  = OUT_GenericStream
...
Module
{
   Grammar = ./formatDesc/Formats/TAP3-NG/TAP_0312_OutGrammar.dsc
   Sequencer = SEQ_GEN_TAPOUT_NetworkOperator01
   Sender = PORTL
   Recipient = OPRO1
```

```
   OutputStream
   {
     ModuleName = EXT_OutFileManager
     Module
     { OutputPath            = ./data/outcollect/tapout/opr01
       OutputPrefix          = CDPORTLOPR01
       TempPrefix            = tmptest_opr01_
       TempDataPath          = ./data/outcollect/tapout/opr01
       TempDataPrefix        = test.opr01.tmp.
       TempDataSuffix        = .data
       UseInputStreamName    = [0,0]
       SequencerPrefix       = ""
       AppendSequenceNumber  = True
     }
   }
}
}
NetworkOperator02Output
{
ModuleName  = OUT_GenericStream
...|
Module
{
   Grammar = ./formatDesc/Formats/TAP3-NG/TAP_0312_OutGrammar.dsc
   Sequencer = SEQ_GEN_TAPOUT_NetworkOperator02
   Sender = PORTL
   Recipient = OPR02
   OutputStream
   {
     ModuleName = EXT_OutFileManager
     Module
     {
       OutputPath            = ./data/outcollect/tapout/opr02
       OutputPrefix          = CDPORTLOPR02
       TempPrefix            = tmptest_opr02_
       TempDataPath          = ./data/outcollect/tapout/opr02
       TempDataPrefix        = test.opr02.tmp.
       TempDataSuffix        = .data
       UseInputStreamName    = [0,0]
       SequencerPrefix       = ""
       AppendSequenceNumber  = True
      }
   }
}
}
```

4. Configure Event Handler to copy outcollect TAP files to a common directory and to move the original outcollect TAP files to the outcollect settlement pipeline input directory.

   a. For each network operator output stream configured in the outcollect rating pipeline, add the following to the **Events** subsection of the EventHandler registry:

      ```
      EVT_OUTPUT_FILE_READY = ./bin/move_outcollectTap.pl
      ```

      The following example shows Event Handler configuration for NetworkOperator01Output and NetworkOperator02Output.

      ```
      EventHandler
      {
           ModuleName = EVT
      ```

```
      Module
      {
         Events
         {
ifw.Pipelines.TAPOutCollectPipeline.Output.OutputCollection.NetworkOperat
or01Output.Module.OutputStream.Module
{
EVT_OUTPUT_FILE_READY = ./bin/move_outcollectTap.pl
}
ifw.Pipelines.TAPOutCollectPipeline.Output.OutputCollection.NetworkOperat
or02Output.Module.OutputStream.Module
{
EVT_OUTPUT_FILE_READY = ./bin/move_outcollectTap.pl
}
         }
      }
}
```

b. Edit **move_outcollectTap.pl**.

   Edit the following line to specify the common directory to which the outcollect TAP files will be copied:

   ```
   my $COPY_DIR = "$ENV{IFW_HOME}/data/outcollect/tapout/common";
   ```

   Edit this line to specify the input directory of the outcollect settlement pipeline.

   ```
   my $MOVE_DIR = "$ENV{IFW_HOME}/data/outcollect/settlement/in";
   ```

## Configuring the DAT_InterConnect Module

The DAT_InterConnect module provides network operator configuration information that is accessed by the FCT_CarrierICRating module.

Configure the DAT_InterConnect module in the **DataPool** registry section. When you configure DAT_InterConnect, you specify the database connection information to the BRM database.

## Configuring Suspense Manager for the Outcollect Rating Pipeline

You must configure Suspense Manager pipeline components to process EDRs suspended by the outcollect rating pipeline.

EDRs suspended by the outcollect rating pipeline are processed by using the following Suspense Manager components:

- FCT_PreSuspense, which appends suspense-related information to the EDR.
- FCT_Reject, which sends suspended EDRs to the reject output stream.
- FCT_Suspense, which routes EDRs from SuspenseCreateOutput to SuspenseUpdateOutput during recycling.
- Suspended Event (SE) Loader, which loads suspended events from the reject output stream into the BRM database.
- Suspense Management Center, which is used to query and edit the suspended events. After making the necessary corrections, you submit the suspended events to be recycled. When suspended events are submitted to be recycled, Suspense Management Center publishes a notification event that is queued in the BRM database to notify Pipeline Manager that events are ready to be recycled.

- DAT_Listener, which dequeues the notification event from the BRM database and notifies the DAT_Recycle module.
- DAT_Recycle, which creates a parameter file that allows the EXT_InEasyDB module to read suspended usage records associated with a recycle job. It also provides an interface for the INP_Recycle module to provide status updates about the EDR stream.
- Pre-recycle pipeline, which sends the EDRs to the Outcollect rating pipeline to be rated again.

# Configuring the Outcollect Settlement Pipeline

Configure the outcollect settlement pipeline by performing the following tasks:

- Configuring the Outcollect Settlement Pipeline EDRFactory Registry
- Configuring the Outcollect Settlement Pipeline DataDescription Registry Section
- Configuring the Outcollect Settlement Pipeline Input Processing
- Configuring the Outcollect Settlement Pipeline Function Modules
- Configuring the Outcollect Settlement Pipeline Output Processing
- Configuring Rated Event Loader to Load Settlement Events into the BRM Database
- Configuring Suspense Manager for the Outcollect Settlement Pipeline

> **Note:**
>
> For an example of outcollect settlement pipeline configuration, see *Pipeline_home***/conf/roaming.reg**.

## Configuring the Outcollect Settlement Pipeline EDRFactory Registry

Set the **EDRFactory Description** entry to the TAP container description file as follows:

```
Description = ./formatDesc/Formats/TAP3-NG/containerDesc.dsc
```

## Configuring the Outcollect Settlement Pipeline DataDescription Registry Section

Configure the outcollect settlement pipeline DataDescription registry section by setting the stream formats, input mapping and output mapping as follows:

```
DataDescription
{
   Standard
   {
   ModuleName = Standard
   Module
   {
   StreamFormats
   {
```

```
      Generic        = ./formatDesc/Formats/TAP3-NG/GenericBlocks.dsc
      TAP            = ./formatDesc/Formats/TAP3-NG/TAP_0312_Blocks.dsc
      EVENT_LOADER   = ./formatDesc/Formats/Solution42/V670_EVENT_LOADER.dsc
      TapHeaderInfo  = ./formatDesc/Formats/TapHeaderInfo/TapHeaderInfo.dsc
   }
   InputMapping
   {
   }
   OutputMapping

   {
     EVENT_LOADER    = ./formatDesc/Formats/Solution42/
V670_EVENT_LOADER_OutMap.dsc
     TapHeaderInfo   = ./formatDesc/Formats/TapHeaderInfo/
TapHeaderInfo_OutMap.dsc
   }
   }
   }
}
```

## Configuring the Outcollect Settlement Pipeline Input Processing

Configure input processing for the outcollect settlement pipeline as follows:

1. Configure the INP_GenericStream input module to map outcollect TAP files into EDR containers.
   a. Set the **Grammar** registry entry to the name of the TAP input grammar description file:

      ```
      Grammar = ./formatDesc/Formats/TAP3-NG/TAP_0312_InGrammar.dsc
      ```

   b. Configure **EXT_InFileManager** to specify input file information.

## Configuring the Outcollect Settlement Pipeline Function Modules

Configure the registry for the following modules:

- ISC_TAP_0312_InMap, which maps TAP data into the EDR container fields.
- ISC_ConsolidatedCP, which removes all non-00 impact category charge packets and sets the G/L ID.

  Use the **GL_CODE** entry to assign the G/L ID for outcollect settlement event balance impacts.
- FCT_ServiceCodeMap, which maps external service codes to internal service codes. Set **MapGroup** as follows:

  ```
  MapGroup = OUTCOLLECT
  ```

- FCT_Account, which determines the roaming partner account and associates the EDR with this account.
- FCT_ExchangeRate, which converts charge amounts in the charge packets to the SDR currency.
- FCT_ItemAssign, which assigns the bill item associated with the roaming partner account's outcollect service to the EDR.

- FCT_BillingRecord, which creates the balance impact information from the charge amount provided in the EDR and associates this impact to the bill item. Set the following entries as follows:

  ```
  CurrencyType = B
  ChargeBreakDownRecord = 980
  ```

- ISC_RollbackSettlement, which rolls back transactions when an error occurs.

## Configuring the Outcollect Settlement Pipeline Output Processing

Configure output processing for the outcollect settlement pipeline as follows:

1. Configure GPRS and GSM EDR splitting.
   a. Create a system brand called **GSMR** to associate with GSM EDRs, and a system brand called **GPRSR** to associate with GPRS EDRs.
   b. Define splitting rules for GPRS and GSM EDRs.
   c. Configure FCT_EnhancedSplitting and use the **SystemBrand** entry to map the system brands to the GPRS and GSM output streams as follows:

   ```
   ModuleName = FCT_EnhancedSplitting
   Module
   {
        Active          = True
        DataConnection  = ifw.DataPool.Login
        DefaultOutput   = GSMOutput
        SystemBrands
        {
           GSMR         = GSMOutput
           GPRSR        = GPRSOutput
        }
   }
   ```

2. Configure an output stream to write GSM EDRs to an output file to be processed by Rated Event (RE) Loader by configuring the OUT_GenericStream module.
   a. Set **EventType** to **/event/delayed/session/telco/gsm/roaming**.
   b. Set the **Grammar** registry entry to the RE Loader output grammar description file:

   ```
   Grammar = ./formatDesc/Formats/Solution42/
   V670_EVENT_LOADER_OutGrammar.dsc
   ```

   c. Configure **EXT_OutFileManager** to specify output file information.
3. Configure another output stream to write GPRS EDRs to an output file to be processed by RE Loader by configuring the OUT_GenericStream module.
   a. Set **EventType** to **/event/delayed/session/telco/gprs/roaming**.
   b. Set the **Grammar** registry entry to the RE Loader output grammar description file:

   ```
   Grammar = ./formatDesc/Formats/Solution42/
   V670_EVENT_LOADER_OutGrammar.dsc
   ```

   c. Configure **EXT_OutFileManager** to specify output file information.
4. Configure Event Handler to move outcollect TAP files from the common directory to another directory, from which they are sent to roaming partners.

a. Add the **Events** subsection, as shown below, to the **EventHandler** registry:

```
EventHandler
{
ModuleName      = EVT
Module
{
   Events
   {
     ifw.Pipelines.TAPOutSettlementPipeline.Output.OutputCollection.GSMOu
tput.Module.OutputStream.Module
     {
       EVT_OUTPUT_FILE_READY = ./bin/move_TapSent.pl
     }
   }
}
}
```

where:

*TAPOutSettlementPipeline* is the name of the outcollect settlement pipeline.

*GSMOutput* is the name of the output stream for GSM events.

b. Edit the **move_TapSent.pl** script:

Edit the following line to specify the common directory where the outcollect TAP files are stored.

```
$IN_DIR = "$ENV{IFW_HOME}/data/outcollect/tapout/common";
```

Edit this line to specify the directory where the outcollect TAP files will be moved to from the common directory (this is the directory from which outcollect TAP files can be sent to your roaming partner):

```
$MOVE_DIR = "$ENV{IFW_HOME}/data/outcollect/tapout/sent";
```

5. Configure the OUT_GenericStream module to write the TAP header information to an output file to be used by the RAP processing pipeline.

a. Set the **Grammar** registry entry as follows:

```
Grammar = ./formatDesc/Formats/TapHeaderInfo/TapHeaderInfo_OutGrammar.dsc
```

b. Configure **EXT_OutFileManager** to specify output file information.

## Configuring Rated Event Loader to Load Settlement Events into the BRM Database

You must configure RE Loader to load settlement events into the BRM database. When you configure RE Loader, you specify information about how to connect to the BRM database, the location of the output files created by the outcollect settlement pipeline, how to process the events in the output file, and so forth.

## Configuring Suspense Manager for the Outcollect Settlement Pipeline

You must configure Suspense Manager pipeline components to process TAP files suspended by the outcollect settlement pipeline.

TAP files suspended by the outcollect settlement pipeline are processed by using the following Suspense Manager components:

- FCT_BatchSuspense, which suspends the TAP files and creates a batch suspense file.
- Suspended Batch (SB) Loader, which loads the batch suspense file into the BRM database.
- Suspense Management Center, which is used to query and edit the batch suspense file. After making the necessary corrections, you submit the batch suspense file to be recycled. When the file is submitted for recycling, Suspense Management Center publishes a notification event to notify Pipeline Manager that the batch suspense file is ready for recycling.
- DAT_Listener, which dequeues the notification event from the BRM database and notifies the DAT_ResubmitBatch module.
- DAT_ResubmitBatch, which retrieves the suspended batch file from the BRM database and sends it to the outcollect settlement pipeline for processing again.

# Configuring the RAP Processing Pipeline

Configure the RAP processing pipeline by performing the following tasks:

- Configuring the RAP Processing Pipeline EDRFactory Registry
- Configuring the RAP Processing Pipeline DataDescription Registry Section
- Configuring the RAP Processing Pipeline Input Processing
- Configuring the RAP Processing Pipeline Function Modules
- Configuring the RAP Processing Pipeline Output Processing
- Configuring Suspense Manager for the RAP Processing Pipeline
- Configuring Event Extraction Manager to Create the Backout File

> **Note:**
>
> For an example of the RAP processing pipeline configuration, see *Pipeline_home***/conf/roaming.reg**.

## Configuring the RAP Processing Pipeline EDRFactory Registry

Set the **EDRFactory Description** entry to the TAP container description file as follows:

```
Description = ./formatDesc/Formats/TAP3-NG/containerDesc.dsc
```

## Configuring the RAP Processing Pipeline DataDescription Registry Section

Configure the RAP processing pipeline **DataDescription** registry section by setting the stream formats, input mapping and output mapping as follows:

```
DataDescription
{
   Standard
   {
   ModuleName = Standard
   Module
   {
```

```
    StreamFormats
    {
      Generic                = ./formatDesc/Formats/TAP3-NG/GenericBlocks.dsc
      RAP                    = ./formatDesc/Formats/TAP3-NG/RAP_0105_Blocks.dsc
      SUSPENSE_BATCH_RECORD  = ./formatDesc/Formats/SBL/SuspenseBatchRecord.dsc
      EET                    = ./formatDesc/Formats/EET/EET.dsc
    }
    InputMapping
    {
    }
    OutputMapping
    {
      SUSPENSE_BATCH_RECORD  = ./formatDesc/Formats/SBL/SuspenseBatchRecord_OutMap.dsc
      EET                    = ./formatDesc/Formats/EET/EET_OutMap.dsc
}
}
}
}
```

## Configuring the RAP Processing Pipeline Input Processing

Configure the INP_GenericStream input module to map RAP files into EDR containers.

Configure input processing for the RAP processing pipeline as follows:

1. Set the **Grammar** registry entry to RAP input grammar description file:

   ```
   Grammar = ./formatDesc/Formats/TAP3-NG/RAP_0105_InGrammar.dsc
   ```

2. Set the following entries to specify information about the TAP Header Information file:
   - Set **TapHeaderInfoFilePrefix** to the file prefix. For example:

     TapHeaderInfoFilePrefix = test_
   - Set **TapHeaderInfoFileSuffix** to the file suffix. For example:

     TapHeaderInfoFileSuffix = .thi
   - Set **TapHeaderInfoFieldSep** to the field separator used in the file. For example:

     TapHeaderInfoFieldSep = ;
   - Set **TapHeaderInfoFilePath** to the path where the file is stored. For example:

     TapHeaderInfoFilePath = ./data/outcollect/settlement/out/tapheaderinfo
3. Configure **EXT_InFileManager** to specify input file information.

## Configuring the RAP Processing Pipeline Function Modules

Configure the registry for the following modules:

- ISC_RAP_0105_InMap, which maps TAP data in the RAP file into the EDR container fields.
- ISC_DupRAPRecords, which duplicates the EDR. For a fatal RAP file, it sends the duplicate EDR to the suspense batch record output stream. For a severe RAP file, it sends the duplicate EDR to the suspense output stream.

- ISC_OverrideSuspenseParams, which overrides the suspense parameters.

## Configuring the RAP Processing Pipeline Output Processing

Configure output processing for the RAP processing pipeline as follows:

1. Configure the OUT_GenericStream module to generate the RAP Acknowledgment file.
   a. Set the **Grammar** registry entry to RAP Acknowledgment output grammar description file:

      ```
      Grammar = ./formatDesc/Formats/TAP3-NG/RAP_0105_AckOutGrammar.dsc
      ```

   b. Set **DeleteEmptyStream** to **False**.
   c. Configure **EXT_OutFileManager** to specify output file information.
2. Configure an output stream to generate output files to be processed by Event Extraction Manager by configuring the OUT_GenericStream module as follows:
   a. Set **EventType** to **/event_extract**.
   b. Set the **Grammar** registry entry to the name of the RE Loader output grammar description file:

      ```
      Grammar = ./formatDesc/Formats/EET/EET_OutGrammar.dsc
      ```

   c. Configure **EXT_OutFileManager** to specify output file information.
3. Configure another output stream to generate suspense batch record files by configuring the OUT_GenericStream module as follows:
   a. Set **EventType** to **/suspended_batch/rapin**.
   b. Set the **Grammar** registry entry to the suspense batch record output grammar description file:

      ```
      Grammar = ./formatDesc/Formats/SBL/
      SuspenseBatchRecord_OutGrammar.dsc
      ```

   c. Configure **EXT_OutFileManager** to specify output file information.

## Configuring Suspense Manager for the RAP Processing Pipeline

You must configure Suspense Manager pipeline components to process TAP files and records suspended by the RAP processing pipeline.

EDRs suspended by the RAP processing pipeline are processed by using the following Suspense Manager components:

- FCT_PreSuspense, which appends suspense-related information to all EDRs.
- FCT_Reject, which sends suspended files to the reject output stream.
- FCT_Suspense, which routes EDRs from SuspenseCreateOutput to SuspenseUpdateOutput during recycling.
- Suspended Event (SE) Loader, which loads suspended events from the reject output stream into the BRM database.

- Suspended Batch (SB) Loader, which loads suspended batch files into the BRM database.
- Suspense Management Center, which is used to query and edit the suspended events. After making the necessary corrections, you submit the suspended events to be recycled. When suspended events are submitted to be recycled, Suspense Management Center publishes a notification event that is queued in the BRM database to notify Pipeline Manager that events are ready to be recycled.
- DAT_Listener, which dequeues the notification event from the BRM database and notifies the DAT_Recycle module.
- DAT_Recycle which creates a parameter file that allows the EXT_InEasyDB module to read suspended usage records associated with a recycle job. It also provides an interface for the INP_Recycle module to provide status updates about the EDR stream.
- Pre-recycle pipeline, which sends the EDRs to the outcollect rating pipeline.

## Configuring Event Extraction Manager to Create the Backout File

Event Extraction Manager creates the backout file used by the backout pipeline.

# Configuring the TAP Correction Pipeline

Configure the TAP correction pipeline by performing the following tasks:

- Configuring the TAP Correction Pipeline EDRFactory Registry
- Configuring the TAP Correction Pipeline DataDescription Registry Section
- Configuring the TAP Correction Pipeline Input Processing
- Configure the TAP Correction Pipeline Function Modules
- Configuring the TAP Correction Pipeline Output Processing

> **Note:**
>
> For an example of TAP correction pipeline configuration, see *Pipeline_home***/conf/roaming.reg**.

## Configuring the TAP Correction Pipeline EDRFactory Registry

Set the **EDRFactory Description** entry to the TAP container description file as follows:

```
Description = ./formatDesc/Formats/TAP3-NG/containerDesc.dsc
```

## Configuring the TAP Correction Pipeline DataDescription Registry Section

Configure the TAP correction pipeline **DataDescription** registry section by setting the stream formats, input mapping and output mapping as follows:

```
DataDescription
{
   Standard
   {
```

```
   ModuleName = Standard
   Module
   {
   StreamFormats
   {
     Generic = ./formatDesc/Formats/TAP3-NG/GenericBlocks.dsc
     TAP = ./formatDesc/Formats/TAP3-NG/TAP_0312_Blocks.dsc
   }
   InputMapping
   {
   }
   OutputMapping
   {
   }
   }
   }
}
```

## Configuring the TAP Correction Pipeline Input Processing

Configure input processing for the TAP correction pipeline as follows:

1. Configure the INP_GenericStream input module to map TAP files into EDR containers.
   a. Set the **Grammar** registry entry to the name of the TAP input grammar description file:

      ```
      Grammar = ./formatDesc/Formats/TAP3-NG/TAP_0312_InGrammar.dsc
      ```

   b. Configure **EXT_InFileManager** to specify input file information.

## Configure the TAP Correction Pipeline Function Modules

Configure the registry for the following modules:

1. ISC_TAP_0312_InMap, which maps TAP data into the EDR container fields.
2. Configure your custom iScript to make corrections to the TAP file.

## Configuring the TAP Correction Pipeline Output Processing

Configure output processing for the TAP correction pipeline as follows:

1. Configure the OUT_GenericStream output module to map the EDR to the TAP files.
   a. Set the **Grammar** registry entry to TAP output grammar description file:

      ```
      Grammar = ./formatDesc/Formats/TAP3-NG/TAP_0312_OutGrammar.dsc
      ```

   b. Configure **EXT_OutFileManager** to specify output file information.
2. Configure Event Handler to send TAP files to the outcollect settlement pipeline.
   a. Set the **Events** subsection in the **EventHandler** section as follows:

      ```
      EventHandler
      {
         ModuleName      = EVT
         Module
         {
      ```

```
      Events
      {
        ifw.Pipelines.TAPCorrectionPipeline.Output.OutputCollection.TAPOut
put.Module.OutputStream.Module
       {
        EVT_OUTPUT_FILE_READY = ./bin/move_outcollectTap.pl
       }
      }
    }
}
```

where:

*TAPCorrectionPipeline* is the name of the TAP correction pipeline.

*TAPOutput* is the name of the TAP correction pipeline output stream.

b. Edit the **move_outcollectTap.pl** script:

Edit the following line to specify the common directory where to copy the TAP files:

```
my $COPY_DIR = "$ENV{IFW_HOME}/data/outcollect/tapout/common";
```

Edit the following line to specify the input directory of the outcollect settlement pipeline:

```
my $MOVE_DIR = "$ENV{IFW_HOME}/data/outcollect/settlement/in";
```

# Configuring the Backout Pipeline

Configure the backout pipeline by performing the following tasks:

- Configuring the Backout Pipeline DataDescription Registry Section
- Configuring the Backout Pipeline Input Processing
- Configuring the Backout Pipeline Output Processing
- Configuring Suspense Manager for the Backout Pipeline

> **Note:**
>
> For an example of backout pipeline configuration, see *Pipeline_home*/**conf/roaming.reg**.

## Configuring the Backout Pipeline DataDescription Registry Section

Configure the backout pipeline **DataDescription** registry section by setting the stream formats, input mapping and output mapping as follows:

```
DataDescription
{
   Standard
   {
   ModuleName = Standard
   Module
   {
   StreamFormats
```

```
    {
      SOL42_FORINPUT = ./formatDesc/Formats/Solution42/SOL42_V670_REL_FORINPUT.dsc
      EVENT_LOADER   = ./formatDesc/Formats/Solution42/V670_EVENT_LOADER.dsc
    }
    InputMapping
    {
      SOL42_FORINPUT = ./formatDesc/Formats/Solution42/SOL42_V670_REL_InMap.dsc
    }
    OutputMapping
    {
      EVENT_LOADER   = ./formatDesc/Formats/Solution42/V670_EVENT_LOADER_OutMap.dsc
    }
    }
    }
}
```

## Configuring the Backout Pipeline Input Processing

Configure input processing for the backout pipeline as follows:

1. Configure INP_GenericStream module to map RAP files into EDR containers.
   a. Set the **Grammar** registry entry to RAP input grammar description file.

      ```
      Grammar = ./formatDesc/Formats/Solution42/
      SOL42_V670_REL_InGrammar_BACKOUT.dsc
      ```

   b. Configure **EXT_InFileManager** to specify input file information.

## Configuring the Backout Pipeline Output Processing

Configure output processing for the backout pipeline as follows:

1. Configure GPRS and GSM EDR splitting.

   > **Note:**
   >
   > If you previously configured GPRS and GSM EDR splitting, you can use the existing system brands and splitting rules. You can skip steps 1.a and 1.b below.

   a. Create a system brand called GSMR for GSM EDRs and a system brand called GPRSR for GPRS EDRs.
   b. Define splitting rules for GPRS and GSM EDRs.
   c. Configure FCT_EnhancedSplitting and use the **SystemBrand** entry to map the system brands to the GPRS and GSM output streams. For an example configuration, see "Configuring the Outcollect Rating Pipeline Input Processing".
2. Configure an output stream to write GSM EDRs to an output file to be processed by RE Loader by configuring OUT_GenericStream as follows:
   a. Set **EventType** to **/event/delayed/session/telco/gsm/roaming**.

b. Set the **Grammar** registry entry to the RE Loader output grammar description file:

```
Grammar = ./formatDesc/Formats/Solution42/
V670_EVENT_LOADER_OutGrammar.dsc
```

c. Configure **EXT_OutFileManager** to specify output file information.

3. Configure another output stream to write GPRS EDRs to an output file to be processed by RE Loader by configuring OUT_GenericStream as follows:

a. Set **EventType** to **/event/delayed/session/telco/gprs/roaming**.

b. Set the **Grammar** registry entry to the RE Loader output grammar description file:

```
Grammar = ./formatDesc/Formats/Solution42/
V670_EVENT_LOADER_OutGrammar.dsc
```

c. Configure **EXT_OutFileManager** to specify output file information.

## Configuring Suspense Manager for the Backout Pipeline

It is possible that the backout pipeline is unable to process the Event Extraction Manager output file. When this occurs, the backout pipeline suspends the entire file. To handle suspension in the pipeline, configure the following Suspense Manager pipeline components:

- FCT_PreSuspense, which appends suspense-related information to all EDRs.
- FCT_Reject, which sends suspended files to the reject output stream.
- FCT_Suspense, which routes EDRs from SuspenseCreateOutput to SuspenseUpdateOutput during recycling.

# 8
# RAP to EDR Field Mappings

This chapter describes RAP-to-EDR mapping used by Oracle Communications Billing and Revenue Management (BRM) TAP Roaming Manager when processing RAP input files.

For more information about RAP file processing, see "About Handling Rejected TAP Files".

## Mapping of RAP Fields to EDR Fields

When processing incoming RAP files, TAP Roaming Manager copies the data in the RAP file into EDR container fields.

Table 8-1 lists the RAP field and the corresponding EDR field in the EDR container where the RAP field data is copied.

**Table 8-1 Mapping of RAP Fields to EDR Fields**

| RAP field | EDR field | Description |
|---|---|---|
| Sender | HEADER.SENDER | The Public Mobile Network (PMN) sending the data. |
| Recipient | HEADER.RECIPIENT | The PMN receiving the data sent by the **Sender**. |
| RapFileSequenceNumber | HEADER.RAP_FILE_SEQ_NO | A unique reference that identifies each RAP data interchange sent by one PMN to another. |
| RapFileCreationTimeStamp | HEADER.CREATION_TIMESTAMP<br>HEADER.UTC_TIME_OFFSET | The date and time the RAP file was created. |
| RapFileAvailable Timestamp | HEADER.TRANSMISSION_DATE | The date and time the RAP file was made available to the **Recipient**. |
| SpecificationVersionNumber | HEADER.SPECIFICATION_VERSION_NUMBER | The specification version number of the TAP file being exchanged between the VPMN and HPMN. |
| ReleaseVersion | HEADER.RELEASE_VERSION | The release version within the Specification Version Number of the TAP file being returned. |
| RapSpecificVersionNumber | HEADER.RAP_SPECIFICATION_VERSION_NUMBER | NA |
| RapReleaseVersion | HEADER.RAP_RELEASE_VERSION | NA |
| SeverReturnValue | TRAILER.TOTAL_CHARGE_VALUE_LIST<br>TOTAL_CHARGE_VALUE | NA |
| TotalSeverReturnValue | TRAILER.TAP_TOTAL_CHARGE_VALUE | Total value of the severe returns within the RAP file. |

**Table 8-1 (Cont.) Mapping of RAP Fields to EDR Fields**

| RAP field | EDR field | Description |
|---|---|---|
| ReturnCountDetail | TRAILER.TAP_TOTAL_NUMBER_OF_RECORDS | NA |
| FileSequenceNumber | DETAIL.ASS_ROAMING_EXT.TAP_FILE_SEQ_NO | A unique reference which identifies the erroneous TAP file. |
| CalleventDetails | NA | NA |
| PathItemId | DETAIL.ASS_TAP3_ERR.TAP3_ERROR_APPLICATION_TAG | Tag Id refers to Application Tag Number as defined in the ASN.1 definition in TD.57. |
| PathItemLevel | DETAIL.ASS_TAP3_ERR.TAP3_ERROR_DEPTH | NA |
| ErrorCode | DETAIL.ASS_TAP3_ERR.TAP3_ERROR_CODE | Code associated with the error found for a particular field. |
| StartMissingSequenceNumberRange | DETAIL.ASS_ROAMING_EXT.<br>START_MISSING_SEQ_NUM | The first sequence number of the series of missing TAP files. |
| EndMissingSequenceNumberRange | DETAIL.ASS_ROAMING_EXT.<br>END_MISSING_SEQ_NUM | The end sequence number of the series of missing TAP files |
| TotalTaxRefund | TRAILER.ASS_ROAMING_EXT.TOTAL_TAX_REFUND | NA |
| FileTypeIndicator | HEADER.DATA_TYPE_INDICATOR | The type of data contained within the erroneous TAP file. |
| OperatorSpecInformation | DETAIL.OPERATOR_SPECIFIC_INFO<br>HEADER.OPERATOR_SPECIFIC_INFO<br>TRAILER.OPERATOR_SPECIFIC_INFO | Information that has been bilaterally agreed upon between the **Sender** and **Recipient**. |
| ItemOccurrence | DETAIL.ASS_ROAMING_EXT.ASS_RAP_EXT.ITEM_OCCURRENCE | The occurrence of the path item at the specified level. |
| ItemOffset | DETAIL.ASS_ROAMING_EXT.ITEM_OFFSET | The OffSet in bytes from the beginning of the file to the start of the item in error, beginning with an offset of zero. |
| ReturnDetailsCount | TRAILER.ASS_ROAMING_EXT.RETURN_DETAILS_COUNT | Number of returned details in the RAP file. |
| TotalDiscountRefund | TRAILER.ASS_ROAMING_EXT.TOTAL_DISCOUNT_REFUND | NA |
| GuaranteedBitRate | DETAIL.ASS_ROAMING_EXT.GUARANTEED_BIT_RATE | NA |
| MaximumBitRate | DETAIL.ASS_ROAMING_EXT. MAXIMUM_BIT_RATE | NA |

**Table 8-1 (Cont.) Mapping of RAP Fields to EDR Fields**

| RAP field | EDR field | Description |
|---|---|---|
| HSCSDIndicator | DETAIL.ASS_ROAMING_EXT.HSCSD_INDICATOR | NA |
| SMSOriginator | DETAIL.ASS_ROAMING_EXT.SMS_ORIGINATOR | NA |
| SMSDestinationNumber | DETAIL.ASS_ROAMING_EXT.SMS_DESTINATION_NUMBER | NA |
| DiscountableAmount | DETAIL.ASS_ROAMING_EXT.DISCOUNTABLE_AMOUNT | NA |
| DiscountCode | DETAIL.ASS_ROAMING_EXT.DISCOUNT_CODE | NA |
| NetworkAccessIdentifier | DETAIL.ASS_ROAMING_EXT.NETWORKACCESS_IDENTIFIER | NA |
| IMSSignallingContext | DETAIL.ASS_ROAMING_EXT.ISM_SIGNALLING_CONTEXT | NA |
| Imsi | DETAIL.ASS_ROAMING_EXT. IMSI | NA |
| HomeBid | DETAIL.ASS_ROAMING_EXT.HOME_BID | NA |
| HomeLocationDescription | DETAIL.ASS_ROAMING_EXT.HOMELOCATION_DESCRIPTION | NA |
| Min | DETAIL.ASS_ROAMING_EXT.MOBILE_ID_NUMBER | NA |
| Mdn | DETAIL.ASS_ROAMING_EXT.MOBILE_DIR_NUMBER | NA |
| TotalAdvisedCharge | DETAIL.ASS_ROAMING_EXT.TOTAL_ADVISED_CHARGE | NA |
| TotalAdvisedChargeRefund | DETAIL.ASS_ROAMING_EXT.TOTAL_ADVISED_CHARGE_REFUND | NA |
| TotalCommission | DETAIL.ASS_ROAMING_EXT.TOTAL_COMMISSION | NA |
| TotalCommissionRefund | DETAIL.ASS_ROAMING_EXT.TOTAL_COMMISSION_REFUND | NA |

# 9
# TAP and EDR Field Mappings

This chapter describes the mapping of fields from TAP file to the EDR container that Oracle Communications Billing and Revenue Management (BRM) uses when processing TAP input files and the mapping of fields from EDR container to TAP file used for generating TAP output files.

## TAP-to-EDR Mapping

When processing incoming TAP files, BRM copies input data from TAP fields into EDR container fields. The table below lists the TAP fields and the corresponding EDR field(s) where the data from the TAP field is stored.

Some of the fields in the TAP file can map to multiple fields in the EDR container description file. For example, both the ACTUAL_DELIVERY_TIMESTAMP and ACT_DELIVERY_UTC_TIME_OFFSET fields in the Associated Content Extension Record of the EDR container description file store the data from the Actual Delivery Timestamp field in the TAP file.

For some other TAP fields, placement of the field within the TAP file determines where to copy the field's data in the EDR container description file. For example, depending on the context within the TAP file, Location Identifier can be mapped to the LOCATION_LIST.IDENTIFIER field in either Associated Location Extension Record or Associated Content Extension Record of the EDR container description file as shown in Table 9-1.

**Table 9-1 TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Access Point Name NI | GPRS Destination Camel Group:<br>• DETAIL.ASS_CAMEL_EXT.DEST_GPRS_APN_ADDRESS<br>GPRS Destination, other cases:<br>• DETAIL.ASS_GPRS_EXT.APN_ADDRESS | Access Point Name NI and Access Point Name OI are mapped to a single EDR field as concatenated and comma-separated items. |
| Access Point Name OI | GPRS Destination Camel Group:<br>• DETAIL.ASS_CAMEL_EXT.DEST_GPRS_APN_ADDRESS<br>GPRS Destination, other cases:<br>• DETAIL.ASS_GPRS_EXT.APN_ADDRESS | Access Point Name NI and Access Point Name OI are mapped to a single EDR field as concatenated and comma-separated items. |
| Action Code | DETAIL.ASS_GSMW_EXT.SS_PACKET.ACTION_CODE | No comment. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Actual Delivery Timestamp | DETAIL.ASS_CONT_EXT.ACTUAL_DELIVERY_TIMESTAMP and DETAIL.ASS_CONT_EXT.ACT_DELIVERY_UTC_TIME_OFFSET | The timestamp part of this item is mapped to DETAIL.ASS_CONT_EXT.ACTUAL_DELIVERY_TIMESTAMP and the UTC offset part is mapped to DETAIL.ASS_CONT_EXT.ACT_DELIVERY_UTC_TIME_OFFSET. |
| Advised Charge | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.ADVISED_CHARGE | No comment. |
| Advised Charge Currency | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.ADVISED_CHARGE_CURRENCY | No comment. |
| Age Of Location | DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.AGE_OF_LOCATION | No comment. |
| Air Interface User Rate Requested | DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.AIUR and DETAIL.ASS_GSMW_EXT.BS_PACKET.AIUR_REQUESTED | No comment. |
| Basic HSCSD Parameters | DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST | This is a block. |
| Basic Service Used | DETAIL.ASS_GSMW_EXT.BS_PACKET | This is a block. |
| Bearer Service Code | DETAIL.BASIC_SERVICE | No comment. |
| Call Event Details Count | TRAILER.TAP_TOTAL_NUMBER_OF_RECORDS | No comment. |
| Call Event Start Timestamp | DETAIL.CHARGING_START_TIMESTAMP and DETAIL.UTC_TIME_OFFSET | The timestamp part of this item is mapped to DETAIL.CHARGING_START_TIMESTAMP and the UTC offset part is mapped to DETAIL.UTC_TIME_OFFSET. |
| Call Reference | DETAIL.ASS_LOCN_EXT.CALL_REFERENCE | For Location Services group, Call Reference is saved in the EDR field. |
| Call Type Level 1 | DETAIL.CONNECT_TYPE | Call Type Level 1 and Call Type Level 2 are mapped to the EDR field as concatenated comma-separated items. |
| Call Type Level 2 | DETAIL.CONNECT_TYPE | Call Type Level 1 and Call Type Level 2 are mapped to the EDR field as concatenated comma-separated items. |
| Call Type Level 3 | DETAIL.CONNECT_SUB_TYPE | No comment. |
| Called Country Code | DETAIL.CALLED_COUNTRY_CODE | No comment. |
| Called Number | DETAIL.B_NUMBER & DETAIL.INTERN_B_NUMBER_ZONE & DETAIL.ASS_GSMW_EXT.DIALED_DIGITS | The called number is the representation of the number dialled by the subscriber. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Called Place | DETAIL.DESCRIPTION | Destination Group.<br>The TAP fields Called Place and Called Region are mapped to the EDR field as concatenated comma-separated items. |
| Called Region | DETAIL.DESCRIPTION | Destination Group.<br>The TAP fields Called Place and Called Region are mapped to the EDR field as concatenated comma-separated items. |
| Camel Call Reference | DETAIL.ASS_CAMEL_EXT.CAMEL_REFERENCE_NUMBER | No comment. |
| CAMEL Destination Number | DETAIL.ASS_CAMEL_EXT.DEST_GSMW_NUMBER_ORIGINAL | No comment. |
| Camel Invocation Fee | DETAIL.ASS_CAMEL_EXT.SERVER_TYPE_OF_NUMBER | The charge for the CAMEL invocation after discounts have been deducted. |
| Camel Initiated CF Indicator | DETAIL.ASS_CAMEL_EXT.CAMEL_INITIATED_CF_INDICATOR | No comment. |
| Camel Modification | DETAIL.ASS_CAMEL_EXT.CAMEL_MODIFICATION_LIST | All Camel Modification fields present in Camel Modification List are mapped to the EDR field as concatenated comma-separated items. |
| Camel Server Address | DETAIL.ASS_CAMEL_EXT.SERVER_ADDRESS | No comment. |
| CAMEL Service Key | DETAIL.ASS_CAMEL_EXT.SERVICE_KEY | No comment. |
| CAMEL Service Level | DETAIL.ASS_CAMEL_EXT.SERVICE_LEVEL | No comment. |
| CAMEL Service Used | DETAIL.ASS_CAMEL_EXT | This is a block. |
| Cause For Termination | DETAIL.CALL_COMPLETION_INDICATOR | If the TAP field value is less than 10, it is prefixed with 0. |
| Cell Identity | GPRS Network Location:<br>• DETAIL.ASS_GPRS_EXT.CELL_ID<br>Network Location:<br>• DETAIL.ASS_GSMW_EXT.CELL_ID | Present within groups:<br>• GPRS Network Location<br>• Network Location |
| Channel Coding Acceptable | DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.CHANNEL_CODING_OK_LIST | All channel coding fields present in Channel Coding Acceptable List are mapped to the EDR field as concatenated comma-separated items. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Channel Coding Used | HSCSD Parameter Modification:<br>• DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.CHANNEL_CODING_USED<br>Basic HSCSD Parameters:<br>• DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.CHANNEL_CODING_USED<br>Channel Coding Acceptable List:<br>• DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.CHANNEL_CODING_OK_LIST | No comment. |
| Charge | DETAIL.ASS_CBD.CP.CHARGED_AMOUNT_VALUE | No comment. |
| Charge Refund Indicator | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.CHARGE_REFUND_INDICATOR | No comment. |
| Charge Type | Taxation:<br>• DETAIL.ASS_CBD.TP.CHARGE_TYPE<br>Charge Detail:<br>• TRAILER.TOTAL_CHARGE_VALUE_LIST.CHARGE_TYPE<br>• DETAIL.ASS_CBD.CP.IMPACT_CATEGORY | Present within groups:<br>• Taxation, when the associated Tax Rate Code references a tax applied to a specific Charge Type.<br>• Charge Detail |
| Chargeable Units | DETAIL.ASS_CBD.CP.CHARGEABLE_QUANTITY_VALUE | No comment. |
| Charged Party Equipment | DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.EQUIPMENT | This is a block. |
| Charged Party Home Identification | DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.HOMEID_LIST | This is a block. |
| Charged Party ID Type | DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.ID_LIST.TYPE | No comment. |
| Charged Party Identification | DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.ID_LIST | This is a block. |
| Charged Party Identifier | DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.ID_LIST.IDENTIFIER | No comment. |
| Charged Party Information | DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO | This is a block. |
| Charged Party Location | DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.LOCATION_LIST | This is a block. |
| Charged Party Status | DETAIL.USAGE_DIRECTION | No comment. |
| Charged Units | DETAIL.ASS_CBD.CP.ROUNDED_QUANTITY_VALUE | No comment. |
| Charging Characteristics | DETAIL.USAGE_CLASS | No comment. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Charging ID | DETAIL.ASS_GPRS_EXT.CHARGING_ID | No comment. |
| Charging Timestamp | Supplementary Service Used:<br>• DETAIL.ASS_GSMW_EXT.SS_PACKET.CHARGING_START_TIMESTAMP<br>and<br>• DETAIL.ASS_GSMW_EXT.SS_PACKET.UTC_TIME_OFFSET<br>Location Service Usage<br>• DETAIL.ASS_GPRS_EXT.SERVICE_USED_CHARGING_START_TIMESTAMP<br>and<br>• DETAIL.ASS_GPRS_EXT.SERVICE_USED_UTC_TIME_OFFSET<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.CHARGING_START_TIMESTAMP<br>and<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.UTC_TIME_OFFSET<br>Basic Service Used:<br>• DETAIL.ASS_GSMW_EXT.BS_PACKET.CHARGING_START_TIMESTAMP<br>and<br>• DETAIL.ASS_GSMW_EXT.BS_PACKET.UTC_TIME_OFFSET<br>GPRS Call (Record type MSS, SCU, and VAS):<br>• DETAIL.CHARGING_START_TIMESTAMP<br>and<br>• DETAIL.UTC_TIME_OFFSET<br>GPRS Service Usage Block:<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.CHARGING_START_TIMESTAMP<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.UTC_TIME_OFFSET<br>GPRS Service Used Block:<br>• DETAIL.ASS_GPRS_EXT.SERVICE_USED_CHARGING_START_TIMESTAMP<br>• DETAIL.ASS_GPRS_EXT.SERVICE_USED_UTC_TIME_OFFSET | Present within groups:<br>• Supplementary Service Used. The timestamp is mandatory and occurs within Supplementary Service Event.<br>• Location Service Usage. The timestamp is only present where it is not the same as the associated LCS Request Timestamp.<br>• Basic Service Used. The timestamp is only present where it is not the same as an associated Call Event Start Timestamp. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| CLIR Status Indicator | Call Originator and SCU Basic Information:<br>• DETAIL.USAGE_CLASS<br>• DETAIL.ASS_ROAMING_EXT.CLIR_INDICATOR<br>Third Party Information:<br>• DETAIL.ASS_GSMW_EXT.SS_PACKET.CLIR_INDICATOR | Present within groups:<br>• Call Originator where available.<br>• SCU Basic Information where available and the Charged Party Status indicates a terminating short message.<br>• Third Party Information where available. |
| Commission | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.COMMISSION | No comment. |
| Completion Timestamp | DETAIL.CHARGING_END_TIMESTAMP | No comment. |
| Content Charging Point | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.CONTENT_CHARGING_POINT | No comment. |
| Content Provider | DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.PROVIDER_LIST | This is a block. |
| Content Provider ID Type | LCS SP Identification:<br>• DETAIL.ASS_LOCN_EXT.LCSSP_INFO.ID_LIST.TYPE<br>Content Provider:<br>• DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.PROVIDER_LIST.TYPE | Mandatory within groups:<br>• LCS SP Identification<br>• Content Provider |
| Content Provider Identifier | LCS SP Identification:<br>• DETAIL.ASS_LOCN_EXT.LCSSP_INFO.ID_LIST.IDENTIFIER<br>Content Provider:<br>• DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.PROVIDER_LIST.IDENTIFIER | Mandatory within groups:<br>• LCS SP Identification<br>• Content Provider |
| Content Provider Name | DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.PROVIDER_NAME | No comment. |
| Content Service Used | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST | This is a block. |
| Content Transaction Code | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.CONTENT_TRANSACTION_CODE | No comment. |
| Content Transaction Type | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.CONTENT_TRANSACTION_TYPE | No comment. |
| CSE Information | DETAIL.ASS_CAMEL_EXT.CSE_INFORMATION | No comment. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Customer ID Type | Tracking Customer Identification:<br>• DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.ID_LIST.TYPE<br>Tracked Customer Identification:<br>• DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.ID_LIST.TYPE | Mandatory within groups:<br>• Tracking Customer Identification<br>• Tracked Customer Identification |
| Customer Identifier | Tracking Customer Identification:<br>• DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.ID_LIST.IDENTIFIER<br>Tracked Customer Identification:<br>• DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.ID_LIST.IDENTIFIER | Mandatory within groups:<br>• Tracking Customer Identification<br>• Tracked Customer Identification |
| Data Volume Incoming | GPRS Service Used:<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.VOLUME_RECEIVED<br>• DETAIL.VOLUME_RECEIVED<br>Content Service Used:<br>• DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.DATA_VOLUME_INCOMING | Present within groups:<br>• GPRS Service Used. Mandatory.<br>• Content Service Used when available. |
| Data Volume Outgoing | GPRS Service Used:<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.VOLUME_SENT<br>• DETAIL.VOLUME_SENT<br>Content Service Used:<br>• DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.DATA_VOLUME_OUTGOING | Present within groups:<br>• GPRS Service Used. Mandatory.<br>• Content Service Used when available. |
| Day Category | DETAIL.ASS_CBD.CP.DAY_CODE | No comment. |
| Default Call Handling Indicator | DETAIL.ASS_CAMEL_EXT.DEFAULT_CALL_HANDLING_INDICATOR | No comment. |
| Deposit Timestamp | DETAIL.CHARGING_START_TIMESTAMP<br>DETAIL.UTC_TIME_OFFSET | The timestamp part of this item is mapped to DETAIL.CHARGING_START_TIMESTAMP and the UTC offset part is mapped to DETAIL.UTC_TIME_OFFSET. |
| Destination Network | DETAIL.DESTINATION_NETWORK | No comment. |
| Dialled Digits | • DETAIL.ASS_GSMW_EXT.DIALED_DIGITS<br>• DETAIL.C_NUMBER | No comment. |
| Discountable Amount | DETAIL.ASS_ROAMING_EXT.DISCOUNTABLE_AMOUNT | The actual part of the Charge/Tax/CAMEL Invocation Fee to which the Discount Value and Discount Rate (Code) relate. |
| Discount Code | DETAIL.ASS_CBD.CP.GRANTED_DISCOUNT_AMOUNT_VALUE | No comment. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Discount Value | DETAIL.ASS_CBD.CP.GRANTED_DISCOUNT_AMOUNT_VALUE | No comment. |
| Distance Charge Band Code | DETAIL.ZONE_DESCRIPTION | No comment. |
| Dual Bearer Service Code | DETAIL.ASS_GSMW_EXT.BASIC_DUAL_SERVICE | The TAP field is prefixed with 1 and stored in the EDR field. |
| Dual Teleservice Code | DETAIL.ASS_GSMW_EXT.BASIC_DUAL_SERVICE | The TAP field is prefixed with 0 and stored in the EDR field. |
| Earliest Call Timestamp | TRAILER.FIRST_START_TIMESTAMP<br>TRAILER.FIRST_CHARGING_UTC_TIME_OFFSET | The timestamp part of this item is mapped to TRAILER.FIRST_START_TIMESTAMP and the UTC offset part is mapped to TRAILER.FIRST_CHARGING_UTC_TIME_OFFSET. |
| Equipment ID | Charged Party Equipment:<br>• DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.EQUIPMENT.IDENTIFIER<br>Tracking Customer Equipment:<br>• DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.EQUIPMENT.IDENTIFIER<br>Tracked Customer Equipment:<br>• DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.EQUIPMENT.IDENTIFIER | Mandatory within groups:<br>• Charged Party Equipment<br>• Tracking Customer Equipment<br>• Tracked Customer Equipment |
| Equipment ID Type | Charged Party Equipment:<br>• DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.EQUIPMENT.TYPE<br>Tracking Customer Equipment:<br>• DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.EQUIPMENT.TYPE<br>Tracked Customer Equipment:<br>• DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.EQUIPMENT.TYPE | Mandatory within groups:<br>• Charged Party Equipment<br>• Tracking Customer Equipment<br>• Tracked Customer Equipment |
| ESN | DETAIL.ASS_GSMW_EXT.DEVICE_NUMBER | No comment. |
| Exchange Rate Code | DETAIL.ASS_CBD.CP.EXCHANGE_RATE | No comment. |
| File Available Timestamp | HEADER.TRANSMISSION_DATE | No comment. |
| File Creation Timestamp | HEADER.CREATION_TIMESTAMP<br>HEADER.UTC_TIME_OFFSET | The timestamp part of this item is mapped to HEADER.CREATION_TIMESTAMP and the UTC offset part is mapped to HEADER.UTC_TIME_OFFSET. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| File Sequence Number | HEADER.SEQUENCE_NUMBER<br>HEADER.ORIGIN_SEQUENCE_NUMBER | No comment. |
| File Type Indicator | HEADER.DATA_TYPE_INDICATOR | No comment. |
| Fixed Network User Rate | DETAIL.ASS_GSMW_EXT.BS_PACKET.FNUR | No comment. |
| Fnur | DETAIL.ASS_GSMW_EXT.BS_PACKET.FNUR | No comment. |
| Fraud Monitor Indicator | DETAIL.FRAUD_MONITOR_INDICATOR | No comment. |
| Geographical Location | DETAIL.GEOGRAPHICAL_LOCATION | The EDR field contains comma-separated tag-value pairs that indicate the geographical location of the serving network, serving BID, serving location description, longitude, and latitude.<br>The tag values of the corresponding fields are as follows:<br>• ServingNetwork: 1<br>• ServingBID: 2<br>• ServingLocationDescription: 3<br>• Longitude: 4<br>• Latitude: 5<br>Example 1: If the TAP field values are as follows:<br>• ServingNetwork: AIRTEL<br>• ServingBID: AIRBID<br>• ServingLocationDescription: Bangalore<br>• Longitude: 111<br>• Latitude: 103<br>The value of DETAIL.GEOGRAPHICAL<br>_LOCATION would be: 1,AIRTEL, 2,AIRBID, 3,Bangalore, 4,111,5,103<br>Example 2: If the TAP field values are as follows:<br>• ServingNetwork: AIRTEL<br>• ServingBID: AIRBID<br>• Latitude: 103<br>The value of DETAIL.GEOGRAPHICAL<br>_LOCATION would be: 1,AIRTEL, 2,AIRBID, 5,103 |
| Guaranteed Bit Rate | DETAIL.ASS_ROAMING_EXT.GUARANTEED_BIT_RATE | Describes the bitrate the UMTS bearer service must guarantee to the user or application for circuit switched UMTS. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| GPRS Destination | GPRS Basic Call Information:<br>• DETAIL.ASS_GPRS_EXT.APN_ADDRESS<br>• DETAIL.ASS_GPRS_EXT.PDP_REMOTE_ADDRESS<br>CAMEL Service Used:<br>• DETAIL.ASS_CAMEL_EXT.DEST_GPRS_APN_ADDRESS<br>• DETAIL.ASS_CAMEL_EXT.DEST_GPRS_PDP_REMOTE_ADDRESS | Present within groups:<br>• GPRS Basic Call Information. Mandatory.<br>• CAMEL Service Used where GPRS Destination has been modified by the CAMEL server. |
| Home Bid | DETAIL.ASS_ROAMING_EXT.HOME_BID | The Home BID (Billing Identifier) is a code identifying the home market area of the Chargeable Subscriber. |
| Home ID Type | Charged Party Home Identification:<br>• DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.HOMEID_LIST.TYPE<br>Tracking Customer Home ID:<br>• DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.HOME_ID_LIST.TYPE<br>Tracked Customer Home ID:<br>• DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.HOME_ID_LIST.TYPE | Mandatory within groups:<br>• Charged Party Home Identification<br>• Tracking Customer Home ID<br>• Tracked Customer Home ID |
| Home Identifier | Charged Party Home Identification:<br>• DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.HOMEID_LIST.IDENTIFIER<br>Tracked Customer Home ID:<br>• DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.HOME_ID_LIST.IDENTIFIER<br>Tracking Customer Home ID:<br>• DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.HOME_ID_LIST.IDENTIFIER | Mandatory within groups:<br>• Charged Party Home Identification<br>• Tracking Customer Home ID<br>• Tracked Customer Home ID |
| Home Location Description | DETAIL.ASS_ROAMING_EXT.HOMELOCATION_DESCRIPTION | A text description giving the home market area of the Chargeable Subscriber. |
| Horizontal Accuracy Delivered | DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.H_ACCURACY_DELIVERED | No comment. |
| Horizontal Accuracy Requested | DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.H_ACCURACY_REQUESTED | No comment. |
| HSCSD Indicator | DETAIL.ASS_ROAMING_EXT.HSCSD_INDICATOR | This indicator, set by the VPMN and passed to the Recipient, indicates that HSCSD has been used. |
| HSCSD Parameter Modification | DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST | This is a block. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| IMEI | • DETAIL.ASS_GSMW_EXT.DEVICE_NUMBER<br>GPRS:<br>• DETAIL.ASS_GPRS_EXT.DEVICE_NUMBER | Present within the group:<br>• Equipment Identifier where available. Is not present when the terminal equipment is not involved in the call. |
| IMSI | • DETAIL.ASS_GSMW_EXT.PORT_NUMBER<br>GPRS:<br>• DETAIL.ASS_GPRS_EXT.PORT_NUMBER | Present within groups:<br>• Chargeable Subscriber when MIN is not present. Mandatory.<br>• GSM Chargeable Subscriber when available.<br>• Must be present for WLAN usage when IMSI is used for identifying the chargeable user. |
| Initiating Party | DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.INITIATING_PARTY | No comment. |
| Internet Service Provider | DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.ISP_LIST | This is a block. |
| ISP ID Type | LCS SP Information:<br>• DETAIL.ASS_LOCN_EXT.LCSSP_INFO.ISP_LIST.TYPE<br>Serving Parties Information:<br>• DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.ISP_LIST.TYPE | No comment. |
| ISP Identifier | LCS SP Information:<br>• DETAIL.ASS_LOCN_EXT.LCSSP_INFO.ISP_LIST.IDENTIFIER<br>Serving Parties Information:<br>• DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.ISP_LIST.IDENTIFIER | No comment. |
| Latest Call Timestamp | TRAILER.LAST_START_TIMESTAMP<br>TRAILER.LAST_CHARGING_UTC_TIME_OFFSET | The timestamp part of this item is mapped to TRAILER.LAST_START_TIMESTAMP and the UTC offset part is mapped to TRAILER.LAST_CHARGING_UTC_TIME_OFFSET. |
| LCS Request Timestamp | DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.LCS_REQUEST_TIMESTAMP<br>DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.LCS_REQ_UTC_OFFSET | The timestamp part of this item is mapped to DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.LCS_REQUEST_TIMESTAMP and the UTC offset part is mapped to DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.LCS_REQ_UTC_OFFSET. |
| LCS SP Identification | DETAIL.ASS_LOCN_EXT.LCSSP_INFO.ID_LIST | This is a block. |
| LCS SP Information | DETAIL.ASS_LOCN_EXT.LCSSP_INFO | This is a block. |
| LCS Transaction Status | DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.LCS_TRANS_STATUS | No comment. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Local Currency | DETAIL.WHOLESALE_CHARGED_AMOUNT_CURRENCY | No comment. |
| Location Area Code | GPRS Network Location:<br>• DETAIL.ASS_GPRS_EXT.LOCATION_AREA_INDICATOR<br>Network Location:<br>• DETAIL.ASS_GSMW_EXT.LOCATION_AREA_INDICATOR | Mandatory within groups:<br>• GPRS Network Location<br>• Network Location<br>except where not supported by the network or the call does not terminate at the equipment. |
| Location ID Type | Charged Party Location:<br>• DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.LOCATION_LIST.TYPE<br>Tracked Customer Location:<br>• DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.LOCATION_LIST.TYPE<br>Tracking Customer Location:<br>• DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.LOCATION_LIST.TYPE | Mandatory within groups:<br>• Charged Party Location<br>• Tracked Customer Location<br>• Tracking Customer Location |
| Location Identifier | Charged Party Location:<br>• DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.LOCATION_LIST.IDENTIFIER<br>Tracked Customer Location:<br>• DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.LOCATION_LIST.IDENTIFIER<br>Tracking Customer Location:<br>• DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.LOCATION_LIST.IDENTIFIER | Mandatory within groups:<br>• Charged Party Location<br>• Tracked Customer Location<br>• Tracking Customer Location |
| Location Service Usage | DETAIL.ASS_LOCN_EXT.SERVICE_USAGE | This is a block. |
| Maximum Bit Rate | DETAIL.ASS_ROAMING_EXT.MAXIMUM_BIT_RATE | The maximum bit rate available for circuit switched UMTS. |
| Mdn | DETAIL.ASS_ROAMING_EXT.MOBILE_DIR_NUMBER | Mobile Directory Number. |
| Message Description Code | - | Message Description Code is not mapped to any EDR field. The DETAIL.DESCRIPTION field in the SCU Charge Type group contains description text with Message Description Code. |
| Message Status | DETAIL.CALL_COMPLETION_INDICATOR | If the TAP field value is less than 10, it is prefixed with 0. |
| Message Type | DETAIL.QOS_USED | No comment. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Min | DETAIL.ASS_ROAMING_EXT.MOBILE_ID_NUMBER | Mobile Identification Number is an item which uniquely identifies the subscriber who has used the network. |
| Modification Timestamp | DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.MODIFICATION_TIMESTAMP<br>and<br>DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.UTC_TIME_OFFSET | The timestamp part of this item is mapped to DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.MODIFICATION_TIMESTAMP and the UTC offset part is mapped to DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.UTC_TIME_OFFSET. |
| MSISDN | The TAP field is mapped to the following fields:<br>• DETAIL.A_NUMBER<br>• DETAIL.INTERN_A_NUMBER_ZONE<br>• DETAIL.ASS_GSMW_EXT.A_NUMBER_USER<br>GPRS:<br>• DETAIL.ASS_GPRS_EXT.A_NUMBER_USER<br>SCU:<br>• DETAIL.ASS_GSMW_EXT.A_NUMBER_USER<br>• DETAIL.ASS_GSMW_EXT.DIALED_DIGITS<br>MTC:<br>• DETAIL.ASS_GSMW_EXT.DIALED_DIGITS | The EDR field is always prefixed with International Access Code.<br>Present within groups:<br>• Chargeable Subscriber or GPRS Chargeable Subscriber when IMSI is present. Should be associated with IMSI.<br>• GSM Chargeable Subscriber when available.<br>• Present when expected in accordance with roaming agreement.<br>• Present for WLAN network usage where the full IMSI or Network Access Identifier are not available. |
| Network Access Identifier | DETAIL.ASS_ROAMING_EXT.NETWORKACCESS_IDENTIFIER | The Network Access Identifier (NAI) is a username identifying a unique customer when generating WLAN CDRs. |
| Network ID Type | Serving Parties Information:<br>• DETAIL.ASS_CONT_EXT.SERVING_<br>• PARTIES_INFO.NETWORK_LIST.TYPE<br>LCS SP Information:<br>• DETAIL.ASS_LOCN_EXT.LCSSP_INFO.NETWORK_LIST.TYPE | No comment. |
| Network Identifier | Serving Parties Information:<br>• DETAIL.ASS_CONT_EXT.SERVING_<br>• PARTIES_INFO.NETWORK_LIST.IDENTIFIER<br>LCS SP Information:<br>• DETAIL.ASS_LOCN_EXT.LCSSP_INFO.NETWORK_LIST.IDENTIFIER | No comment. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Network Init. PDP Context | DETAIL.ASS_GPRS_EXT.NETWORK_INITIATED_PDP | No comment. |
| Network Type | DETAIL.SOURCE_NETWORK_TYPE | No comment. |
| Number Of Channels | Basic HSCSD Parameters:<br>• DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.NUMBER_OF_CHANNELS<br>HSCSD Parameter Modification:<br>• DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.MAX_NUMBER_OF_CHANNELS | No comment. |
| Number Of Channels Used | Basic HSCSD Parameters:<br>• DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.NUMBER_OF_CHANNELS_USED<br>• DETAIL.NUMBER_OF_UNITS<br>HSCSD Parameter Modification:<br>• DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.NUMBER_OF_CHANNELS_USED | No comment. |
| Object Type | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.OBJECT_TYPE | No comment. |
| Operator Spec Information | DETAIL.OPERATOR_SPECIFIC_INFO [if Record type is record_GPRS]<br>HEADER.OPERATOR_SPECIFIC_INFO [record_Header]<br>TRAILER.OPERATOR_SPECIFIC_INFO [record_Trailer] | This is an optional repeating field which contains operator specific information. |
| Order Placed Timestamp | DETAIL.ASS_CONT_EXT.ORDER_PLACED_TIMESTAMP<br>DETAIL.ASS_CONT_EXT.ORDER_PLACED_UTC_TIME_OFFSET | The timestamp part of this item is mapped to DETAIL.ASS_CONT_EXT.ORDER_PLACED_TIMESTAMP and the UTC offset part is mapped to DETAIL.ASS_CONT_EXT.ORDER_PLACED_UTC_TIME_OFFSET. |
| Originating Network | DETAIL.SOURCE_NETWORK | No comment. |
| Paid Indicator | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.PAID_INDICATOR | A flag which shows that the Charged Party has paid for the service. |
| Partial Type Indicator | DETAIL.LONG_DURATION_INDICATOR | No comment. |
| Payment Method | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.PAYMENT_METHOD | No comment. |
| PDP Address | DETAIL.ASS_GPRS_EXT.PDP_ADDRESS | No comment. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| PDP Context Start Timestamp | DETAIL.ASS_GPRS_EXT.PDP_CONTEXT_START_TIMESTAMP<br>DETAIL.ASS_GPRS_EXT.PDP_UTC_TIME_OFFSET | The timestamp part of this item is mapped to DETAIL.ASS_GPRS_EXT.PDP_CONTEXT_START_TIMESTAMP and the UTC offset part is mapped to DETAIL.ASS_GPRS_EXT.PDP_UTC_TIME_OFFSET. |
| Positioning Method | DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.POSITIONING_METHOD | No comment. |
| Priority Code | DETAIL.QOS_REQUESTED | No comment. |
| QoS Delay | QoS Requested:<br>• DETAIL.ASS_GPRS_EXT.QOS_REQUESTED_DELAY<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_REQUESTED_DELAY<br>QoS Used:<br>• DETAIL.ASS_GPRS_EXT.QOS_USED_DELAY<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_USED_DELAY | No comment. |
| QoS Mean Throughput | QoS Requested:<br>• DETAIL.ASS_GPRS_EXT.QOS_REQUESTED_MEAN_THROUGHPUT<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_REQUESTED_MEAN_THROUGHPUT<br>QoS Used:<br>• DETAIL.ASS_GPRS_EXT.QOS_USED_MEAN_THROUGHPUT<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_USED_MEAN_THROUGHPUT | No comment. |
| QoS Peak Throughput | QoS Requested:<br>• DETAIL.ASS_GPRS_EXT.QOS_REQUESTED_PEAK_THROUGHPUT<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_REQUESTED_PEAK_THROUGHPUT<br>QoS Used:<br>• DETAIL.ASS_GPRS_EXT.QOS_USED_PEAK_THROUGHPUT<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_USED_PEAK_THROUGHPUT | No comment. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| QoS Precedence | QoS Requested:<br>• DETAIL.ASS_GPRS_EXT.QOS_REQUESTED_PRECEDENCE<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_REQUESTED_PRECEDENCE<br>QoS Used:<br>• DETAIL.ASS_GPRS_EXT.QOS_USED_PRECEDENCE<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_USED_PRECEDENCE | No comment. |
| QoS Reliability | QoS Requested:<br>• DETAIL.ASS_GPRS_EXT.QOS_REQUESTED_RELIABILITY<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_REQUESTED_RELIABILITY<br>QoS Used:<br>• DETAIL.ASS_GPRS_EXT.QOS_USED_RELIABILITY<br>• DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_USED_RELIABILITY | No comment. |
| Radio Channel Requested | • DETAIL.QOS_REQUESTED<br>• DETAIL.ASS_GSMW_EXT.BS_PACKET.QOS_REQUESTED | No comment. |
| Radio Channel Used | • DETAIL.QOS_USED<br>• DETAIL.ASS_GSMW_EXT.BS_PACKET.QOS_USED | No comment. |
| RAP File Sequence Number | Call Event Details:<br>• DETAIL.RAP_FILE_SEQ_NO<br>Batch Control Information and Notification:<br>• HEADER.RAP_FILE_SEQ_NO | Must be present within groups:<br>• Notification<br>• Batch Control Information |
| Recipient | HEADER.RECIPIENT | No comment. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Recording Entity Code | Service Center Usage:<br>• DETAIL.ASS_GSMW_EXT.ORIGINATING_SWITCH_IDENTIFICATION<br>Location Service:<br>• DETAIL.ASS_LOCN_EXT.REC_ENTITY_CODE | Mandatory within groups:<br>• Recording Entity Information<br>• Location Service<br>• Network Location<br>• Service Center Usage where it must be of type 'Service Center'<br>In the case of GPRS network usage, two or more occurrences must be present within GPRS Network Location. One occurrence must be of type 'GGSN' (see Recording Entity Type) and all other occurrences must be of type 'SGSN'.<br>In the case of WLAN network usage, one occurrence must be present identifying the WLAN billing information recording entity.<br>Network Location:<br>Recording Entity Code is used to get corresponding Recording Entity ID. Recording Entity Code is not stored in any EDR field.<br>Rec Entity Code Information:<br>Recording Entity Code is used to get corresponding Recording Entity ID. Recording Entity Code is not stored in any EDR field. |
| Release Version Number | HEADER.RELEASE_VERSION | No comment. |
| Requested Delivery Timestamp | DETAIL.ASS_CONT_EXT.REQUESTED_DELIVERY_TIMESTAMP<br>DETAIL.ASS_CONT_EXT.REQ_DELIVERY_UTC_TIME_OFFSET | The timestamp part of this item is mapped to DETAIL.ASS_CONT_EXT.REQUESTED_DELIVERY_TIMESTAMP, and the UTC offset part is mapped to DETAIL.ASS_CONT_EXT.REQ_DELIVERY_UTC_TIME_OFFSET. |
| Requested Destination | Requested Number:<br>• DETAIL.ASS_LTE_EXT.REQUESTEDNUMBER<br>Requested Public User ID:<br>• DETAIL.ASS_LTE_EXT.REQUESTEDPUBLICUSERID | The original destination to which the customer requested to be connected. |
| Response Time | DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.RESPONSE_TIME | No comment. |
| Response Time Category | DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.RESPONSE_TIME_CATEGORY | No comment. |
| Sender | HEADER.SENDER | No comment. |
| Serving Bid | DETAIL.GEOGRAPHICAL_LOCATION | The Serving BID (Billing Identifier) is a code associated with a geographical area. |
| Serving Location Description | DETAIL.GEOGRAPHICAL_LOCATION | A text description giving the geographical location of the terminal equipment. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Serving Network | Serving Network:<br>• DETAIL.ASS_GSMW_EXT.SERVING_<br>• NETWORK<br>Geographical Location:<br>• DETAIL.GEOGRAPHICAL_LOCATION | Serving Network is stored in DETAIL.GEOGRAPHICAL_LOCATION along with other concatenated comma-separated tag-value pairs from Geographical Location. |
| Serving Parties Information | DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO | This is a block. |
| SIM Toolkit Indicator | DETAIL.DISCOUNT_KEY | No comment. |
| SMS Destination Number | DETAIL.ASS_ROAMING_EXT.SMS_DESTINATION_NUMBER | The SMS Destination Number item contains the actual destination (intended recipient) of the SMS text message. |
| SMS Originator | DETAIL.ASS_ROAMING_EXT.SMS_ORIGINATOR | The SMS Originator holds the identification of the actual sender of the SMS |
| Specification Version Number | HEADER.SPECIFICATION_VERSION_NUMBER | No comment. |
| Speech Version Requested | DETAIL.ASS_GSMW_EXT.BS_PACKET.SPEECH_VERSION_REQUESTED | No comment. |
| Speech Version Used | DETAIL.ASS_GSMW_EXT.BS_PACKET.SPEECH_VERSION_USED | No comment. |
| Supplementary Service Code | DETAIL.ASS_GSMW_EXT.SS_PACKET.SS_EVENT | No comment. |
| Supplementary Service Parameters | DETAIL.ASS_GSMW_EXT.SS_PACKET.SS_PARAMETERS | No comment. |
| Supplementary Service Used | DETAIL.ASS_GSMW_EXT.SS_PACKET | This is a block. |
| TAP Decimal Places | HEADER.TAP_DECIMAL_PLACES | No comment. |
| Tax Information | DETAIL.ASS_CBD.TP | This is a block. |
| Tax Rate Code | DETAIL.ASS_CBD.TP.TAX_CODE | Mandatory within groups:<br>• Taxation<br>• Tax Information |
| Tax Value | DETAIL.WHOLESALE_CHARGED_TAX_VALUE<br>DETAIL.ASS_CBD.TP.TAX_VALUE | No comment. |
| Taxable Amount | DETAIL.ASS_CBD.TP.TAXABLE_AMOUNT | No comment. |
| TeleService Code | DETAIL.BASIC_SERVICE<br>DETAIL.ASS_GSMW_EXT.BS_PACKET.BASIC_SERVICE | The EDR fields are prefixed with 0. |
| Third Party Number | DETAIL.C_NUMBER<br>DETAIL.ASS_GSMW_EXT.SS_PACKET.THIRD_PARTY_NUMBER | Present within the Third Party Information group where available. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Time Band | DETAIL.ASS_CBD.CP.TIME_INTERVAL_CODE | No comment. |
| Total Advised Charge | TRAILER.ASS_ROAMING_EXT.TOTAL_ADVISEDCHARGE | The sum of all the advised charges associated with the corresponding currency excluding those representing a refund. |
| Total Advised Charge Refund | TRAILER.ASS_ROAMING_EXT.TOTAL_ADVISEDCHARGE_REFUND | The sum of all the advised charges associated with the corresponding currency representing a refund. |
| Total Commission | TRAILER.ASS_ROAMING_EXT.TOTAL_COMMISSION | The sum of all the commissions associated with the corresponding currency excluding those representing a refund. |
| Total Commission Refund | TRAILER.ASS_ROAMING_EXT.TOTAL_COMMISSION_REFUND | The sum of all the commissions associated with the corresponding currency representing a refund. |
| Total Discount Refund | TRAILER.ASS_ROAMING_EXT.TOTAL_DISCOUNT_REFUND | The sum of the Discount Values plus each application of a Fixed Discount Value contained in the batch representing a refund. |
| Total Tax Refund | TRAILER.ASS_ROAMING_EXT.TOTAL_TAX_REFUND | The sum of the Tax Values contained in the batch representing a refund. |
| Total Transaction Duration | Total Transaction Duration:<br>• DETAIL.ASS_CONT_EXT.TOTAL_TRANSACTION_DURATION<br>Total Call Event Duration:<br>• DETAIL.TOTAL_CALL_EVENT_DURATION | No comment. |
| Total Call Event Duration | Total Call Event Duration:<br>• DETAIL.TOTAL_CALL_EVENT_DURATION<br>Total Transaction Duration:<br>• DETAIL.ASS_CONT_EXT.TOTAL_TRANSACTION_DURATION | No comment. |
| Total Charge | TRAILER.TOTAL_CHARGE_VALUE_LIST | This is a block. |
| Total Charge Refund | TRAILER.TOTAL_CHARGE_VALUE_LIST.TOTAL_CHARGE_REFUND | No comment. |
| Total Data Volume | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.TOTAL_DATA_VOLUME | No comment. |
| Total Discount Value | TRAILER.TAP_TOTAL_DISCOUNT_VALUE | No comment. |
| Total Tax Value | TRAILER.TAP_TOTAL_TAX_VALUE | No comment. |
| Tracked Customer Equipment | DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.EQUIPMENT | This is a block. |
| Tracked Customer Home Id | DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.HOME_ID_LIST | This is a block. |
| Tracked Customer Identification | DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.ID_LIST | This is a block. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Tracked Customer Information | DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO | This is a block. |
| Tracked Customer Location | DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.LOCATION_LIST | This is a block. |
| Tracking Customer Equipment | DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.EQUIPMENT | This is a block. |
| Tracking Customer Home Id | DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.HOME_ID_LIST | This is a block. |
| Tracking Customer Identification | DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.ID_LIST | This is a block. |
| Tracking Customer Information | DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO | This is a block. |
| Tracking Customer Location | DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.LOCATION_LIST | This is a block. |
| Tracking Frequency | DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.REQ_TRACKING_FREQUENCY<br>DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.DEL_TRACKING_FREQUENCY | No comment. |
| Tracking Period | DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.TRACKING_PERIOD<br>DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.DEL_TRACKING_PERIOD | No comment. |
| Transaction Authorization Code | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.TRANSACTION_AUTH_CODE | No comment. |
| Transaction Description Suppression | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.TRANSACTION_DESCRIPTION_SUPP | No comment. |
| Transaction Detail Description | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.TRANSACTION_DETAIL_DESCRIPTION | No comment. |
| Transaction Identifier | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.TRANSACTION_IDENTIFIER | No comment. |
| Transaction Short Description | DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.TRANSACTION_SHORT_DESCRIPTION | No comment. |
| Transaction Status | DETAIL.ASS_CONT_EXT.TRANSACTION_STATUS | No comment. |
| Transfer Cut Off Timestamp | HEADER.TRANSFER_CUTOFF_TIMESTAMP | No comment. |
| Transparency Indicator | DETAIL.ASS_GSMW_EXT.BS_PACKET.TRANSPARENCY_INDICATOR | No comment. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| UMTS Quality Of Service Requested | DETAIL.ASS_GPRS_EXT.GS_PACKET.UMTS_QOS_REQUESTED | The EDR field contains comma-separated tag-value pairs mapped from UMTS Quality Of Service Requested.<br>The tag values of the corresponding fields are as follows:<br>• QosTrafficClassKey: 1<br>• QosMaxBitRateUpLnKey: 2<br>• QosMaxBitRateDownLnKey: 3<br>• QosGuaranteedBitRateDownLnKey: 4<br>• QosGuaranteedBitRateUpLnKey: 5<br>• QosAllocRetenPriorityKey: 6 |
| UMTS Quality Of Service Used | DETAIL.ASS_GPRS_EXT.GS_PACKET.UMTS_QOS_USED | The EDR field contains comma-separated tag-value pairs mapped from UMTS Quality Of Service Used.<br>The tag values of the corresponding fields are as follows:<br>• QosTrafficClassKey: 1<br>• QosMaxBitRateUpLnKey: 2<br>• QosMaxBitRateDownLnKey: 3<br>• QosGuaranteedBitRateDownLnKey: 4<br>• QosGuaranteedBitRateUpLnKey: 5<br>• QosAllocRetenPriorityKey: 6 |
| User Protocol Indicator | DETAIL.ASS_GSMW_EXT.BS_PACKET.USER_PROTOCOL_INDICATOR | No comment. |
| UTC Time Offset | File Creation Timestamp:<br>• HEADER.UTC_TIME_OFFSET<br>Earliest Call Timestamp:<br>• TRAILER.FIRST_CHARGING_UTC_TIME_OFFSET<br>Latest Call Timestamp<br>• TRAILER.LAST_CHARGING_UTC_TIME_OFFSET | Mandatory within items:<br>• File Creation Timestamp<br>• Earliest Call Timestamp<br>• Latest Call Timestamp<br>Mandatory within UTC Time Offset Information. |
| UTC Time Offset Code | Actual Delivery Timestamp:<br>• DETAIL.ASS_CONT_EXT.ACT_DELIVERY_UTC_TIME_OFFSET<br>Order Placed Timestamp:<br>• DETAIL.ASS_CONT_EXT.ORDER_PLACED_UTC_TIME_OFFSET<br>Requested Delivery Time Stamp:<br>• DETAIL.ASS_CONT_EXT.REQ_DELIVERY_UTC_TIME_OFFSET<br>LCS Request Timestamp:<br>• DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.LCS_REQ_UTC_OFFSET | Mandatory within UTC Time Offset Information.<br>Mandatory within items:<br>• Call Event Start Timestamp<br>• Charging Timestamp<br>• Charge Detail Timestamp<br>• Deposit Timestamp<br>• Completion Timestamp<br>• Order Placed Timestamp<br>• Requested Delivery Timestamp<br>• Actual Delivery Timestamp<br>• LCS Request Timestamp<br>• PDP Context Start Timestamp<br>In Date Time group, UTC Time Offset Code is only used to get corresponding UTC Time Offset, but is not mapped to any EDR field. |

**Table 9-1 (Cont.) TAP-to-EDR Mapping**

| TAP Field | EDR Field | Comments |
|---|---|---|
| Value Added Service Used | DETAIL.ASS_VAS_EXT | This is a block. |
| VAS Code | DETAIL.ASS_VAS_EXT.VAS_CODE<br>DETAIL.ASS_GSMW_EXT.VAS_PRODUCT_CODE | No comment. |
| Vertical Accuracy Delivered | DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.V_ACCURACY_DELIVERED | No comment. |
| Vertical Accuracy Requested | DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.V_ACCURACY_REQUESTED | No comment. |

# EDR-to-TAP Mapping

When generating output TAP files, BRM maps EDR container fields to the fields in TAP output files. Table 9-2 lists the EDR and TAP field mappings that BRM uses when producing the output files.

> **Note:**
>
> Some of the fields in the EDR container file, such as DETAIL.UTC_TIME_OFFSET, can provide data to different fields in the output TAP file.

**Table 9-2 EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.A_NUMBER | MSISDN | No comment. |
| DETAIL.ASS_CAMEL_EXT | CAMEL Service Used | This is a block. |
| DETAIL.ASS_CAMEL_EXT.CAMEL_INITIATED_CF_INDICATOR | Camel Initiated CF Indicator | No comment. |
| DETAIL.ASS_CAMEL_EXT.CAMEL_MODIFICATION_LIST | Camel Modification | Comma-separated list. |
| DETAIL.ASS_CAMEL_EXT.CAMEL_REFERENCE_NUMBER | Camel Call Reference | No comment. |
| DETAIL.ASS_CAMEL_EXT.CSE_INFORMATION | CSE Information | No comment. |
| DETAIL.ASS_CAMELEXT.DEFAULT_CALL_HANDLING_INDICATOR | Default Call Handling Indicator | No comment. |
| DETAIL.ASS_CAMEL_EXT.DEST_GPRS_APN_ADDRESS | GPRS Destination | The EDR field contains concatenated and comma-separated values of Access Point Name NI and Access Point Name OI. |
| DETAIL.ASS_CAMEL_EXT.DEST_GPRS_PDP_REMOTE_ADDRESS | Remote Pdp Address List | Comma-separated list. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.ASS_CAMEL_EXT.DEST_GSMW_NUMBER | Camel Destination Number | International Access Code prefixes the EDR field. |
| DETAIL.ASS_CAMEL_EXT.RECORD_NUMBER | Tax Information List | No comment. |
| DETAIL.ASS_CAMEL_EXT.SERVER_TYPE_OF_NUMBER | Camel Invocation Fee | No comment. |
| DETAIL.ASS_CAMEL_EXT.DEST_GSMW_NUMBER_ORIGINAL | Camel Destination Number | No comment. |
| DETAIL.ASS_CAMEL_EXT.MSC_ADDRESS | Camel Msc Address | International Access Code prefixes the EDR field. |
| DETAIL.ASS_CAMEL_EXT.SERVER_ADDRESS | Camel Server Address | No comment. |
| DETAIL.ASS_CAMEL_EXT.SERVICE_KEY | CAMEL Service Key | No comment. |
| DETAIL.ASS_CAMEL_EXT.SERVICE_LEVEL | CAMEL Service Level | No comment. |
| DETAIL.ASS_CBD.CP.CHARGEABLE_QUANTITY_VALUE | Chargeable Units | No comment. |
| DETAIL.ASS_CBD.CP.CHARGED_AMOUNT_VALUE | Charge | No comment. |
| DETAIL.ASS_CBD.CP.CHARGING_START_TIMESTAMP<br>DETAIL.UTC_TIME_OFFSET | Charging Timestamp | No comment. |
| DETAIL.ASS_CBD.CP.DAY_CODE | Day Category | No comment. |
| DETAIL.ASS_CBD.CP.EXCHANGE_RATE | Exchange Rate Code | No comment. |
| DETAIL.ASS_CBD.CP.GRANTED_DISCOUNT_AMOUNT_VALUE | • Discount Value<br>• Discount Code | No comment. |
| DETAIL.ASS_CBD.CP.IMPACT_CATEGORY | Charge Type | No comment. |
| DETAIL.ASS_CBD.CP.PRODUCTCODE_USED | VAS:<br>• VasShortDesc for the corresponding VAS Code<br>Camel:<br>• Hard coded to CAMEL | In Charge Detail Group, values that are mapped to the EDR field depend on the service type: VAS or Camel. |
| DETAIL.ASS_CBD.CP.ROUNDED_QUANTITY_VALUE | Charged Units | No comment. |
| DETAIL.ASS_CBD.CP.TIME_INTERVAL_CODE | Time Band | No comment. |
| DETAIL.ASS_CBD.TP | Tax Information | This is a block. |
| DETAIL.ASS_CBD.TP.CHARGE_TYPE | Charge Type | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.ASS_CBD.TP.TAX_CODE | Tax Rate Code | No comment. |
| DETAIL.ASS_CBD.TP.TAX_VALUE | Tax Value | No comment. |
| DETAIL.ASS_CBD.TP.TAXABLE_AMOUNT | Taxable Amount | No comment. |
| DETAIL.ASS_CONT_EXT.ACTUAL_DELIVERY_TIMESTAMP<br>DETAIL.ASS_CONT_EXT.ACT_DELIVERY_UTC_TIME_OFFSET | Actual Delivery Timestamp | No comment. |
| DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO | Charged Party Information | This is a block. |
| DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.EQUIPMENT | Charged Party Equipment | This is a block. |
| DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.EQUIPMENT.IDENTIFIER | Charged Party Equipment:<br>• Equipment Id | No comment. |
| DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.EQUIPMENT.TYPE | Charged Party Equipment:<br>• Equipment ID Type | No comment. |
| DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.HOMEID_LIST | Charged Party Home Identification | This is a block. |
| DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.HOMEID_LIST.IDENTIFIER | Charged Party Home Identification:<br>• Home Identifier | No comment. |
| DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.HOMEID_LIST.TYPE | Charged Party Home Identification:<br>• Home ID Type | No comment. |
| DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.ID_LIST | Charged Party Identification | This is a block. |
| DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.ID_LIST.IDENTIFIER | Charged Party Identifier | No comment. |
| DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.ID_LIST.TYPE | Charged Party ID Type | No comment. |
| DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.LOCATION_LIST | Charged Party Location | This is a block. |
| DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.LOCATION_LIST.IDENTIFIER | Charged Party Location:<br>• Location Identifier | No comment. |
| DETAIL.ASS_CONT_EXT.CHARGED_PARTY_INFO.LOCATION_LIST.TYPE | Charged Party Location:<br>• Location ID Type | No comment. |
| DETAIL.ASS_CONT_EXT.ORDER_PLACED_TIMESTAMP<br>DETAIL.ASS_CONT_EXT.ORDER_PLACED_UTC_TIME_OFFSET | Order Placed Timestamp | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.ASS_CONT_EXT.RECORD_NUMBER | Keeps the number of records of content Transaction. | No comment. |
| DETAIL.ASS_CONT_EXT.REQUESTED_DELIVERY_TIMESTAMP<br>DETAIL.UTC_TIME_OFFSET | Requested Delivery Timestamp | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST | Content Service Used | This is a block. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.ADVISED_CHARGE | Advised Charge | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.ADVISED_CHARGE_CURRENCY | Advised Charge Currency | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.CHARGE_REFUND_INDICATOR | Charge Refund Indicator | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.COMMISSION | Commission | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.CONTENT_CHARGING_POINT | Content Charging Point | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.CONTENT_TRANSACTION_CODE | Content Transaction Code | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.CONTENT_TRANSACTION_TYPE | Content Transaction Type | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.DATA_VOLUME_INCOMING | Data Volume Incoming | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.DATA_VOLUME_OUTGOING | Data Volume Outgoing | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.OBJECT_TYPE | Object Type | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.PAID_INDICATOR | Paid Indicator | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.PAYMENT_METHOD | Payment Method | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.TOTAL_DATA_VOLUME | Total Data Volume | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.TRANSACTION_AUTH_CODE | Transaction Authorization Code | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.TRANSACTION_DESCRIPTION_SUPP | Transaction Description Suppression | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.TRANSACTION_DETAIL_DESCRIPTION | Transaction Detail Description | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.TRANSACTION_IDENTIFIER | Transaction Identifier | No comment. |
| DETAIL.ASS_CONT_EXT.SERVICE_USED_LIST.TRANSACTION_SHORT_DESCRIPTION | Transaction Short Description | No comment. |
| DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO | Serving Parties Information | This is a block. |
| DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.ISP_LIST | Internet Service Provider | This is a block. |
| DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.ISP_LIST.IDENTIFIER | ISP Identifier | No comment. |
| DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.ISP_LIST.TYPE | ISP ID Type | No comment. |
| DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.NETWORK_LIST | Network | This is a block. |
| DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.NETWORK_LIST.IDENTIFIER | Serving Parties Info Block:<br>• Network Identifier | No comment. |
| DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.NETWORK_LIST.TYPE | Serving Parties Info Block:<br>• Network ID Type | No comment. |
| DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.PROVIDER_LIST | Content Provider | This is a block. |
| DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.PROVIDER_LIST.IDENTIFIER | Content Provider Block:<br>• Content Provider Identifier | No comment. |
| DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.PROVIDER_LIST.TYPE | Content Provider Block:<br>• Content Provider Id Type | No comment. |
| DETAIL.ASS_CONT_EXT.SERVING_PARTIES_INFO.PROVIDER_NAME | Content Provider Name | No comment. |
| DETAIL.ASS_CONT_EXT.TOTAL_TRANSACTION_DURATION | Total Transaction Duration | No comment. |
| DETAIL.ASS_CONT_EXT.TRANSACTION_STATUS | Transaction Status | No comment. |
| DETAIL.ASS_GPRS_EXT.A_NUMBER_USER | MSISDN | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.ASS_GPRS_EXT.APN_ADDRESS | GPRS Destination Group:<br>• Access Point Name NI, if Camel option is not set.<br>• Access Point Name OI, if Camel option is not set. | The EDR field contains concatenated and comma-separated values of Access Point Name NI and Access Point Name OI. |
| DETAIL.ASS_GPRS_EXT.CELL_ID | Cell Identity | No comment. |
| DETAIL.ASS_GPRS_EXT.CHARGING_ID | Charging ID | No comment. |
| DETAIL.ASS_GPRS_EXT.DEVICE_NUMBER | IMEI | No comment. |
| DETAIL.ASS_GPRS_EXT.GGSN_ADDRESS | Recording Entity ID | Rec Entity Code Element Group.<br>Recording Entity Code is used to get corresponding Recording Entity ID. The obtained Recording Entity ID is stored in the EDR field. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET | GPRS Service Used | This is a block. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.CHARGING_START_TIMESTAMP<br>DETAIL.ASS_GPRS_EXT.GS_PACKET.UTC_TIME_OFFSET | Charging Timestamp | No comment. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_REQUESTED_DELAY | QoS Requested:<br>• QoS Delay | No comment. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_REQUESTED_MEAN_THROUGHPUT | QoS Requested:<br>• QoS Mean Throughput | No comment. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_REQUESTED_PEAK_THROUGHPUT | QoS Requested:<br>• QoS Peak Throughput | No comment. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_REQUESTED_PRECEDENCE | QoS Requested:<br>• QoS Precedence | No comment. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_REQUESTED_RELIABILITY | QoS Requested:<br>• QoS Reliability | No comment. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_USED_DELAY | QoS Used:<br>• QoS Delay | No comment. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_USED_MEAN_THROUGHPUT | QoS Used:<br>• QoS Mean Throughput | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_USED_PEAK_THROUGHPUT | QoS Used:<br>• QoS Peak Throughput | No comment. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_USED_PRECEDENCE | QoS Used:<br>• QoS Precedence | No comment. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.QOS_USED_RELIABILITY | QoS Used:<br>• QoS Reliability | No comment. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.UMTS_QOS_REQUESTED | UMTS Quality Of Service Requested | The EDR field is mapped into concatenated and comma-separated tag-value pairs in UMTS Quality Of Service Requested.<br>The tag values of the corresponding fields are as follows:<br>• QosTrafficClassKey: 1<br>• QosMaxBitRateUpLnKey: 2<br>• QosMaxBitRateDownLnKey: 3<br>• QosGuaranteedBitRateDownLnKey: 4<br>• QosGuaranteedBitRateUpLnKey: 5<br>• QosAllocRetenPriorityKey: 6 |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.UMTS_QOS_USED | UMTS Quality Of Service Used | The EDR field is mapped into concatenated and comma-separated tag-value pairs in UMTS Quality Of Service Used.<br>The tag values of the corresponding fields are as follows:<br>• QosTrafficClassKey: 1<br>• QosMaxBitRateUpLnKey: 2<br>• QosMaxBitRateDownLnKey: 3<br>• QosGuaranteedBitRateDownLnKey: 4<br>• QosGuaranteedBitRateUpLnKey: 5<br>• QosAllocRetenPriorityKey: 6 |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.UTC_TIME_OFFSET | Charging Timestamp | No comment. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.VOLUME_RECEIVED | Data Volume Incoming | No comment. |
| DETAIL.ASS_GPRS_EXT.GS_PACKET.VOLUME_SENT | Data Volume Outgoing | No comment. |
| DETAIL.ASS_GPRS_EXT.LOCATION_AREA_INDICATOR | Location Area Code | No comment. |
| DETAIL.ASS_GPRS_EXT.NETWORK_INITIATED_PDP | Network Initiated PDP Context | No comment. |
| DETAIL.ASS_GPRS_EXT.ORIGINATING_SWITCH_IDENTIFICATION | Recording Entity ID | Rec Entity Code Element.<br>Recording Entity Code is used to get corresponding Recording Entity ID. The Recording Entity ID is stored in the EDR field. |
| DETAIL.ASS_GPRS_EXT.PDP_ADDRESS | PDP Address | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.ASS_GPRS_EXT.PDP_CONTEXT_START_TIMESTAMP<br>DETAIL.ASS_GPRS_EXT.PDP_UTC_TIME_OFFSET | PDP Context Start Timestamp | No comment. |
| DETAIL.ASS_GPRS_EXT.PORT_NUMBER | IMSI | No comment. |
| DETAIL.ASS_GPRS_EXT.SERVICE_USED_CHARGING_START_TIMESTAMP<br>DETAIL.ASS_GPRS_EXT.SERVICE_USED_UTC_TIME_OFFSET | GGPRS Service Used Block:<br>• Charging Timestamp | No comment. |
| DETAIL.ASS_GPRS_EXT.SGSN_ADDRESS | Recording Entity ID | Rec Entity Code Element.<br>Recording Entity Code is used to get corresponding Recording Entity ID. Recording Entity ID is stored in the EDR field. |
| DETAIL.ASS_GPRS_EXT.SGSN_INFO_LIST.SGSN_ADDRESS<br>DETAIL.ASS_GPRS_EXT.WLAN_ADDRESS | Recording Entity ID | Rec Entity Code Element.<br>The Recording Entity code is used to get corresponding Recording Entity ID. The Recording Entity ID is stored in the EDR field. |
| DETAIL.ASS_GSMW_EXT.A_NUMBER_USER | • MSISDN<br>• Third Party Number | No comment. |
| DETAIL.ASS_GSMW_EXT.BASIC_DUAL_SERVICE | • Dual Teleservice Code<br>• Dual Bearer Service Code | • The EDR field is prefixed with 0.<br>• The EDR field is prefixed with 1. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET | • Basic Service<br>• Basic Service Used | This is a block. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.AIUR_REQUESTED | Air Interface User Rate Requested | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.CHARGING_START_TIMESTAMP<br>DETAIL.ASS_GSMW_EXT.BS_PACKET.UTC_TIME_OFFSET | Charging Timestamp | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.FNUR | Fixed Network User Rate | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.CHANNEL_CODING_OK_LIST | Channel Coding Acceptable | The EDR field is mapped as a comma-separated list of channel coding. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.CHANNEL_CODING_USED | Channel Coding Used | The EDR field is mapped as a comma-separated list of channel coding. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.NUMBER_OF_CHANNELS | Number Of Channels | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.NUMBER_OF_CHANNELS_USED | Number Of Channels Used | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST | Basic HSCSD Parameters | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST | HSCSD Parameter Modification | This is a block. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.AIUR | Air Interface User Rate Requested | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.CHANNEL_CODING_USED | Channel Coding Used | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.INITIATING_PARTY | Initiating Party | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.MAX_NUMBER_OF_CHANNELS | Number Of Channels | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.MODIFICATION_TIMESTAMP<br>DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.UTC_TIME_OFFSET | Modification Timestamp | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.HSCSD_INFO_PACKET.PM_LIST.NUMBER_OF_CHANNELS_USED | Number Of Channels Used | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.QOS_REQUESTED | Radio Channel Requested | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.QOS_USED | Radio Channel Used | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.SPEECH_VERSION_REQUESTED | Speech Version Requested | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.SPEECH_VERSION_USED | Speech Version Used | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.TRANSPARENCY_INDICATOR | Transparency Indicator | No comment. |
| DETAIL.ASS_GSMW_EXT.BS_PACKET.USER_PROTOCOL_INDICATOR | User Protocol Indicator | No comment. |
| DETAIL.ASS_GSMW_EXT.CELL_ID | Cell Identity | No comment. |
| DETAIL.ASS_GSMW_EXT.DEVICE_NUMBER | IMEI or ESN | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.ASS_GSMW_EXT.DIALED_DIGITS | • Dialled Digits<br>• MSISDN, in MTC and SCU groups | No comment. |
| DETAIL.ASS_GSMWEXT.LOCATION_AREA_INDICATOR | Location Area Code | No comment. |
| DETAIL.ASS_GSMW_EXT.MS_CLASS_MARK | Mobile Station Classmark | No comment. |
| DETAIL.ASS_GSMW_EXT.NUMBER_OF_SS_PACKETS | • Number of Supplementary Service Used blocks<br>• Number of Supplementary Service Used Event blocks | No comment. |
| DETAIL.ASS_GSMW_EXT.ORIGINATING_SWITCH_IDENTIFICATION | • Location Information<br>• Recording Entity ID | No comment. |
| DETAIL.ASS_GSMW_EXT.PORT_NUMBER | IMSI | No comment. |
| DETAIL.ASS_GSMW_EXT.SERVING_NETWORK | Serving Network | No comment. |
| DETAIL.ASS_GSMW_EXT.SS_PACKET | Supplementary Service Used | This is a block. |
| DETAIL.ASS_GSMW_EXT.SS_PACKET.ACTION_CODE | Supplementary Service Action Code | No comment. |
| DETAIL.ASS_GSMW_EXT.SS_PACKET.BASIC_SERVICE_CODE_LIST | Basic Service Code SS | No comment. |
| DETAIL.ASS_GSMW_EXT.SS_PACKET.CLIR_INDICATOR | CLIR Status Indicator | No comment. |
| DETAIL.ASS_GSMW_EXT.SS_PACKET.SS_EVENT | Supplementary Service Code | No comment. |
| DETAIL.ASS_GSMW_EXT.SS_PACKET.SS_PARAMETERS | Supplementary Service Parameters | No comment. |
| DETAIL.ASS_GSMW_EXT.SS_PACKET.THIRD_PARTY_NUMBER | Third Party Number | No comment. |
| DETAIL.ASS_GSMW_EXT.SS_PACKET.UTC_TIME_OFFSET | UTC Time Offset | No comment. |
| DETAIL.ASS_LOCN_EXT.CALL_REFERENCE | Call Reference | No comment. |
| DETAIL.ASS_LOCN_EXT.LCSSP_INFO | LCS SP Information | This is a block. |
| DETAIL.ASS_LOCN_EXT.LCSSP_INFO.ID_LIST | LCS SP Identification | This is a block. |
| DETAIL.ASS_LOCN_EXT.LCSSP_INFO.ID_LIST.IDENTIFIER | LCS SP Identification:<br>• Content Provider Identifier | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.ASS_LOCN_EXT.LCSSP_INFO.ID_LIST.TYPE | LCS SP Identification:<br>• Content Provider ID Type | No comment. |
| DETAIL.ASS_LOCN_EXT.LCSSP_INFO.ISP_LIST | Internet Service Provider | This is a block. |
| DETAIL.ASS_LOCN_EXT.LCSSP_INFO.ISP_LIST.IDENTIFIER | LCS SP Information:<br>• ISP Identifier | No comment. |
| DETAIL.ASS_LOCN_EXT.LCSSP_INFO.ISP_LIST.TYPE | LCS SP Information:<br>• ISP ID Type | No comment. |
| DETAIL.ASS_LOCN_EXT.LCSSP_INFO.NETWORK_LIST.IDENTIFIER | LCS SP Information:<br>• Network Identifier | No comment. |
| DETAIL.ASS_LOCN_EXT.LCSSP_INFO.NETWORK_LIST.TYPE | LCS SP Information:<br>• Network ID Type | No comment. |
| DETAIL.ASS_LOCN_EXT.REC_ENTITY_CODE | Location Service:<br>• Recording Entity Code | No comment. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE | Location Service Usage | This is a block. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.AGE_OF_LOCATION | Age Of Location | No comment. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.DEL_TRACKING_FREQUENCY | Tracking Frequency | No comment. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.DEL_TRACKING_PERIOD | Tracking Period | No comment. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.H_ACCURACY_DELIVERED | Horizontal Accuracy Delivered | No comment. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.H_ACCURACY_REQUESTED | Horizontal Accuracy Requested | No comment. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.LCS_REQUEST_TIMESTAMP<br>DETAIL.UTC_TIME_OFFSET | LCS Request Timestamp | No comment. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.LCS_TRANS_STATUS | LCS Transaction Status | No comment. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.POSITIONING_METHOD | Positioning Method | No comment. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.REQ_TRACKING_FREQUENCY | Tracking Frequency | No comment. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.RESPONSE_TIME | Response Time | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.RESPONSE_TIME_CATEGORY | Response Time Category | No comment. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.TRACKING_PERIOD | Tracking Period | No comment. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.V_ACCURACY_DELIVERED | Vertical Accuracy Delivered | No comment. |
| DETAIL.ASS_LOCN_EXT.SERVICE_USAGE.V_ACCURACY_REQUESTED | Vertical Accuracy Requested | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO | Tracked Customer Information | This is a block. |
| DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.EQUIPMENT | Tracked Customer Equipment | This is a block. |
| DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.EQUIPMENT.IDENTIFIER | Tracked Customer Equipment:<br>• Equipment Id | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.EQUIPMENT.TYPE | Tracked Customer Equipment:<br>• Equipment ID Type | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.HOME_ID_LIST | Tracked Customer Home Id | This is a block. |
| DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.HOME_ID_LIST.IDENTIFIER | Tracked Customer Home Id:<br>• Home Identifier | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.HOME_ID_LIST.TYPE | Tracked Customer Home Id:<br>• HomeIDType | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.ID_LIST | Tracked Customer Identification | This is a block. |
| DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.ID_LIST.IDENTIFIER | Tracked Customer Identification:<br>• Customer Identifier | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.ID_LIST.TYPE | Tracked Customer Identification:<br>• Customer ID Type | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.LOCATION_LIST | Tracked Customer Location | This is a block. |
| DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.LOCATION_LIST.IDENTIFIER | Tracked Customer Location:<br>• Location Identifier | |
| DETAIL.ASS_LOCN_EXT.TRACKED_CUST_INFO.LOCATION_LIST.TYPE | Tracked Customer Location:<br>• Location ID Type | |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO | Tracking Customer Information | This is a block. |
| DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.EQUIPMENT | Tracking Customer Equipment | This is a block. |
| DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.EQUIPMENT.IDENTIFIER | Tracking Customer Equipment:<br>• Equipment ID | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.EQUIPMENT.TYPE | Tracking Customer Equipment:<br>• Equipment ID Type | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.HOME_ID_LIST | Tracking Customer Home ID | This is a block. |
| DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.HOME_ID_LIST.IDENTIFIER | Tracking Customer Home ID:<br>• Home Identifier | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.HOME_ID_LIST.TYPE | Tracking Customer Home ID:<br>• Home ID Type | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.ID_LIST | Tracking Customer Identification | This is a block. |
| DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.ID_LIST.IDENTIFIER | Tracking Customer Identification:<br>• Customer Identifier | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.ID_LIST.TYPE | Tracking Customer Identification:<br>• Customer ID Type | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.LOCATION_LIST | Tracking Customer Location | This is a block. |
| DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.LOCATION_LIST.IDENTIFIER | Tracking Customer Location:<br>• Location Identifier | No comment. |
| DETAIL.ASS_LOCN_EXT.TRACKING_CUST_INFO.LOCATION_LIST.TYPE | Tracking Customer Location:<br>• Location ID Type | No comment. |
| DETAIL.ASS_LTE_EXT.REQUESTEDNUMBER | Requested Destination:<br>• Requested Number | The EDR value is populated only for the Mobile Session (MO Voice Over LTE) events. |
| DETAIL.ASS_LTE_EXT.REQUESTEDPUBLICUSERID | Requested Destination:<br>• Requested Public User ID | The EDR value is populated only for the Mobile Session (MO Voice Over LTE) events. |
| DETAIL.ASS_ROAMING_EXT.CLIR_INDICATOR | CLIR Indicator | No comment. |
| DETAIL.ASS_ROAMING_EXT.GUARANTEED_BIT_RATE | Guaranteed Bit Rate | No comment. |
| DETAIL.ASS_ROAMING_EXT.HSCSD_INDICATOR | HSCSD Indicator | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.ASS_ROAMING_EXT.MAXIMUM_BIT_RATE | Maximum Bit Rate | No comment. |
| DETAIL.ASS_ROAMING_EXT.MOBILE_DIR_NUMBER | Mobile Directory Number | No comment. |
| DETAIL.ASS_ROAMING_EXT.MOBILE_ID_NUMBER | Mobile ID Number | No comment. |
| DETAIL.ASS_ROAMING_EXT.NETWORKACCESS_IDENTIFIER | Network Access Identifier | No comment. |
| DETAIL.ASS_ROAMING_EXT.RAP_FILE_SEQ_NO | File Sequence Number | No comment. |
| DETAIL.ASS_ROAMING_EXT.SMS_DESTINATION_NUMBER | SMS Destination Number | No comment. |
| DETAIL.ASS_ROAMING_EXT.SMS_ORIGINATOR | SMS Originator | No comment. |
| DETAIL.ASS_ROAMING_EXT.HOME_BID | Home Bid | No comment. |
| DETAIL.ASS_ROAMING_EXT.HOMELOCATION_DESCRIPTION | Home Location Description | No comment. |
| DETAIL.ASS_ROAMING_EXT.ISM_SIGNALLING_CONTEXT | ISM Signalling Context | No comment. |
| DETAIL.ASS_VAS_EXT | Value Added Service Used | This is a block. |
| DETAIL.ASS_VAS_EXT.UTC_TIME_OFFSET | UTC Time Offset | No comment. |
| DETAIL.ASS_VAS_EXT.VAS_CODE | VAS Code | No comment. |
| DETAIL.ASS_VAS_EXT.VAS_DESC | VAS Description | No comment. |
| DETAIL.ASS_VAS_EXT.VAS_SHORT_DESC | VAS Short Description | No comment. |
| DETAIL.B_NUMBER | • Called Number<br>• Calling Number<br>• Non Charged Number | International Access Code prefixes the EDR field. |
| DETAIL.BASIC_SERVICE | • TeleService Code<br>• Bearer Service Code | No comment. |
| DETAIL.C_NUMBER | • Third Party Number<br>• Dialled Digits | No comment. |
| DETAIL.CALL_COMPLETION_INDICATOR | • Cause For Termination<br>• Message Status | The EDR field is mapped to different TAP fields:<br>• Service Center Usage Group. The EDR field is mapped to Message Status. If the value is less than 10, it is prefixed with 0.<br>• GPRS/Mobile Originated/ Mobile Terminated Group. The EDR field is mapped to Cause for Termination. If the value is less than 10, it is prefixed with 0. |
| DETAIL.CALLED_COUNTRY_CODE | Called Country Code | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.CHARGING_END_TIMESTAMP<br>DETAIL.UTC_TIME_OFFSET | • Completion Timestamp<br>• Call Event Start Time Stamp<br>• Charging Time Stamp (MSS, SCU, and VAS) | When the EDR is mapped to Completion Timestamp, the DETAIL.UTC_TIME_OFFSET part is not stored. |
| DETAIL.CHARGING_START_TIMESTAMP<br>DETAIL.UTC_TIME_OFFSET | • Deposit Timestamp<br>• Charging Timestamp<br>• Call Event Start Timestamp | No comment. |
| DETAIL.CONNECT_SUB_TYPE | Call Type Level 3 | No comment. |
| DETAIL.CONNECT_TYPE | • Call Type Level 1<br>• Call Type Level 2 | Contents of the EDR field are mapped as concatenated items to Call Type Level 1 and Call Type Level 2. |
| DETAIL.DESCRIPTION | • Called Place<br>• Called Region<br>• Message Description Code | Destination:<br>• Contents of the EDR field are mapped as concatenated comma-separated values into Called Place and Called Region.<br>SCU Charge Type:<br>• The EDR field mapped to Message Description corresponds to the Message Description Code present in SCU Charge Type. |
| DETAIL.DESTINATION_NETWORK | Destination Network | No comment. |
| DETAIL.DISCOUNT_KEY | SIM Toolkit Indicator | No comment. |
| DETAIL.DURATION | Total Call Event Duration | No comment. |
| DETAIL.FRAUD_MONITOR_INDICATOR | Fraud Monitor Indicator | No comment. |
| DETAIL.GEOGRAPHICAL_LOCATION | Geographical Location | Contents of the EDR field are mapped as comma-separated tag-value pairs.<br>The tag values of the corresponding fields are as follows:<br>• ServingNetwork: 1<br>• ServingBID: 2<br>• ServingLocationDescription: 3<br>• Longitude: 4<br>• Latitude: 5 |
| DETAIL.INTERN_A_NUMBER_ZONE | MSISDN | No comment. |
| DETAIL.LONG_DURATION_INDICATOR | Partial Type Indicator | No comment. |
| DETAIL.OPERATOR_SPECIFIC_INFO | Operator Specific Information | No comment. |
| DETAIL.QOS_REQUESTED | • Priority Code<br>• Radio Channel Requested | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| DETAIL.QOS_USED | • Message Type<br>• Radio Channel Used | No comment. |
| DETAIL.RAP_FILE_SEQ_NO | RAP File Sequence Number | No comment. |
| DETAIL.SOURCE_NETWORK | Originating Network | No comment. |
| DETAIL.SOURCE_NETWORK_TYPE | Network Type | No comment. |
| DETAIL.USAGE_CLASS | GPRS Chargeable Subscriber:<br>• Charging Characteristics<br>SCU Basic Information, Call Originator:<br>• CLIR Status Indicator | No comment. |
| DETAIL.USAGE_DIRECTION | Charged Party Status | No comment. |
| DETAIL.UTC_TIME_OFFSET | • Charging Timestamp<br>• LCS Request Timestamp<br>• Actual Delivery Timestamp<br>• Requested Delivery Timestamp<br>• Order Placed Timestamp<br>• Completion Timestamp<br>• Deposit Timestamp<br>• Call Event Start Timestamp | No comment. |
| DETAIL.VOLUME_RECEIVED | Data Volume Incoming | No comment. |
| DETAIL.VOLUME_SENT | Data Volume Outgoing | No comment. |
| DETAIL.WHOLESALE_CHARGED_TAX_RATE | Tax Rate Code | No comment. |
| DETAIL.WHOLESALE_CHARGED_TAX_VALUE | Tax Value | No comment. |
| DETAIL.ZONE_DESCRIPTION | Distance Charge Band Code | No comment. |
| HEADER.CREATION_TIMESTAMP<br>HEADER.UTC_TIME_OFFSET | File Creation Timestamp | No comment. |
| HEADER.DATA_TYPE_INDICATOR | File Type Indicator | No comment. |
| HEADER.OPERATOR_SPECIFIC_INFO | Operator Specific Information | No comment. |
| HEADER.RAP_FILE_SEQ_NO | RAP File Sequence Number | No comment. |

**Table 9-2 (Cont.) EDR-to-TAP Mapping**

| EDR Field | TAP Field | Comments |
|---|---|---|
| HEADER.RECIPIENT | Recipient | No comment. |
| HEADER.SENDER | Sender | No comment. |
| HEADER.SEQUENCE_NUMBER | File Sequence Number | No comment. |
| HEADER.SPECIFICATION_VERSION_NUMBER | Specification Version Number | No comment. |
| HEADER.TAP_DECIMAL_PLACES | TAP Decimal Places | No comment. |
| HEADER.TRANSFER_CUTOFF_TIMESTAMP<br>HEADER.UTC_TIME_OFFSET | Transfer Cut Off Timestamp | No comment. |
| HEADER.TRANSMISSION_DATE<br>HEADER.UTC_TIME_OFFSET | File Available Timestamp | No comment. |
| TRAILER.LAST_START_TIMESTAMP<br>TRAILER.LAST_CHARGING_UTC_TIME_OFFSET | Latest Call Timestamp | No comment. |
| TRAILER.OPERATOR_SPECIFIC_INFO | Operator Specific Information | No comment. |
| TRAILER.TAP_TOTAL_DISCOUNT_VALUE | Total Discount Value | No comment. |
| TRAILER.TAP_TOTAL_NUMBER_OF_RECORDS | Call Event Details Count | No comment. |
| TRAILER.TAP_TOTAL_TAX_VALUE | Total Tax Value | No comment. |
| TRAILER.TOTAL_CHARGE_VALUE_LIST.CHARGE_TYPE | Charge Type | No comment. |
| TRAILER.TOTAL_CHARGE_VALUE_LIST.TOTAL_CHARGE_REFUND | Total Charge Refund | No comment. |

10

# Rating CIBER Roaming Usage Events

This chapter describes how to set up the Oracle Communications Billing and Revenue Management (BRM) Pipeline Manager for rating CIBER events.

## About Processing CIBER OCC Records

Other charges and credits (OCC) records are CIBER records of types 50 and 52. When you configure a pipeline to create CIBER OCC records, one OCC record is generated for each day that a roaming subscriber makes one or more calls from a visited network. By default, a CIBER OCC record is created only for the first call processed for a subscriber for a particular day, with the day beginning at 12:00 a.m.

To generate CIBER OCC records for network operators, you configure the following components:

1. Use Pricing Center or Pipeline Configuration Center (PCC) to specify that CIBER OCC records are generated for network operators. See "About Generating CIBER OCC Records for Network Operators".
2. Configure the FCT_CiberOcc function module to create CIBER OCC records.

   Use the EdrNetworkModel entry to specify the network model, which identifies the home network to use for the pipeline.
3. Configure the FCT_DuplicateCheck function module to set an EDR field for duplicate EDRs. This field is checked by the FCT_CiberOcc module to determine whether to create an OCC record.

> **Note:**
>
> To rate CIBER records, an EDR must be able to contain multiple charge packets. To enable this, create price models with multiple RUMs.

CIBER OCC records are created only when the call record being processed by FCT_CiberOcc has OCC-associated charges. The type of call record determines which OCC record type is generated as shown in Table 10-1:

**Table 10-1 Call Record type**

| Call record type | Type of OCC record generated |
|---|---|
| 10, 20, 30 | 50 |
| 22, 32 | 52 |
| Other call records | No OCC record is generated. |

If a combination of these types occur for a subscriber on the same day, the type of OCC record created is based on the first processed call record.

## About Generating CIBER OCC Records for Network Operators

You use Pricing Center or Pipeline Configuration Center (PCC) to specify whether to generate CIBER records for other charges and credits (OCC records) during outcollect processing. These records let you apply surcharges when your partner's roaming customers make calls from your network.

## Configuring Duplicate Check for CIBER OCC Records

You can avoid creating duplicate OCC records by configuring the FCT_CiberOcc module to work with the FCT_DuplicateCheck module.

1. Determine which field you want to use for duplicate check. Typically, this field is DETAIL.ASS_CIBER_EXT.NO_OCC. If you use a different field, it must be an Integer value.
2. Enter the field name in the FCT_CiberOcc module **NoOCCField** registry entry:

   ```
   NoOCCField = DETAIL.ASS_CIBER_EXT.NO_OCC
   ```

3. Enter the same field name in the FCT_DuplicateCheck module **DuplicateIndicatorField** registry entry:

   ```
   DuplicateIndicatorField = DETAIL.ASS_CIBER_EXT.NO_OCC
   ```

## Changing the Default Time Scheme

A CIBER OCC record is generated only for the first call processed for a subscriber for the day, with the day beginning at 12:00 a.m. You can customize this feature to use another time scheme for all system identification numbers (SIDs). However, you cannot specify different time schemes for different SIDs.

To use another time scheme:

1. Define a new EDR field that records an attribute of the call date and time.

   This field will be used to determine whether to generate an OCC record. For example, record a value between 1 and 12 to generate an OCC record once per month, or record a value between 1 and 52 to generate a weekly OCC record.
2. Write an iScript that sets a value in the new EDR field based on the call date. This iScript must be executed in the pipeline before the FCT_DuplicateCheck module.
3. Specify the new EDR field for duplicate checking in the **Fields** entry in the FCT_DuplicateCheck module registry.
4. Specify the values that describe the new time interval in the **OCCIntervalIndicator** and **OCCDescription** entries in the FCT_CiberOcc module registry.
   - The **OCCDescription** entry specifies the service associated with the OCC.

     This value is entered in the OCC_DESCRIPTION field in the ASSOCIATED_CIBER_EXTENSION block of the OCC record created.

> **Note:**
>
> This field must not contain spaces. If you require spaces in the description, write an iScript to populate this field.

- The **OCCIntervalIndicator** field specifies the interval at which the associated OCC record is generated.

  > **Note:**
  >
  > To use an interval other than the default (daily), you must customize this feature. See "Changing the Default Time Scheme".

  Possible values:

  **1** = Event (Generates an OCC record based on an event.)

  **2** = Hourly

  **3** = Daily

  **4** = Weekly

  **5** = Monthly

  This value is entered in the OCC_INTERVAL_INDICATOR field in the ASSOCIATED_CIBER_EXTENSION block of the OCC record.

5. Change the DETAIL.ASS_CIBER_EXT.OCC_END_DATE field in the OCC record to the date or time specific to your needs. By default, this field is set to the value of OCC_START_DATE to apply a daily surcharge.

   > **Note:**
   >
   > You can change the field by writing an iScript.

## About Finding the Charge for CIBER Records

To ensure that a charge is selected for every CIBER record, you must define a default Interconnect (IC) charge offer for source networks. IC charge offers are linked to charges. If a search for a corresponding charge can not be found for the source network, the charge for the default IC charge offer is used.

You configure IC charge offers in Pricing Center or Pipeline Configuration Center (PCC).

For every IC charge offer Configuration that has a value in the **Source Network** entry, add a new IC charge offer Configuration.

# Configuring EDR Field Validation

You configure an EDR field validation to ensure that your roaming partner has followed the agreed procedure for generating files and automatically return the single EDRs that do not match the agreement, without rejecting the entire file.

To perform EDR field validation, follow these procedures:

- Configure the "ISC_CiberInputValidation" iScript to validate CIBER record fields.
- Configure the iRuleValidation iRule module to validate CIBER record fields. See "Configuring the iRuleValidation Module".

To perform additional EDR field validation, configure rule sets and assign the rule sets to the FCT_IRules module. See "Configuring Rule Sets for the EDR Field Validation".

## Configuring the iRuleValidation Module

The iRuleValidation module is an instance of the FCT_IRules function module. To configure iRuleValidation, set up an instance of FCT_IRules in the **FunctionPool** section of the Pipeline Manager registry and use **iRulesValidation** as the module instance.

iRuleValidation uses one of the following XML files that contain the rules and rule sets used for validation:

- The **CIBER_VAL.xml** file specifies the rules and rule items for CIBER records.

Rules in the **.xml** file must be loaded into the Pipeline Manager database before starting a pipeline.

Specify the XML rules file in the **Rules** entry of the iRuleValidation registry.

## Configuring Rule Sets for the EDR Field Validation

You configure rule sets for EDR field validation in the database. You name a rule set according to the format used, such as CIBER. Each rule set consists of a series of rules, defining one rule for each of the EDR fields that are validated. Each rule contains a rule item. This rule item represents the current default error condition that results in an error message.

There are several levels of error messages:

- Severe errors
- Fatal errors
- Warning errors

> **Note:**
>
> In case of warning errors, Pipeline Manager generates an internal error that is logged in the stream log but does not return any detail. In this case, you discuss the settlement with your roaming partner using a conventional method, such as telephone or mail.

The rules and rule sets for EDR field validation are stored in the following database tables:

- IFW_RULESET
- IFW_RULESETLIST
- IFW_RULE
- IFW_RULEITEM

You can use the following tools to configure rules and rule sets:

- Pricing Center or Pipeline Configuration Center (PCC).
- The FCT_IRules module. This module can use rules stored in the database.

# 11
# Rating Interconnect Events

This chapter describes how to set up the Oracle Communications Billing and Revenue Management (BRM) Pipeline Manager for rating interconnect events.

You should be familiar with how roaming events are rated by Pipeline Manager. See "About Rating Roaming Events".

## About Interconnect Rating

*Interconnection* means the process of handling events over physical lines between two or more network operators. The following types of network can be involved in an interconnect process:

- Originating network: where a call originates
- Transit network: network which passes the call on
- Terminating network: where a call terminates

An interconnect process always involves an originating and terminating network; a transit network is optional.

The cost added for handling an interconnect event is called the *interconnect charge*. An interconnect charge is calculated according to a service agreement between interconnect partners.

For information about processing settlements for rated interconnect events, see "About Managing Settlement for Interconnect Charges".

## About Setting Up Interconnect Rating

To set up interconnect rating, do the following:

1. Use Pricing Center or Pipeline Configuration Center (PCC) to create network operators, network models, and interconnect charge offers. When you set up interconnect rating, you also define the following:
   - The calculation mode to define which EDR data to rate for the network model, for example, inroute, outroute, or transit data.
   - Network elements to find the zone for interconnect calls.
     - Map points of interconnection (POIs) to area codes or logical point codes.
     - Assign switches to network operators.
     - Assign trunks to network operators.
2. Configure the FCT_CarrierICRating module. See "About FCT_CarrierICRating Module".
3. Configure the DAT_InterConnect module. See "About the DAT_InterConnect Module".

4. Define aggregation scenarios. See "About Aggregation Scenarios for Roaming".
5. Define network operator bill cycles. See "About Network Operator Bill Cycles".

## About FCT_CarrierICRating Module

The FCT_CarrierIcRating module uses the interconnect charge offers to identify the network operator and which charge to use.

The FCT_CarrierIcRating module creates associated charge breakdown records and charge packets that contain data used for rating roaming events, for example, the network operator and event timestamp. This data is used by the FCT_PreRating and FCT_MainRating modules to determine the impact category and calculate the charges for the event. The roaming data is used for both incollect and outcollect processing.

FCT_CarrierIcRating creates ratable charge packets for each valid roaming charge (IFW_ICPRODUCT_RATE) entry for the IC charge offer.

When you configure the FCT_CarrierIcRating module:

- Use the **EdrNetworkModel** entry to specify the network model, which identifies the home network to use for the pipeline.
- Use the **IcProductGroup** entry to specify the network model, which identifies the home network to use for the pipeline.

## About the DAT_InterConnect Module

To provide roaming configuration data to pipeline function modules, you must configure the DAT_Interconnect module. This module caches interconnect and roaming related configuration data. This information is used by FCT_CarrierIcRating module.

You can use the **Reload** semaphore to reload interconnect data.

## About Aggregation Scenarios for Roaming

You use aggregation scenarios to do the following:

- Aggregate charges for outcollect rating to send to network operators.
- Aggregate charges for incollect processing to compare with the charges in the invoice sent to you from network operators.

Pipeline Manager aggregates settlement information for each network operator and stores it in the Pipeline Manager database. You can use this settlement information to bill your interconnect partners or verify interconnect charges.

To compare aggregated charges to those from network operators, you extract the aggregated settlement data from the Pipeline Manager database. This gives you a text file containing charge information. To bill network operators for interconnect charges, you load the extracted aggregation data into the BRM database and run billing. For more information, see "About Processing Outcollect Settlement Data".

You can also set up your own aggregation scenarios.

## About Network Operator Bill Cycles

> **Note:**
>
> You only define network operator bill cycles when you use the **settlement_extract** utility to load aggregated settlement data into the BRM database.

You define bill cycles in Pricing Center or Pipeline Configuration Center (PCC) for your interconnect partners. A bill cycle is defined as a billrun. Billruns are used to determine whether you have billed the network operator for roaming usage during a specified period.

When you define billruns, you enter the bill cycle period, and the begin and end dates of the bill cycle. All events generated within this period apply to the specified billrun.

### Closing a Billrun

Prior to extracting aggregated roaming settlement data from the Pipeline Manager database, you must close the bill cycle for the network operator. This ensures that only unbilled events are extracted for loading into the BRM database.

# About Setting Up Network Operator Accounts

To set up network operator accounts, you use Pricing Center or Pipeline Configuration Center (PCC) to configure the following elements in the Pipeline Manager database:

- About Network Operators
- About Network Models
- About Interconnect Charge Offers
- About Interconnect Charge Offer Groups
- About Linking Charges to Network Operators and IC Charge Offers

## About Network Operators

Use Pricing Center or Pipeline Configuration Center (PCC) to create a network operator account in the Pipeline Manager database for every roaming partner.

> **Note:**
>
> When creating network operator accounts for roaming, the roaming partner account for that network operator must be created in the BRM database before creating a network operator account.

When you set up network operators, you include the following data:

- Network operator name.
- Network operator type, for example, interconnect partner or service provider partner. (This information is for your reference, not for processing.)
- How to identify the network operator; for example, by the carrier access code or by the PLMN ID.
- Whether to apply taxes for roaming charges.
- (Roaming) The network operator's roaming partner account in the BRM database.
- (Roaming) Fraud or high-usage limits.

## About Network Models

A network model identifies your roaming agreements and is associated with your home network. Each network operator representing a roaming partner is linked to the network model.

When you set up a roaming network model, you include the following data:

- Model type. For roaming, this is always **Reseller Roaming**.
- The network operator that represents your network.
- Your home currency.

## About Interconnect Charge Offers

An IC charge offer specifies the network data that identifies a network operator and type of service. You create one or more IC charge offers for each network operator and link them to charges. You create IC charge offers to select the charge to use for the network operator's services. For example, to use a charge that includes mailbox inquiries, you include a mailbox inquiry usage class in the IC charge offer configuration. You identify the network operator by specifying the source and destination of the call.

You configure IC charge offers in the IC charge offer group in Pricing Center or Pipeline Configuration Center (PCC). When you configure an IC charge offer, you specify the following information:

- Validity dates
- To identify the network operator:
  - Source and destination area codes
  - Source and destination networks
  - Transit area code
- To identify the type of service:
  - Record type
  - Service code, service class, and usage class

Roaming events with data that matches an interconnect charge offer belong to the associated network operator and are rated by using the associated charge. See "About Linking Charges to Network Operators and IC Charge Offers".

## About Interconnect Charge Offer Groups

An interconnect charge offer group is a collection of interconnect charge offer configurations. You create an interconnect charge offer group to define the set of interconnect charge offers available to each network model. You can create multiple interconnect charge offer groups, but you use only one interconnect charge offer group in a pipeline.

When you create interconnect charge offer groups, you specify the following:

- The network model that uses the interconnect charge offer group.
- The ranking of interconnect charge offers in the interconnect charge offer group. The first configuration that matches an event attribute will be used for rating.

An interconnect charge offer can be in several interconnect charge offer groups.

## About Linking Charges to Network Operators and IC Charge Offers

To rate a call and perform settlements, you must link the call attributes defined by the interconnect charge offer to a network operator and charge. You can link each interconnect charge offer to multiple network operators and charges. This allows you to:

- Use a different charge for the same network operator. For example, you might use different charges for different types of services such as telephony and SMS, or for different types of usage such as mailbox inquiries and friends-and-family calls.
- Use the same charge for different network operators. For example, you might have roaming agreements with two network operators that provide the same services.

To link the call attributes defined by the interconnect charge offer to a network operator and charge:

1. Use Pricing Center or Pipeline Configuration Center (PCC) to link network operators to IC charge offers and charges by configuring the following:
   - Validity dates.
   - The network model.
   - The charge.
   - The IC charge offer.
   - Zone direction. For roaming, this is always **Standard Zoning (A#->B#)**.
2. Configure the FCT_CarrierIcRating module. See "About FCT_CarrierICRating Module".

# About Managing Settlement for Interconnect Charges

To manage settlement for interconnect charges, you do the following:

- For outcollect processing, you process settlement data for visiting customers. You send this data to your roaming partners. To process this data, you do the following:
  - Set up accounts for roaming partners in BRM. See "About Creating Accounts for Interconnect Partners".

  - Extract settlement data from the Pipeline Manager database.
  - Load settlement data into the BRM database. You can then create an invoice to send to your roaming partners.
- For incollect processing, you process settlement data from your roaming partners. This data is from calls made by your customers on other networks.
  - Validate the interconnect charges you receive from your roaming partners.

# About Creating Accounts for Interconnect Partners

You create BRM accounts for each network operator by using Billing Care. For each network operator, create one parent account with a paying bill unit and two child accounts with nonpaying bill units.

Network operator accounts store the following information:

- The parent account is responsible for the accounts receivable.
- One child account is responsible for incoming roaming charges.

  *Incoming roaming charges* are fees that you owe your roaming partner for calls made by your subscribers. These fees are aggregated into a single amount. Incoming charges are represented as accounts receivable in the parent account.
- The second child account is responsible for outgoing roaming charges.

  *Outgoing roaming charges* are fees that your roaming partner owes you for calls made by their subscribers. These fees are aggregated into a single amount. Outgoing charges are represented as bill items in the parent account.

## How Settlements Are Applied to Account Balances

When you rate usage by a visiting customer, you bill the visiting customer's network operator for that usage. Pipeline Manager aggregates charges for each network operator on a daily basis. When you load the aggregated settlement information and bill the accounts, the amount due is the difference between what you owe your partners and what they owe you. Amounts owed to you are included in the bill. The net roaming charges are stored in the balance impact of your roaming partner's parent account.

# About Processing Outcollect Settlement Data

When Pipeline Manager rates roaming calls, it stores the settlement information, such as what is owed by each participating network provider, in the Pipeline Manager database. You extract the settlement information from the pipeline database and load it into the BRM database. After the settlement information is loaded, you can bill your network partners for the settlement amounts.

Before you can extract settlement information from the pipeline database and load it into the BRM database, you must complete the following tasks:

1. Install the roaming settlements package. This package includes the utility and template files you use to extract and load settlement data.
2. Import the Universal Event Mapper settlement template by running the **pin_uei_deploy** utility. See "Importing the UE Mapper Settlement Template".

3. Configure Universal Event (UE) Loader to load the settlement file. See "Configuring UE Loader to Load the Settlement Data File".

To get the settlement data from the Pipeline Manager database to the BRM database, you use the following:

- The **settlement_extract.pl** utility to extract the data from the Pipeline Manager database into a data file. See "Extracting Settlement Information from the Pipeline Manager Database".
- Universal Event (UE) Loader to load the settlement data file into the BRM database. UE Loader uses the Universal Event Mapper settlement template (**SettlementTemplate.xml**) that specifies the settlement data file format. See "Loading Settlement Data into the BRM Database".

The ASCII file created by the **settlement_extract** utility contains the settlement fees. There is one record for fees owed to each network. For example, if you have settlements between networks B and C, the file contains the following:

- How much you owe B
- How much B owes you
- How much you owe C
- How much C owes you

Settlement amounts can be in different currencies. You define the currencies when you set up roaming in Pipeline Manager.

# Importing the UE Mapper Settlement Template

The UE Mapper settlement template specifies the format of the file containing settlement information.

When you install Roaming Settlement Package, you install the **SettlementTemplate.xml** template in the *BRM_home***/apps/uel** directory. You must import the template into the BRM database by running the **pin_uei_deploy** utility.

> **Note:**
>
> To connect to the BRM database, the **pin_uei_deploy** utility needs a configuration (**pin.conf**) file in the directory from which you run the utility.

To import the **SettlementTemplate.xml** template:

1. If you have not already done so, download and install Roaming Settlement package.
2. Run the **pin_uei_deploy** utility:

   ```
   pin_uei_deploy -c -t template_name -i SettlementTemplate.xml
   ```

   where *template_name* is the name you want to give to the template in BRM.

# Configuring UE Loader to Load the Settlement Data File

After you extract settlement data by using the **settlement_extract.pl** utility, you load the data by using UE Loader. You must first configure UE Loader to load the settlement file.

> **Note:**
>
> Before following this procedure, you should be familiar with UE Loader.

1. Open the *BRM_home***/apps/uel/Infranet.properties** file in a text editor.
2. If necessary, edit the **infranet.connection** entry to point to the correct database. For example:

   ```
   infranet.connection=pcp://root.0.0.0.1:password@localhost:37180/service/
   pcm_client
   ```

3. Specify the following date/time format for the settlement file in the **infranet.uel.date_pattern** entry:

   ```
   infranet.uel.date_pattern=yyyy-MM-dd
   ```

4. Specify the location of the settlement data file in the **infranet.uel.event_log_file_location** entry.

   > **Note:**
   >
   > The default location is the **C:/Portal/apps/uel** directory. Modify this entry to specify the correct location, or move the settlement data file to this directory when you run UE Loader.

# Configuring UE Loader to Run Automatically (Optional)

If you load settlement data on a regular basis, you can schedule UE Loader to load the settlement file automatically. To do this, you use the Batch Controller and sample batch handler.

To configure automatic loading:

1. Create a UE Loader batch handler to load the settlement data file by using the sample batch handler.

   You specify the UE Mapper settlement template in the **$TEMPLATE** entry of the batch handler **.values** file (*BRM_home***/apps/sample_handler/samplehandler_config.values**, unless you renamed the file). For example:

   ```
   $TEMPLATE = "Template_name";
   ```

2. Configure the Batch Controller to start the UE Loader batch handler.

# Extracting Settlement Information from the Pipeline Manager Database

You extract settlement information from the Pipeline Manager database by using the settlement extraction utility (*BRM_home*/**apps/uel/settlement_extract.pl**). This utility creates a data file containing settlement amounts and other activity information.

> **Note:**
>
> To ensure that only unbilled events are extracted, before extracting the settlement data, you must close the billrun for each roaming partner account. You close the billrun by using Pricing Center or Pipeline Configuration Center (PCC).

When the **settlement_extract.pl** utility extracts settlement data, it marks the data in the database as exported so the next time you run the utility, you export only new data. For this reason, you cannot use this utility to extract the same settlement information twice. However, if you make adjustments to the aggregated settlement amounts by using Pricing Center or Pipeline Configuration Center (PCC), you can extract the adjusted settlement data. For more information, see "About Adjusting Aggregated Settlement Amounts".

> **Note:**
>
> (**HP-UX only**) Before running this utility, you must load the **libjava.sl** (HP-UX PA-RISC) or **libjava.so** (HP-UX IA64) library. One way of doing this is to set the LD_PRELOAD environment variable to point to the library file.

For example (using the HP-UX PA-RISC library file):

```
# sateens LD_PRELOAD /u01/ape/oracle/product/817/JRE/lib/PA_RISC/native_threads/libjava.sl
```

> **Note:**
>
> To connect to the BRM database, the **settlement_extract** utility needs a configuration file in the directory from which you run the utility.

To extract settlement information:

1. Close the billrun for each roaming partner account.
2. Use the following command to run the **settlement_extract.pl** utility:

   **`settlement_extract.pl`** [**`-u`**] *`dbsn username password`* [*`filepath`*]

   where *dbsn* is the Perl database source name.

For example:

```
settlement_extract.pl -u dbi:Oracle:orcl scott tiger /usr/home/files
```

## Loading Settlement Data into the BRM Database

To load the data in the settlement file, you run UE Loader.

There are two ways to run UE Loader:

- To run UE Loader manually, use the following command:

  ```
  uel -t template_name    settlement_file_name
  ```

  where:

  – *template_name* is the name you gave the template when you imported it into the BRM database. (See "Importing the UE Mapper Settlement Template".)

  – *settlement_file_name* is the name of the extracted settlement data file.

  > **Note:**
  >
  > Do not include the path in the command line. You specify the path to the settlement file in the UE Loader properties file. See "Configuring UE Loader to Load the Settlement Data File".

- To run UE Loader automatically, create a UE Loader batch handler and configure the Batch Controller. See " Configuring UE Loader to Run Automatically (Optional)".

# About Adjusting Aggregated Settlement Amounts

Pipeline Manager stores aggregated settlement data in the IC_DAILY database table. If any aggregated settlement amounts are in error, you can use Pricing Center or Pipeline Configuration Center (PCC) to adjust the aggregated amounts in the Pipeline Manager database and then load them into the BRM database.

To make adjustments, you search for the aggregated settlements you want to modify by searching for associated data such as network operators, IC charge offers, and dates the events were aggregated. You then make changes and update the database.

# About Generating SMS Usage Reports

You can collect aggregated information about SMS messages exchanged between your subscribers' home networks and other networks for generating settlement reports. The FCT_AggreGate module includes a scenario defined to aggregate the number of SMS messages based on the following attributes:

- Origination Carrier ID
- Destination Carrier ID
- Record type
- Date of the message

The FCT_AggreGate module extracts the SMS usage information from the input call details record (CDR) files and creates aggregated data files.

You use the Universal Event (UE) Loader to load the aggregate SMS information into the BRM database. UE Loader parses the FCT_AggreGate output files that contain the SMS message information and calls the PCM_OP_IC_LOAD_SMS_REPORT opcode to create or update the /sms_settle_report object in the BRM database. See "Loading SMS Data into the BRM Database".

You can run a report to generate SMS bulk reports from the data in the /sms_settle_report object.

## Generating an SMS Usage Report

To generate an SMS usage report, perform these tasks:

1. Make sure you have installed and configured Pipeline Manager.
2. Install the roaming settlements package.
3. Install the BRM reports SMS Settlement Reports package.
4. Create the aggregation scenario in the database.

   See "Creating the Aggregation Scenario in the Database".
5. Configure the FCT_AggreGate registry file to specify the SMS Message scenario, **SMS_SCE_01**.

   See "Configuring the FCT_AggreGate Module to Collect SMS Usage Information".
6. Load the SMS interworking message information for settlement reports into the BRM database.

   See "Loading the SMS Message Data into the Database".
7. Run reports to generate the SMS bulk reports.

   See "Generating SMS Bulk Reports".

## Creating the Aggregation Scenario in the Database

This section describes how to create aggregation scenarios in Oracle database.

To create the aggregation scenario in an Oracle database, run the **SMS_Interworking_Scenario.sql** script from the *Pipeline_home***/database/Oracle/Scripts** directory.

This SQL script creates the SMS_SCE_01 scenario in the database that the FCT_AggreGate module uses to collect SMS usage information.

## Configuring the FCT_AggreGate Module to Collect SMS Usage Information

Add an entry for the SMS settlement report scenario in the registry file.

For example:

```
Aggregate
{
   ModuleName = FCT_AggreGate
   Module
 {
```

```
   Active = TRUE
   ScenarioReaderDataModule = ifw.DataPool.ScenarioReader
   Scenarios
  {
   SMS_SCE_01
   {
   TableName = TAB_SMS_RPT
   Threshold = 100000
   TempDir = sms_result/temp
   DoneDir = sms_result/done
   CtlDir = sms_result/ctl
   FieldDelimiter = ,
   FlushMode = 0
   }
  }
ResultFile
 {
   TempSuffix = .tmp
   DoneSuffix = .dat
   WriteEmptyFile = FALSE
 }
  ControlFile
 {
  Suffix = .ctl
  DataFilePath = TRUE
 }
}
}
```

## Loading the SMS Message Data into the Database

When you install the roaming settlements package, you install the SMS settlement report template file (**SMSSettlementRptTemplate.xml**) in the *BRM_home*/**apps/uel** directory. This template is used by UE Loader to parse aggregated SMS settlement data when it loads the data into the BRM database.

1. Import the **SMSSettlementRptTemplate.xml** template by running the **pin_uei_deploy** utility:

   ```
   pin_uei_deploy -c -t template_name -i SMSSettlementRptTemplate.xml
   ```

   where *template_name* is the name you want to give the template.

2. Configure Universal Event (UE) Loader to load the SMS settlement data by modifying the *BRM_home*/**apps/uel/Infranet.properties** file.

3. To load the file manually, run UE Loader by using this command:

   ```
   uel -t template_name log_file_name
   ```

   For example:

   ```
   uel -t SMSSettlementRpt SMSSettlementRpt.dat
   ```

> **Note:**
>
> The **SMSSettlementRpt.dat** file contains the aggregated SMS settlement data output by the FCT_AggreGate module. UE Loader uses the **.dat** files to load the data into the BRM database.

4. To run UE Loader automatically, create a UE Loader batch handler and configure the Batch Controller.

## Generating SMS Bulk Reports

An SMS bulk report is a summary report of the aggregated information collected for SMS messages exchanged between the home network and other networks.

To generate an SMS bulk report, you run the BRM reports SMS Internetworking Bulk Data Report. You must have installed BRM reports and the SMS Settlement Reports package. This package includes the SMS Internetworking Bulk Data Report template, **SMSinterworkingbulk.rpt**.

# Opcodes Used for Managing Settlement Data

For more information about settlement, see "About Managing Settlement for Interconnect Charges".

Use the following IC Daily standard opcodes to manage settlement data:

- To load settlement data into the BRM database, use PCM_OP_IC_DAILY_LOADER. See "Loading Settlement Data into the BRM Database".
- To load aggregated SMS data into the BRM database, use PCM_OP_IC_LOAD_SMS_REPORT. See "Loading SMS Data into the BRM Database".

## Loading Settlement Data into the BRM Database

Use PCM_OP_IC_DAILY_LOADER to load settlement data files into the BRM database. Settlement data files are generated by the **settlement_extract** utility and specify the amount you owe to each network partner. See "About Processing Outcollect Settlement Data".

Universal Event (UE) Loader calls this opcode when loading settlement data into the BRM database.

> **Note:**
>
> You configure UE Loader to call this opcode by using the Universal Event Mapper. See "Importing the UE Mapper Settlement Template".

PCM_OP_IC_DAILY_LOADER performs the following tasks:

1. Prepares the data from the settlement data file.
2. Records the event and updates the network provider's account balance in the BRM database.
3. Creates an /event/activity/settlement object to record details about the roaming event.

> **Note:**
>
> Each event contains information for one network partner.

4. Returns the POID of the **/event/activity/settlement** object.

## Loading SMS Data into the BRM Database

Use PCM_OP_IC_LOAD_SMS_REPORT to validate SMS aggregation data and create or update the /sms_settle_report object. See "About Generating SMS Usage Reports".

Universal Event (UE) Loader calls this opcode when loading aggregated SMS data into the BRM database.

> **Note:**
>
> You configure UE Loader to call this opcode by using the Universal Event Mapper. See "Loading the SMS Message Data into the Database"

PCM_OP_IC_LOAD_SMS_REPORT performs the following tasks:

1. Determines whether the **/sms_settle_report** object already exists in the BRM database.
   - If it finds the report object, it updates the object with the value for SMS_TOTAL from the input flist.
   - If it does not find the object, it creates the **/sms_settle_report** object.
2. Returns the POID of **/sms_settle_report** object.

12

# Detecting Roaming Fraud Using NRTRDE

This chapter provides an overview of the roaming incollect and outcollect processes for generating and processing roaming usage data for NRTRDE (Near Real-Time Roaming Data Exchange)

## About Roaming Usage Data for NTRTRDE

In NRTRDE, roaming usage data records are transferred in TD35 file format. A TD35 record is structurally similar to a TAP (Transfer Account Procedure) record and contains basic call details (without the charging information), to allow HPMN (Home Public Mobile Network) operators to quickly analyze the usage data. The actual charge information is still exchanged using TAP records.

Generally, the Visited Public Mobile Network (VPMN) operator generates the TD35 files and sends them to the HPMN operator. The HPMN operator processes the TD35 files and analyzes the roaming usage data to determine any fraudulent activity.

### About Handling Roaming Usage Data for NRTRDE

Roaming partners exchange roaming usage data in near real time by sending the data in TD35 file format. Pipeline Manager handles TD35 files as follows:

- TD35 files are created during roaming outcollect processing by the outcollect rating pipeline. See "About Generating Roaming Usage Data for NRTRDE" for more information.
- TD35 files are processed during roaming incollect processing by the NRTRDE processing pipeline. See "About Processing Roaming Usage Data for NRTRDE" for more information.

### About Generating Roaming Usage Data for NRTRDE

**Figure 12-1 Generating Roaming Usage Data (Outcollect Processing)**

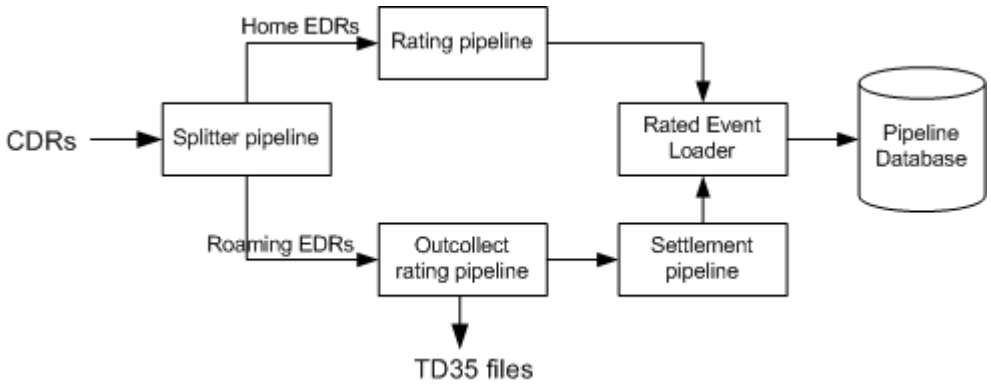


Figure 12-1 shows a high-level overview of how roaming usage data is generated for NRTRDE during roaming outcollect processing:

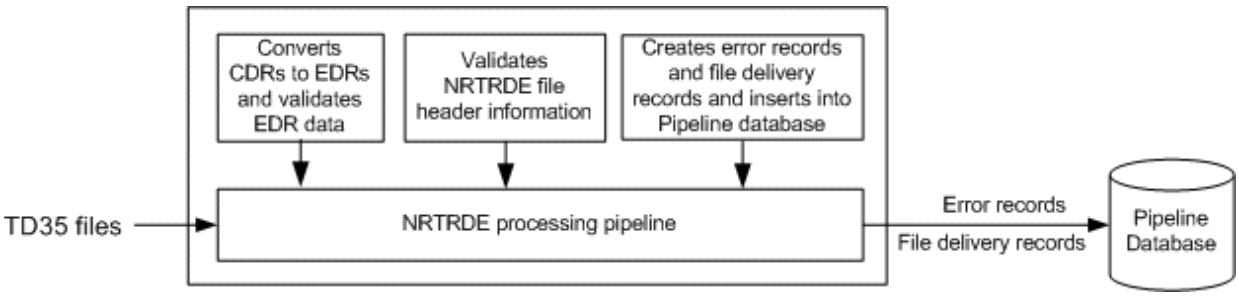
1. CDRs arrive at the splitter pipeline.
2. The outcollect splitter pipeline converts incoming call data records (CDRs) into event data record (EDR) format and separates the EDRs into home subscribers' EDRs and visiting subscribers' roaming EDRs.
3. Home subscribers' EDRs are sent to the normal rating pipeline to be rated and to the Rated Event Loader.

   Visiting subscribers' roaming EDRs are sent to the outcollect rating pipeline to be rated. The outcollect rating pipeline rates the visiting subscribers' roaming EDRs and generates TAP files and TD35 files for each roaming partner. A copy of the visiting subscribers' roaming EDRs is sent to the outcollect settlement pipeline from where they are sent to the rated event loader.
4. The rated event loader send the data to be recorded in the BRM database.

See "About Processing Visiting Subscribers' Roaming Usage" and "Setting Up Pipeline Manager for NRTRDE" for more information.

## About Processing Roaming Usage Data for NRTRDE

**Figure 12-2 Generating Roaming Usage Data (Incollect Processing)**




The following is a high-level overview of how roaming usage data is processed for NRTRDE during roaming incollect processing (shown in Figure 12-2):

1. Incoming TD35 files are sent to the NRTRDE processing pipeline.
2. The input module uses NRTRDE input grammar to convert the TD35 records into EDR format and performs file and record validations based on the TD35 specifications.
3. For each TD35 record that fails validation, an NRTRDE error record is created in the Pipeline Manager database. Information stored in the error records is used in generating NRTRDE Error reports. See "About NRTRDE Reports".
4. For each TD35 file processed, a file processing record is created in the Pipeline Manager database. Information stored in the file processing records is used in generating NRTRDE File Delivery reports. See "About NRTRDE Reports".

## About NRTRDE Reports

During roaming incollect processing, the NRTRDE processing pipeline creates NRTRDE error records and NRTRDE file processing records in the Pipeline Manager

database. The information stored in these records is used to generate NRTRDE reports. See "Creating NRTRDE Reports" for more information.

# Setting Up Pipeline Manager for NRTRDE

> **Note:**
>
> You must have Roaming Manager installed and configured before you configure Pipeline Manager for NRTRDE. See "Setting Up Roaming for TAP" for more information.

Roaming usage data is transferred in TD35 file format between network operators for NRTRDE. To set up Pipeline Manager for NRTRDE, do the following:

1. Create NRTRDE tables in the BRM database. See "Creating NRTRDE Tables in the BRM Database" for more information.
2. Set up Pipeline Manager for generating roaming usage data. See "Setting Up Pipeline Manager for Generating Roaming Usage Data for NRTRDE" for more information.
3. Set up Pipeline Manager for processing roaming usage data. See "Setting Up Pipeline Manager for Processing Roaming Usage Data for NRTRDE" for more information.

## Creating NRTRDE Tables in the BRM Database

NRTRDE File Delivery and NRTRDE Error reports use the following tables located in the BRM database:

- NRTRDE_FILES
- NRTRDE_ERRORS
- NRTRDE_SEQUENCES

Create these tables in your BRM database by manually running each of the SQL commands in the **NRTRDE_Tables.sql** script. This script is located in the *Pipeline_ home***/database/Oracle/Scripts** directory, where *Pipeline_ home* is the directory where the Pipeline Manager is installed.

## Setting Up Pipeline Manager for Generating Roaming Usage Data for NRTRDE

> **Note:**
>
> Before you set up Pipeline Manager for generating roaming usage date for NRTRDE, you must set up Pipeline Manager for roaming outcollect processing. See the discussion of setting up Pipeline Manager for TAP Outcollect processing in the BRM documentation.

TD35 files are generated during roaming outcollect processing by the outcollect rating pipeline. To configure roaming outcollect processing for TD35 file generation, do the following:

1. Limit the number of records in a TD35 file. See "Limiting the Number of Records by Configuring a Batch Controller" for more information.
2. Configure a sequence generation for NRTRDE files. See "Configuring a Sequence Generation for NRTRDE Files" for more information.
3. Include descriptions for NRTRDE stream format. See "Including NRTRDE Stream Format Descriptions" for more information.
4. Provide the required EDRs to roaming partner NRTRDE output streams. See "Providing Required EDRs to Roaming Partner NRTRDE Output Streams" for more information.
5. Configure an NRTRDE output stream for each roaming partner in the outcollect rating pipeline. See "Configuring NRTRDE Output Stream for Roaming Partners" for more information.

## Limiting the Number of Records by Configuring a Batch Controller

One of the requirements for NRTRDE is to limit the number of records in a TD35 file to a maximum of 1000 records.

When you have files with a large number of records, use the **SplitSol42.sh** script to split the files into multiple files and limit the number of records to a maximum of 1000 per TD35 file. You must run **SplitSol42.sh** on the output files generated by the outcollect splitter pipeline.

Configure a batch controller to invoke the **SplitSol42.sh** script as in the following example:

```
SplitSol42.sh source_directory target_directory
```

where

- *source_directory* is the source directory.
- *target_directory* is the input directory of the outcollect rating pipeline.

**SplitSol42.sh** splits the files in *source_directory* and puts the new files in *target_directory*. If a source file contains less than 1000 records, **SplitSol42.sh** moves the file to the *target_directory*.

## Configuring a Sequence Generation for NRTRDE Files

Configure sequence generation for NRTRDE files as follows:

1. Using Pricing Center or Pipeline Configuration Center (PCC), define a sequence generator for each roaming partner by entering a name and a unique sequence key.
2. Configure each sequencer by editing the **SequencerPool** registry entries of the roaming registry (*Pipeline_home***/conf/roaming.reg**), where *Pipeline_home* is the directory where Pipeline Manager is installed.
   a. Set the **SequencerInstance** name to the name of the sequence generator defined in the (step 1).

b. Set the **SequencerType** registry entry to **Generation**.

The following sample configuration shows two sequence generators for HPMN operators *hpmn01* and *hpmn02*.

```
SequencerPool
   {
      SEQ_GEN_NRTRDEOUT_hpmn01
      {
         Source = Database
         Controller
         {
            SequencerType = Generation
            ReuseGap = True
            SequenceLength = 7
            DatabaseConnection = ifw.DataPool.Login
         }
      }
      SEQ_GEN_NRTRDEOUT_hpmn02
      {
         Source = Database
         Controller
         {
            SequencerType = Generation
            ReuseGap = True
            SequenceLength = 7
            DatabaseConnection = ifw.DataPool.Login
         }
      }
}
```

## Including NRTRDE Stream Format Descriptions

Edit the outcollect rating pipeline **DataDescription** registry entries to include the NRTRDE stream format description as follows:

```
DataDescription
{
   StreamFormats
   {
      SOL42 = ./formatDesc/Formats/Solution42/
SOL42_V670_REL_FORINPUT.dsc
      TAP3 = ./formatDesc/Formats/TAP3/TAP3_v12_Blocks.dsc
      NRTRDE2 = ./formatDesc/Formats/TAP3/NRTRDE2_v01_Blocks.dsc
      SUSPENSE_CREATE_OUTPUT  = ./formatDesc/Formats/SuspenseHandling/
SuspendedUsageCreation.dsc
      SUSPENSE_UPDATE_OUTPUT  = ./formatDesc/Formats/SuspenseHandling/
SuspendedUsageUpdate.dsc
}
   InputMapping
   {
      SOL42 = ./formatDesc/Formats/Solution42/SOL42_V670_REL_InMap.dsc
   }
   OutputMapping
   {
      SUSPENSE_CREATE_OUTPUT  = ./formatDesc/Formats/SuspenseHandling/
SuspendedUsageCreationMapping.dsc
      SUSPENSE_UPDATE_OUTPUT  = ./formatDesc/Formats/SuspenseHandling/
```

```
SuspendedUsageUpdateMapping.dsc
   }
}
```

## Providing Required EDRs to Roaming Partner NRTRDE Output Streams

The ISC_NRTRDE_EventSplit iScript is provided for use by roaming outcollect processing to duplicate and route EDRs to the corresponding roaming partner NRTRDE output streams based on the SOURCE_NETWORK EDR field.

Configure ISC_NRTRDE_EventSplit in the outcollect rating pipeline. For example,

```
NRTRDE_EventSplit
     {
     FileName = ./iScriptLib/iScriptLib_Roaming/ISC_NRTRDE_EventSplit.isc
 NRTRDE_STREAM_PATTERN = NRTRDEOutput
     }
```

## Configuring NRTRDE Output Stream for Roaming Partners

Configure an NRTRDE output stream for each roaming partner in the outcollect rating pipeline. For *each* roaming partner, configure the **OUT_GenericStream** module registry entries as follows:

1. Set the Grammar registry entry to the NRTRDE output grammar description file.

   ```
   Grammar = ./formatDesc/Formats/TAP3/NRTRDE2_v01__OutGrammar.dsc
   ```

2. Set the Sequencer registry entry to the name of the sequence generator for generating the sequence number for this roaming partner. See "Configuring a Sequence Generation for NRTRDE Files", described earlier.
3. Set the **Sender** registry entry to the VPMN ID sending the TD35 file.
4. Configure the **EXT_OutFileManager** registry entries to specify the output file information.

   The following example shows output stream configurations for HPMN operators *hpmn01* and *hpmn02*:

   ```
   hpmn01NrtrdeOutput
   {
   ModuleName  = OUT_GenericStream
   ...
   Module
   {
      Grammar = ./formatDesc/Formats/TAP3/NRTRDE2_v01_OutGrammar.dsc
      DeleteEmptyStream = False
      Sequencer = SEQ_GEN_NRTRDEOUT_hpmn01
      Sender = PORTL
      Recipient = hpmn01
      OutputStream
      {
         ModuleName = EXT_OutFileManager
         Module
         {
            OutputPath            = ./data/outcollect/nrtrdeout/hpmn01
   ```

```
            OutputPrefix          = NRPORTLhpmn01
            TempPrefix            = tmptest_hpmn01_
            TempDataPath          = ./data/outcollect/nrtrdeout/hpmn01
            TempDataPrefix        = test.hpmn01.tmp.
            TempDataSuffix        = .data
            UseInputStreamName    = [0,0]
            SequencerPrefix       = ""
            AppendSequenceNumber  = True
         }
      }
   }
   }
   hpmn02NrtrdeOutput
   {
   ModuleName  = OUT_GenericStream
   ...
   Module
   {
      Grammar = ./formatDesc/Formats/TAP3/NRTRDE2_v01_OutGrammar.dsc
      DeleteEmptyStream = False
      Sequencer = SEQ_GEN_NRTRDEOUT_hpmn02
      Sender = PORTL
      Recipient = hpmn02
      OutputStream
      {
         ModuleName = EXT_OutFileManager
         Module
         {
            OutputPath            = ./data/outcollect/nrtrdeout/hpmn02
            OutputPrefix          = NRPORTLhpmn02
            TempPrefix            = tmptest_hpmn02_
            TempDataPath          = ./data/outcollect/nrtrdeout/hpmn02
            TempDataPrefix        = test.hpmn02.tmp.
            TempDataSuffix        = .data
            UseInputStreamName    = [0,0]
            SequencerPrefix       = ""
            AppendSequenceNumber  = True
         }
      }
   }
   }
```

# Setting Up Pipeline Manager for Processing Roaming Usage Data for NRTRDE

TD35 files are processed during roaming incollect processing by the NRTRDE processing pipeline.

To configure the NRTRDE processing pipeline, do the following:

> **Note:**
>
> For an example of NRTRDE processing pipeline configuration, see *Pipeline_home*/**conf/roaming.reg**, where is *Pipeline_home* the directory where Pipeline Manager is installed.

1. Configure the NRTRDE processing pipeline **DataDescription** registry entries by setting the stream format as shown in this code sample:

```
DataDescription
{
   StreamFormats
   {
      NRTRDE2  = ./formatDesc/Formats/TAP3/NRTRDE2_v01_Blocks.dsc
   }
   InputMapping
   {
   }
   OutputMapping
   {
   }
}
```

2. Configure the NRTRDE processing pipeline input processing as follows:

   a. Set the Grammar registry entry for the **INP_GenericStream** input module to the NRTRDE input grammar description file with the following command:

```
Grammar = ./formatDesc/Formats/TAP3/NRTRDE2_v01_InGrammar.dsc
```

   b. Configure the **EXT_InFileManager** registry entries to specify information about the NRTRDE input file.

      The following example shows input processing for the NRTRDE processing pipeline.

```
InputModule
{
   ModuleName = INP_GenericStream
   Module
   {
      DefaultOutput  = DevNull
      Grammar     = ./formatDesc/Formats/TAP3/
NRTRDE2_v01_InGrammar.dsc
      InputStream
      {
         ModuleName = EXT_InFileManager
         Module
         {
            InputPath   = ./data/incollect/nrtrdein/in
            InputPrefix = NR
            #InputPrefix = test_
            #InputSuffix = .edr
```

```
                DonePath    = ./data/incollect/nrtrdein/done
                DonePrefix  = test_NRTRDEInProcessingPipeline_
                DoneSuffix  = .done
                ErrorPath   = ./data/incollect/nrtrdein/error
                ErrorPrefix = test_NRTRDEInProcessingPipeline_
                ErrorSuffix = .err
                TempPrefix  = temp_NRTRDEInProcessingPipeline_
                Replace     = True
                InputDirEmptyTimeout = 10
            }
        }
    }
}
```

3. Configure the **ISC_NrtrdeHeaderValidation_v2_01** iScript.
4. Configure the **ISC_NRTRDE_ErrorReport** iScript.

# Creating NRTRDE Reports

Roaming NRTRDE reports include the following:

- NRTRDE Delivery Report
- NRTRDE Error Report

Use the NRTRDEReportGen64 utility to generate the "NRTRDE Delivery Report" and the "NRTRDE Error Report".

To run the NRTRDE reports, you use the NRTRDEReportGen64 utility. You can generate the reports for a specific VPMN operator or for all VPMNs. See NRTRDEReportGen64.

# iScripts

BRM provides the following iScripts for use with NRTRDE:

- ISC_NRTRDE_EventSplit. This iScript is used by roaming outcollect processing to duplicate and route EDRs to the corresponding roaming partner NRTRDE output streams based on the SOURCE_NETWORK EDR field.
- ISC_NrtrdeHeaderValidation_v2_0. This iScript is used during roaming incollect processing by the NRTRDE processing pipeline. ISC_NrtrdeHeaderValidation_v2_01 validates the information in the header record of the TD35 file based on the TD35 specifications.
- ISC_NRTRDE_ErrorReport. This iScript is used during roaming incollect processing by the NRTRDE processing pipeline. It collects the validation errors in the EDRs and creates error records in the Pipeline Manager database. ISC_NRTRDE_ErrorReport also collects NRTRDE file processing information and creates file processing records in the Pipeline Manager database. The information stored in the validation and file processing records in the database are used for generating NRTRDE reports.

# NRTRDE Delivery Report

The NRTRDE File Delivery report file lists all the TD35 files processed by the HPMN. You can generate the report for a specific VPMN operator or for all VPMNs.

Each NRTRDE File Delivery report includes a header record, one or more detail records, and a trailer record.

### Header Record

The header record includes the following data:

**ND**,*Version*,*HPMNId*,*VPMNId*,*SeqNo*,*CreationStartTime*,*PeriodStartTime*,*PeriodEndTime*

where:

- **ND**. NRTRDE File Delivery report identification.
- *Version*. Report version number.
- *HPMNId*. Home Public Mobile Network identifier.
- *VPMNId*. Visited Public Mobile Network identifier.
- *SeqNo*. Report file sequence number.
- *CreationStartTime*. Report creation date and time in the format *yyyymmddhhmmss*.
- *PeriodStartTime*. Report period start date and time in the format *yyyymmddhhmmss*.
- *PeriodEndTime*. Report period end date and time in the format *yyyymmddhhmmss*.

### Detail Record

The detail records include the following data:

*FileName*,*ReceivedTime*

where:

- *FileName*. Name of the TD35 file in the format

  **NR***xxxxxyyyyySeqNo:*

  where
  - **NR** identifies the file as containing NRTRDE information.
  - *xxxx* identifies the Sender TADIG Code in uppercase and five characters long.
  - *yyyy* identifies the Recipient TADIG Code in uppercase and five characters long.
  - *SeqNo* identifies the file sequence number.

- *ReceivedTime*. The time the TD35 file was received by HPMN, in the format *yyyymmddhhmmss*, (described earlier).

### Trailer Record

The trailer record includes the following data:

**END**,*NumberOfRecords*

where,

- **END**. End of file marker
- *NumberOfRecords*. Number of total records in the report including, header and trailer records.

### Delivery Report Example

The following example shows the output of a NRTRDE File Delivery report for HPMN XYZ99 and VPMN ABC01.

```
ND,1.0,XYZ99,ABC01,00001,20070215020000-0500,20070214000000-0500,2007021
4235959-0500
NRABC01XYZ990000001,20070214010000-0500
NRABC01XYZ990000002,20070214040000-0500
NRABC01XYZ990000003,20070214070000-0500
NRABC01XYZ990000004,20070214100000-0500
NRABC01XYZ990000005,20070214130000-0500
NRABC01XYZ990000006,20070214160000-0500
NRABC01XYZ990000007,20070214190000-0500
NRABC01XYZ990000008,20070214220000-0500
END,10
```

### NRTRDE File Delivery Report File

NRTRDEReportGen64 generates the NRTRDE File Delivery report and sends the output to a file with the following file name format:

**ND***xxxxxyyyyySeqNo:*

where

- **ND** identifies the file as containing NRTRDE File Delivery Report.
- *xxxx* identifies the Sender TADIG Code in uppercase and five characters long.
- *yyyy* identifies the Recipient TADIG Code in uppercase and five characters long.
- *SeqNo* identifies the report file sequence number.

# NRTRDE Error Report

The NRTRDE Error report lists the TD35 records that failed the NRTRDE incollect validation process. You can generate the report for a specific VPMN (Visited Public Mobile Network) operator or for all VPMNs. You send this report to the VPMN for corrections.

Each NRTRDE Error report includes a header record, one or more detail records, and a trailer record.

### Header Record

The header record includes the following data:

**NE**,*Version*,*HPMNId*,*VPMNId*,*SeqNo*,*CreationStartTime*,*PeriodStartTime*,*PeriodEndTime*

where:

- **NE**. NRTRDE Error report identification.
- *Version*. Report version number.
- *HPMNId*. Home Public Mobile Network identifier.
- *VPMNId*. Visited Public Mobile Network identifier.
- *SeqNo*. Report file sequence number.
- *CreationStartTime*. Report creation date and time in the format *yyyymmddhhmmss*.
- *PeriodStartTime*. Report period start date and time in the format *yyyymmddhhmmss*.
- *PeriodEndTime*. Report period end date and time in the format *yyyymmddhhmmss*.

### Detail Record

The detail records include the following data:

*FileName*,*RecordNo*,*RecordType*,*ErrorCode*

where:

- *FileName*. Name of the TD35 file, that contains the TD35 record that failed, in the format

  **NR***xxxxxyyyyySeqNo:*

  where
  - **NR** identifies the file as containing NRTRDE information.
  - *xxxx* identifies the Sender TADIG Code in uppercase and five characters long.
  - *yyyy* identifies the Recipient TADIG Code in uppercase and five characters long.
  - *SeqNo* identifies the file sequence number.
- *RecordNo*. TD35 record number.
- *RecordType*. The record type of *RecordNo*.
- *ErrorCode*. TD35 validation error code.

### Trailer Record

The trailer record includes the following data:

**END**,*NumberOfRecords*

where,

- **END**. End of file marker
- *NumberOfRecords*. Number of total records in the report including, header and trailer records.

### Error Report Example

The following example shows the output of a **NRTRDE Error** report for HPMN XYZ99 and VPMN ABC01.

```
NE,1.0,XYZ99,ABC01,00001,20070215020000-0500,20070214000000-0500,2007021
4235959-0500
NRABC01XYZ990000004,,,400
NRABC01XYZ990000005,123,MOC,315
NRABC01XYZ990000005,145,MOC,315
NRABC01XYZ990000005,167,MTC,315
NRABC01XYZ990000005,753,GPRS,304,307,308
NRABC01XYZ990000006,,,117
END,8
```

### NRTRDE Error Report File

**NRTRDEReportGen64** generates the NRTRDE Error report and sends the output to a file with the following file name format:

**NE***xxxxxyyyyySeqNo:*

where

- **NE** identifies the file as containing NRTRDE Error Report.
- *xxxx* identifies the Sender TADIG Code in uppercase and five characters long.
- *yyyy* identifies the Recipient TADIG Code in uppercase and five characters long.
- *SeqNo* identifies the report sequence number.

# NRTRDEReportGen64

Use the **NRTRDEReportGen64** utility to generate the "NRTRDE Delivery Report" and the "NRTRDE Error Report".

### Location

*Pipeline_home*/**bin**

### Syntax

```
NRTRDEReportGen64 database_access_library server_name user_name
password database_name hpmn [vpmn]
```

### Parameters

The parameters for this utility are:

- *database_access_library*. The database access library. For example, *liboci10g6312d.a* for Oracle on AIX.
- *server_name*. The database alias of the host machine running the Pipeline Manager database.
- *user_name*. The user name to log into the Pipeline Manager database.
- *password*. The password associated with *user_name*.
- *database_name*. The database ID of the Pipeline Manager database.
- *hpmn*. The Home Public Mobile Network ID.
- *vpmn*. The Visited Public Mobile Network ID. If this option is not specified, the utility generates reports for all VPMN operators.

### Results

The **NRTRDEReportGen64** utility generates the NRTRDE Error report and the NRTRDE File Delivery report with report period start as the previous report's report period end date and report period end as the current date.