

Oracle® Communications Diameter Signaling Router

Steering of Roaming User Guide



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What's New in This Guide

Release 9.0.0.0.0 - F79521-02 , July 2024

Added the [Upgrading SoR](#) section to describe the upgrading of SoR.

Release 9.0.0.0.0 - F79521-01, April 2023

No updates for the release.

1

Introduction

The Roaming Steering application allows home network operators to control and distribute registration traffic of their outbound roamers. To achieve this, the Roaming Steering application enables home network operators to define roaming steering policies for each group of roaming partners that are part of the same country. This functionality provides a roaming management solution to optimize roaming cooperation between operators, and it allows flexible network selection management for output roamers.

This document content provides information about the Roaming Steering application and functionality.

The Roaming Steering application menu options allow you to work with:

- Custom MEALS
- General Options
- Trial MPs Assignment
- Application Control
- System Options (SO Only)

Roaming Steering is a Diameter Custom Application (DCA) Framework application. Like other DCA Framework applications, you can use Roaming Steering to work with the DCA Framework functions. If Roaming Steering is visible in the DCA Framework GUI menu, the application is already activated and provisioned.

1.1 Overview of SoR Tasks

The document provides the following types of information about SoR tasks:

- SoR application logic
- Procedures to configure and manage SoR components, including Config_Params and SoR Profile tables
- Information about SoR components and GUI elements
- References to related documentation, including *DCA Programmer's Guide* and *DCA Feature Activation*

1.2 Intended Scope and Audience

This content is intended for personnel who perform SoR tasks, and it includes procedures for performing tasks using the product GUI.

This content does not describe how to install or replace software or hardware.

The SoR software application interacts with UDR. For this reason, this content includes references to the shared applications, and might describe GUI options that are not visible or applicable to SoR.

1.3 Manual Organization

This content is organized as follows:

- [Introduction](#) contains general information about the SoR application including overview and logic information, the organization of this content, and how to get technical assistance.
- [Understanding SoR Functionality and Logic](#) describes SoR logic.
- [Configuring SoR](#) provides information about customizing SoR resources.

2

Understanding SoR Functionality and Logic

This section describes Steering of Roaming (SoR) functionality and logic.

SoR is a business logic application that functions from within the DSR Custom Application (**DCA**) Framework. The DCA Framework application is a prerequisite for SoR.

The SoR application must be activated to access the SoR GUI menu and functionality.



Note:

DCA Framework is a set of APIs and services that are made available to DCA developers who need to develop applications.

The following documents contain information about DCA Framework applications and functionality:

- *DCA Feature Activation*
 - Activating and enabling DCA applications and framework
 - Deactivating DCA applications and framework
- *DCA Programmer's Guide*
 - Provisioning DCA
 - Developing stateful DCA applications
 - Monitoring DCA applications
 - Using DCA applications
 - Using Custom Meals
 - Using the DCA GUI
 - Understanding the development and environment
 - Using DCA APIs
 - Implementing DCA best practices

2.1 SoR Application Overview

The **SoR** application lets home network operators control and distribute registration traffic of their outbound roamers. Use SoR to define static distribution roaming steering policies for each group of roaming partners that are part of the same country.

SoR is deployed as a roaming management solution intended for optimizing roaming cooperation between operators. It allows flexible network selection management for outbound roamers to stimulate an appropriate roaming network choice for subscribers.

For each roaming partner providing service in a given country to the home network's outbound roamers, the home network can define the following:

- Static proportion of successful registrations
- Proportion of successful registrations in the network over a specified period of time
- Minimal allowable threshold for successful registrations over a specified period of time

SoR tracks the number of times a given subscriber was rejected in a certain (configurable) time window, and if the number of registration attempts exceeds a certain count (also configurable) within the time window, the Request is allowed for further processing by the DSR irrespective of the **VPLMN**. To assist with the allow and reject decisions, the SoR can rely on the configuration in addition to maintaining the number of rejections and the time window.

The SoR application is configured as the owner of a UDR database. To avoid overloading the SoR application, the Application Routing Table (**ART**) is configured in such a way so as to route only ULR messages to the SoR application that include an Origination-Realm that does not match the realm of the home MNO.

The SoR application can be enabled and disabled as a DCA Framework application. Disabling SoR on a specific site is possible only if SoR has been disabled on all the **DA**-MPs on that specific site. SoR can be completely configured at the NO.

DCA Framework allows for the creation of applications on top of the Diameter Signaling Router (DSR), allowing for a faster development cycle. There can be up to 10 versions of each Diameter Custom Application in the various states.

To use the SoR application for DCA, the DCA Framework must be activated on the NO. Activation needs to be performed only once. See the *Diameter Custom Applications Feature Activation Guide* for instructions about activating DCA Framework.

When the SoR application is initially installed, it is disabled, and you must manually enable it. To do so, navigate to **Diameter**, and then **Maintenance**, and then **Applications** and enable the application for every **DMAP** using SoR.

If SoR is in the DCA Framework **GUI** menu, this means that the application is already enabled, but does not guarantee that it is provisioned. You can also disable SoR from the **Diameter**, and then **Maintenance**, and then **Applications**.

DCA Framework applications functionality varies between the SO and NO; for example, **System Options** is available on the SO only.

2.2 Understanding SoR Functionality

Different methods can be used within the roaming platform to control outbound roaming registration traffic. For each roaming partner providing service in a given country to the home network's outbound roamers, the home network can define static proportion of successful registrations.

The following factors are used to determine whether a request is accepted:

- Desired distribution of the registrations
- A subscriber that has successfully connected and registered through some **vmNO** should be allowed to keep on using this **vmNO**, even if the subscriber has changed location
- The number of registration attempts should be limited to some predefined value regardless of the distribution preferences of the home operator. After a maximum number of registration attempts, the subscriber should be allowed to register through any **vmNO**.

To distribute the registration requests in accordance to some distribution preferences and limit the number of rejections, the SoR application keeps the following types of data:

- Information about the distribution of registrations in the form of X registrations from **MCC** in country MCC
- Information about how often the registration attempt by a subscriber is rejected and through which MNO was the last successful registration of that subscriber

When a client attaches to the network of an operator (**vPLMN**), an Update Location Request (**ULR**) is generated that indicates the operator through which the subscriber is trying to register. The SoR application is deployed as part of the **DSR** logic. When receiving an ULR from a roaming subscriber, the SoR logic determines (based on a predefined profile) whether the request should be processed and forwarded to the HSS or rejected. If the ULR is rejected by SoR, then the subscriber initiates another registration and thus a new ULR, possibly through another operator.

ULR messages of the same subscriber can arrive through different vPLMNs and be processed by different DSR instances. This information is kept in a database that can be accessed by different DSR instances, such as the UDR. Thus, when the SoR application rejects or accepts a registration request, it also updates the subscriber information in the UDR.

The Home-MNO define roaming steering profile tables and includes the following:

- Country (MCC)
- The list of **MNC** values (one or more) that are owned by the visited-MNO
- Per Visited-MNO traffic rate
- Unique identification of a Visited-MNO (MNO-ID)
- A textual representation of the visited operator (V-MNO Name)
- Visited-MNO status (Preferred/Non-Preferred)

The SoR menu options allow you to:

- Perform SoR configuration tasks
- View information about SoR settings and tables
- Work with SoR provision tables

2.3 SoR Functions within the DCA Framework

DCA lets you access with the following functions:

- Use **Custom MEALS** to view a list of any previously configured SoR custom defined measurements and events (SO or NO view GUI page). Use this page to insert, edit, and delete Custom MEALS.
- Select **General Options** from the NO to specify the Perl Subroutine for Diameter Request and Answer. From the SO, use **General Options** to view the Perl Subroutine specified for Diameter request and answer in read-only mode.
- Select **Trial MPs Assignment** to specify which MPs run the trial version of an application. If no trial version of an application configured in the system, the trial MPs will run the production version (if any exist). If there is a trial application version configured in the system, but no trial MPs is specified, a warning message is generated. From the SO, use this page to view which MPs run the trial version of an application. The page is accessible in read-only mode.
- Use **Application Control** from the NO to:
 - List all application versions configured in the system

- Insert a new application version
- Copy and modify an existing application version
- Export an application version entirely (business logic + provisioned data from the NO)
- Export only the NO provisioned data of an application version
- Import a previously exported application version (business logic + NO provisioned data)
- Import only the NO provisioned data to an existing application version
- Access the application version configuration tables
- Access a flowchart of an application version
- Delete an existing application version
- Change the status of an application version (Development, Trial, Production, Archived)
- Use **Application Control** from the SO to:
 - List all application versions configured in the system
 - Export only the SO provisioned data of an application version
 - Import only the SO provisioned data to an existing application version
 - Access the application version configuration tables
 - Access a flowchart of an application version (read-only)
- Use **System Options** from the SO (only) to enable the configuration of the DSR application parameters that are:
 - Relevant to the operational status unavailable
 - Relevant to the case when the **DRL** resources are exhausted
 - Relevant to the run-time error
 - Realm and **FQDN** values that are placed in Answer message generated by the **DCA**

2.4 SoR Logic Process

In order for SoR logic to be triggered, some prerequisite conditions are required. For example, DCA Framework must be installed and activated and SoR must be activated, enabled, and provisioned. See [SoR Pre-Configuration Activities](#).

SoR logic is triggered when a URL message is received. After triggering, SoR:

1. Confirms the **MCC/MNC** value of the visited **PLMN** as included in the visited-PLMN-ID AVP and verifies whether this value is either explicitly or implicitly included in the SoR_Profile table as part of a Visited-**MNO**. If that is not the case and the Unknown VPLMN configuration parameter is set to reject, go to 2 ; otherwise, go to 3. See [Understanding SoR Configuration Options](#).
2. Rejects the registration with a **ULA** message and updates the related counters. The processing of the current message by the SoR application is now finished.
3. Confirms whether the registration is from a preferred network; if not, go to 4. Otherwise, go to 10.
4. Determines if any preferred network has not received its pre-configured share yet and if that is the case, go to 6; otherwise, go to 5. For example, all preferred networks have received (at the minimum) their pre-configured share.

5. Confirm if the Visited-MNO to which the received MCC/MNC belongs has received its pre-configured value; if yes, go to 6 and if not, go to 10.
6. Selects the subscriber's UDR entry, which is Information about the number of registration attempts by a subscriber that is kept in a UDR database. If the subscriber still does not have an entry or the entry is outdated, for example, no ULR message of this subscriber was rejected at all or for some time, go to 8; otherwise, go to 7.
7. Confirms if the ULR message was generated from the same MNO as the last successful ULR for this subscriber (based on the subscriber's UDR record). If that is the case, go to 10; otherwise, go to 9.
8. Rejects the registration with a ULA message and updates the related counters, as well as the subscriber's UDR record. The processing of the current message by the SoR application is now finished.
9. Confirms if the number of times the subscription messages of this subscriber (from the subscriber's UDR record) were rejected exceeds either the **MaximumAttempts** value or the **MaxNumOfRejectionsPerMNO** value, go to 10; otherwise, go to 8.
10. Accepts the registration and updates the related counters and the subscriber's UDR record; for example, the value of the last accepted **MNO** in the **UDR** record. The processing of the current message by the SoR application is now finished.

2.5 SoR Traffic Rejection Logic

Traffic steering is achieved by accepting or rejecting a **ULR** message.

The SoR application uses on/off rejection, all ULR messages from some MNO are rejected until the average share of this MNO goes below its configured value. This can result in bursty behavior, as all ULR messages would be rejected for some time leading to bursts of re-registrations.

2.6 SoR Message Acceptance and Rejection Logic

When receiving a ULR message, SoR determines whether the message should be accepted or rejected. Accepting a ULR means that the message is forwarded for further processing on the DSR **MP** and possibly later to the **HSS**. Rejecting a ULR sends back a ULA message.

Accepting or rejecting a message depends on the conditions described in [Table 2-1](#).

Table 2-1 Message Accept or Reject Criteria

Condition	Description
vMNO status	If the ULR is coming from a vPLMN that belongs to a vMNO with non-preferred status from some country, then the message should be accepted only if none of the preferred vMNOs for that country has not received its defined share of traffic yet. A ULR coming through a vPLMN belonging to a preferred vMNO is always accepted.
vMNO share	In case of non-preferred MNOs, whether a ULR should be accepted or not depends on the number of successful registrations already served by the vMNO.
Registration history	Subscribers re-registering after a successful registration through some vMNO should be allowed to register through the same vMNO again regardless whether this vMNO has received its share. Furthermore, the number of registration attempts must be limited so as not to prolong the registration period indefinitely.

SoR collects the information described in Table 2-2 to determine whether to reject or accept a ULR message.

Table 2-2 Data Collected by the SoR Application

Value	Description
Traffic distribution	Collect information about the distribution of successful registrations. An arrayed custom measurement is created with an entry for each MNO configured in the roaming steering profile. An arrayed custom measurement for MCC is created with an entry for each MCC configured in the roaming steering profile.
Subscriber ULR Handling	SoR maintains (per subscriber) records that indicate the following data: Total Rejections How often was the registration of this subscriber rejected Last rejected MNO Identity of the MNO to which the MCCMNC indicated in the last rejected ULR message of this subscriber belongs to. Last accepted vPLMN Identity of the MNO to which the MCCMNC indicated in the last accepted ULR message of this subscriber belongs to.

2.7 Upgrading SoR

The upgrade from Steering of Roaming (SoR) with Universal Session Binding Repository U-SBR to SoR with UDR DSR release is not supported, the upgrade from SoR with UDR to SoR with UDR DSR release is supported.

Perform the following procedure to migrate the NOAM Level configuration data:

1. Export the NOAM configuration data on the previous release setup.
 - a. Log in to the NOAM GUI.
 - b. From the **Main Menu**, navigate to **DCA Framework**, and **Steering of Roaming**, and then **Application Control**. Ensure that an entry is added in DCA application version details table.
 - c. Select the required Steering of Roaming version name.
 - d. Click **A Level Config Data** in the **Export** section of the **Application Control** page.

Figure 2-1 Application Control Page

Main Menu: DCA Framework -> Steering of Roaming -> Application Control

Thu Jun 20 03:07:19 2024 EDT

Filter*

Version Name	Status	Comments	Creation Time	Production Time	Flowchart Checksum
Version1	Development	DCA Based Steering of Roaming Application Version 1	2024-Jun-19 01:32:51 EDT		87fcd87154942a4a844a3961a96863c

Config Tables and Data Development Environment Create New Development

Copy to New Development

Delete

Make Development Make Trial Make Production

Import:

Business Logic A Level Config Data

Export:

Business Logic A Level Config Data Both

2. To import the configuration data to a new release setup, the SoR application should be fresh installed on a new release. The application should be deactivated, then activated, and then NOAM json file of the upgraded release should be imported.
3. Perform the following procedure to import the NOAM configuration data on the upgraded setup:
 - a. Log in to the active NOAM GUI.
 - b. From the **NOAM GUI** Main Menu, navigate to **DCA Framework**, and **Steering of Roaming**, and then **Application Control**.
 - c. Click **A Level Config Data** in the **Import** section of the **Application Control** page, select the **file**, and then click **Import** to import the NOAM configuration data.

3

Configuring SoR

This section contains information about and describes the procedures used to activate, configure, and deactivate the SoR application.

SoR uses two tables for holding configuration values:

- Config_Params
- SoR_Profile

The following SoR functions are accessible from the **DCA Framework**, and then **Steering of Roaming** GUI page:

- Custom MEALS
- General Options
- Trial MPs Assignment
- Application Control
- System Options (SO only)

3.1 Understanding SoR Configuration Options

The SoR configuration database schema uses the following options to customize the application behavior:

Maximum attempts

Indicates the maximum number of registration attempts that might be rejected before the subscriber is allowed to subscribe through any MNO. This value limits the amount of time the subscription process might take.

Maximum number of rejections per MNO

Sets how often can Registration attempts by a subscriber over a certain non-preferred **VPLMN** be rejected before the subscriber is allowed to register through this non-preferred MNO. This is needed in case a subscriber does not receive coverage by a preferred MNO, then it preferable to reduce the time needed for a successful registration.

Rejection code

Indicates a specific (Experimental-) Result Code to be used when the DSR with SoR application must send an Answer message with error to the downstream peer. If this is not set, the ULA message is sent with an error code. If a rejection code is defined, the ULA is sent with an Experimental-Result AVP.

Rejection text

Defines the text to be added in an Error-Message **AVP** to indicate what caused the error.

Unknown VPLMN

Indicates how to handle ULRs messages that arrive from VPLMNs that are not listed explicitly or implicitly in the SoR_Profile table. The options are Reject/Accept. A VPLMN is considered unknown if the included MCCMNC value in the ULR is not included explicitly or implicitly in the SoR_Profile table. See [Configuring SoR_Profile Tables](#). Explicit

inclusion indicates in this context that the MCC values contained in the MCCMNC value of the ULR message is included in the MCC column of the SoR_Profile table and one of the rows listing this MCC includes the MNC in the MNC column. Implicit inclusion indicates in this context that the MCC values contained in the MCCMNC value of the ULR message is included in the MCC column of the SoR_Profile table and while none of these rows includes the MNC of the VPLMN, one of the rows listing this MCC includes an asterisk (*) in the MNC column.

These values are stored in SoR configuration tables.

To track a user's registration history, the SoR application keeps subscriber-related records in a UDR Generic State database indexed by the subscriber's **IMSI**. This is accessible from the **UDR**, and then **Configuration**, and then **UDR Databases** page.

3.2 SoR Pre-Configuration Activities

Before you can configure SoR as a DCA Framework application, DCA Framework must be activated on the NO. See *DCA Feature Activation*.

Following DCA Framework activation, individual applications are in the disabled state. While disabled, no diameter traffic is delivered to SoR.

You now need to enable SoR. Perform this task from the **Diameter**, and then **Maintenance**, and then **Applications** page from the SO. See *Diameter User's Guide* for details.

Now, you can provision and configure the business logic for SoR using the SoR provisioning tables.



Note:

Production and Trial functions are unavailable, and SoR's operational status is unavailable until you configure SoR.

3.3 Activating SoR

Use this task to activate SoR.

See *DCA Feature Activation* for detailed information.

1. Check that the DCA framework has already been activated. See *DCA Feature Activation*.
2. Add an entry in the **DsrApplication** if it does not already exist.
3. Add an entry in the **DcaDalld** table if it does not already exist.
4. Enable visibility for the main menu **DCA Framework**, and then **DCA Roaming Steering** subtree.

The SoR instance is added to the GUI menu.

3.4 Verifying that SoR is activated

Use this task to verify that SoR is activated prior to enabling SoR and performing configuration (provisioning) activities.

Confirm that the SoR folder is visible on the GUI menu. All measurements and KPIs that are associated with the DCA Framework are visible also on the **Measurements**, and then **Report** and **Status & Manage**, and then **KPIs** pages. When activated, SoR becomes visible across DSR (for example, ART and maintenance).

Use this menu to import business logic and provision configuration data.

3.5 Deactivating SoR

Use this task to deactivate SoR. You cannot deactivate SoR while a version of the respective application is still in the Production and/or Trial state.

Before deactivation can take place, the DCA Framework application must be disabled on all MPs in the network.

See *DCA Feature Activation* for detailed information.

1. Disable the corresponding main menu from **DCA Framework**, and then **DCA Roaming Steering**.
2. Delete ART rules referring to the deactivated SoR instance.

The SoR instance is removed from the GUI menu.

3.6 Enabling SoR

Use this task to enable SoR on the SO. You can also pause updates using this task.

1. Navigate to **Diameter**, and then **Maintenance**, and then **Applications**.
2. Select **DCA_SOR**.
3. Click **Enable**.

The SoR instance is added to the GUI menu.

3.7 Disabling SoR

Use this task to disable SoR on the SO.

1. Navigate to **Diameter**, and then **Maintenance**, and then **Applications**.
2. Select **DCA_SOR**.
3. Click **Disable**.

The SoR instance is removed from the GUI menu.

3.8 SoR Database Tables

[Table 3-1](#) lists the the SoR database tables.

Use **DCA Framework**, and then **Steering of Roaming**, and then **Application Control** page to work with Config_Params and SoR_Profile tables.

Table 3-1 SoR Database Tables

Field	Description
Config_Params	This table includes configuration parameters for the SoR application.
SoR_Profile	This table includes the following configuration information: <ul style="list-style-type: none">• MCCs and MNO IDs and names• Traffic %• Whether the operator is preferred

3.9 Configuring Config_Params Tables

Use this task to configure SoR Config_Params tables.

**Note:**

The available GUI choices differ between the SO and the NO.

The SoR Config_Params tables fields are described in [Table 3-2](#).

1. Navigate to **DCA Framework**, and then **Steering of Roaming**, and then **Application Control**.
2. Select a **Version Name**.
3. Click the appropriate action button. For example, **Config Tables and Data** on the NO or **Config Data** on the SO.
The active buttons are related to your site configuration.
4. Select **Config_Params**.
5. Select an action that corresponds to the task you want to perform. For example, **View** on the SO.
6. Fill out the fields to define or edit the selected table. Some fields are cannot be edited; this is related to their provisioned values and permissions.
7. Click **OK** or **Apply** to complete the task.

3.10 Configuring SoR_Profile Tables

Use this task to configure SoR_Profile tables.

**Note:**

The available GUI choices differ between the SO and the NO.

The SoR_Profile tables fields are described in [Table 3-2](#).

1. Navigate to **DCA Framework**, and then **Steering of Roaming**, and then **Application Control**.
2. Select a **Version Name** choice.

3. Click the appropriate action button. For example, **Config Tables and Data** on the NO or **Config Data** on the SO.
The active buttons are related to your site configuration.
4. Select a **SoR_Profile**.
5. Select an action. For example, **View** on the SO.
6. Fill out the fields to define or edit the selected table. Some fields are cannot be edited; this is related to their provisioned values and permissions.
7. Click **OK** or **Apply** to complete the task.

3.11 Config_Params and SoR_Profile Database Tables elements

Table 3-2 describes the fields in the Config_Params and SoR_Profile Database tables.

Table 3-2 Config_Params and SoR_Profile Database Table Elements

Field (* indicates a required field)	Description	Data Input Notes
* Table Name	Unique name of the table	Format: Valid characters are alphanumeric and underscore, and must contain at least one alpha and must not start with a digit. Range: 1 - 32 characters Default: NA
Description	An optional description of the table	Format: Text string Range: 1 - 255 characters Default: NA
Single row	Indicates whether or not the table must have a single row	Format: Checkbox Range: checked, unchecked Default: unchecked
Level	Sets the configuration level of the table (NO or SO)	Format: Option Range: NO or SO Default: NO
Table fields		
*Field Name	Unique name of the Table field	Format: Valid characters are alphanumeric and underscore, and must contain at least one alpha and must not start with a digit Range: 1 - 32 characters Default: NA
Description	An optional description of the table	Format: Valid characters are alphanumeric and underscore, and must contain at least one alpha and must not start with a digit Range: 1 - 255 characters Default: NA
Unique	Indicates whether the table must be unique	Format: Checkbox Range: checked, unchecked Default: unchecked

Table 3-2 (Cont.) Config_Params and SoR_ProfileDatabase Table Elements

Field (* indicates a required field)	Description	Data Input Notes
Mandatory	Indicates whether the table must be s mandatory	Format: Checkbox Range: checked, unchecked Default: unchecked
* Data type	Sets the date type	Format: List Range: Integer, Float, UTF8String, OctetString, IP Address, IP/Netmask, DiameterURI, DiameterIdentity, Enumerated, Boolean <ul style="list-style-type: none"> Integer - Unsigned64, Signed64 Float - [+/-]number[number][e/E[+/-]number], for example, 12.3 or 1.23e+1 UTF8String OctetString - IPv4 (decimal numbers separated by a period)/ IPv6 (RFC 4291, section 2.2: form 1 and 2 are supported. IP/Netmask - IPv4 or IPv6/Netmask DiameterURI - "aaa://"FDQN [port] [transport] [protocol]/"aaas://"FDQN [port] [transport] [protocol], see RFC 6733 DiameterIdentity - FDQN or Realm, see RFC 6733 Enumerated - Comma separate list of valuse, which can be separate items (a, b, c) or in form of: (a:1, b:2, c:3) Boolean - true/false Default: NA
* Min Value	Minimum integer value	Format: Integer Range: 1 - 64 Default: NA
* Max Value	Maximum integer value	Format: Integer Range: 1 - 64 Default: NA
Default Value	Default value	Format: Integer Range: 1 - 64 Default: NA
Remove	Removes the table	Format: Button Range: NA Default: NA
Add	Adds a table	Format: Button Range: NA Default: NA

3.12 SoR Provision Tables

Use SoR Provision tables to work with provisioning information for Config_Params and SoR_Profile table values. Actions include inserting, editing, deletion options.

3.13 Configuring SoR Provisioning Tables

Use this task to configure SoR provisioning tables.



Note:

The available GUI choices differ between the SO and the NO.

The fields are described in [Table 3-3](#) and [Table 3-4](#).

1. Select **DCA Framework**, and then **Roaming of Steering**, and then **Application Control**.
2. Select a **Version Name** choice.
3. Click the appropriate action button; for example, **Config Tables and Data** on the NO or **Config Data** on the SO.
4. Select a **Table Name**.
5. Select **Provision Table**.
6. Fill out the fields to define or edit the selected table.
7. Click **OK** or **Apply** to complete the task.

3.14 Adding a new SoR_Profile entry

Use this task to add SoR provisioning entries.

1. Navigate to **DCA Framework**, and then **DCA Roaming Steering**, and then **Application Control**.
2. Select **DCA_SOR**.
3. Select a **Version Name**.
4. Select a **Config Tables and Data**.
5. Select a **Table Name**.
6. Select a **Provision Table**.
7. Fill out the fields to define the table. The field values you provide define either Config_Params or SoR_Profile configuration parameters (this depends on which provision option that you selected).

See [Config_Params Provision Tables elements](#) and [SoR_Profile Provision Tables elements](#).

3.15 Config_Params Provision Tables elements

[Table 3-3](#) describes the fields on the Config_Params Provision Table page.

Table 3-3 Config_Params Provision Tables elements

Field (* indicates a required field)	Description	Data Input Notes
* MaximumAttempts	The maximum number of consecutive rejections per subscriber.	Format: Numeric Range: 1 - 100 characters Default: 5
* MaxNumOfRejections PerMNO	The maximum number of consecutive rejections per MNO per subscriber	Format: Numeric Range: 1 - 100 characters Default: none
RejectionCode	The rejection code to use with a ULA.	Format: Numeric Range: 6000 - 9999 characters Default: NA
RejectionText	The text to be added in an Error-Message AVP to indicate what caused the error. If the rejection code was indicated, this field must not be empty.	Format: Alpha Range: 1 - 100 characters Default: NA
UnknownVPLMN	Select to reject or accept traffic from an unknown VPLMN.	Format: Option Range: Accept/Reject Default: Reject

3.16 SoR_Profile Provision Tables elements

Table 3-4 describes the fields on the SoR_Profile Provision Table page.

Table 3-4 SoR_Profile Provision Tables elements

Field (* indicates a required field)	Description	Data Input Notes
* CountryMCC	The country MCC .	Format: numeric Range: 1 - 999 characters Default: none
* OperatorMNC	A list of MNC values, separated by commas. Note: Use asterisk (*) for a wildcard search.	Format: numeric Range: 1 - 100 characters Default: none
* Traffic	The traffic in percent.	Format: numeric Range: 1 - 100 characters Default: none
* MNO_ID	Sets the MNO identity.	Format: numeric Range: 1 - 1000 characters Default: none
* MNO_Name	Sets the MNO name.	Format: alphanumeric Range: 1 - 100 characters Default: none

Table 3-4 (Cont.) SoR_Profile Provision Tables elements

Field (* indicates a required field)	Description	Data Input Notes
* Preferred	Sets the MNO status.	Format: checkbox Range: Preferred, non-preferred Default: Non-preferred

3.17 Configure Active UDR NOAM for SoR application

1. From the main Menu, Navigate to **UDR**, then select **Subscriber Entity Configuration**, then select **Transparent Entity**, select **Base Field Set**, and click **Edit**.
2. Under **SprProfileBFS** add these fields for SoR Application.

Figure 3-1 SprProfileBFS screen

ACLE User Data Repository 12.6.1.0.0-18.7.0 Pause Updates | Help | Logged in Account: guidadmin | Log Out

Main Menu: UDR -> Subscriber Entity Configuration -> Transparent Entity -> Base Field Set -> [Edit] Tue Aug 24 02:24:52 2021 EDT

Warning

Base Field Set Name * SprProfileBFS Name of this Base Field Set Definition. [Default = n/a; Range = A 64-character string. Valid characters are alphanumeric and underscore. Must contain at least one alpha and must not start with a digit.] [A value is required.]

Element String * subscriber XML element name under which defined fields reside. [Default = n/a; Range = A 64-character string. Valid characters are alphanumeric and underscore. Must contain at least one alpha and must not start with a digit.] [A value is required.]

Version Identifier Element Check box if multiple versions of this entity are allowed. [Default = unchecked]

Allow Versions ☐ **Version Value** XML element name of the version identifier. [Range = A 64-character string. Valid characters are alphanumeric and underscore. Must contain at least one alpha and must not start with a digit.]

XML Storage Format Field Name Based Version value associated with this BaseFieldSet. [Range = Must be an integer] Select if entity version is element based or field name based. [Default = Element Based; Select value from list]

Element String	Type	Field Set Name	Min Value	Max Value	Updatable	Resettable	Reset Value	Defaultable	Default Value	Min Occur	Max Occur	Speci
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Note:

If DSA application is activated on that setup, the following fields are present.

Figure 3-2 SprProfileBFS field screen

Main Menu: UDR -> Subscriber Entity Configuration -> Transparent Entity -> Base Field Set -> [Edit]

Warning

XML Storage Format: Field Name based [Default = Element Based; Select value from list]

Element String	Type	Field Set Name	Min Value	Max Value	Updatable	Resettable	Reset Value	Defaultable	Default Value	Min Occur	Max Occur	Special Format
01 MSISDN	RegEx		0	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	3	^d{8,15}\$
02 IMSI	RegEx		0	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	3	^d{10,15}\$
03 NAI	RegEx		0	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	3	^[x20-x7e]{
04 AccountId	RegEx		0	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	1	^[x20-x7e]{
05 IMEI	RegEx		0	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	2	^d{8,14}\$
06 lastUN	RegEx		0	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	1	^[x20-x7e]{
07 VLR	RegEx		0	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	1	^[x20-x7e]{
08 VPLMN	RegEx		0	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	1	^[x20-x7e]{
09 MCC	RegEx		0	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	1	^[x20-x7e]{
10 MMER	RegEx		0	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	1	^[x20-x7e]{
11 MMEH	RegEx		0	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	1	^[x20-x7e]{

3. Configure the following fields.

SoR Specific Fields :
MSISDN - key

no_total_rej: value contains digit : Reg Exp : ^\d+\$
no_mno_rej: value contains digit : Reg Exp : ^\d+\$
acc_mno_id: value contains string " acc mno id" : ^[\x20-\x7e]{0,255}\$
rej_mno_id : value contains string "rej mno id" : ^[\x20-\x7e]{0,255}\$

Figure 3-3 Configuration fields

25 no_total_rej	RegEx				<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	1	^d+\$
26 no_mno_rej	RegEx				<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	1	^d+\$
27 acc_mno_id	RegEx				<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	1	^[x20-x7e]{0,255}\$
28 rej_mno_id	RegEx				<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		0	1	^[x20-x7e]{0,255}\$