Oracle® Communications Diameter Signaling Router

Steering of Roaming User's Guide

Release 8.1

E87972 Revision 01

July 2017

ORACLE®

Oracle Communications Diameter Signaling Router Steering of Roaming User's Guide, Release 8.1

Table of Contents

List of Figures

List of Tables

Chapter
1

Introducing Steering of Roaming (SoR)

Topics:

The SoR application allows home network operators to control and distribute registration traffic of their outbound roamers. To achieve this, the SoR 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 SoR application and functionality.

The SoR application menu options allow you to work with:

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

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

Revision History

Date	Description
March 2017	Initial release

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*

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 SBR. For this reason, this content includes references to the shared applications, and might describe GUI options that are not visible or applicable to SoR.

Content Organization

This content is organized as follows:

- *Introducing Steering of Roaming (SoR)* contains general information about the SoR application including overview and logic information, the organization of this content, and how to get technical assistance.
- *User Interface Introduction* describes the organization and usage of the user interface. In it you can find information about how the interface options are organized, how to use widgets and buttons, and how filtering and other page display options work.
- *Understanding SoR Functionality and Logic* describes SoR logic.
- *Configuring SoR* provides information about customizing SoR resources.

Documentation Admonishments

Admonishments are icons and text throughout this manual that alert the reader to assure personal safety, to minimize possible service interruptions, and to warn of the potential for equipment damage.

Table 1: Admonishments

Icon	Description
DANGER	Danger: (This icon and text indicate the possibility of *personal injury*.)
WARNING	Warning: (This icon and text indicate the possibility of *equipment damage*.)
CAUTION	Caution: (This icon and text indicate the possibility of *service interruption*.)
TOPPLE	Topple: (This icon and text indicate the possibility of *personal injury* and *equipment damage*.)

Related Publications

For information about additional publications related to this document, refer to the Oracle Help Center site. See *Locate Product Documentation on the Oracle Help Center Site* for more information on related product publications.

Locate Product Documentation on the Oracle Help Center Site

Oracle Communications customer documentation is available on the web at the Oracle Help Center (OHC) site, *http://docs.oracle.com*. You do not have to register to access these documents. Viewing these files requires Adobe Acrobat Reader, which can be downloaded at *http://www.adobe.com*.

1. Access the Oracle Help Center site at *http://docs.oracle.com*.
2. Click **Industries**.

3. Under the Oracle Communications subheading, click the `Oracle Communications documentation` link.
   The Communications Documentation page appears. Most products covered by these documentation sets will appear under the headings "Network Session Delivery and Control Infrastructure" or "Platforms."

4. Click on your Product and then the Release Number.
   A list of the entire documentation set for the selected product and release appears.

5. To download a file to your location, right-click the `PDF` link, select `Save target as` (or similar command based on your browser), and save to a local folder.

Customer Training

Oracle University offers training for service providers and enterprises. Visit our web site to view, and register for, Oracle Communications training:

http://education.oracle.com/communication

To obtain contact phone numbers for countries or regions, visit the Oracle University Education web site:

www.oracle.com/education/contacts

My Oracle Support (MOS)

MOS (*https://support.oracle.com*) is your initial point of contact for all product support and training needs. A representative at Customer Access Support (CAS) can assist you with MOS registration.

Call the CAS main number at 1-800-223-1711 (toll-free in the US), or call the Oracle Support hotline for your local country from the list at *http://www.oracle.com/us/support/contact/index.html*. When calling, make the selections in the sequence shown below on the Support telephone menu:

1. Select **2** for New Service Request
2. Select **3** for Hardware, Networking and Solaris Operating System Support
3. Select one of the following options:

   - For Technical issues such as creating a new Service Request (SR), Select **1**
   - For Non-technical issues such as registration or assistance with MOS, Select **2**

You will be connected to a live agent who can assist you with MOS registration and opening a support ticket.

MOS is available 24 hours a day, 7 days a week, 365 days a year.

Emergency Response

In the event of a critical service situation, emergency response is offered by the Customer Access Support (CAS) main number at 1-800-223-1711 (toll-free in the US), or by calling the Oracle Support hotline for your local country from the list at *http://www.oracle.com/us/support/contact/index.html*. The emergency response provides immediate coverage, automatic escalation, and other features to ensure that the critical situation is resolved as rapidly as possible.

A critical situation is defined as a problem with the installed equipment that severely affects service, traffic, or maintenance capabilities, and requires immediate corrective action. Critical situations affect service and/or system operation resulting in one or several of these situations:

- A total system failure that results in loss of all transaction processing capability
- Significant reduction in system capacity or traffic handling capability
- Loss of the system's ability to perform automatic system reconfiguration
- Inability to restart a processor or the system
- Corruption of system databases that requires service affecting corrective actions
- Loss of access for maintenance or recovery operations
- Loss of the system ability to provide any required critical or major trouble notification

Any other problem severely affecting service, capacity/traffic, billing, and maintenance capabilities may be defined as critical by prior discussion and agreement with Oracle.

Chapter
2

User Interface Introduction

Topics:

This section describes the organization and usage of the application's user interface. In it you can find information about how the interface options are organized, how to use widgets and buttons, and how filtering and other page display options work.

User Interface Organization

The user interface is the central point of user interaction within an application. It is a Web-based graphical user interface (GUI) that enables remote user access over the network to an application and its functions.

The core framework presents a common set of Main Menu options that serve various applications. The common Main Menu options are:

- Administration
- Configuration
- Alarms and Events
- Security Log
- Status and Manage
- Measurements
- Help
- Legal Notices
- Logout

Applications build upon this framework to present features and functions. Depending on your application, some or all of the following Main Menu options may appear on the Network Operation, Administration, and Maintenance (NOAM) GUI:

- Communication Agent
- Diameter Common
- Diameter
- UDR (User Data Repository)
- MAP-Diameter IWF
- RADIUS (Remote Authentication Dial-In User Service)
- SBR (Session Binding Repository)
- Policy and Charging
- DCA (DOIC Capabilities Announcement) Framework

The DSR System OAM GUI may present even more Main Menu options as listed below. The end result is a flexible menu structure that changes according to the application needs and features activated.

- Transport Manager
- SS7/Sigtran
- RBAR (Range Based Address Resolution)
- FABR (Full Address Based Resolution)
- GLA (Gateway Location Application)
- MAP-Diameter IWF
- RADIUS
- SBR
- Mediation
- Policy and Charging
- DCA Framework
- IPFE (IP Front End)

Note that the System OAM (SOAM) Main Menu options differ from the Network OAM (NOAM) options. Some Main Menu options are configurable from the NOAM server and view-only from the SOAM (SOAM) server. This remains true for other applications.

User Interface Elements

Table 2: User Interface Elements describes elements of the user interface.

Table 2: User Interface Elements

Element	Location	Function
Identification Banner	Top bar across the web page	The left side of the banner provides the following information: • Displays the company name, • product name and version, and • the alarm panel. The right side of the banner: • Allows you to pause any software updates. • Links to the online help for all software. • Shows the user name of the currently logged-in user. • Provides a link to log out of the GUI.
Main Menu	Left side of screen, under banners	A tree-structured menu of all operations that can be performed through the user interface. The plus character (+) indicates a menu item contains subfolders. • To display submenu items, click the plus character, the folder, or anywhere on the same line. • To select a menu item that does not have submenu items, click on the menu item text or its associated symbol.
Work Area	Right side of panel under status	Consists of three sections: Page Title Area, Page Control Area (optional), and Page Area. • Page Title Area: Occupies the top of the work area. It displays the title of the current page being displayed, date and time, and includes a link to context-sensitive help. • Page Control Area: Located below the Page Title Area, this area shows controls for the Page Area (this area is optional). When available as an option, filter controls display in this area. The Page Control Area contains the optional layout element toolbar, which displays different elements depending on which GUI page is selected. For more information, see *Optional Layout Element Toolbar*. • Page Area: Occupies the bottom of the work area. This area is used for all types of operations. It displays all options, status, data, file, and query screens. Information

Element	Location	Function
		or error messages are displayed in a message box at the top of this section. A horizontal and/or vertical scroll bar is provided when the displayed information exceeds the page area of the screen. When a user first logs in, this area displays the application user interface page. The page displays a user-defined welcome message. To customize the message, see *Customizing the Login Message*.
Session Banner	Across the bottom of the web page	The left side of the banner provides the following session information: • The name of the machine to which the user is connected, and whether the user is connected via the VIP or directly to the machine. • The HA state of the machine to which the user is connected. • The role of the machine to which the user is connected. The right side of the banner shows the alarm panel.

Main Menu Options

Table 3: Main Menu Options describes all main menu user interface options.

Note: The menu options can differ according to the permissions assigned to a user's log-in account. For example, the Administration menu options do not appear on the screen of a user who does not have administrative privileges.

Note: Some menu items are configurable only on the Network OAM and view-only on the System OAM; and some menu options are configurable only on the System OAM.

Note: Some features do not appear in the main menu until the features are activated.

Table 3: Main Menu Options

Menu Item	Function
Administration	The Administration menu allows the user to: • General Options. Configure options such as password history and expiration, login message, welcome message, and the number of failed login attempts before an account is disabled • Set up and manage user accounts • Configure group permissions • View session information • Manage sign-on certificates • Authorize IP addresses to access the user interface • Configure SFTP user information • View the software versions report • Upgrade management including backup and reporting

Menu Item	Function
	• Authenticate LDAP servers • Configure SNMP trapping services • Configure an export server • Configure DNS elements
Configuration	On the NOAM, allows the user to configure: • Network Elements • Network Devices • Network Routes • Services • Servers • Server Groups • Resource Domains • Places • Place Associations • Interface and Port DSCP
Alarms and Events	Allows the user to view: • Active alarms and events • Alarm and event history • Trap log
Security Log	Allows the user to view, export, and generate reports from security log history.
Status and Manage	Allows the user to monitor the individual and collective status of Network Elements, Servers, HA functions, Databases, KPIs, system Processes, and Tasks. The user can perform actions required for server maintenance, database management, data, and ISO file management.
Measurements	Allows the user to view and export measurement data.
Transport Manager (optional)	On the SOAM, allows the user to configure adjacent nodes, configuration sets, or transports. A maintenance option allows the user to perform enable, disable, and block actions on the transport entries. This option only appears with the DSR application.
Communication Agent (optional)	Allows the user to configure Remote Servers, Connection Groups, and Routed Services. The user can perform actions to enable, disable, and block connections. Also allows the user to monitor the status of Connections, Routed Services, and HA Services.
SS7/Sigtran (optional)	On the SOAM, allows the user to configure various users, groups, remote signaling points, links, and other items associated with SS7/Sigtran; perform maintenance and troubleshooting activities; and provides a command line interface for bulk loading SS7 configuration data. This option only appears with the DSR application.

Menu Item	Function
Diameter Common (optional)	Allows the user to view or configure: • Dashboard, configure on the NOAM; view on both OAMs • Network Identifiers on the SOAM - MCC Ranges • Network Identifiers on the NOAM - MCCMNC and MCCMNC Mapping • MPs (on the SOAM) - editable Profile parameters and Profile Assignments The DSR Bulk Import and Export functions are available on both OAMs for the data configured on that OAM.
Diameter (optional)	Allows the user to configure, modify, and monitor Diameter routing: • On the NOAMP, Diameter Topology Hiding and Egress Throttle List configuration • On the SOAM, Diameter Configuration, Maintenance, Reports, Troubleshooting with IDIH, AVP Dictionary, and Diameter Mediation configuration
UDR (User Data Repository) (optional)	Allows the user to add, edit, store, and manage subscriber and pool data. The user can also monitor the import, export, and subscribing client status. This option only appears with the UDR application.
RBAR (Range-Based Address Resolution) (optional)	Allows the user to configure the following Range-Based Address Resolution (RBAR) settings: • Applications • Exceptions • Destinations • Address Tables • Addresses • Address Resolutions • System Options This is accessible from the SOAM only. This option only appears with the DSR application.
FABR (Full Address Based Resolution) (optional)	Allows the user to configure the following Full Address Based Resolution (FABR) settings: • Applications • Exceptions • Default Destinations • Address Resolutions • System Options This is accessible from the SOAM only. This option is only available with the DSR application.
Gateway Location Application (optional)	On the SOAM, allows the user to perform configuration tasks, edit options, and view elements for: • Exceptions

Menu Item	Function
	• Options GLA can deploy with Policy DRA (in the same DA-MP or a separate DA-MP). This option only appears with the DSR application.
MAP-Diameter Interworking (optional)	On the SOAM, allows the user to perform configuration tasks, edit options, and view elements for the DM-IWF DSR Application: • DM-IWF Options • Diameter Exception On the NOAMP, allows the user to perform configuration tasks, edit options, and view elements for the MD-IWF SS7 Application: • MD-IWF Options • Diameter Realm • Diameter Identity GTA • GTA Range to PC • MAP Exception • CCNDC Mapping This option only appears with the DSR application.
RADIUS (Remote Authentication Dial-In User Service) (optional)	Allows the user to perform configuration tasks, edit system options, and view elements for: • Network Options • Message Authenticator Configuration Sets • Shared Secret Configuration Sets • Ingress Status Server Configuration Sets • Message Conversion Configuration Sets • NAS Node This option only appears with the DSR application.

SBR (Session Binding Repository) (optional)	Allows the user to perform configuration tasks, edit system options, and view elements for:
	
	• SBR Databases
	• SBR Database Resizing Plans
	• SBR Data Migration Plans
	• Database Options
	
	Additionally, on the NOAMP, users are allowed to perform maintenance tasks, edit options, and view elements for:
	
	• Maintenance
	
	   • SBR Database Status
	   • SBR Status
	   • SBR Database Reconfiguration Status
	
	This option only appears with the DSR application.

Menu Item	Function
Mediation	Allows the user to make routable decisions to end the reply, drop the message, or set the destination realm.

Policy and Charging (optional)	On the NOAMP, allows the user to perform configuration tasks, edit options, and view elements for:
	
	• General Options
	• Access Point Names
	• Policy DRA
	
	  • PCRF Pools
	  • PCRF Sub-Pool Selection Rules
	  • Network-Wide Options
	
	• Online Charging DRA
	
	  • OCS Session State
	  • Realms
	  • Network-Wide Options
	
	• Alarm Settings
	• Congestion Options
	
	Additionally on the NOAMP, users are allowed to perform maintenance tasks, edit options, and view elements for:
	
	• Maintenance
	
	  • SBR Database Status
	  • SBR Status
	  • SBR Database Reconfiguration Status
	  • Policy Database Query
	
	On the SOAM, allows the user to perform configuration tasks, edit options, and view elements for:
	
	• General Options
	• Access Point Names
	• Policy DRA
	
	  • PCRFs
	  • Binding Key Priority
	  • PCRF Pools
	  • PCRF Pool to PRT Mapping
	  • PCRF Sub-Pool Selection Rules
	  • Policy Clients
	  • Suspect Binding Removal Rules
	  • Site Options
	
	• Online Charging DRA
	
	  • OCSs
	  • CTFs

Menu Item	Function
	• OCS Session State • Realms • Error Codes • Alarm Settings • Congestion Options This option only appears with the DSR application.
DCA Framework (optional)	Allows the user to perform configuration tasks, edit system options, and view elements for DCA applications: • Custom MEALs (Measurements, Events, Alarms, and Logs) • General Options • Trial MPs assignment • Application Control • System Options
IPFE (optional)	Allows the user to configure IP Front End (IPFE) options and IP List TSAs. This is accessible from the SOAM server only. This option only appears with the DSR application.
Help	Launches the Help system for the user interface
Legal Notices	Product Disclaimers and Notices
Logout	Allows the user to log out of the user interface

Missing Main Menu options

Permissions determine which Main Menu options are visible to users. Permissions are defined through the **Group Administration** page. The default group, **admin**, is permitted access to all GUI options and functionality. Additionally, members of the **admin** group set permissions for other users.

Main Menu options vary according to the group permissions assigned to a user's account. Depending on your user permissions, some menu options may be missing from the Main Menu. For example, Administration menu options do not appear on your screen if you do not have administrative permissions. For more information about user permissions, see *Group Administration* in the OAM section of the online help, or contact your system administrator.

Common Graphical User Interface Widgets

Common controls allow you to easily navigate through the system. The location of the controls remains static for all pages that use the controls. For example, after you become familiar with the location of the display filter, you no longer need to search for the control on subsequent pages because the location is static.

Supported Browsers

This application supports the use of Microsoft® Internet Explorer 8.0, 9.0, or 10.0.

is designed to work with most modern HTML5 compliant browsers and uses both JavaScript and cookies. Please refer to the *Oracle Software Web Browser Support Policy* for details

System Login Page

Access to the user interface begins at the System Login page. The System Login page allows users to log in with a username and password and provides the option of changing the password upon login. The System Login page also features a date and time stamp reflecting the time the page was last refreshed. Additionally, a customizable login message appears just below the **Log In** button.

The user interface is accessed via HTTPS, a secure form of the HTTP protocol. When accessing a server for the first time, HTTPS examines a web certificate to verify the identity of the server. The configuration of the user interface uses a self-signed web certificate to verify the identity of the server. When the server is first accessed, the supported browser warns the user that the server is using a self-signed certificate. The browser requests confirmation that the server can be trusted. The user is required to confirm the browser request to gain access.

Customizing the Login Message

Before logging in, the **System Login** page appears. You can create a login message that appears just below the **Log In** button on the **System Login** page.

ORACLE®

Oracle System Login

Wed Jul 8 14:20:00 2015 EDT

Log In
Enter your username and password to log in

Username: [   ]
Password: [   ]

☐ Change password

[Log In]

Welcome to the Oracle System Login.

Unauthorized access is prohibited. This Oracle system requires the use of Microsoft Internet Explorer 8.0, 9.0, or 10.0 with support for JavaScript and cookies.

Oracle and Java are registered trademarks of Oracle Corporation and/or its affiliates.
Other names may be trademarks of their respective owners.

Copyright © 2010, 2015, Oracle and/or its affiliates. All rights reserved.

Figure 1: Oracle System Login

1. From the **Main Menu**, click **Administration** > **General Options**.

   The **General Options Administration** page appears.

2. Locate **LoginMessage** in the **Variable** column.

3. Enter the login message text in the **Value** column.

4. Click **OK** or **Apply** to submit the information.

   A status message appears at the top of the Configuration Administration page to inform you if the operation was successful.

The next time you log in to the user interface, the login message text displays.

Accessing the DSR Graphical User Interface

In DSR, some configuration is done at the NOAM server, while some is done at the SOAM server. Because of this, you need to access the DSR graphical user interface (GUI) from two servers. Certificate Management (Single Sign-On) can be configured to simplify accessing the DSR GUI on the NOAM and the SOAM.

For information on configuring Single Sign-On certificates, see **OAM** > **Administration** > **Access Control** > **Certificate Management** in the DSR online help.

After the certificates have been configured, you can log into the DSR GUI on any NOAM or SOAM, and access the DSR GUI on other servers (NOAM or other SOAMs) without having to re-enter your login credentials.

1. In the browser URL field, enter the fully qualified hostname of the NOAM server, for example https://dsr-no.yourcompany.com.

    When using Single Sign-On, you cannot use the IP address of the server.

2. When prompted by the browser, confirm that the server can be trusted.

    The System Login page appears.

3. Enter the Username and Password for your account.

    The DSR GUI for the NOAM appears.

4. To access the DSR GUI for the SOAM, open another browser window and enter the fully qualified hostname of the SOAM.

    The DSR GUI for the SOAM appears

You can toggle between the DSR GUI on the NOAM and the DSR GUI on the SOAM as you perform configuration tasks.

Main Menu Icons

This table describes the icons used in the **Main Menu**.

Table 4: Main Menu Icons

Icon	Name	Description
	Folder	Contains a group of operations. If the folder is expanded by clicking the plus (+) sign, all available operations and sub-folders are displayed. Clicking the minus (-) collapses the folder.
	Config File	Contains operations in an Options page.
	File with Magnifying Glass	Contains operations in a Status View page.
	File	Contains operations in a Data View page.
	Multiple Files	Contains operations in a File View page.
	File with Question Mark	Contains operations in a Query page.

Icon	Name	Description
	User	Contains operations related to users.
	Group	Contains operations related to groups.
	Task	Contains operations related to Tasks
	Help	Launches the Online Help.
	Logout	Logs the user out of the user interface.

Work Area Displays

In the user interface, tables, forms, tabbed pages, and reports are the most common formats.

Note: Screen shots are provided for reference only and may not exactly match a specific application's GUI.

Tables

Paginated tables describe the total number of records being displayed at the beginning and end of the table. They provide optional pagination with **First | Prev | Next | Last** links at both the beginning and end of this table type. Paginated tables also contain action links on the beginning and end of each row. For more information on action links and other page controls, see *Page Controls*.

Displaying Records 1-1 of 1 | First | Prev | Next | Last

Action	System ID	IP Address	Permission	Action
Edit Delete	lisa	10.25.62.4	READ_WRITE	Edit Delete

Displaying Records 1-1 of 1 | First | Prev | Next | Last

Figure 2: Paginated Table

Scrollable tables display all of the records on a single page. The scroll bar, located on the right side of the table, allows you to view all records in the table. Scrollable tables also provide action buttons that operate on selected rows. For more information on buttons and other page controls, see *Page Controls*.

Sequence #	Alarm ID	Timestamp	Severity	Product	Process	NE	Server	Type	Instance	Alarm Text
3498	31201	2009-Jun-11 18:07:41.214 UTC	MAJOR	MiddleWare	procmgr	OAMPNE	teks8011006	PROC	eclipseHelp	A managed process cannot be started or has unexpectedly terminated
5445	31201	2009-Jun-11 18:07:27.137 UTC	MAJOR	MiddleWare	procmgr	SOAMP	teks8011002	PROC	eclipseHelp	A managed process cannot be started or has unexpectedly terminated
5443	**31107**	**2009-Jun-11 18:07:24.704 UTC**	**MINOR**	**MiddleWare**	**inetmerge**	**SOAMP**	**teks8011002**	**COLL**	**teks8011004**	**DB merging from a child Source Node has failed**
5444	31107	2009-Jun-11 18:07:24.704 UTC	MINOR	MiddleWare	inetmerge	SOAMP	teks8011002	COLL	teks8011003	DB merging from a child Source Node has failed
5441	31209	2009-Jun-11 18:07:22.640 UTC	MINOR	MiddleWare	re.portmap	SOAMP	teks8011002	SW	teks8011003	Unable to resolve a hostname specified in the NodeInfo table.
										Unable to resolve a

Export

Figure 3: Scrollable Table

Note: Multiple rows can be selected in a scrollable table. Add rows one at a time using CTRL-click. Add a span of rows using SHIFT-click.

Forms

Forms are pages on which data can be entered. Forms are typically used for configuration. Forms contain fields and may also contain a combination of lists, buttons, and links.

Figure 4: Form Page

Tabbed pages

Tabbed pages provide collections of data in selectable tabs. Click on a tab to see the relevant data on that tab. Tabbed pages also group Retrieve, Add, Update, and Delete options on one page. Click on the relevant tab for the task you want to perform and the appropriate fields populate on the page. Retrieve is always the default for tabbed pages.

Figure 5: Tabbed Pages

Figure 6: Tabbed Pages

Reports

Reports provide a formatted display of information. Reports are generated from data tables by clicking **Report**. Reports can be viewed directly on the user interface, or they can be printed. Reports can also be saved to a text file.

```
================================================================================

User Account Usage Report

================================================================================

Report Generated: Fri Jun 19 19:30:55 2009 UTC
From: Unknown Network OAM&P on host teks5001701
Report Version: 1.0
User: guiadmin

--------------------------------------------------------------------------------

Username         Date of Last Login    Days Since Last Login    Account Status
---------------  --------------------  ---------------------    ---------------
guiadmin         2009-06-19 19:00:17   0                        enabled

--------------------------------------------------------------------------------

End of User Account Usage Report

================================================================================
```

Figure 7: Report Output

Customizing the Splash Page Welcome Message

When you first log in to the user interface, the splash page appears. Located in the center of the main work area is a customizable welcome message. Use this procedure to create a message suitable for your needs.

1. From the **Main Menu**, click **Administration** > **General Options**.
2. Locate **Welcome Message** in the **Variable** column.
3. Enter the desired welcome message text in the **Value** column.
4. Click **OK** to save the change or **Cancel** to undo the change and return the field to the previously saved value.
   A status message appears at the top of the page to inform you if the operation was successful.

The next time you log in to the user interface, the new welcome message text is displayed.

Column Headers (Sorting)

You can sort a table by a column by clicking the column header. However, sorting is not necessarily available on every column. Sorting does not affect filtering.

When you click the header of a column that the table can be sorted by, an indicator appears in the column header showing the direction of the sort. See *Figure 8: Sorting a Table by Column Header*. Clicking the column header again reverses the direction of the sort.


Figure 8: Sorting a Table by Column Header

Page Controls

User interface pages contain controls, such as buttons and links, that perform specified functions. The functions are described by the text of the links and buttons.

Note: Disabled buttons are grayed out. Buttons that are irrelevant to the selection or current system state, or which represent unauthorized actions as defined in **Group Administration**, are disabled. For example, **Delete** is disabled for users without Global Data Delete permission. Buttons are also disabled if, for example, multiple servers are selected for an action that can only be performed on a single server at a time.

Table 5: Example Action Buttons contains examples of Action buttons.

Table 5: Example Action Buttons

Action Button	Function
Insert	Inserts data into a table.
Edit	Edits data within a table.
Delete	Deletes data from table.

Action Button	Function
Change	Changes the status of a managed object.

Some Action buttons take you to another page.

Submit buttons, described in *Table 6: Submit Buttons*, are used to submit information to the server. The buttons are located in the page area and accompanied by a table in which you can enter information. The Submit buttons, except for **Cancel**, are disabled until you enter some data or select a value for all mandatory fields.

Table 6: Submit Buttons

Submit Button	Function
OK	Submits the information to the server, and if successful, returns to the View page for that table.
Apply	Submits the information to the server, and if successful, remains on the current page so that you can enter additional data.
Cancel	Returns to the View page for the table without submitting any information to the server.

Clear Field Control

The clear field control allows you to clear the value from a list. The clear field control is available only on some lists.

Click the **X** next to a list to clear the field.
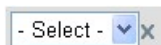
Figure 9: Clear Field Control X

Optional Layout Element Toolbar

The optional layout element toolbar appears in the Page Control Area of the GUI.
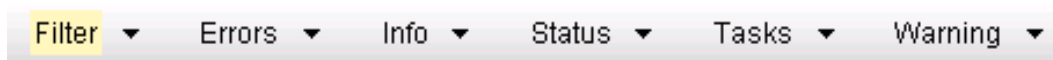
Figure 10: Optional Layout Element Toolbar

The toolbar displays different elements depending on which GUI page is selected. The elements of the toolbar that can appear include:

• Filter – Allows you to filter data in a table.
• Errors – Displays errors associated with the work area.
• Info – Displays information messages associated with the work area.
• Status – Displays short status updates associated with the main work area.
• Warning – Displays warnings associated with the work area.

Notifications

Some messages require immediate attention, such as errors and status items. When new errors occur, the Errors element opens automatically with information about the error. Similarly, when new status items are added, the Status element opens. If you close an automatically opened element, the element stays closed until a new, unacknowledged item is added.
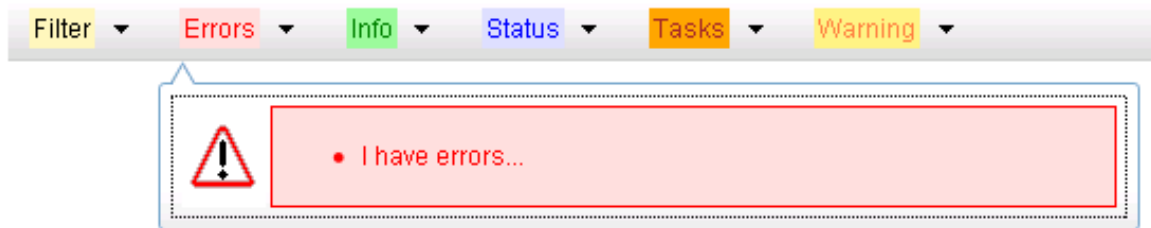

Figure 11: Automatic Error Notification

Note: Viewing and closing an error does not clear the Errors element. If you reopen the Errors element, previously viewed errors are still in the list.

When new messages are added to Warning or Info, the styling of the element changes to indicate new messages are available. The styling of the Task element changes when a task changes state (such as, a task begins or ends).

Opening an Element in the Toolbar

Use this procedure to open an element in the optional layout element toolbar.

1. Click the text of the element or the triangle icon to open an element.

   The selected element opens and overlays the work area.

2. Click **X** to close the element display.

Filters

Filters are part of the optional layout element toolbar and appear throughout the GUI in the Page Control Area. For more information about optional layout element toolbar functionality, see *Optional Layout Element Toolbar*.

Filters allow you to limit the data presented in a table and can specify multiple filter criteria. By default, table rows appear unfiltered. Three types of filters are supported, however, not all filtering options are available on every page. The types of filters supported include:

- Network Element – When enabled, the Network Element filter limits the data viewed to a single Network Element.

  Note: Once enabled, the Network Element filter affect all pages that list or display data relating to the Network Element.

- Collection Interval – When enabled, the collection interval filter limits the data to entries collected in a specified time range.
- Display Filter – The display filter limits the data viewed to data matching the specified criteria.

Once a field is selected, it cannot be selected again. All specified criteria must be met in order for a row to be displayed.

The style or format of filters may vary depending on which GUI pages the filters are displayed. Regardless of appearance, filters of the same type function the same.

Figure 12: Examples of Filter Styles

Filter Control Elements

This table describes filter control elements of the user interface.

Table 7: Filter Control Elements

Operator	Description
=	Displays an exact match.
!=	Displays all records that do not match the specified filter parameter value.
>	Displays all records with a parameter value that is greater than the specified value.
>=	Displays all records with a parameter value that is greater than or equal to the specified value.
<	Displays all records with a parameter value that is less than the specified value.
<=	Displays all records with a parameter value that is less than or equal to the specified value.
Like	Enables you to use an asterisk (*) as a wildcard as part of the filter parameter value.
Is Null	Displays all records that have a value of **Is Null** in the specified field.

Note: Not all filterable fields support all operators. Only the supported operators are available for you to select.

Filtering on the Network Element

The global Network Element filter is a special filter that is enabled on a per-user basis. The global Network Element filter allows a user to limit the data viewed to a single Network Element. Once enabled, the global Network Element filter affects all sub-screens that display data related to Network Elements. This filtering option may not be available on all pages.

1. Click **Filter** in the optional layout element toolbar.
2. Select a Network Element from the **Network Element** list.
3. Click **Go** to filter on the selection or click **Reset** to clear the selection.
4. For data tables that support compound filtering, click **Add** to add another filter condition and repeat steps 2 through 4.

   Multiple filter conditions are joined by an AND operator.

Records are displayed according to the specified criteria.

Filtering on Collection Interval

The Collection Interval filter allows a user to limit the data viewed to a specified time interval. This filtering option may not be available on all pages.

1. Click **Filter** in the optional layout element toolbar.
2. Enter a duration for the **Collection Interval** filter.

   The duration must be a numeric value.

3. Select a unit of time from the list.

   The unit of time can be seconds, minutes, hours, or days.

4. Select **Beginning** or **Ending** from the list.
5. Click **Go** to filter on the selection, or click **Reset** to clear the selection.

Records are displayed according to the specified criteria.

Filtering Using the Display Filter

Use this procedure to perform a filtering operation. This procedure assumes you have a data table displayed on your screen with the Display Filter field. This process is the same for all data tables. However, all filtering operations are not available for all tables.

Note: Display Filter does not support compound filtering. For example, you cannot filter on both severity and a server name. Try to filter on a single filter criteria, such as the server hostname for server-scoped metric cells; or the application name for St- and NE-scoped metric cells. You can also sort by congestion level (descending) to help improve your filter.

1. Click **Filter** in the optional layout element toolbar.
2. Select a field name from the **Display Filter** list.

   This selection specifies the field in the table that you want to filter on. The default is **None**, which indicates that you want all available data displayed.

3. Select an operator from the operation selector list.
4. Enter a value in the value field.

   This value specifies the data that you want to filter on. For example, if you specify Filter=Severity with the equals (=) operator and a value of MINOR, the table would show only records where Severity=MINOR.

5. Click **Go** to filter on the selection, or click **Reset** to clear the selection.

Records are displayed according to the specified criteria.

Note: PCA was known as PDRA and may still be seen in some filtering.

Pause Updates

Some pages refresh automatically. Updates to these pages can be paused by selecting the **Pause updates** checkbox. Uncheck the **Pause updates** checkbox to resume automatic updates. The **Pause updates** checkbox is available only on some pages.

Max Records Per Page Controls

Max Records Per Page is used to control the maximum number of records displayed in the page area. If a page uses pagination, the value of Max Records Per Page is used. Use this procedure to change the Max Records Per Page.

1. From the **Main Menu**, click **Administration** > **General Options**.
2. Change the value of the **MaxRecordsPerPage** variable.

   Note: **Maximum Records Per Page** has a range of values from 10 to 100 records. The default value is 20.

3. Click **OK** or **Apply**.

   OK saves the change and returns to the previous page.

   Apply saves the change and remains on the same page.

The maximum number of records displayed is changed.

Chapter

3

Understanding SoR Functionality and Logic

Topics:

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 prerequesite 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

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 U-SBR 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** > **Maintenance** > **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** > **Maintenance** > **Applications**.

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

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 SBR. Thus, when the SoR application rejects or accepts a registration request, it also updates the subscriber information in the SBR.

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

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

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 U-SBR entry, which is Information about the number of registration attempts by a subscriber that is kept in a U-SBR 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 SBR 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 U-SBR 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 U-SBR 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 U-SBR record; for example, the value of the last accepted MNO in the U-SBR record. The processing of the current message by the SoR application is now finished.

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.

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 8: Message Accept or Reject Criteria*.

Table 8: 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 9: Data Collected by the SoR Application* to determine whether to reject or accept a ULR message.

Table 9: 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.

Chapter

4

Configuring SoR

Topics:

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** > **Steering of Roaming** GUI page:

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

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 users's registration history, the SoR application keeps subscriber-related records in a U-SBR Generic State database indexed by the subscriber's IMSI. This is accessible from the **SBR** > **Configuration** > **SBR Databases** page.

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** > **Maintenance** > **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.

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 **DcaDalId** table if it does not already exist.
4. Enable visibility for the main menu **DCA Framework** > **DCA Roaming Steering** subtree.
   The SoR instance is added to the GUI menu.

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** > **Report** and **Status & Manage** > **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.

Dectivating SoR

Use this task to deactivate SoR. You cannot deactivate SoR while a verison 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** > **DCA Roaming Steering**.
2. Delete ART rules referring to the deactivated SoR instance.
   The SoR instance is removed from the GUI menu.

Enabling SoR

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

1. Navigate to **Diameter** > **Maintenance** > **Applications**.
2. Select **DCA_SOR**.
3. Click **Enable**.
   The SoR instance is added to the GUI menu.

Disabling SoR

Use this task to disable SoR on the SO.

1. Navigate to **Diameter** > **Maintenance** > **Applications**.
2. Select **DCA_SOR**.
3. Click **Disable**.
   The SoR instance is removed from the GUI menu.

SoR Database Tables

Table 10: SoR Database Tables lists the the SoR database tables.

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

Table 10: 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: • MCCs and MNO IDs and names • Traffic % • Whether the operator is preferred

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 11: Config_Params and SoR_ProfileDatabase Table Elements*.

1. Navigate to **DCA Framework** > **Steering of Roaming** > **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.

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 11: Config_Params and SoR_ProfileDatabase Table Elements*.

1. Navigate to **DCA Framework** > **Steering of Roaming** > **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.

Config_Params and SoR_Profile Database Tables elements

Table 11: Config_Params and SoR_ProfileDatabase Table Elements describes the fields in the Config_Params and SoR_Profile Database tables.

Table 11: Config_Params and SoR_ProfileDatabase 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
Mandatory	Indicates whether the table must be s mandatory	Format: Checkbox Range: checked, unchecked Default: unchecked

Field (* indicates a required field)	Description	Data Input Notes
* Data type	Sets the date type	Format: List Range: Integer, Float, UTF8String, OctetString, IP Address, IP/Netmask, DiameterURI, DiameterIdentity, Enummerated, Boolean • 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

Field (* indicates a required field)	Description	Data Input Notes
		Default: NA

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.

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 12: Config_Params Provision Tables elements* and *Table 13: SoR_Profile Provision Tables elements*.

1. Select **DCA Framework** > **Roaming of Steering** > **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.

Adding a new SoR_Profile entry

Use this task to add SoR provisioning entries.

1. Navigate to **DCA Framework** > **DCA Roaming Steering** > **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*.

Config_Params Provision Tables elements

Table 12: Config_Params Provision Tables elements describes the fields on the Config_Params Provision Table page.

Table 12: 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

SoR_Profile Provision Tables elements

Table 13: SoR_Profile Provision Tables elements describes the fields on the SoR_Profile Provision Table page.

Table 13: 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
* Preferred	Sets the MNO status.	Format: checkbox Range: Preferred, non-preferred Default: Non-preferred

Glossary

A

ART

Application Routing Table

AVP

Attribute-Value Pair

The Diameter protocol consists of a header followed by one or more attribute-value pairs (AVPs). An AVP includes a header and is used to encapsulate protocol-specific data (for example, routing information) as well as authentication, authorization or accounting information.

C

CTF

Charging Trigger Function

D

DA

Destination Address

DCA

Diameter Custom Application

DNS

Domain Name System

A system for converting Internet host and domain names into IP addresses.

DRA

Diameter Relay Agent

DRL

Diameter Routing Layer - The software layer of the stack that implements Diameter routing.

D

DSCP

Differentiated Services Code Point

Provides a framework and building blocks to enable deployment of scalable service discrimination in the internet. The differentiated services are realized by mapping the code point contained in a field in the IP packet header to a particular forwarding treatment or per-hop behavior (PHB). Differentiated services or DiffServ is a computer networking architecture that specifies a simple, scalable and coarse-grained mechanism for classifying and managing network traffic and providing quality of service (QoS) on modern IP networks.

DSR

Diameter Signaling Router

A set of co-located Message Processors which share common Diameter routing tables and are supported by a pair of OAM servers. A DSR Network Element may consist of one or more Diameter nodes.

F

FQDN

Fully Qualified Domain Name

The complete domain name for a specific computer on the Internet (for example, www.oracle.com).

A domain name that specifies its exact location in the tree hierarchy of the DNS.

G

GLA

Gateway Location Application A DSR Application that provides a Diameter interface to subscriber data stored in the DSR's Policy

G

Session Binding Repository (pSBR). Subscriber data concerning binding and session information is populated in the pSBR-B by the Policy Diameter Routing Agent (Policy DRA). GLA provides methods for a Diameter node to query binding information stored in the pSBR-B. The query can be by either IMSI or MSISDN. GLA processes Diameter Requests and generates Diameter Answers.

GTA

Global Title Address

GUI

Graphical User Interface

The term given to that set of items and facilities which provides you with a graphic means for manipulating screen data rather than being limited to character based commands.

H

HA

High Availability

High Availability refers to a system or component that operates on a continuous basis by utilizing redundant connectivity, thereby circumventing unplanned outages.

HSS

Home Subscriber Server

A central database for subscriber information.

I

IDIH

Integrated Diameter Intelligence Hub

I

IMSI

International Mobile Subscriber Identity

A unique internal network ID identifying a mobile subscriber.

IP

Internet Protocol - IP specifies the format of packets, also called datagrams, and the addressing scheme. The network layer for the TCP/IP protocol suite widely used on Ethernet networks, defined in STD 5, RFC 791. IP is a connectionless, best-effort packet switching protocol. It provides packet routing, fragmentation and re-assembly through the data link layer.

K

KPI

Key Performance Indicator

L

LDAP

Lightweight Directory Access Protocol

A protocol for providing and receiving directory information in a TCP/IP network.

M

MAP

Mobile Application Part

An application part in SS7 signaling for mobile communications systems.

MCC

Mobile Country Code

A three-digit number that uniquely identifies a country served by wireless telephone networks. The MCC is part of the International Mobile Subscriber Identity (IMSI)

M

	number, which uniquely identifies a particular subscriber. See also MNC, IMSI.
MD-IWF	MAP-Diameter Interworking SS7 Application, which translates MAP messages into Diameter messages
MEAL	Measurements, Events, Alarms, and Logs
MNC	Mobile Network Code
	A number that identifies a mobile phone carrier. Used in combination with a Mobile Country Code (MCC) to uniquely identify a mobile phone operator/carrier. See also MCC.
MNO	Mobile Network Operator
MP	Message Processor - The role of the Message Processor is to provide the application messaging protocol interfaces and processing. However, these servers also have OAM components. All Message Processors replicate from their Signaling OAM's database and generate faults to a Fault Management System.

N

NAS	Network Access Server
	A single point of access or gateway to a remote resource. NAS systems are usually associated with AAA servers.

N

NOAM

Network Operations, Administration, and Maintenance

NOAMP

Network Operations, Administration, Maintenance, and Provisioning

O

OCS

Online Charging System

A system allowing a Communications Service Provider to charge customers in real time based on service usage.

P

PCRF

Policy and Charging Rules Function

The ability to dynamically control access, services, network capacity, and charges in a network.

Maintains rules regarding a subscriber's use of network resources. Responds to CCR and AAR messages. Periodically sends RAR messages. All policy sessions for a given subscriber, originating anywhere in the network, must be processed by the same PCRF.

In the Policy Management system, PCRF is located in the MPE device.

Software node designated in real-time to determine policy rules in a multimedia network.

PLMN

Public Land Mobile Network

A wireless communications network that uses land-based radio transmitters or base stations, intended for public use by terrestrial subscribers in vehicles or on foot. A PLMN is identified

P

by its Mobile Country Code (MCC) and Mobile Network Code (MNC).

PRT

Peer Route Table or Peer Routing Table

R

RADIUS

Remote Authentication Dial-In User Service

A client/server protocol and associated software that enables remote access servers to communicate with a central server to authorize their access to the requested service. The MPE device functions with RADIUS servers to authenticate messages received from remote gateways. See also Diameter.

S

SBR

Session Binding Repository

A highly available, distributed database for storing Diameter session binding data.

SFTP

SSH File Transfer Protocol (sometimes also called Secure File Transfer Protocol)

A client-server protocol that allows a user on one computer to transfer files to and from another computer over a TCP/IP network over any reliable data stream. It is typically used with version two of the SSH protocol.

SNMP

Simple Network Management Protocol.

S

An industry-wide standard protocol used for network management. The SNMP agent maintains data variables that represent aspects of the network. These variables are called managed objects and are stored in a management information base (MIB). The SNMP protocol arranges managed objects into groups.

SOAM

System Operations, Administration, and Maintenance

SoR

Steering of Roaming

SS7

Signaling System #7

A communications protocol that allows signaling points in a network to send messages to each other so that voice and data connections can be set up between these signaling points. These messages are sent over its own network and not over the revenue producing voice and data paths. The EAGLE is an STP, which is a device that routes these messages through the network.

T

TSA

Target Set Address

An externally routable IP address that the IPFE presents to application clients. The IPFE distributes traffic sent to a target set address across a set of application servers.

U

U

UDR

User-Data-Request

A user-identity and service indication sent by a Diameter client to a Diameter server in order to request user data.

ULA

Update Location Answer

ULR

Update Location Request

V

VPLMN

Visited Public Land Mobile Network

The PLMN to which a mobile subscriber has roamed when leaving the subscriber's Home Public Land Mobile Network.