

**Oracle® Communications
Diameter Signaling Router**

Range Based Address Resolution (RBAR) User's Guide

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Oracle Communications Diameter Signaling Router Range Based Address Resolution (RBAR) User's Guide
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Table of Contents

Chapter 1: Introduction.....	8
Overview.....	9
Scope and Audience.....	9
Manual Organization.....	9
Documentation Admonishments.....	9
Related Publications.....	10
Locate Product Documentation on the Oracle Help Center Site.....	10
Customer Training.....	11
My Oracle Support (MOS).....	11
Emergency Response.....	11
Chapter 2: User Interface Introduction.....	13
User Interface Organization.....	14
User Interface Elements.....	15
Main Menu Options.....	16
Missing Main Menu options.....	20
Common Graphical User Interface Widgets.....	21
Supported Browsers.....	21
System Login Page.....	21
Main Menu Icons.....	23
Work Area Displays.....	24
Customizing the Splash Page Welcome Message.....	27
Column Headers (Sorting).....	27
Page Controls.....	27
Clear Field Control.....	28
Optional Layout Element Toolbar.....	28
Filters.....	29
Pause Updates.....	32
Max Records Per Page Controls.....	32
Chapter 3: Range Based Address Resolution.....	33
Range Based Address Resolution overview.....	34
Address Ranges.....	35

Individual Addresses.....	35
Application Chaining.....	36
Request Message Validation.....	37
Multiple DSR Application Invocation Prevention.....	43
Metadata Recording for Integrated DIH (IDIH).....	44
Chapter 4: Configuration of RBAR.....	46
Pre-Configuration Activities.....	47
Verifying Server status.....	47
Diameter Common Configuration for RBAR.....	47
Diameter Configuration for RBAR.....	48
RBAR Configuration.....	49
Applications configuration.....	49
Exceptions configuration.....	52
Destinations configuration.....	55
Address Tables configuration.....	59
Addresses configuration.....	61
Address Resolutions configuration.....	67
System Options configuration.....	72
Post-Configuration Activities.....	76
Enabling the RBAR Application.....	76
Status Verification.....	76
Bulk Import and Export.....	77
Chapter 5: Maintenance of RBAR.....	79
RBAR Maintenance Overview.....	80
RBAR Administrative State and Operational Status.....	80
Glossary.....	81

List of Figures

Figure 1: Oracle System Login.....	22
Figure 2: Paginated Table.....	24
Figure 3: Scrollable Table.....	25
Figure 4: Form Page.....	25
Figure 5: Tabbed Pages.....	26
Figure 6: Tabbed Pages.....	26
Figure 7: Report Output.....	26
Figure 8: Sorting a Table by Column Header.....	27
Figure 9: Clear Field Control X.....	28
Figure 10: Optional Layout Element Toolbar.....	28
Figure 11: Automatic Error Notification.....	29
Figure 12: Examples of Filter Styles.....	30
Figure 13: IMSI/MSISDN Overlap Range Scenario.....	43

List of Tables

Table 1: Admonishments.....	10
Table 2: User Interface Elements.....	15
Table 3: Main Menu Options.....	16
Table 4: Main Menu Icons.....	23
Table 5: Example Action Buttons.....	27
Table 6: Submit Buttons.....	28
Table 7: Filter Control Elements.....	30
Table 8: RBAR Supported AVPs.....	38
Table 9: Combinations of User Identity Types and Associated AVPs.....	39
Table 10: Relation between Configured User Identity Types and Data Formats.....	40
Table 11: DSR-Application-Invoked AVP.....	43
Table 12: RBAR Metadata-Generating Events.....	44
Table 13: Applications Configuration Elements.....	50
Table 14: Connections Status Filtering Categories.....	50
Table 15: Connections Status Filtering Operators.....	50
Table 16: Exceptions Configuration Elements.....	52
Table 17: Connections Status Filtering Categories.....	54
Table 18: Connections Status Filtering Operators.....	54
Table 19: Destinations Configuration Elements.....	56
Table 20: Connections Status Filtering Categories.....	56
Table 21: Connections Status Filtering Operators.....	57
Table 22: Address Tables Configuration Elements.....	59

Table 23: Connections Status Filtering Categories.....	60
Table 24: Connections Status Filtering Operators.....	60
Table 25: Addresses Configuration Elements.....	62
Table 26: Address Resolutions Configuration Elements.....	67
Table 27: Connections Status Filtering Categories.....	69
Table 28: Connections Status Filtering Operators.....	69
Table 29: System Options Elements.....	72
Table 30: RBAR Admin State and Operational Status.....	80

Chapter 1

Introduction

Topics:

- [Overview.....9](#)
- [Scope and Audience.....9](#)
- [Manual Organization.....9](#)
- [Documentation Admonishments.....9](#)
- [Related Publications.....10](#)
- [Locate Product Documentation on the Oracle Help Center Site.....10](#)
- [Customer Training.....11](#)
- [My Oracle Support \(MOS\).....11](#)
- [Emergency Response.....11](#)

The *Range Based Address Resolution (RBAR) User's Guide* and Help provide an overview of RBAR functions and procedures to configure RBAR. The contents of this chapter include sections on the scope, audience, and organization of the document, Oracle documentation, and how to contact Oracle for assistance.

Overview

The Range Based Address Resolution (RBAR) documentation provides information about RBAR functions, explains how to use the RBAR GUI, and the following procedures to configure the RBAR application.

- Applications
- Exceptions
- Destinations
- Address Tables
- Addresses
- Address Resolutions
- System Options

Scope and Audience

The RBAR document is for anyone responsible for configuring and using the RBAR application. Users of this manual must have a working knowledge of telecommunications, network installations, and the product that is using the RBAR functions.

Manual Organization





This manual is organized into the following chapters:

- *Introduction* contains general information about the RBAR help documentation, the organization of this manual, and how to get technical assistance.
- *User Interface Introduction* describes the organization and usage of the application 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.
- *Range Based Address Resolution* describes the function of the RBAR application.
- *Configuration of RBAR* describes how to configure the RBAR application, including Applications, Exceptions, Destinations, Address Tables, Addresses, Address Resolutions, and System Options.
- *Maintenance of RBAR* describes maintenance functions and information that can be used with the RBAR application.

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 <i>personal injury</i> .)
 WARNING	Warning: (This icon and text indicate the possibility of <i>equipment damage</i> .)
 CAUTION	Caution: (This icon and text indicate the possibility of <i>service interruption</i> .)
 TOPPLE	Topple: (This icon and text indicate the possibility of <i>personal injury and equipment damage</i> .)

Related Publications

For information about additional publications that are related to this document, refer to the *Related Publications Reference* document, which is published as a separate document on the Oracle Help Center site. See [Locate Product Documentation on the Oracle Help Center Site](#) for more information.

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:

- [User Interface Organization.....14](#)
- [Missing Main Menu options.....20](#)
- [Common Graphical User Interface Widgets.....21](#)

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
- Alarm and Events
- Security Log
- Status & Manage
- Measurements
- Help
- Legal Notices
- Logout

Applications, such as DSR, build upon this framework to present features and functions. For example, the DSR Network OAM GUI may present the following Main Menu options in addition to the common options:

- Communication Agent
- Diameter Common
- Diameter
- Policy and Charging
- MAP-Diameter IWF
- SBR
- RADIUS

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
- FABR
- IPFE
- GLA
- Policy and Charging
- MAP-Diameter IWF
- SBR
- RADIUS
- Mediation

Note that the DSR System OAM Main Menu options differ from the Network OAM options. Some Main Menu options are configurable from the DSR Network OAM server and view-only from the System OAM 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	Displays the company name, product name and version, and the alarm panel.
Session Banner	Next bar across the top of the web page	<p>The left side of the banner just above the Main Menu provides the following session information:</p> <ul style="list-style-type: none"> • 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. <p>The right side of the banner:</p> <ul style="list-style-type: none"> • 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	<p>A tree-structured menu of all operations that can be performed through the user interface. The plus character (+) indicates a menu item contains subfolders.</p> <ul style="list-style-type: none"> • 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	<p>Consists of three sections: Page Title Area, Page Control Area (optional), and Page Area.</p> <ul style="list-style-type: none"> • 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 .

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	<p>The Administration menu allows the user to:</p> <ul style="list-style-type: none"> • 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 • Authenticate LDAP servers • Configure SNMP trapping services • Configure an export server • Configure DNS elements
Configuration	<p>On the NOAM, allows the user to configure:</p> <ul style="list-style-type: none"> • Network Elements • Network Devices • Network Routes

Menu Item	Function
	<ul style="list-style-type: none"> • Services • Servers • Server Groups • Resource Domains • Places • Place Associations • Interface and Port DSCP
Alarms and Events	<p>Allows the user to view:</p> <ul style="list-style-type: none"> • Active alarms and events • Alarm and event history • Trap log
Security Log	<p>Allows the user to view, export, and generate reports from security log history.</p>
Status & Manage	<p>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.</p>
Measurements	<p>Allows the user to view and export measurement data.</p>
Transport Manager (optional)	<p>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.</p>
Communication Agent (optional)	<p>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.</p>
SS7/Sigtran (optional)	<p>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.</p>
Diameter Common (optional)	<p>Allows the user to view or configure:</p> <ul style="list-style-type: none"> • 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 <p>The DSR Bulk Import and Export functions are available on both OAMs for the data configured on that OAM.</p>
Diameter (optional)	<p>Allows the user to configure, modify, and monitor Diameter routing:</p> <ul style="list-style-type: none"> • On the NOAMP, Diameter Topology Hiding and Egress Throttle List configuration

Menu Item	Function
	<ul style="list-style-type: none"> • On the SOAM, Diameter Configuration, Maintenance, Reports, Troubleshooting with IDIH, AVP Dictionary, and Diameter Mediation configuration
RBAR (Range-Based Address Resolution) (optional)	Allows the user to configure the following Range-Based Address Resolution (RBAR) settings: <ul style="list-style-type: none"> • Applications • Exceptions • Destinations • Address Tables • Addresses • Address Resolutions • System Options This is accessible from the SOAM only.
FABR (Full Address Based Resolution) (optional)	Allows the user to configure the following Full Address Based Resolution (FABR) settings: <ul style="list-style-type: none"> • Applications • Exceptions • Default Destinations • Address Resolutions • System Options This is accessible from the SOAM only.
Policy and Charging (optional)	On the NOAMP, allows the user to perform configuration tasks, edit options, and view elements for: <ul style="list-style-type: none"> • General Options • Access Point Names • Policy DRA <ul style="list-style-type: none"> • PCRF Pools • PCRF Sub-Pool Selection Rules • Network-Wide Options • Online Charging DRA <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Maintenance <ul style="list-style-type: none"> • SBR Database Status

Menu Item	Function
	<ul style="list-style-type: none"> • SBR Status • SBR Database Reconfiguration Status • Policy Database Query <p>On the SOAM, allows the user to perform configuration tasks, edit options, and view elements for:</p> <ul style="list-style-type: none"> • General Options • Access Point Names • Policy DRA <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • OCSs • CTFs • OCS Session State • Realms • Error Codes • Alarm Settings • Congestion Options
Gateway Location Application (optional)	<p>On the SOAM, allows the user to perform configuration tasks, edit options, and view elements for:</p> <ul style="list-style-type: none"> • Exceptions • Options <p>GLA can deploy with Policy DRA (in the same DA-MP or a separate DA-MP).</p>
IPFE (optional)	<p>Allows the user to configure IP Front End (IPFE) options and IP List TSAs. This is accessible from the SOAM server only.</p>
MAP-Diameter Interworking (optional)	<p>On the SOAM, allows the user to perform configuration tasks, edit options, and view elements for the DM-IWF DSR Application:</p> <ul style="list-style-type: none"> • DM-IWF Options • Diameter Exception <p>On the NOAMP, allows the user to perform configuration tasks, edit options, and view elements for the MD-IWF SS7 Application:</p>

Menu Item	Function
	<ul style="list-style-type: none"> • MD-IWF Options • Diameter Realm • Diameter Identity GTA • GTA Range to PC • MAP Exception • CCNDC Mapping
RADIUS (optional)	<p>Allows the user to perform configuration tasks, edit system options, and view elements for:</p> <ul style="list-style-type: none"> • Network Options • Message Authenticator Configuration Sets • Shared Secret Configuration Sets • Ingress Status Server Configuration Sets • Message Conversion Configuration Sets • NAS Node
SBR (optional)	<p>Allows the user to perform configuration tasks, edit system options, and view elements for:</p> <ul style="list-style-type: none"> • SBR Databases • SBR Database Resizing Plans • SBR Data Migration Plans <p>Additionally, on the NOAMP, users are allowed to perform maintenance tasks, edit options, and view elements for:</p> <ul style="list-style-type: none"> • Maintenance <ul style="list-style-type: none"> • SBR Database Status • SBR Status • SBR Database Reconfiguration Status
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.

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 System Login

Wed Jul 8 14:20:00 2015 EDT

Log In

Enter your username and password to log in

Username:

Password:

Change password

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.

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Other names may be trademarks of their respective owners.*

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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 a DSR, some configuration is done at the NOAM server, while some is done at the SOAM server. Because of this, you will 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 then 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.
	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 pulldown lists, buttons, and links.

Username: (5-16 characters)

Group:

Time Zone:

Maximum Concurrent Logins: Maximum concurrent logins for a user (0=no limit). [Default = 1; Range = 0-50]

Session Inactivity Limit: Time (in minutes) after which login sessions expire (0 = never). [Default = 120; Range = 0-120]

Comment: (max 64 characters)

Temporary Password: (8-16 characters)

Re-type Password:

Ok Apply Cancel

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.

Entire Network *		System.CPU_CoreUtilPct_Average	System.CPU_CoreUtilPct_Peak				
NOAMP	SOAM	Timestamp	System CPU UtilPct Average	System CPU UtilPct Peak	System Disk UtilPct Average	System Disk UtilPct Peak	System RAM UtilPct Average
		10/22/2009 19:45	6.764068	44	0.520000	1	7.939407
		10/22/2009 20:00	7.143644	25	0.520000	1	8.523822

Figure 5: Tabbed Pages

Retrieve Add Update Delete

Fields marked with a red asterisk (*) require a value.

Field	Value	Description
Network Entity	<input type="text"/>	* Numeric identifier for the Network Entity 1-15 DIGITS

Retrieve

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**.

The **General Options** page appears.

2. Locate **WelcomeMessage** 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.

Local Node Name	Realm	FQDN	SCTP Listen Port	TCP Listen Port	Connection Configuration Set	CEX Configuration Set	IP Addresses
-----------------	-------	------	------------------	-----------------	------------------------------	-----------------------	--------------

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.

Action Button	Function
Delete	Deletes data from table.
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 pulldown list. The clear field control is available only on some pulldown fields.

Click the X next to a pulldown list to clear the field.

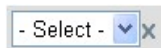


Figure 9: Clear Field Control X

Optional Layout Element Toolbar

The optional layout element toolbar appears in the Page Control Area of the GUI.

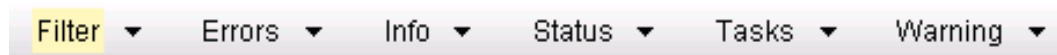


Figure 10: Optional Layout Element Toolbar

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.

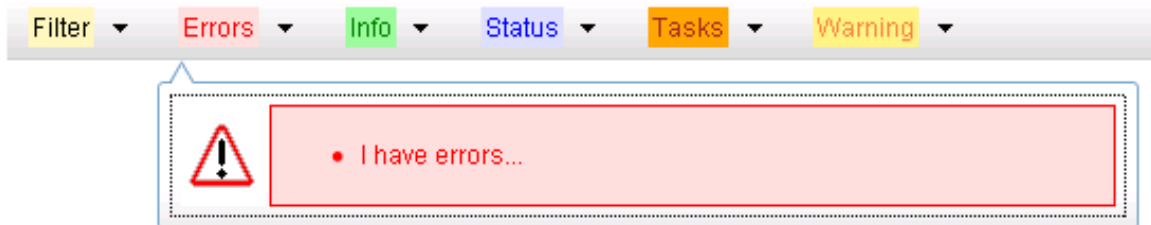


Figure 11: Automatic Error Notification

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 will 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 will be 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.
The filter tool appears.
2. Select a Network Element from the **Network Element** pulldown menu.
3. Click **Go** to filter on the selection, or click **Reset** to clear the selection.

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.
The filter tool appears.
2. Enter a duration for the **Collection Interval** filter.
The duration must be a numeric value.
3. Select a unit of time from the pulldown menu.
The unit of time can be seconds, minutes, hours, or days.
4. Select **Beginning** or **Ending** from the pulldown menu.
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. This process is the same for all data tables. However, all filtering operations are not available for all tables.

1. Click **Filter** in the optional layout element toolbar.
The filter tool appears.
2. Select a field name from the **Display Filter** pulldown menu.
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.
The selected field name displays in the **Display Filter** field.
3. Select an operator from the operation selector pulldown menu.
The selected operator appears in the field.
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. For data tables that support compound filtering, click **Add** to add another filter condition. Then repeat steps 2 through 4.

Multiple filter conditions are joined by an AND operator.

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

Records are displayed according to the specified criteria.

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**.

The **General Options Administration** page appears.

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

Range Based Address Resolution

Topics:

- *Range Based Address Resolution overview.....34*
- *Application Chaining.....36*
- *Request Message Validation.....37*
- *Multiple DSR Application Invocation Prevention.....43*
- *Metadata Recording for Integrated DIH (IDIH).....44*

This section provides an overview of the function of the Range Based Address Resolution (RBAR) DSR Application.

Range Based Address Resolution overview

Range Based Address Resolution (RBAR) is an enhanced routing application that allows the routing of Diameter end-to-end transactions based on Diameter Application ID, Command Code, Routing Entity Type, and Routing Entity Addresses (range and individual) as a Diameter Proxy Agent.

A Routing Entity can be:

- A User Identity:
 - International Mobile Subscriber Identity (IMSI)
 - Mobile Subscriber Integrated Services Digital Network (Number) (MSISDN)
 - IP Multimedia Private Identity (IMPI)
 - IP Multimedia Public Identity (IMPU)
- An IP Address associated with the User Equipment
 - IPv4 (based upon the full 32-bit value in the range of 0x00000000 to 0xFFFFFFFF)
 - IPv6-prefix (1 to 128 bits)
- A general purpose data type: UNSIGNED16 (16-bit unsigned value)

Routing resolves to a Destination that can be configured with any combination of a Realm and Fully Qualified Domain Name (FQDN); Realm-only, FQDN-only, or Realm and FQDN.

When a message successfully resolves to a destination, RBAR replaces the destination information (Destination-Host and/or Destination-Realm) in the ingress message with the corresponding values assigned to the resolved destination, and forwards the message to the (integrated) Diameter Relay Agent for egress routing into the network.

RBAR Functions

RBAR provides the following functions:

Reserved MCC Ranges

Mobile Country Code (MCC) ranges that are reserved for future use are defined in a system-wide **MCC Ranges** table. If the MCC digits portion of a decoded IMSI digits fall within one of the ranges designated in the **MCC Ranges** table, the IMSI digits will NOT be used for further Address Resolution. RBAR will continue decoding the digits using other AVP instances, or next Priority AVP (if provisioned), or next Routing Entity (if provisioned).

Identifying IMSIs and MSISDNs

Address resolution applications like Full Address Based Resolution (FABR) and (RBAR) need to categorize User Identities (digit strings) decoded from the Diameter Request AVPs as either MSISDN or IMSI, to allow looking up the User Identity in the appropriate lookup table.

If there is no plus sign before the digits, the Routing Entity Type is IMPU, and decoded digits falls within MSISDN and IMSI overlap range, configured MCC+MNC combinations can be compared to the first 5 or 6 digits of the User Identity. If a match occurs, the User Identity is considered as an IMSI and used for IMSI lookup. If a match does not occur, the User Identity is considered as an MSISDN and used for MSISDN lookup.

See [Identifying IMSIs and MSISDNs](#) for more information about identifying IMSIs and MSISDNs using digit string lengths and MCC+MNC combinations.

Application Chaining

Application Routing Rules can be configured so that RBAR and the PCA applications can be run independently on a same DSR DA-MP without interfering with each other's functionality.

Assumption and Limitation

In Diameter, all IMSIs are in the form of an ITU-T E.212 number. It is assumed that customers will provision all IMSIs within the RBAR database as E.212 values. E.212 to E.214 conversion is not supported.

Address Ranges

An Address Range contains the following attributes:

- Routing Entity Type
- Start Address
- End Address
- Destination

RBAR Address Ranges are at least two addresses.

A common set of Address Ranges (such as all IMSIs associated with a LTE-HSS) is called a Digit Range Table (DRT).

For a DRT that can be associated with User Identity Types,

- RBAR supports DRT Address Ranges with different digit lengths.

or example, the range 9195550000 - 9195559999 and the range 303200 - 303299 are allowed in the same DRT.

- RBAR supports a minimum of 8 different DRT Address Range digit lengths.

For example, an MSISDN DRT could contain Address Ranges with 3 digits, 6 digits, 10 digits and 15 digits.

For a DRT that can be associated with the Routing Entity Type IPv6-Prefix Address, RBAR supports a minimum of 32 different DRT Address Range bit lengths.

The Start Address and the End Address attributes of an Address Range entry that can be associated with the Routing Entity Type UNSIGNED16 will always be a 16-bit value.

Individual Addresses

An Individual Address contains the following attributes:

- (AET) Table Name
- Address
- Routing Entity Type
- Destination

A common set of Individual Addresses (such as all IMSIs associated with a LTE-HSS) is called an Address Exception Table (AET).

The Address attribute of an Individual Address that can be associated with User Identity Types will contain a minimum of three (3) and a maximum of fifteen (15) digits.

The Address attribute of an Individual Address that can be associated with the Routing Entity Type (IPv4 Address) will always be a 32-bit value.

The Address attribute of an Individual Address that can be associated with the Routing Entity Type (IPv6-Prefix Address) will contain a minimum of one (1) and a maximum of 128 bits.

The Address attribute of an Individual Address that can be associated with the Routing Entity Type (UNSIGNED16) will always be a 16-bit value.

For an AET that can be associated with User Identity Types and with the Routing Entity Type (IPv6-Prefix Address), RBAR supports addresses with different digit lengths.

Application Chaining

Application Chaining for RBAR and PCA refers to the enhanced ability to support the running of multiple DSR applications independently on a same DSR DA-MP without interfering to each other's functionality and the two applications can be invoked in turn on the same DA-MP. The order in which the applications are invoked can be configured based on the existing and enhanced Application Routing Rule.

When DSR receives a request, the routing layer makes the decision to forward the message, either to an application residing in the DSR or to a peer DSR node. This decision is based on the Application Routing Table (ART) rules. The ART also determines which application is initially forwarded the message.

Historically, Diameter messages use the Command Code as one of the main parameters in the ART to help with the DRL application forwarding decision. Application chaining enhances and expands the currently used Command Code parameter into an Extended Command Code (ECC) that contains the following attributes:

- ECC name, which is the actual Command Code name
- Command Code value
- AVP code Value, an AVP within the Command Code
- AVP data value

Application Route Table (ART)

Application Route Tables (ART) are used for routing Request messages to DSR Applications. An Application Route Table consists of a set of prioritized Application Routing Rules that the Diameter Routing Function searches with the content of a Request message, to determine whether the message should be forwarded to a DSR Application for processing.

The ART is searched when a Request message is received from a Peer Node or a DSR Application. Searching an ART when a Request message is received from a DSR Application allows the operator to route the ingress Diameter transaction to multiple DSR Applications in sequence. The operator can create multiple ARTs to assign an ART to a Request message based upon a set of user-defined criteria.

One ART is searched each time a Request message is received from a Peer Node or a DSR Application. This method allows forwarding a Diameter transaction to one or more DSR Applications for processing.

However, the Diameter Routing Function does not allow a DSR Application to process a Diameter transaction more than once. The Diameter Routing Function internally keeps track of which DSR Applications have already processed the message. When the Diameter Routing Function is searching an ART and encounters an Application Routing Rule that is associated with a DSR Application that has already processed the transaction, that Application Routing Rule will be bypassed.

For RBAR and PCA Application chaining, up to six parameters may be used to form Application Routing Rules:

- Application ID
- Extended Command Code
- Origin-Host
- Origin-Realm
- Destination-Host
- Destination-Realm

A priority is also assigned to each Application Routing Rule. If conditions in multiple rules are triggered simultaneously, the associated priority determines which rule applies.

Request Message Validation

The RBAR application processes the Diameter Request message based on the configuration, to extract the User Identity addresses.

When RBAR receives a Diameter Request message, the following validation is performed:

- Determine whether the Application ID in the message header is defined in the configuration.
If a valid Application ID cannot be found, the message is not processed. An Answer response with a Result Code AVP for DIAMETER_APPLICATION_UNSUPPORTED is returned.
- If a valid (configured) Application ID is received in a Diameter Request message, validate whether the pair (Application ID, Command Code) received in the message is defined in the configuration.
If the pair cannot be found in the configuration, the appropriate Routing Exception Handling procedure is invoked.
- If the pair is configured, search for a valid Routing Entity address in the message based on the highest priority Routing Entity Type (Primary Routing Entity Type in Address Resolution configuration) assigned to the pair.
- Search for a valid Routing Entity Address in the message based on a prioritized set of AVPs assigned to the triplet.

If a valid Routing Entity Address cannot be found in searching the configured Routing Entity Types assigned to the pair, the Routing Exception Handling procedure is invoked that is assigned to the Application ID and this Routing Entity Type.

Routing Exception Handling

When an ingress RBAR Request message cannot be resolved to a Destination (no address matched, no valid digits decoded, or any other error is returned), RBAR will invoke a Routing Exception Handling procedure based on user-defined configuration.

Routing Exception Handling procedures will result in one for the following configured actions:

- Forward the message unchanged
- Forward the message using a user-defined Default Destination
- Send Answer response with a user-defined Result-Code AVP value and Error-Message AVP
- Send Answer response with user-defined Experimental-Code AVP values and Error-Message AVP
- Abandon Request (discard the ingress Diameter Request message)

The following types of Routing Exceptions will be supported:

- Unknown Command Code
- Valid address not found
- Valid address was found and did not match a configured address or address range

Supported AVPs

RBAR supports the AVPs associated with a User Identity Type (IMSI, MSISDN, IMPI, IMPU), as defined in [Table 8: RBAR Supported AVPs](#).

Table 8: RBAR Supported AVPs

For a User Identity Type (IMSI, MSISDN, IMPI, IMPU) AVPs	Vendor ID and AVP Code	AVP Type	AVP Reference
User-Name	Vendor-ID: none AVP Code: 1	UTF8String	Section 8.14 of RFC 3588bis
Service-Information [Subscription-ID]	Vendor-ID: 10415 (3GPP) AVP Code: 873	Grouped	Section 7.2.192 of 3GPP 32.299
Subscription-ID [Subscription-ID-Data]	Vendor-ID: none AVP Code: 443	Grouped	Section 8.46 of RFC 4006
Subscription-ID-Data	Vendor-ID: none AVP Code: 444	UTF8String	Section 8.48 of RFC 4006
Public Identity	Vendor-ID: 10145 (3GPP) AVP Code: 601	UTF8String	Section 6.3.2 of 3GPP 29.229
User-Identity: [Public-Identity] [MSISDN]	Vendor-ID: 10415 (3GPP) AVP Code: 700	Grouped	Section 6.3.1 of 3GPP 29.329

For a User Identity Type (IMSI, MSISDN, IMPI, IMPU) AVPs	Vendor ID and AVP Code	AVP Type	AVP Reference
MSISDN	Vendor-ID: 10415 (3GPP) AVP Code: 701	OctetString	Section 6.3.2 of 3GPP 29.329
Public-Identity	Vendor-ID: 10415 (3GPP) AVP Code: 601	UTF8String	Section 6.3.2 of 3GPP 29.229
For a Routing Entity Type IPv4 Address			
Framed-IP-Address	Vendor-ID: none AVP Code: 8	OctetString	Section 6.11.1 of RFC 4005
For a Routing Entity Type IPv6 Prefix Address			
Framed-IPv6-Prefix	Vendor-ID: none AVP Code: 97	OctetString	Section 6.11.6 of RFC 4005

Each of the configured User Identity types supported in RBAR is associated with certain AVPs that contain the User Identity type as defined by various Diameter application standards. [Table 9: Combinations of User Identity Types and Associated AVPs](#) presents all possible combinations of the User Identity types and the associated AVPs.

Table 9: Combinations of User Identity Types and Associated AVPs

User Identity Types/AVPs	IMSI	MSISDN	IMPI	IMPU
MSISDN		Applicable		Applicable
User-Identity: MSISDN		Applicable		Applicable
Public-Identity	Applicable	Applicable	Applicable	Applicable
User-Identity: Public-Identity	Applicable	Applicable	Applicable	Applicable
User-Name	Applicable		Applicable	
Subscription-ID-Data (0-E.164)		Applicable		Applicable
Service-Information: Subscription-ID-Data (0-E.164)		Applicable		Applicable
Subscription-ID-Data (1-IMSI)	Applicable		Applicable	
Service-Information: Subscription-ID-Data (1-IMSI)	Applicable		Applicable	
Subscription-ID-Data (2-SIP URI)	Applicable	Applicable	Applicable	Applicable

Range Based Address Resolution

User Identity Types/AVPs	IMSI	MSISDN	IMPI	IMPU
Service-Information: Subscription-ID-Data (2-SIP URI)	Applicable	Applicable	Applicable	Applicable
Subscription-ID-Data (3-NAI)	Applicable	Applicable	Applicable	Applicable
Service -Information: Subscription-ID-Data (3-NAI)	Applicable	Applicable	Applicable	Applicable
Subscription-ID-Data (4-Private)	Applicable	Applicable	Applicable	Applicable
Service -Information: Subscription-ID-Data (4-Private)	Applicable	Applicable	Applicable	Applicable
Wildcarded-Public-Identity				Applicable

A User Identity type can be associated with one or more data formats that will be examined when deriving the user identity address from the associated AVPs. The relation between User Identity types and the corresponding data formats to be encountered in the ingress Diameter request message are listed in [Table 10: Relation between Configured User Identity Types and Data Formats](#).

Table 10: Relation between Configured User Identity Types and Data Formats

Configurable User Identity Types/User Identity Formats in Messages	IMSI	MSISDN	IMPI	IMPU
IMSI Format: ASCII Example: 311480123456789	Applicable		Applicable	
MSISDN Format: ASCII and TBCD Example: 19194605500		Applicable		Applicable
SIP URI with IMSI Format: ASCII	Applicable		Applicable	
Examples: sip:123456789012345@nai.epc.mnc456.mcc123.3gppnetwork.org sip:6311150999995555@ims.mnc015.mcc311.3gppnetwork.org sip:311480999995555@my.network.org sip: 6311480999995555@my.network.org				
SIP URI with MSISDN Format: ASCII		Applicable		Applicable

Range Based Address Resolution

Configurable User Identity Types/User Identity Formats in Messages	IMSI	MSISDN	IMPI	IMPU
Examples: sip:+1-919-460-5500@xyz.com;user=phone sip:311480999995555@my.network.org				
SIP URI with NAI Format: ASCII Example: sip:handy.manny@xyz.com			Applicable	Applicable
SIP URI with Wildcarded PSI Format: ASCII Example: sip:WP-A_ServiceType-!.*!@att.com				Applicable
TEL URI with MSISDN FORMAT: ASCII		Applicable		Applicable
Examples: tel:+1-919-460-5500; phone-context=example.com tel:+19258889999 tel:19195551212				
NAI with IMSI/MSISDN Format: ASCII	Applicable	Applicable	Applicable	Applicable
Examples: 123456789012345@xyz.com 123456789012345 311480999995555@ims.mnc480.mcc311.3gppnetwork.org 6311150999995555@xyz.com 6311150999995555@ims.mnc015.mcc311.3gppnetwork.org				
NAI Format: ASCII Example: handy.manny@xyz.com			Applicable	Applicable

Routing Based on IMSI/MSISDN Prefix Lookup

If configured, RBAR will perform prefix-based lookups after the full address lookup is performed. The prefix and range based lookup will only be performed if the full address lookup does not find a match and can be enabled by the operator for a combination of Application-ID, Command-Code, and Routing Entity Type.

If a match is found in the prefix database, that RBAR application will populate the Destination-Host AVP and/or the Destination-Realm AVP based on the resolved destination.

If a match is not found in the prefix database, then RBAR will perform the No Address Match Found routing exception handling procedure.

The IMSI/MSISDN Prefix and Range lookup can be enabled or disabled on a system wide basis.

Identifying IMSIs and MSISDNs

In certain Diameter messages over the Cx interface (and possibly over the Sh interface), certain AVPs that typically carry an IMSI sometimes can carry an MSISDN.

Address resolution applications like Full Address Based Resolution (FABR) and Range Based Address Resolution (RBAR) need to categorize User Identities (digit strings) decoded from the Diameter Request AVPs as either MSISDN or IMSI, to allow looking up the User Identity in the appropriate lookup table.

Most of the time, these applications can clearly categorize the decoded User Identity based on:

- The configured Routing Entity Type
- The contents of the AVP

For instance, if the User Identity has been decoded from a SIP URI that has a plus sign before the digits (such as sig:+1-919-460-5500@oracle.com), it can be directly categorized as an MSISDN.

- The number of digits in the User Identity

In certain cases, none of these methods allow a clear categorization (for example, if the number of digits needs to be used and the received number of digits are applicable to both IMSIs and MSISDNs, and thus leads to an ambiguous determination; or if there is no plus sign before the digits).

If RBAR has been configured to decode an IMPU/MSISDN from a User Identity (digit string) but cannot determine whether the User Identity is an IMSI or an MSISDN based on digit analysis, a tie-breaker is needed to properly categorize the User Identity.

If the Routing Entity Type is IMPU, the User Identity extracted results in only digits and the length of the digits in the User Identity falls within an overlap digits range of MSISDN and IMSI. As shown in [Figure 13: IMSI/MSISDN Overlap Range Scenario](#), if the User Identity is an IMSI or MSISDN the logic is determined as follows:

- RBAR extracts the first 5 or 6 digits of the User Identity and compares them against a list of configured 5- or 6-digit MCC-MNC combinations.

The **Diameter Common > Network Identifiers > MCCMNC** GUI pages can be used to configure up to 2500 distinct combinations of Mobile Country Code (MCC) and Mobile Network Code (MNC). (Refer to the *Diameter Common User's Guide* and Help for procedures to configure MCC-MNC combinations.)

- If a match occurs, the User Identity is considered as an IMSI. RBAR will bypass the AVP, as RBAR does not support decoding an IMSI form a Routing Entity IMPU or MSISDN.
- If a match does not occur, the User Identity is considered as a MSISDN and used for MSISDN lookup.

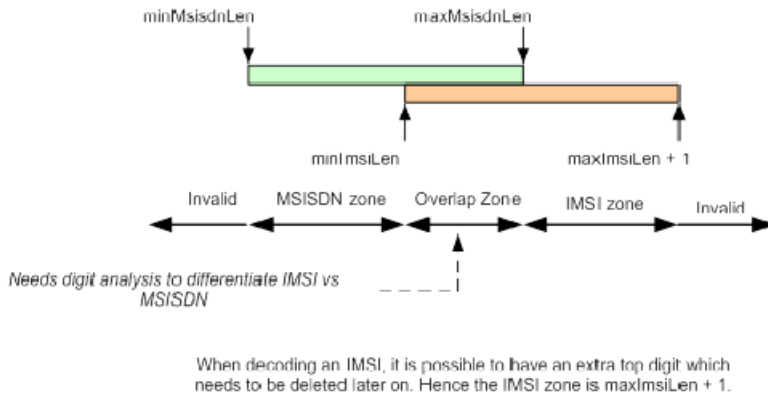


Figure 13: IMSI/MSISDN Overlap Range Scenario

Multiple DSR Application Invocation Prevention

The DSR provides a mechanism for preventing the same DSR Application from being invoked on two different DSR nodes:

- When a DSR Application does not want to be invoked a second time on another DSR, it can insert a DSR AVP called DSR-Application-Invoked containing its DSR Application ID.
- When the Diameter Routing Function searches an ART, it ignores any Application Routing Rules associated with a DSR-Application that has inserted the DSR-Application-Invoked AVP.

DSR-Application-Invoked AVP

To prevent the same DSR Application from being invoked on multiple DSRs in a network (and processing the same message twice by the same DSR Application), a DSR Application can (optionally) add to the Request message a DSR-Application-Invoked AVP containing the DSR Application ID as describe in [Table 11: DSR-Application-Invoked AVP](#).

Table 11: DSR-Application-Invoked AVP

Byte 1	Byte 2	Byte 3	Byte 4
AVP Code = 2468			
Flags=10000000		Length = 16	
Vendor ID = 323			
DSR Application Id = Unsigned32			

This AVP is decoded by the Diameter Routing Function before ART processing to prevent multiple invocations of the same DSR Application. Any Application Routing Rule with this DSR Application Id will be ignored by the Diameter Routing Function.

This AVP can be repeated in the Request to indicate different DSR Applications, but is inserted only once per DSR Application.

Insertion of a DSR Application-Invoked AVP is controlled by DSR Application-specific System Options configuration, such as:

Allow Subsequent RBAR Invocation – Checked = Yes, Unchecked = No

If checked, subsequent invocation of RBAR on a different DSR node in the network is allowed.

Metadata Recording for Integrated DIH (IDIH)

Integrated DIH (IDIH) can be used to capture detailed information about selected Diameter transactions, and transmit this information to DIH for further analysis.

The Diameter Routing Function and invoked DSR Applications record detailed information about each Diameter transaction - called transaction metadata. Each metadata record describes an important event in the lifetime of a Diameter transaction. Metadata appears in the Trace Transaction Record (TTR) in the order that the metadata-generating events actually occurred. Together, all of the metadata records combine to document the processing performed on the entire transaction, and can later be used to provide diagnostic information when performing troubleshooting. Metadata is recorded to a TTR for each transaction so that, even if the transaction is selected to be sent to DIH at an Answer Troubleshooting Trigger Point (TTP-IA or TTP-EA), the metadata for all of the messages in the transaction will be present.

The functions of IDIH are described in the *Integrated DIH User's Guide* and Help.

RBAR will record the Application-specific metadata events described in [Table 12: RBAR Metadata-Generating Events](#).

Table 12: RBAR Metadata-Generating Events

Event	Type	Scope	Instance Data	When Recorded
Address Resolution Match found	Address Resolution Match	App Data	<ul style="list-style-type: none"> Routing Entity Type (such as IMSI) Routing Entity AVP (such as User Name) Routing Entity Address (such as 123456789012345) 	After RBAR searches and finds a valid Routing Entity address in an ingress Request message using a prioritized set of AVPs associated with the highest priority Routing Entity Type assigned to the Address Resolution order pair (Diameter Application ID, Command Code).
Routing Entity address resolved to a Destination	Destination Resolution	App Data	<ul style="list-style-type: none"> Destination Routing Table Format (such as AET) 	When a valid Routing Entity address extracted

Range Based Address Resolution

Event	Type	Scope	Instance Data	When Recorded
address for request message routing			<ul style="list-style-type: none"> • Destination Realm (such as xyz.com) • Destination FQDN (such as hss1.hss.xyz.com) 	from an Ingress Request message matches an AET or DRT entry for request message routing.
Routing Exception	Routing Exception	App Data	<ul style="list-style-type: none"> • Routing Exception Type (such as Unknown Command Code) • Routing Exception Action (such as Abandon Request) 	After any Routing Exception is encountered.

Chapter 4

Configuration of RBAR

Topics:

- *Pre-Configuration Activities.....47*
- *RBAR Configuration.....49*
- *Post-Configuration Activities.....76*

This section describes the procedures used to configure the RBAR Application.

Pre-Configuration Activities

Before RBAR configuration can be performed, the following activities need to be performed in the system:

- Verify server status
- Gather information that is required for Diameter, Diameter Common, and RBAR configuration
- Configure Diameter Common components that are required for RBAR configuration
- Configure Diameter components that are required for RBAR configuration

Verifying Server status

Use this task to verify server status before RBAR configuration.

1. From the active SOAM, select **Status & Manage > Server**.
2. Verify that for each server, the **Appl State** field is **Disabled**, and the **DB, Reporting Status**, and **Proc** fields are **Norm**.

Diameter Common Configuration for RBAR

The following Diameter Common configuration must be done before RBAR configuration can be performed.

Use the explanations and procedures in the Diameter Common configuration help and the *Diameter Common User's Guide* to complete the Diameter Common configuration, including the Diameter Common components needed for use with RBAR.

SOAM Diameter Common Configuration

Diameter Common configuration for MCC Ranges Network Identifiers and MP Profile assignment for RBAR is done from the SOAM GUI in a DSR topology.

1. MPs

Select **Diameter Common > MPs > Profile Assignments**, and verify that the correct Database MP Profiles have been assigned for RBAR DA-MPs. If assignments need to be made or changed, use the **Diameter Common -> MPs -> Profile Assignments** page to assign the correct MP Profiles.

If RBAR and Policy DRA are running on the same DA-MP, select a Session_Database MP Profile.

2. MCC Ranges

Use the **Diameter Common -> Network Identifiers -> MCC Ranges [Insert]** page to specify up to 10 distinct, non-overlapping MCC Ranges.

The following two **MCC Ranges** are reserved by telephony standards and are recommended to be created in addition to other specified ranges:

1. 000-199
2. 800-899

NOAM Diameter Common Configuration

Diameter Common configuration for MCCMNC and MCCMNC Mapping Network Identifiers for RBAR is done from the NOAM GUI in a DSR topology.

1. Use the **Diameter Common > Network Identifiers > MCCMNC [Insert]** page to configure MCCMNC entries.

Diameter Configuration for RBAR

The following Diameter configuration must be done before RBAR configuration can be performed.

All Diameter Configuration is done using the SOAM GUI in a DSR topology.

Use the explanations and procedures in the Diameter Configuration help and the *Diameter User's Guide* to complete the Diameter configuration, including the Diameter components needed for use with RBAR.

1. Application IDs

Diameter Application IDs must be configured prior to making them available for use in an RBAR Address Resolution. Use the **Diameter -> Configuration -> Application Ids [Insert]** page to configure Diameter Application Ids.

The Application IDs that need to be configured depend on the types of Diameter servers being supported, including HSS, PCRF, OFCS, and OCS.

2. Command Codes

Diameter Command Codes must be configured prior to using them in an RBAR Address Resolution. Use the **Diameter -> Configuration -> Command Codes [Insert]** page to configure Diameter Command Codes.

Configure any Command Codes that need to be handled by RBAR. The Command Codes are associated with the Diameter Applications supported by the Diameter servers (for example, HSS, PCRF, OCFS, or OCS) which are the destination of Diameter Requests being routed by RBAR. For example, the combination of Application Id = S6a and Command Code = ULR/ULA might be relevant for HSS.

3. Application Route Tables

Either use the default **Application Route Table** (always available), or use the **Diameter -> Configuration -> Application Route Tables [Insert]** page to configure one or more **Application Route Tables** in addition to the default. **Application Route Tables** contain **Application Routing Rules** that direct messages to RBAR and other DSR Applications.

4. Application Routing Rules

On the **Diameter -> Configuration -> Application Route Tables** page, select an **Application Route Table Name** and click **View/Edit Rules**.

Use the **Viewing Rules for Application Route Table** page to insert or edit an **Application Routing Rule** so that messages are directed to RBAR.

Set the **Application Name** to **RBAR**.

If the RBAR application and the DM-IWF application will be chained, so that both of them can process the same Request message, insert or edit a second Application Routing Rule with the Application Name set to DM-IWF.

Set the Priority in each of the two Application Routing Rules to indicate which application will process the message first (the higher priority processes first).

RBAR Configuration

The **RBAR > Configuration** pages allow you to manage the RBAR configuration.

RBAR configuration typically occurs in the following order:

1. Add Diameter **Applications** to a list of RBAR supported Diameter Applications.
2. Configure **Destinations**.
3. If necessary, edit the Routing Exception Action associated with routing **Exceptions**.
4. Configure **Address Tables**.
5. Configure **Addresses**, specifying either address ranges or individual addresses.
6. Configure **Address Resolutions**.
7. If necessary, change the **System Options**.

Applications configuration

The **RBAR > Configuration > Applications** page allows you to access a list of Diameter Applications supported by RBAR.

From the **RBAR > Configuration > Applications** page, you can:

- Filter the list of supported Diameter Applications to display only the desired Application(s).
- View a list of supported Diameter Applications.
- Insert a supported Diameter Application.

Note: When an Application entry is added, Routing Exceptions (Unknown Command Code, No valid Routing Entity Address, No Address Match) are automatically inserted with the Routing Exception Action value as Forward Unchanged.

- Delete a Diameter Application from the list of supported Diameter Applications.

Note: When an Application entry is deleted, the associated Routing Exceptions are automatically deleted.

Applications configuration elements

Table 13: Applications Configuration Elements describes the fields on the Applications View and Insert pages.

Table 13: Applications Configuration Elements

Field	Description	Data Input Notes
Application ID	Diameter Application ID, used by RBAR, along with Command Code and Routing Entity Type, to determine Address Resolution for routing Request messages.	Format: Pulldown list Range: Configured Diameter Application IDs
Routing Mode (Read only)	Method of routing for Request messages received containing the Diameter Application ID.	Format: Disabled pulldown list with a value of Proxy .

Viewing supported Diameter applications

Use this task to view currently configured supported Diameter applications.

1. Select **RBAR > Configuration > Applications**.
The **RBAR > Configuration > Applications** page appears with the currently allowed applications listed in the table.
2. To look for a specific application, click **Filter**.
3. Select category from the **Display Filter** pulldown list as described in [Table 14: Connections Status Filtering Categories](#).

Table 14: Connections Status Filtering Categories

Category	Description
Application ID	Identifying text for the application
Application Name	Diameter name for the Application ID
Routing Mode	Method for routing

4. Choose the filtering operator as described in [Table 15: Connections Status Filtering Operators](#).

Table 15: Connections Status Filtering Operators

Operator	Description
=	Is equal to
!=	Is not equal to
>	Is greater than
>=	Is equal to or greater than
<	Is less than
<=	Is equal to or less than
Like	Is Like (wildcard is * character)
Is Null	has no entry (is zero)

5. Enter the target character string to filter on in the text box.
6. Click **Go**.

Inserting a supported Diameter application

Use this task to add a Application ID in the Diameter message.

Inserting a supported Application automatically adds three (3) Routing Exceptions (**Unknown Command Code**, **No valid Routing Entity Address**, and **Missing Configured Address Entry**) with the **Routing Exception Action** set to Forward Unchanged.

1. Select **RBAR > Configuration > Applications**.
The **RBAR > Configuration > Applications** page appears.
2. Click **Insert**.
The **RBAR > Configuration > Applications [Insert]** page appears.
3. From the **Application ID** drop down list, select the Application ID in the Diameter message.
Note: The Application IDs presented in this list are those created using **Main Menu > Diameter > Configuration > Application Ids**.
For more information about each field, see [Table 13: Applications Configuration Elements](#).
Note: The **Routing Mode** field is disabled.
4. Perform one of the following actions:
 - Click **OK** to save the application and return to the **RBAR > Configuration > Applications** page.
 - Click **Apply** to save the application and stay on this page.
Note: If field validations succeed after clicking either **OK** or **Apply**, the new Application is saved and an informational message about the automatic addition of the Routing Exceptions appears.
 - Click **Cancel** to return to the **RBAR > Configuration > Applications** page without saving the changes.

If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:

- The **Application ID** is empty; no value was entered or selected
- The **Application Name** or **Application ID** is not unique; it already exists in the system
- The entry in any field is not valid (wrong data type or out of the valid range)
- The maximum number of supported Diameter applications (16) is already defined in the system

Deleting a Diameter application

Use this task to delete a Diameter Application ID from the list of supported Diameter applications.

An Application ID cannot be deleted if it is being used by an Address Resolution. Before you perform this task, delete any Address Resolution that uses the Application.

1. Select **RBAR > Configuration > Applications**.
The **RBAR > Configuration > Applications** page appears.
2. Select the Application ID you want to delete, then click **Delete**.
A popup window appears.

3. Perform one of the following actions:
 - Click **OK** to delete the application.
 - Click **Cancel** to cancel the delete function and return to the **RBAR > Configuration > Applications** page.

If **OK** is clicked and the following condition exists, an error message appears:

- The Application is in use by an Address Resolution

Exceptions configuration

The **RBAR > Configuration > Exceptions** page allows you to specify the routing exception action to take when RBAR is unable to resolve an address to a Destination for each supported Diameter Application and Routing Exception Type.

There are three (3) Routing Exception entries (**No Address Match**, **No valid Routing Entity Address**, and **Unknown Command Code**) automatically inserted with the **Routing Exception Action** set to **Forward Unchanged** as the default action for a supported Diameter application entry when that application entry is added. Similarly, these Routing Exceptions that are associated with an application entry are automatically deleted when that application entry is deleted.

From the **RBAR > Configuration > Exceptions** page, you can:

- Filter the list of exceptions to display only the desired exceptions.
- View a list of supported Diameter applications and their associated Routing Exception Types and Routing Exception Actions.
- Edit the Routing Exception Action and its associated attributes for a supported Diameter application.

Exceptions configuration elements

Table 16: Exceptions Configuration Elements describes the fields on the Exceptions View and Edit pages.

Table 16: Exceptions Configuration Elements

Field	Description	Data Input Notes
Application ID (Read only)	Application ID in a Diameter message	N/A
Application Name (Read only)	Name of the application	N/A
Routing Exception Type (Read only)	The routing exception that prevented address resolution. This field displays one of the following values: <ul style="list-style-type: none"> • Unknown Command Code • No valid Routing Entity Address • No Address Match 	N/A

Field	Description	Data Input Notes
Routing Exception Action	The action applied to modify the Routing Exception Type message.	Format: Radio buttons Range: <ul style="list-style-type: none"> • Forward Unchanged • Forward to Destination • Send Answer with Result-Code AVP • Send Answer with Experimental-Result AVP • Abandon Request
Destination	Destination to where the message is forwarded associated with the Routing Exception Type . This field is enabled when the Routing Exception Action is set to Forward to Destination.	Format: Pulldown list Range: Available user-configured destinations
Result-Code Value	Result code associated with this Routing Exception Type . This field is enabled when the Routing Exception Action is set to either Send Answer with Result-Code AVP or Send Answer with Experimental-Result AVP.	Format: <ul style="list-style-type: none"> • Selection text box; numeric • Selection pulldown list Range: <ul style="list-style-type: none"> • Selection box: 1000–5999 • Selection pulldown list: available Diameter answer codes
Vendor-ID	Value returned in the Vendor-ID AVP of the answer message associated with this Routing Exception Type . This field is enabled when the Routing Exception Action is set to Send Answer with Experimental-Result AVP.	Format: Text box; numeric Range: 1–4294967295
Error Message	Value returned in the Error-Message AVP of the answer message. This field is enabled when the Routing Exception Action is set to either Send Answer with Result-Code AVP or Send Answer with Experimental-Result AVP.	Format: Alphanumeric, underscore (_), period (.) Range: 0–64 characters Default: Null string

Viewing Exceptions

Use this task to view currently configured Exceptions.

1. Select **RBAR > Configuration > Exceptions**.
The **RBAR > Configuration > Exceptions** page appears. This list of applications and associated Routing Exception information can be filtered to display only desired items.
2. To look for a specific application, click **Filter**.
3. Select a category from the **Display Filter** pulldown list as described in [Table 17: Connections Status Filtering Categories](#).

Table 17: Connections Status Filtering Categories

Category	Description
Application ID	Identifying text for the application
Application Name	Diameter name for the Application ID
Routing Exception Type	Routing exception that prevented address resolution
Routing Exception Action	Action taken to the routing type
Result-Code Value	Result code associated with the routing exception type
Result-Code Name	Name of the Result-Code Value
Vendor-ID	Value returned in the Vendor-ID AVP of the answer message
Error Message	Value returned in the Error-Message AVP of the answer message
Destination	Destination of the forwarded message

4. Choose the filtering operator as described in [Table 18: Connections Status Filtering Operators](#).

Table 18: Connections Status Filtering Operators

Operator	Description
=	Is equal to
!=	Is not equal to
>	Is greater than
>=	Is equal to or greater than
<	Is less than
<=	Is equal to or less than
Like	Is Like (wildcard is * character)
Is Null	has no entry (is zero)

5. Enter the target character string to filter on in the text box.
6. Click **Go**.

Editing a Routing Exception

Use this task to edit a Routing Exception.

1. Select **RBAR > Configuration > Exceptions**.
The **RBAR > Configuration > Exceptions** page appears.
2. Select the Application ID/Name you want to edit, then click **Edit**.
The **RBAR > Configuration > Exceptions [Edit]** page appears.
3. Update the relevant fields.
For more information about each field, see [Table 16: Exceptions Configuration Elements](#).
4. Perform one of the following actions:
 - Click **OK** to save the application and return to the **RBAR > Configuration > Exceptions** page.
 - Click **Apply** to save the application and stay on this page.
 - Click **Cancel** to return to the **RBAR > Configuration > Exceptions** page without saving the changes.

If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:

- A valid **Vendor-ID** is missing when the **Routing Exception Action** is **Send Answer with Experimental Result-Code AVP**.
- A valid **Destination** is missing when the **Routing Exception Action** is **Forward to Destination**.
- A valid **Result-Code Value** is missing when the **Routing Exception Action** is **Send Answer** or **Send Answer with Experimental-Result AVP**.

Destinations configuration

The **RBAR > Configuration > Destinations** page contains the attributes associated with a destination to which RBAR routes a message. RBAR uses these attributes to modify the contents of a received message before forwarding the message.

Each destination can be configured with any combination of a Realm and FQDN such as Realm-only, FQDN-only, or Realm and FQDN.

From the **RBAR > Configuration > Destinations** page, you can:

- Filter the list of destinations to display only the desired destinations.
- View a list of destinations.
- Insert a destination.
- Edit a destination.
- Delete a destination.

Destinations configuration elements

[Table 19: Destinations Configuration Elements](#) describes the fields on the Destinations View, Insert, and Edit pages.

Table 19: Destinations Configuration Elements

Field	Description	Data Input Notes
Name	Unique name of the Destination If a duplicate Name is entered or the Name is not specified, an error message appears.	Format: Alphanumeric and underscore (_) Range: 1–32 characters; cannot start with a digit and must contain at least one alpha
Realm	Realm of the Destination The Realm and Fully Qualified Domain Name cannot both be empty; otherwise, an error message appears.	Format: Text box; string consisting of a list of labels separated by dots, where a label must contain letters, digits, hyphen (-) and underscore (_). A label must start with a letter or underscore and must end with a letter or digit. Underscores may be used only as the first character.
Fully Qualified Domain Name	Unique Fully Qualified Domain Name of the Destination If a duplicate FQDN is entered, an error message appears. The Fully Qualified Domain Name and Realm cannot both be empty; otherwise, an error message appears.	Range: A valid FQDN or Realm. A label consists of up to 63 characters and a Realm or FQDN up to 255 characters
Allow Subsequent RBAR invocation	Enables the subsequent invocation of RBAR on a different DSR node in the network, when RBAR resolves to this destination Note: If the System Options Allow Subsequent RBAR Invocation option is checked, then this attribute will be ignored.	Format: Check box Range: Checked, unchecked Default: Checked

Viewing Destinations

Use this task to view currently configured Destinations.

1. Select **RBAR > Configuration > Destinations**.
The **RBAR > Configuration > Destinations** page appears. This list of destinations can be filtered to display only desired items.
2. To look for a specific destination, click **Filter**.
3. Select a category from the **Display Filter** pulldown list as described in [Table 20: Connections Status Filtering Categories](#).

Table 20: Connections Status Filtering Categories

Category	Description
Name	Name of the destination

Category	Description
Realm	Realm of the destination
FQDN	Name of the fully qualified domain name
Allow Subsequent RBAR invocation	Enables the subsequent invocation of RBAR

- Choose the filtering operator as described in [Table 21: Connections Status Filtering Operators](#).

Table 21: Connections Status Filtering Operators

Operator	Description
=	Is equal to
!=	Is not equal to
>	Is greater than
>=	Is equal to or greater than
<	Is less than
<=	Is equal to or less than
Like	Is Like (wildcard is * character)
Is Null	has no entry (is zero)

- Enter the target character string to filter on in the text box.
- Click **Go**.

Inserting a Destination

Use this task to add a new Destination.

- Select **RBAR > Configuration > Destinations**.
The **RBAR > Configuration > Destinations** page appears.
- Click **Insert**.
The **RBAR > Configuration > Destinations [Insert]** page appears.
- Enter a unique name for the destination in the **Name** field.
For more information about each field, see [Table 19: Destinations Configuration Elements](#).
- Enter the realm in the **Realm** field.
- Enter a unique FQDN in the **Fully Qualified Domain Name** field.
- If you want to allow subsequent invocation of RBAR on a different DSR node in the network, leave the **Allow Subsequent RBAR invocation** check box selected (by default, this option is checked).

Note: If you do not want to allow subsequent invocation of RBAR on a different DSR node in the network when RBAR resolves to this destination, uncheck this check box. In addition, the **Allow Subsequent RBAR invocation** check box on the **System Options** page must be unchecked. For more information about the **System Options** attributes, see [Table 29: System Options Elements](#).

7. Perform one of the following actions:

- Click **OK** to save the destination and return to the **RBAR > Configuration > Destinations** page.
- Click **Apply** to save the destination and stay on this page.
- Click **Cancel** to return to the **RBAR > Configuration > Destinations** page without saving the data.

If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:

- Both the **Realm** and **Fully Qualified Domain Name** are empty; no value was entered
- The **Name** or **Fully Qualified Domain Name** is not unique; it already exists in the system
- The entry in any field is not valid (wrong data type or out of the valid range)
- The required **Name** is empty
- The maximum number of destinations (1024) is already defined in the system

Editing a Destination

Use this task to edit a Destination.

1. Select **RBAR > Configuration > Destinations**.

The **RBAR > Configuration > Destinations** page appears.

2. Select the Destination you want to edit, then click **Edit**.

The **RBAR > Configuration > Destinations [Edit]** page appears.

3. Update the relevant fields.

For more information about each field, see [Table 19: Destinations Configuration Elements](#).

The **Name** field is read-only and cannot be edited.

4. Perform one of the following actions:

- Click **OK** to save the changes and return to the **RBAR > Configuration > Destinations** page.
- Click **Apply** to save the changes and stay on this page.
- Click **Cancel** to return to the **RBAR > Configuration > Destinations** page without saving the changes.

If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:

- Both the **Realm** and **Fully Qualified Domain Name** are empty; no value was entered
- The **Fully Qualified Domain Name** is not unique; it already exists in the system
- The entry in any field is not valid (wrong data type or out of the valid range)

Deleting a Destination

Use this task to delete a destination. A destination cannot be deleted if it is being used by any Address Range, Individual Address, or Routing Exception. Before this task is performed, delete the association with any Individual Address, Address Range, or Routing Exception.

1. Select **RBAR > Configuration > Destinations**.

The **RBAR > Configuration > Destinations** page appears.

2. Select the destination you want to delete, then click **Delete**.

A popup window appears.

3. Perform one of the following actions:

- Click **OK** to delete the destination.
- Click **Cancel** to cancel the delete function and return to the **RBAR > Configuration > Destinations** page.

If **OK** is clicked and the following condition exists, an error message appears:

- The destination is in use by an Address Range, Individual Address, or Routing Exception.

Address Tables configuration

The **RBAR > Configuration > Address Tables** page allows you to access an Address Table and its associated attributes.

From the **RBAR > Configuration > Address Tables** page, you can:

- Filter the list of address tables to display only the desired application(s).
- View a list of address tables.
- Insert an address table.
- Delete an address table.

Address Tables configuration elements

[Table 22: Address Tables Configuration Elements](#) describes the fields on the Address Tables View and Insert pages only.

Table 22: Address Tables Configuration Elements

Field	Description	Data Input Notes
Name	Unique name of the Address Table If a duplicate Name is entered or the Name is not specified, an error message appears.	Format: Alphanumeric and underscore (_) Range: 1–32 characters; cannot start with a digit and must contain at least one alpha
Comment	Information about the Address Table	Format: Text box; free form Range: up to 64 characters
Routing Entity Type	Type of Routing Entity If the Routing Entity Type is not specified, an error message appears.	Format: Pulldown list Range: <ul style="list-style-type: none"> • IMSI • MSISDN • IMPI • IMPU • IPv4 • IPv6 Prefix • UNSIGNED16

Viewing Address Tables

Use this task to view currently configured Address Tables.

1. Select **RBAR > Configuration > Address Tables**.
The **RBAR > Configuration > Address Tables** page appears. This list of address tables can be filtered to display only desired tables.
2. To look for a specific Address Table, click **Filter**.
3. Select a category from the **Display Filter** pulldown list as described in [Table 23: Connections Status Filtering Categories](#).

Table 23: Connections Status Filtering Categories

Category	Description
Name	Name of the destination
Comments	Comments about the Address Table
Routing Entity Type	Type of routing entity

4. Choose the filtering operator as described in [Table 24: Connections Status Filtering Operators](#).

Table 24: Connections Status Filtering Operators

Operator	Description
=	Is equal to
!=	Is not equal to
>	Is greater than
>=	Is equal to or greater than
<	Is less than
<=	Is equal to or less than
Like	Is Like (wildcard is * character)
Is Null	has no entry (is zero)

5. Enter the target character string to filter on in the text box.
6. Click **Go**.

Inserting an Address Table

Use this task to add a new Address Table.

1. Select **RBAR > Configuration > Address Table**.
The **RBAR > Configuration > Address Table** page appears.
2. Click **Insert**.
The **RBAR > Configuration > Address Table [Insert]** page appears.

3. Enter a unique name for the Address Table in the **Name** field.
For more information about each field, see [Table 22: Address Tables Configuration Elements](#).
4. If needed, enter a comment or additional information about the Address Table in the **Comment** field.
5. Select the type of routing entity from the **Routing Entity Type** pulldown list.
6. Perform one of the following actions:
 - Click **OK** to save the Address Table and return to the **RBAR > Configuration > Address Table** page.
 - Click **Apply** to save the Address Table and stay on this page.
 - Click **Cancel** to return to the **RBAR > Configuration > Address Table** page without saving the data.

If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:

- Any required field is empty; no value was entered or selected
- The **Name** is not unique; it already exists in the system
- The entry in any field is not valid (wrong data type or out of the valid range)
- The maximum number of Address Tables (40) is already defined in the system

Deleting an Address Table

Use this task to delete an Address Table. An Address Table cannot be deleted if it is being used by any Individual Address, Address Range, or Address Resolution. Before you perform this task, delete the association with any Individual Address, Address Range, or Address Resolution.

1. Select **RBAR > Configuration > Address Table**.
The **RBAR > Configuration > Address Table** page appears.
2. Select the Address Table you want to delete, then click **Delete**.
A popup window appears.
3. Perform one of the following actions:
 - Click **OK** to delete the Address Table.
 - Click **Cancel** to cancel the delete function and return to the **RBAR > Configuration > Address Table** page.

If **OK** is clicked and the following condition exists, an error message appears:

- The Address Table is in use by an Address Range, Individual Address, or Address Resolution.

Addresses configuration

The **RBAR > Configuration > Addresses** page allows you to access the Routing Entity Address Range and Individual Address configurable options.

- The Address Range provides the mapping between a single address range and a Destination for routing.
- The Individual Address provides the mapping between an individual address and a Destination for routing.

Note: If an incoming message maps both an Address Range and an Individual Address, then the Individual Address entry takes priority.

The Address Range and Individual Address entries have their own associated attributes, which are accessed from this **RBAR > Configuration > Addresses** page.

From the **RBAR > Configuration > Addresses** page, you can:

- Filter the list of addresses to display only the desired records. You can filter the list by the following criteria:
 - Address table
 - Address table and Individual address
 - Address table and Range (start address, end address)
 - Address table, Individual address, and Range (start address, end address)
 - Destination
 - Destination and Address table
 - Destination, Address table, and Individual address
 - Destination, Address table, and Range (start address, end address)
 - Destination, Address table, Individual address, and Range (start address, end address)
- View a list of addresses.
- Insert an address.
- Edit an address.
- Delete an address.

Addresses configuration elements

Table 25: Addresses Configuration Elements describes the fields on the Addresses View, Insert, and Edit pages. Data Input Notes apply only to the Insert and Edit pages; the View page is read-only.

Table 25: Addresses Configuration Elements

Field	Description	Data Input Notes
Table Name	Address Table name	N/A
Address	Address of destination	N/A
Entry Type	Address type (Individual or Range)	N/A
Routing Entity	Routing Entity type	N/A
Individual Address	Specific address	N/A
Start Address	Starting address of the Range	N/A
End Address	Ending address of the Range	N/A
Destination	Destination of the Address	N/A
Insert / Edit pages		

Field	Description	Data Input Notes
Routing Entity Type	Routing Entity type	Format: Pulldown list Range: <ul style="list-style-type: none"> • IMSI • IMSISDN • IMPI • IMPU • IPv4 • IPv6 Prefix • UNSIGNED16
Table Name	Address Table name	Format: Pulldown list Range: Available user-configured address table names associated to the selected Routing Entity Type
Address Type	Type of address for the Routing Entity Type	Format: Radio buttons Range: Range or Individual Address
Start Address	Starting address for an Address Range This field is required when Range is selected as Address Type . If Address is an IPv6-prefix, the prefix length must be entered in the IPv6 Prefix length field.	Format: Text box Range: End Address must be greater than Start Address. <ul style="list-style-type: none"> • Routing Entity Address: <ul style="list-style-type: none"> • IMSI: 15 digit string • MSISDN: 3-14 digit string • IMPI: 15 digit string • IMPU: 3-15 digit string
End Address	Ending address for an Address Range This field is required when Range is selected as Address Type . If Address is an IPv6-prefix, the prefix length must be entered in the IPv6 Prefix length field.	<ul style="list-style-type: none"> • IPv4 Address: a 15 character string; quad-dotted format; valid characters are numeric (0–9) and dot (.); both compressed and expanded form are supported; for example: 192.168.1.15 or 192.168.001.015 • IPv6-Prefix Address: Hexadecimal value; up to 39 characters; valid alphanumeric characters (0-9, A-F, a-f) and colon (:); both compressed and expanded form are supported; for example: 1::2 or 0001:0000:0000:0000:0000:0000:0000:0002
Address	Specific address This field is enabled and required when Individual Address is selected as Address Type . If Address is an IPv6-prefix, the prefix length must be entered in the IPv6 Prefix length field.	<ul style="list-style-type: none"> • IPv6-Prefix Address: Hexadecimal value; up to 39 characters; valid alphanumeric characters (0-9, A-F, a-f) and colon (:); both compressed and expanded form are supported; for example: 1::2 or 0001:0000:0000:0000:0000:0000:0000:0002 <p>Note: If this IPv6 address portion of the IPv6-prefix address is expressed in binary form</p>

Field	Description	Data Input Notes
		<p>(converting hexadecimal digits to bits), then no bit that is set (value=1) can be at an index that is greater than the configured IPv6 Prefix length. For example: 0001:0001:: for prefix length 28 is invalid as the 32nd bit is set.</p> <p>In addition, trailing zeros (0) can be dropped in this IPv6 address portion of the IPv6-prefix address but not the leading zeros (0); for example: 8:: for prefix length 1 is invalid because 8:: is treated as 0008::</p> <ul style="list-style-type: none"> • UNSIGNED16: Hexadecimal value; valid alphanumeric characters (0-9, A-F, a-f); for example: 512, 20, 40, AA, 50A, FFFF
IPv6 Prefix length	<p>Prefix length of an IPv6-prefix address; specifies how many of the leftmost contiguous bits of the address comprise the prefix.</p> <p>This field is enabled and required when IPv6 Prefix is selected as Routing Entity Type.</p>	<p>Format: Text box; numeric</p> <p>Range: 1–128</p>
Destination	Destination of the Address	<p>Format: Pulldown list</p> <p>Range: Available user-configured destinations</p>

Viewing Addresses

Use this task to view currently configured addresses.

1. Select **RBAR > Configuration > Addresses**.
The **RBAR > Configuration > Addresses** page appears.
2. Click the desired tab (**Address Ranges**, **Individual Addresses**, or **All Addresses**) to display the associated records.
The list of associated records appears. The total number of records is also provided.
3. If you want to filter this list of records, select the desired criteria and click **Go**.

Note: To clear any of the fields, click **Reset**.

The list can be filtered in the following combinations:

- Address table

- Address table and Individual address
- Address table and Range (start address, end address)
- Address table, Individual address, and Range (start address, end address)
- Destination
- Destination and Address table
- Destination, Address table, and Individual address
- Destination, Address table, and Range (start address, end address)
- Destination, Address table, Individual address, and Range (start address, end address)

The addresses that match the search criteria appear.

Note: The IPv4 address appears in a collapsed form (for example: 1:2:3:4). The IPv6 Prefix address appears in the format *ipv6-address/prefix-length* where *ipv6-address* is in a collapsed form and *prefix-length* is a decimal value specifying how many of the leftmost contiguous bits of the address comprise the prefix.

The list of addresses is restricted to display a maximum of 100,000 records. If this condition occurs, an informational message will display stating that the number of records was restricted to 100,000. In addition, an informational message appears stating the number of records that correspond to the applied filter.

When **Go** is clicked and any of the following conditions exist, an error message appears:

- **Address** entry is not within the **Start Address** and **End Address** entries
- **Start Address** is greater than the **End Address**
- The entry in any field is not valid (wrong data type or out of the valid range)

Inserting an Address

Use this task to add a new address or range of addresses to a Routing Entity type.

Before this task is performed, make sure there is at least one Address Table and one Destination configured in the system.

1. Select **RBAR > Configuration > Addresses**.
The **RBAR > Configuration > Addresses** page appears.
2. Click **Insert**.
The **RBAR > Configuration > Addresses [Insert]** page appears.
3. Select the type of Routing Entity from the **Routing Entity Type** pulldown list.
For more information about each field, see [Table 25: Addresses Configuration Elements](#).
4. Select the name of the Address Table from the **Address Table** pulldown list.
5. Select the desired **Address Type** radio button (Range or Individual Address).
6. Enter the appropriate address data depending on the selection of the **Address Type**:
 - For Range:
 1. Enter the starting address for the range in the **Start Address** field.
 2. Enter the ending address for the range in the **End Address** field.
 - For Individual Address, enter the specific address in the **Address** field.
7. If the address entered is an IPv6-prefix, enter the prefix length in the **IPv6 Prefix length** field.

8. Select the Destination from the **Destination** pulldown list.
9. Perform one of the following actions:
 - Click **OK** to save the address entry and return to the **RBAR > Configuration > Addresses** page.
 - Click **Apply** to save the address entry and stay on this page.
 - Click **Cancel** to return to the **RBAR > Configuration > Addresses** page without saving the data.

If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:

- **Start Address** is greater than the **End Address**
- **Start Address** and **End Address** for an Address Range are overlapping or already exists
- At least one **Address Table** and one **Destination** have not been configured; they do not exist in the system
- Address already exists for a **Table Name**
- The entry in any field is not valid (wrong data type or out of the valid range)
- Any required field is empty
- The maximum number of records for the Address Type (1,000,000 for each type) is already defined in the system

Editing an Address

Use this task to edit an address associated with a Routing Entity type.

1. Select **RBAR > Configuration > Addresses**.
The **RBAR > Configuration > Addresses** page appears.
2. Select the Address you want to edit, then click **Edit**.
The **RBAR > Configuration > Addresses [Edit]** page appears.
3. Update the relevant fields.
For more information about each field, see [Table 25: Addresses Configuration Elements](#).

The following fields are read-only and cannot be edited:

- **Routing Entity Type**
- **Address Type**

4. Perform one of the following actions:
 - Click **OK** to save the changes and return to the **RBAR > Configuration > Addresses** page.
 - Click **Apply** to save the changes and stay on this page.
 - Click **Cancel** to return to the **RBAR > Configuration > Addresses** page without saving the changes.

If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:

- **Start Address** is greater than the **End Address**
- **Start Address** and **End Address** for an Address Range are overlapping or already exists
- Address already exists for a **Table Name**
- The entry in any field is not valid (wrong data type or out of the valid range)
- Any required field is empty

Deleting an Address

Use this task to delete an Address.

1. Select **RBAR > Configuration > Addresses**.

The **RBAR > Configuration > Addresses** page appears.

2. Select the Address you want to delete, then click **Delete**.

Note: For details about locating an address, see [Viewing Addresses](#).

A popup window appears.

3. Perform one of the following actions:

- Click **OK** to delete the Address.
- Click **Cancel** to cancel the delete function and return to the **RBAR > Configuration > Addresses** page.

Address Resolutions configuration

The **RBAR > Configuration > Address Resolutions** page allows you to define the routing relationship between message content and an address by mapping a Diameter Application ID, Command Code, and Routing Entity Type to a user-configured address (a range or individual address). An Address Resolution supports up to two prioritized Routing Entity Types for each Application ID and Command Code (highest priority – Primary Routing Entity Type – and lowest priority – Secondary Routing Entity Type).

From the **RBAR > Configuration > Address Resolutions** page, you can:

- Filter the list of address resolutions to display only the desired records.
- View a list of address resolutions.
- Insert an address resolution.
- Edit an address resolution.
- Delete an address resolution.

Address Resolutions configuration elements

Table 26: Address Resolutions Configuration Elements describes the fields on the Address Resolutions View, Insert, and Edit pages. Data Input Notes apply only to the Insert and Edit pages; the View page is read-only.

Table 26: Address Resolutions Configuration Elements

Field	Description	Data Input Notes
Application ID	Application ID in a Diameter message The Application ID is an IANA-assigned Diameter Application ID, which is a 32-bit field that is mandatory in all Diameter messages. It is commonly used for screening and routing messages between Diameter nodes.	Format: Pulldown list Range: Application IDs configured for RBAR

Field	Description	Data Input Notes
	If a combination of the Application ID and Command Code already exists, an error message appears.	
Command Code	Command Code in a Diameter message If a combination of the Application ID and Command Code already exists, an error message appears.	Format: Pulldown list Range: Command Codes configured for Diameter
Primary Routing Entity/Secondary Routing Entity sections		
Routing Entity Type	Routing Entity type The same Routing Entity Type cannot be selected for both the Primary and the Secondary Routing Entity; if the same type is selected, an error message appears. If the Routing Entity Type is not specified for the Primary Routing Entity, an error message appears.	Format: Pulldown list Range: <ul style="list-style-type: none"> • IMSI • MSISDN • IMPI • IMPU • IPv4 • IPv6 Prefix • UNSIGNED16
Primary AVP	Primary AVP used for extracting the Routing Entity address The same Primary AVP and Secondary AVP cannot be selected for either the Primary Routing Entity or for the Secondary Routing Entity; if the same AVP is selected, an error message appears. If Primary AVP is not selected for the Primary Routing Entity, an error message appears.	Format: Pulldown list Range: <ul style="list-style-type: none"> • User Identity Routing Entity Type: <ul style="list-style-type: none"> • Public Identity • ServiceInfo.Subscription-Id(0) • ServiceInfo.Subscription-Id(1) • ServiceInfo.Subscription-Id(2) • ServiceInfo.Subscription-Id(3) • ServiceInfo.Subscription-Id(4) • Subscription-Id(0) • Subscription-Id(1) • Subscription-Id(2) • Subscription-Id(3) • Subscription-Id(4) • UserIdentity.MSISDN • UserIdentity.Public-Identity • UserName
Secondary AVP	Secondary AVP used for extracting the Routing Entity address The same Primary AVP and Secondary AVP cannot be selected for either the Primary Routing Entity or for the Secondary Routing Entity; if the same AVP is selected, an error message appears. The Secondary AVP field is available for User Identity routing types only; this field is disabled if IPV4, IPV6 Prefix, and UNSIGNED16 are selected as the Routing Entity Type.	<ul style="list-style-type: none"> • IPv4 Routing Entity Type: Framed IP Address • IPv6 Prefix Routing Entity Type: Framed IPv6 Prefix

Field	Description	Data Input Notes
		<ul style="list-style-type: none"> UNSIGNED16 Routing Entity Type: ServiceInfo.PSInfo.3GPP-CC
Address Table Name	Address Table for this Routing Entity Type If Address Table Name is not selected for the Primary Routing Entity, an error message appears.	Format: Pulldown list Range: Available configured Address Table names

Viewing Address Resolutions

Use this task to view currently configured Address Resolutions.

1. Select **RBAR > Configuration > Address Resolutions**.
The **RBAR > Configuration > Address Resolutions** page appears. This list of Address Resolutions can be filtered to display only desired records.
2. To look for a specific Address Resolution, click **Filter**.
3. Select a category from the **Display Filter** pulldown list as described in [Table 27: Connections Status Filtering Categories](#).

Table 27: Connections Status Filtering Categories

Category	Description
Application ID	Identifying text for the application
Application Name	Diameter name for the Application ID
Command Code	Command code in the Diameter message
Routing Entity Type	Routing Entity type
Primary AVP	Primary AVP used for extracting the Routing Entity address
Secondary AVP	Secondary AVP used for extracting the Routing Entity address
Address Table Name	Address Table for this Routing Entity Type

4. Choose the filtering operator as described in [Table 28: Connections Status Filtering Operators](#).

Table 28: Connections Status Filtering Operators

Operator	Description
=	Is equal to
!=	Is not equal to
>	Is greater than
>=	Is equal to or greater than
<	Is less than

Operator	Description
<=	Is equal to or less than
Like	Is Like (wildcard is * character)
Is Null	has no entry (is zero)

5. Enter the target character string to filter on in the text box.
6. Click Go.

Inserting an Address Resolution

Use this task to add a new Address Resolution.

Before this task is performed, make sure there is at least one supported Diameter Application and one Address Table configured in the system.

1. Select **RBAR > Configuration > Address Resolutions**.
The **RBAR > Configuration > Address Resolutions** page appears.
2. Click **Insert**.
The **RBAR > Configuration > Address Resolutions [Insert]** page appears.
3. Select an application ID from the **Application ID** pulldown list.
Note: The Application IDs presented in this list are those created using **Main Menu > RBAR > Configuration > Applications**.
For more information about each field, see [Table 26: Address Resolutions Configuration Elements](#).
4. Select the appropriate command code from the **Command Code** pulldown list.
Note: The Command Codes presented in this list are those created using **Main Menu > Diameter > Command Codes**.
5. For the Primary Routing Entity section, perform the following:
 - a) Select the appropriate Routing Entity type from the **Routing Entity Type** pulldown list.
 - b) Select the Primary AVP from the **Primary AVP** pulldown list.
 - c) If needed, select the Secondary AVP from the **Secondary AVP** pulldown list.
Note: The **Secondary AVP** field is disabled if either IPv4, IPv6 Prefix, or UNSIGNED16 is selected in the **Routing Entity Type** field.
 - d) Select the Address Table name from the **Address Table Name** pulldown list.
6. If needed, for the Secondary Routing Entity section, perform the following:
 - a) Select the appropriate Routing Entity type from the **Routing Entity Type** pulldown list.
 - b) Select the Primary AVP from the **Primary AVP** pulldown list.
 - c) If needed, select the Secondary AVP from the **Secondary AVP** pulldown list.
Note: The **Secondary AVP** field is disabled if either IPv4, IPv6 Prefix, or UNSIGNED16 is selected in the **Routing Entity Type** field.
 - d) Select the Address Table name from the **Address Table Name** pulldown list.
7. Perform one of the following actions:

- Click **OK** to save the address resolution and return to the **RBAR > Configuration > Address Resolutions** page.
- **Apply** to save the address resolution and stay on this page.
- Click **Cancel** to return to the **RBAR > Configuration > Address Resolutions** page without saving the data.

If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:

- The combination of **Application ID** and **Command Code Value** is not unique; it already exists in the system
- At least one supported Diameter **Application** and one **Address Table** have not been configured; they do not exist in the system
- The entry in any field is not valid (wrong data type or out of the valid range)
- Any required field is empty
- Duplicate Routing Entity Types were selected in the **Primary** and **Secondary** Routing Entity sections
- Duplicate AVPs were selected in the **Primary AVP** and **Secondary AVP** fields
- The maximum number of Address Resolutions (64) is already defined in the system

Editing an Address Resolution

Use this task to edit an Address Resolution.

1. Select **RBAR > Configuration > Address Resolution**.
The **RBAR > Configuration > Address Resolutions** page appears.
2. Select the Address Resolution you want to edit, then click **Edit**.
The **RBAR > Configuration > Address Resolutions [Edit]** page appears.
3. Update the relevant fields.

For more information about each field, see [Table 26: Address Resolutions Configuration Elements](#).

The following fields are read-only and cannot be edited:

- **Application ID**
- **Command Code**

4. Perform one of the following actions:
 - Click **OK** to save the changes and return to the **RBAR > Configuration > Address Resolutions** page.
 - Click **Apply** to save the changes and stay on this page.
 - Click **Cancel** to return to the **RBAR > Configuration > Address Resolutions** page without saving the changes.

If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:

- The entry in any field is not valid (wrong data type or out of the valid range)
- Any required field is empty
- Duplicate Routing Entity Types were selected in the **Primary** and **Secondary** Routing Entity sections
- Duplicate AVPs were selected in the **Primary AVP** and **Secondary AVP** fields

Deleting an Address Resolution

Use this task to delete an Address Resolution.

1. Select **RBAR > Configuration > Address Resolutions**.
The **RBAR > Configuration > Address Resolutions** page appears.
2. Select the Address Resolution you want to delete, then click **Delete**.
A popup window appears.
3. Perform one of the following actions:
 - Click **OK** to delete the Address Resolution.
 - Click **Cancel** to cancel the delete function and return to the **RBAR > Configuration > Address Resolutions** page.

System Options configuration

The **RBAR > Configuration > System Options** page allows you to modify the default system values for RBAR global parameters (for example, FQDN/Realm, or Allow Subsequent RBAR Invocation, or Application Unavailable action).

System Options elements

Table 29: System Options Elements describes the fields on the System Options page.

Table 29: System Options Elements

Field	Description	Data Input Notes
URI Local Number Enabled	<p>This only applies to the Routing Entity Type IMPU; defines whether Local Numbers are considered valid addresses within a SIP or TEL URI. An address of this form is considered a Local Number if it does not start with the Global Number prefix character plus sign (+).</p> <p>If checked, both Local and Global Numbers are valid addresses for IMPU decoded from Diameter Requests.</p> <p>If unchecked, only Global Numbers are valid addresses.</p>	<p>Format: Check box</p> <p>Range: Checked, unchecked</p> <p>Default: Unchecked</p>
ASCII Excluded Digits	<p>List of ASCII characters to ignore while parsing digits from a raw AVP data field of AVP Type UTF8String.</p> <p>If an invalid character is entered, an error message appears.</p>	<p>Format: Text boxes</p> <p>Range: ASCII-printable characters except the percent sign (%)</p>

Configuration of RBAR

Field	Description	Data Input Notes
Exclude Space	<p>Defines whether ASCII character space is ignored while parsing digits from a raw AVP data field of AVP Type UTF8String</p> <p>If checked, ASCII character space is ignored.</p> <p>If not checked, ASCII character space is not ignored.</p>	<p>Format: Check box</p> <p>Range: Checked, unchecked</p> <p>Default: Unchecked</p>
TBCD Excluded Digits	<p>Defines whether the associated character is ignored while parsing digits from a raw AVP data field of AVP Type OctetString encoded as a TBCD-string</p> <p>If checked, character is ignored.</p> <p>If not checked, character is not ignored.</p>	<p>Format: Check boxes</p> <p>Range: Checked, unchecked for each option: *(0010), #(1011), a(1100), b(1101), c(1110)</p> <p>Default: Unchecked</p>
Allow Subsequent RBAR Invocation	<p>Enables the subsequent invocation of RBAR on a different DSR node in the network</p> <p>If checked, this setting overrides the Allow Subsequent RBAR Invocation attribute in Destination.</p>	<p>Format: Check box</p> <p>Range: Checked, unchecked</p> <p>Default: Unchecked</p>
Remove Destination-Host	<p>If checked, RBAR deletes any instance of Destination-Host AVPs in the message when performing Realm only resolution.</p>	<p>Format: Check box</p> <p>Range: Checked, unchecked</p> <p>Default: Unchecked</p>
Realm	<p>Value to be placed in the Origin-Realm AVP of the Answer message generated by RBAR.</p> <p>A Realm must be paired with a Fully Qualified Domain Name. If entering a value for Realm, then a value for Fully Qualified Domain Name must also be entered; otherwise, an error message appears.</p> <p>If not configured, the local node Realm for the egress connection is used to populate Origin-Realm AVP.</p>	<p>Format: Text box; string consisting of a list of labels separated by dots, where a label must contain letters, digits, hyphen (-) and underscore (_). A label must start with a letter or underscore and must end with a letter or digit. Underscores may be used only as the first character.</p>
Fully Qualified Domain Name	<p>Value to be placed in the Origin-Host AVP of the Answer message generated by RBAR.</p> <p>A Fully Qualified Domain Name must be paired with a Realm. If entering a value for Fully Qualified Domain Name, then a value for Realm must also be entered; otherwise, an error message appears.</p>	<p>Range: A valid Realm or FQDN. A label consists up to 63 characters and a Realm or FQDN up to 255 characters</p>

Configuration of RBAR

Field	Description	Data Input Notes
	If not configured, the local node FQDN for the egress connection is used to populate the Origin-Host AVP.	
Resource Exhaustion Result-Code	<p>Result-Code or Experimental-Result-Code value to be returned in an Answer message when a message is not successfully routed because of internal resource being exhausted</p> <p>If Vendor-Id is configured, this result-code value is encoded as Experimental-Result-Code AVP; otherwise the result-code is encoded as Result-Code AVP.</p>	<p>Format:</p> <ul style="list-style-type: none"> • Selection text box; numeric • Selection pulldown list <p>Range:</p> <ul style="list-style-type: none"> • Selection box: 1000–5999 • Pulldown list: available Code values <p>Default: 3004</p>
Resource Exhaustion Error Message	Error-Message AVP value to be returned in an Answer message when a message is not successfully routed because of internal resource being exhausted	<p>Format: Alphanumeric, underscore (_), and period (.)</p> <p>Range: 0–64 characters</p> <p>Default: RBAR Resource Exhausted</p>
Resource Exhaustion Vendor-Id	Vendor-Id AVP value to be returned in an Answer message when a message is not successfully routed because of internal resource being exhausted	<p>Format: Text box; numeric</p> <p>Range: 1–4294967295</p>
Application Unavailable Action	<p>Defines action to be taken when RBAR is not available to process messages</p> <p>If the Default Route option is selected, an entry must be provided for the Application Unavailable Route List.</p>	<p>Format: Radio buttons</p> <p>Range:</p> <ul style="list-style-type: none"> • Continue Routing • Default Route • Send Answer with Result-Code AVP • Send Answer with Experimental-Result AVP <p>Default: Continue Routing</p>

Field	Description	Data Input Notes
Application Unavailable Route List	<p>Defines where the requests will be routed when RBAR is not available. Peer Routing Rules will be bypassed.</p> <p>A route list must be entered if Default Route is selected as the Application Unavailable Action.</p>	<p>Format: Pulldown list</p> <p>Range: Available Route List entries</p>
Application Unavailable Result-Code	<p>Result-Code or Experimental-Result-Code value to be returned in an Answer message when a message is not successfully routed because RBAR is not available.</p> <p>If Vendor-Id is configured, this result-code value is encoded as Experimental-Result-Code AVP; otherwise the result-code is encoded as Result-Code AVP.</p> <p>A code must be entered if either the Send Answer with Result-Code AVP or the Send Answer with Experimental Result-Code AVP option is selected as the Application Unavailable Action.</p>	<p>Format:</p> <ul style="list-style-type: none"> • Selection Text box; numeric • Selection pulldown list <p>Range:</p> <ul style="list-style-type: none"> • Selection box: 1000–5999 • Pulldown list: available Code values <p>Default: 3002</p>
Application Unavailable Error Message	<p>Error-Message AVP value to be returned in an Answer message when a message is not successfully routed because RBAR is not available.</p> <p>A message can be entered, if needed, when either the Send Answer with Result-Code AVP or the Send Answer with Experimental Result-Code AVP option is selected as the Application Unavailable Action.</p>	<p>Format: Alphanumeric, underscore (_), and period (.)</p> <p>Range: 0–64 characters</p> <p>Default: RBAR Unavailable</p>
Application Unavailable Vendor-Id	<p>Vendor-Id AVP value to be returned in an Answer message when a message is not successfully routed because RBAR is not available.</p> <p>A vendor-Id must be entered if the Send Answer with Experimental Result-Code AVP option is selected as the Application Unavailable Action.</p>	<p>Format: Text box; numeric</p> <p>Range: 1–4294967295</p>

Editing System Options

Use this task to edit System Options.

1. Select **RBAR > Configuration > System Options**.
The **RBAR > Configuration > System Options** page appears.
2. Update the relevant fields.
For more information about each field, see [Table 29: System Options Elements](#).
3. Perform one of the following actions:

- Click **OK** to save the changes and return to the **RBAR > Configuration > System Options** page.
- Click **Apply** to save the changes and stay on this page.
- Click **Cancel** to return to the **RBAR > Configuration > System Options** page without saving the changes.

If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:

- Either the **Realm** or **Fully Qualified Domain Name** is empty; no value was entered; these fields must be configured as a pair
- Any required field is empty; no value was entered
- The entry in any field is not valid (wrong data type or out of the valid range)

Post-Configuration Activities

After RBAR configuration is complete, the following activities need to be performed to make RBAR fully operational in the system:

- Enabling the RBAR application
- Status Verification

Enabling the RBAR Application

Use this task to enable the RBAR application.

1. From the each active SOAM, select **Diameter > Maintenance > Applications**.
The **Diameter > Maintenance > Applications** page appears.
2. Under **DSR Application Name**, select each **RBAR** row.
To select more than one row, press and hold **Ctrl** while you click each row.
3. Click **Enable**.
4. Verify the application status on the page.

The **Admin State**, **Operational Status**, **Operational Reason**, and **Congestion Level** in each of the selected rows should have changed respectively to **Enabled**, **Available**, **Normal**, and **Normal**.

Status Verification

Use this task to verify RBAR status after configuration is complete.

1. Verify Communication Agent (ComAgent) Connection status.
 - a) From the active SOAM, select **Communication Agent > Maintenance > Connection Status**
 - b) Verify that the **Automatic Connections Count** field displays **X of X in service** where X is the number of peer server connections.
2. Verify server status.
 - a) From the active SOAM, select **Status & Manage > Server**
 - b) Verify that for each server, the **Appl State** field is **Enabled**, and the **DB**, **Reporting Status**, and **Proc** fields are **Norm**.

Bulk Import and Export

The *Diameter Common User's Guide* describes the use and operation of Bulk Import and Export functions:

- **Help > Diameter Common > Bulk Import**
- **Help > Diameter Common > Bulk Export**

The Bulk Import and Export functions can be used to export Diameter, IPFE, and Application configuration data in CSV files to a location outside the system, and to import the files (usually edited) into the system where the Import function is executed.

Bulk Import

The Bulk Import operations use configuration data in ASCII Comma-Separated Values (CSV) files (.csv), to insert new data into, update existing data in, or delete existing data from the configuration data in the system.

Note: Some configuration data can be imported only with the Update operation, and other data can be imported with Insert and Delete operations but not Update. Refer to the *Diameter Common User's Guide* or the **Diameter Common > Import Help** for valid Import operations.

Import CSV files can be created by using a Bulk Export operation, or can be manually created using a text editor.

Note: The format of each Import CSV file record must be compatible with the configuration data in the release that is used to import the file. Across different release versions, column counts may not be compatible, and the import will fail.

Files that are created using the Bulk Export operation can be exported either to the local Status & Manage File Management Directory (**Status & Manage > Files** page), or to the local Export Server Directory.

CSV files that are in the local File Management area can be used for Bulk Import operations on the local system.

Files can be created manually using a text editor; the files must be uploaded to the File Management area of the local system before they can be used for Import operations on the local system.

Multiple Import operations can be performed:

- Insert new configuration data records that do not currently exist in the system
- Update existing configuration data in the system
- Delete existing configuration data from the system

Each Import operation creates a log file. If errors occur, a Failures CSV file is created that appears in the File Management area. Failures files can be downloaded, edited to correct the errors, and imported to successfully process the records that failed. Failures files that are unchanged for more than 14 days and log files that are older than 14 days are automatically deleted from the File Management area.

Bulk Export

The Bulk Export operation creates ASCII Comma-Separated Values (CSV) files (.csv) containing Diameter, IPFE, and Application configuration data. Exported configuration data can be edited and used with the Bulk Import operations to change the configuration data in the local system without the use of GUI pages. The exported files can be transferred to and used to configure another system.

Each exported CSV file contains one or more records for the configuration data that was selected for the Export operation. The selected configuration data can be exported once immediately, or exports can be scheduled to periodically occur automatically at configured times.

Configuration data can be exported in one Export operation:

- All exportable configuration data in the system
- All exportable configuration data from the selected Application, IPFE, or Diameter (each component's data is in a separate file)
- Exportable configuration data from a selected configuration component for the selected Application, IPFE, or Diameter

Exported files can be written to the File Management Directory in the local File Management area (**Status & Manage > Files** page), or to the Export Server Directory for transfer to a configured remote Export server.

CSV files that are in the local File Management area can be used for Bulk Import operations on the local system.

If the export has any failures or is unsuccessful, the results of the export operation are logged to a log file with the same name as the exported file but with a .log extension. Successful export operations will not be logged.

Chapter 5

Maintenance of RBAR

Topics:

- [RBAR Maintenance Overview.....80](#)
- [RBAR Administrative State and Operational Status.....80](#)

The **Diameter > Maintenance** GUI provides the RBAR specific maintenance functions. In this section describes Admin State, Operational Status, Operational Reason, and Congestion Levels on the **Diameter -> Maintenance -> Applications** page.

RBAR Maintenance Overview

The RBAR application has no maintenance GUI pages of its own. The following Diameter > Maintenance GUI pages provide functions and information that can be used with the RBAR application:

- The **Diameter > Maintenance > Applications** page displays RBAR status information including Admin State, Operational Status, and Operational Reason. The page also provides functions to enable and disable the application. Refer to the *Diameter User's Guide* and Help for explanations of the page and the status information.
- The **Diameter > Maintenance > DA-MPs** page displays status and connectivity information for the DA-MP that is running the RBAR application. Refer to the *Diameter User's Guide* and Help for explanations of the page and the status information.

RBAR Administrative State and Operational Status

The RBAR Administrative State (Admin State) indicates the state that the operator wants the RBAR application to be in, and can be manually enabled or disabled. The Operational Status indicates the actual status of the RBAR application. The RBAR Admin State and Operational Status will be updated when the application is started or restarted and when RBAR congestion is detected.

Next Generation Network Priority Service (NGN-PS) allows National Security/Emergency Preparedness (NS/EP) users to make priority calls/sessions using public networks. The NGN-PS requests are never discarded due to congestion. NGN-PS messages are always processed by RBAR application except when application is unavailable, in that case configured Exception Action is used for further Routing. For a detailed description of NGN-PS, refer to the *Diameter User's Guide* and Help.

Table 30: RBAR Admin State and Operational Status describes the Admin State, Operational Status, Operational Reason, and Congestion Levels on the **Diameter -> Maintenance -> Applications** page.

Table 30: RBAR Admin State and Operational Status

Admin State	Operational Status	Operational Reason	Congestion Level
Disabled	Unavailable	The default shutdown state	Any
Enabled	Available	RBAR receives Requests from the DRL normally	Normal / CL1 / CL2
	Degraded	The DRL only forwards NGN-PS Requests to RBAR	CL3

A

Application Routing Rule A set of conditions that control message routing to a DSR application based on message content.

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.

D

Destination

The node to which the signaling link traffic is routed. This destination is identified by a point code, either a full point code or a cluster point code.

Diameter Relay Agent

Diameter agent that forwards requests and responses to other Diameter nodes based on routing-related AVPs (for example, Destination-Realm) and routing table entries. Since relays do not make policy decisions, they do not examine or alter non-routing AVPs. As a result, relays never originate messages, do not need to understand the semantics of messages or non-routing AVPs, and are capable of handling any Diameter application or message type.

D

DSR	<p>Diameter Signaling Router</p> <p>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.</p>
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G

GUI	<p>Graphical User Interface</p> <p>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.</p>
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H

HSS	<p>Home Subscriber Server</p> <p>A central database for subscriber information.</p>
-----	---

I

IANA	<p>Internet Assigned Numbers Authority</p> <p>An organization that provides criteria regarding registration of values related to the Diameter protocol.</p>
IMPI	<p>IP Multimedia Private Identity</p>
IMPU	<p>IP Multimedia Public Identity</p>
IMSI	<p>International Mobile Subscriber Identity</p> <p>A unique internal network ID identifying a mobile subscriber.</p>

M

MSISDN	<p>Mobile Subscriber Integrated Services Digital Network [Number]</p> <p>The MSISDN is the network specific subscriber number of a mobile communications subscriber. This is normally the phone number that is used to reach the subscriber.</p>
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N

NGN-PS	NGN Priority Service
NOAM	Network Operations, Administration, and Maintenance

O

OCS	<p>Online Charging System</p> <p>A system allowing a Communications Service Provider to charge customers in real time based on service usage.</p>
OFCS	Offline Charging Server

P

PCA	Point Code ANSI
PCRF	<p>Policy and Charging Rules Function</p> <p>The ability to dynamically control access, services, network capacity, and charges in a network.</p> <p>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.</p>

P

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.

Policy DRA

Policy Diameter Relay Agent. A scalable, geo-diverse DSR application that creates a binding between a subscriber and a PCRF, and routes all policy messages for a given subscriber to the PCRF that currently hosts that subscriber's policy rules. Policy DRA is capable of performing Topology Hiding to hide the PCRF from the Policy Client.

Proxy Agent

Performs the basic forwarding functions of a Relay Agent, but unlike a Relay Agent, a Proxy Agent can modify the message content and provide value-added services, enforce rules on different messages, or perform administrative tasks for a specific realm.

R

Range Based Address Resolution

See RBAR.

RBAR

Range Based Address Resolution

A DSR enhanced routing application which allows you to route Diameter end-to-end transactions based on Application ID, Command Code, Routing Entity Type, and Routing Entity address ranges.

S

S

- SIP
Session Initiation Protocol
A peer-to-peer protocol used for voice and video communications.
- SOAM
System Operations,
Administration, and Maintenance

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

- URI
Uniform Resource Identifier
An internet protocol element consisting of a short string of characters that conform to a certain syntax. The string comprises a name or address that can be used to refer to a resource.