Oracle® Communications
Diameter Signaling Router

Charging Proxy Application (CPA) and Offline Charging Solution

User's Guide

E57509 Revision 01

March 2015

ORACLE®

Oracle® Communications Charging Proxy Application (CPA) and Offline Charging Solution User's Guide

Copyright © 2011, 2015, Oracle and/or its affiliates. All rights reserved.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, then the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are "commercial computer software" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

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

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

Table of Contents

Chapter 1: Introduction.....7

Overview.....8
Scope and Audience.....8
Manual Organization.....8
Documentation Admonishments.....8
Related Publications.....9
Locate Product Documentation on the Oracle Technology Network Site.....9
Customer Training.....10
My Oracle Support (MOS).....10
Emergency Response.....10

Chapter 2: User Interface Introduction.....12

User Interface Organization.....13
User Interface Elements.....13
Main Menu Options.....15
Missing Main Menu options.....19
Common Graphical User Interface Widgets.....19
Supported Browsers.....19
System Login Page.....20
Main Menu Icons.....21
Work Area Displays.....22
Customizing the Splash Page Welcome Message.....25
Column Headers (Sorting).....25
Page Controls.....26
Clear Field Control.....26
Optional Layout Element Toolbar.....27
Filters.....28
Pause Updates.....30
Max Records Per Page Controls.....30

Chapter 3: Offline Charging Solution.....31

Offline Charging Solution.....32
Introduction to the Charging Proxy Application.....32

Introduction to the Charging Session Binding Repository....32

Chapter 4: Charging Proxy Application....34

Pre-Configuration Activities....35
Verifying Charging SBR Server and Server Group Configuration....35
Diameter Common Configuration for CPA....35
Diameter Configuration for CPA....35
Configuration....39
System Options....39
Message copy....41
SBR page....44
SBR Subresource Mapping page....46
Post-Configuration Activities....47
Enabling the CPA....47
Enabling Connections....48
Status Verification....48
DSR Bulk Import and Export....48

Glossary....51

List of Figures

Figure 1: Oracle System Login....20

Figure 2: Paginated table 22

Figure 3: Scrollable table....23

Figure 4: Form page....23

Figure 5: Tabbed pages....24

Figure 6: Tabbed pages....24

Figure 7: Report output....25

Figure 8: Sorting a Table by Column Header....25

Figure 9: Clear Field Control X....26

Figure 10: Optional Layout Element Toolbar....27

Figure 11: Automatic Error Notification....27

Figure 12: Examples of Filter Styles....28

List of Tables

Table 1: Admonishments....9

Table 2: User interface elements....13

Table 3: Main Menu Options....15

Table 4: Main Menu icons....21

Table 5: Example Action buttons....26

Table 6: Submit buttons....26

Table 7: Filter control elements....28

Table 8: System Options page elements....39

Table 9: Message Copy Elements....42

Chapter 1

Introduction

Topics:

- *Overview.....8*
- *Scope and Audience.....8*
- *Manual Organization.....8*
- *Documentation Admonishments.....8*
- *Related Publications.....9*
- *Locate Product Documentation on the Oracle Technology Network Site.....9*
- *Customer Training.....10*
- *My Oracle Support (MOS).....10*
- *Emergency Response.....10*

This chapter contains an overview of the procedures to configure the Charging Proxy Application. The contents include sections on the scope, audience, and organization of the documentation, and how to contact Oracle for assistance.

Overview

The Charging Proxy Application (CPA) document provides information about how to use the DSR GUI to configure the CPA.

The document provides procedures to:

- Edit System Options
- Edit Message Copy configuration settings
- Edit Session Binding Repository (SBR) configuration settings
- Edit SBR Subresource Mapping configuration settings

Scope and Audience

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

This manual is intended for personnel who configure the Charging Proxy Application.

This manual contains procedures for configuring CPA using the DSR GUI.

Manual Organization

This manual is organized into the following chapters:

- *Introduction* contains general information about the CPA help documentation, the organization of this document, 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.
- *Offline Charging Solution* contains information about the Offline Charging Solution and its components.
- *Charging Proxy Application* provides information about configuring System Options, Message Copy, Session Binding Repository, and SBR Subresource Mapping.

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**: (This icon and text indicate the possibility of *personal injury*.)
	**Warning**: (This icon and text indicate the possibility of *equipment damage*.)
	**Caution**: (This icon and text indicate the possibility of *service interruption*.)
	**Topple**: (This icon and text indicate the possibility of *personal injury* and *equipment damage*.)

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 Technology Network (OTN) site. See *Locate Product Documentation on the Oracle Technology Network Site* for more information.

Locate Product Documentation on the Oracle Technology Network Site

Oracle customer documentation is available on the web at the Oracle Technology Network (OTN) 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 *www.adobe.com*.

1. Log into the Oracle Technology Network site at *http://docs.oracle.com*.
2. Select the **Applications** tile.
   The **Applications Documentation** page appears.
3. Select **Apps A-Z**.
4. After the page refreshes, select the **Communications** link to advance to the **Oracle Communications Documentation** page.
5. Navigate to your Product and then the Release Number, and click the **View** link (note that the Download link will retrieve the entire documentation set).
6. To download a file to your location, right-click the **PDF** link and select **Save Target As**.

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.....13*
- *Missing Main Menu options.....19*
- *Common Graphical User Interface Widgets.....19*

This section 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.

User Interface Organization

The user interface is the central point of user interaction with 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.

DSR GUI

In a DSR, the following Main Menu options are accessible from the System OAM (SOAM) server:

- Transport Manager
- Communication Agent
- SS7/Sigtran
- Diameter Common
- Diameter
- RBAR
- FABR
- Policy and Charging
- IPFE
- MAP-Diameter IWF
- CPA

The following Main Menu options are accessible from the Network OAM (NOAM) server:

- Communication Agent
- Diameter Common > Network Identifiers > MCCMNC, MCCMNC Mapping
- Diameter > Configuration for Topology Hiding,
- Network-wide Policy and Charging > Configuration components are configurable on the NOAM; some Configuration components are view-only on the SOAM. Policy and Charging > Maintenance components are accessible on the NOAM only.
- MAP-Diameter IWF

Bulk Import and Bulk Export functions appear on both OAMs, to be used for the data that can be configured on that OAM.

Most other Main Menu options are configurable from the Network OAM server and view-only from the System OAM server.

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.

Element	Location	Function
Session Banner	Next bar across the top of the web page	The left side of the banner just above the Main Menu provides the following session information: • The name of the machine to which the user is connected, and whether the user is connected via the VIP or directly to the machine. • The HA state of the machine to which the user is connected. • The role of the machine to which the user is connected. The right side of the banner: • Shows the user name of the currently logged-in user. • Provides a link to log out of the GUI.
Main Menu	Left side of screen, under banners	A tree-structured menu of all operations that can be performed through the user interface. The plus character (+) indicates that a menu item contains subfolders. • To display submenu items, click the plus character, the folder, or anywhere on the same line. • To select a menu item that does not have submenu items, click on the menu item text or its associated symbol.
Work Area	Right side of panel under status	Consists of three sections: Page Title Area, Page Control Area (optional), and Page Area. • **Page Title Area**: Occupies the top of the work area. It displays the title of the current page being displayed, the date and time, and includes a link to context-sensitive help. • **Page Control Area**: Is located below the Page Title Area, and is used to show controls for the Page Area (this area is optional). When available for 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 or error messages are displayed in a message box at the top of this section. A horizontal and/or vertical scroll bar is

Element	Location	Function
		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 Splash Page Welcome 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 would not appear on the screen of a user who does not have administrative privileges.

Note: Some menu items are configurable only on the NOAM and view-only on the SOAM; and some menu options are configurable only on the SOAM. See *DSR GUI*.

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

Table 3: Main Menu Options

Menu Item	Function
Administration	The Administration menu allows the user to: • 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 • Configure options such as password history and expiration, login message, welcome message, and the number of failed login attempts before an account is disabled • Manage licenses and upgrades • Authenticate LDAP servers • Configure SNMP trapping services • Validate and transfer ISO files • Prepare, initiate, monitor, and complete upgrades • View the software versions report • Configure an export server • Configure DNS elements
Configuration	On the NOAM, allows the user to configure: • Network Elements • Network Devices • Network Routes

Menu Item	Function
	• Services • Servers • Server Groups • Resource Domains • Places • Place Associations On the SOAM, allows the user to configure the NOAM list plus Interface and Port DSCP.
Alarms and Events	Allows the user to view: • Active alarms and events • Alarm and event history • Trap log
Security Log	Allows the user to view, export, and generate reports from security log history.
Status & Manage	Allows the user to monitor the individual and collective status of Network Elements, Servers, HA functions, Databases, system Processes, and Tasks. The user can perform actions required for server maintenance, database management, and data file management.
Measurements	Allows the user to view and export measurement data.
Transport Manager	Allows the user to configure adjacent nodes, configuration sets, or transports; and edit transports.
Communication Agent	Allows the user to configure Remote Servers, Connection Groups, and Routed Services. Also allows the user to monitor the status of Connections, Routed Services, and HA Services.
SS7/Sigtran (optional)	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.
Diameter Common	Allows the user to configure: • Network Identifiers: on the NOAM - MCC Ranges • Network Identifiers on the SOAM - MCCMNC and MCCMNC Mapping • MPs (on the SOAM) - editable Profile parameters and Profile assignments The DSR Bulk Import and Export functions are available on both OAMs for the data that is configured on that OAM.
Diameter	Allows the user to configure, modify, and monitor Diameter routing: • On the NOAM, Diameter Topology Hiding configuration

Menu Item	Function
	• On the SOAM, Diameter Configuration, AVP Dictionary and Troubleshooting for IDIH configuration; Diameter Mediation configuration: and Maintenance functions
RBAR (Range-Based Address Resolution) (optional)	Allows the user to configure the following Range-Based Address Resolution (RBAR) settings: • Applications • Exceptions • Destinations • Address Tables • Addresses • Address Resolutions • System Options This is accessible from the SOAM only.
FABR (Full Address Based Resolution) (optional)	Allows the user to configure the following Full Address Based Resolution (FABR) settings: • Applications • Exceptions • Default Destinations • Address Resolutions • System Options This is accessible from the SOAM only.

Policy and Charging
(optional)
	On the NOAM, allows the user to perform configuration tasks, edit options, and view elements for:
	• General Options
	• Access Point Names
	• Policy DRA
	  • PCRF Pools
	  • PCRF Sub-Pool Selection Rules
	  • Network-Wide Options
	• Online Charging DRA
	  • OCS Session State
	  • Realms
	  • Network-Wide Options
	• Alarm Settings
	• Congestion Options
	On the NOAM, allows the user to perform maintenance tasks, edit options, and view elements for:
	• Maintenance
	  • SBR Status

Menu Item	Function

	• Policy Database Query
	
	On the SOAM, allows the user to perform configuration tasks, edit options, and view elements for:
	• General Options
	• Access Point Names
	• Policy DRA
	  • PCRFs
	  • Binding Key Priority
	  • PCRF Pools
	  • PCRF Pool to PRT Mapping
	  • PCRF Sub-Pool Selections
	  • Policy Clients
	  • Site Options
	• Online Charging DRA
	  • OCSs
	  • CTFs
	  • OCS Session State
	  • Realms
	• Error Codes
	• Alarm Settings
	• Congestion Options

Gateway Location Application (Optional)	On the SOAM, allows the user to perform configuration tasks, edit options, and view elements for: • Exceptions • Options GLA can deploy with Policy DRA (in the same DA-MP or a separate DA-MP).
IPFE (optional)	Allows the user to configure IP Front End (IPFE) options and IP List TSAs. This is accessible from the SOAM server only.
MAP-Diameter Interworking	On the SOAM, allows the user to perform configuration tasks, edit options, and view elements for the DM-IWF DSR Application: • DM-IWF Options • Diameter Exception On the NOAM, allows the user to perform configuration tasks, edit options, and view elements for the MD-IWF SS7 Application: • MD-IWF Options • Diameter Realm

Menu Item	Function
	• Diameter Identity GTA • GTA Range to PC • MAP Exception • CCNDC Mapping
CPA (Charging Proxy Application) (optional)	Allows the user to perform configuration tasks, edit system options, and view elements for: • System Options • Message Copy • Session Binding Repository • SBR Subresource Mapping This is accessible from the SOAM only.
Help	Launches the Help system for the user interface.
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 will 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 a password upon login. The System Login page also features a current date and time stamp and a customizable login message.

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.

Customizing the Login Message

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

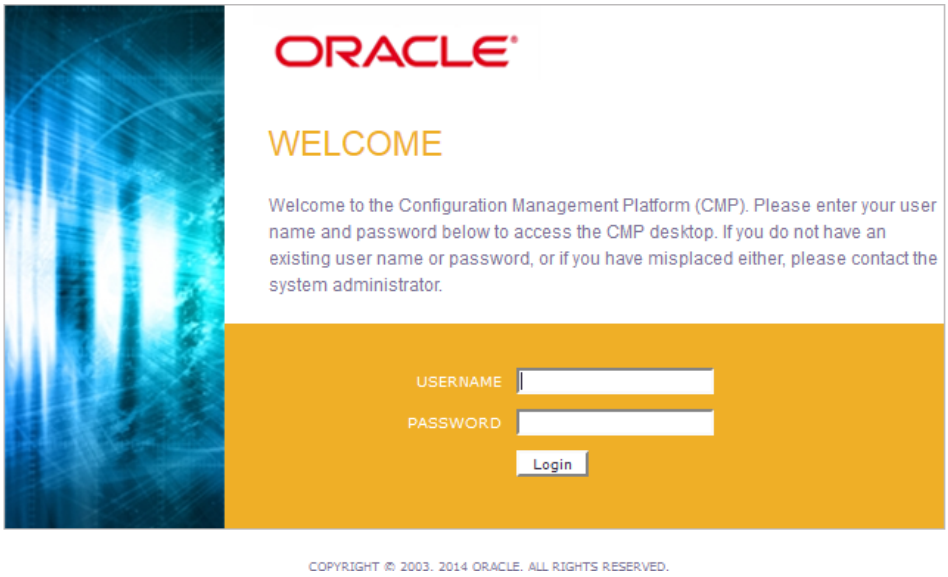


Figure 1: Oracle System Login

1. From the **Main Menu**, select **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 is displayed.

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.

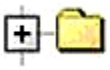
   When using Single Sign-On, you cannot use the IP address of the server.
2. When prompted by the browser, confirm that the server can be trusted.
   The System Login page appears.
3. Enter the Username and Password for your account.
   The DSR GUI for the NOAM appears.
4. To access the DSR GUI for the 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 (-) will collapse the folder.
	Config File	Contains operations in an Options page.
	File with Magnifying Glass	Contains operations in a Status View page.

Icon	Name	Description
	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.
	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, you will see a variety of page formats. Tables, forms, tabbed pages, and reports are the most common formats in the user interface.

Note: Screenshots 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*.

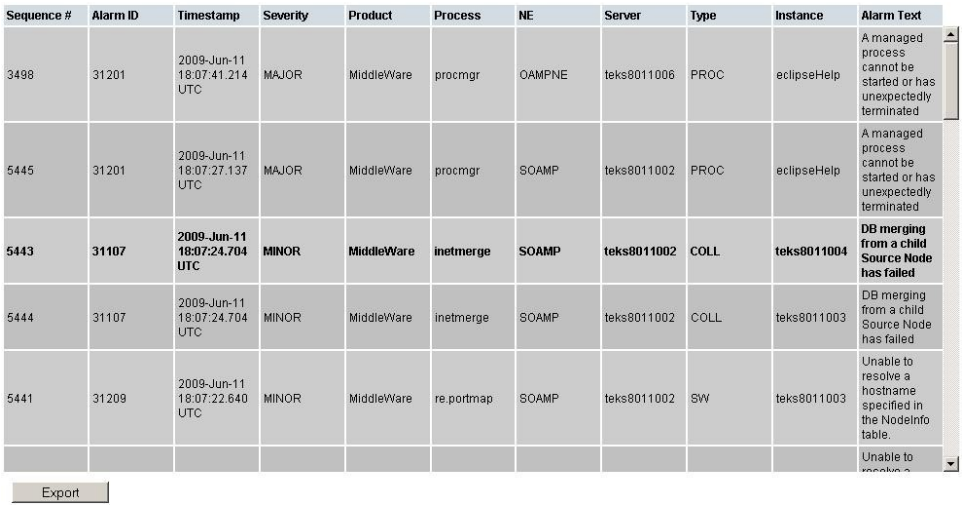
Displaying Records 1-1 of 1 | First | Prev | Next | Last

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

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.

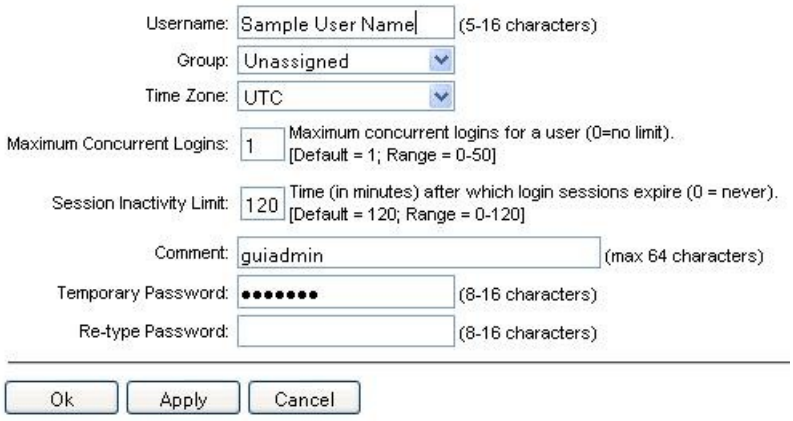


Figure 4: Form page

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 will populate on the page. Retrieve is always the default for tabbed pages.

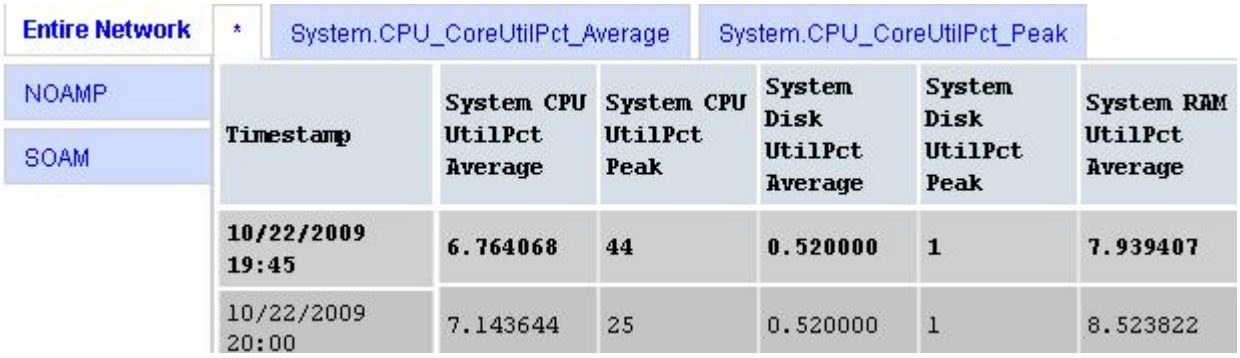


Figure 5: Tabbed pages

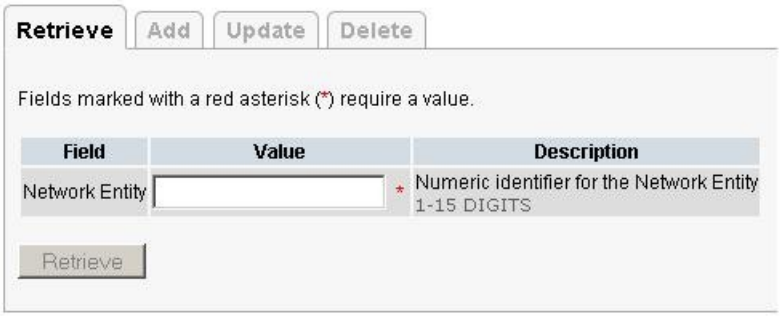


Figure 6: Tabbed pages

Reports

Reports provide a formatted display of information. Reports are generated from data tables by clicking the **Report** button. 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 **User Interface** splash page appears. You can display a customized welcome message on the **User Interface** splash page. Use this procedure to customize the message.

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

   The **General Options Administration** page appears.

2. Locate **WelcomeMessage** in the **Variable** column.
3. Enter the welcome message text in the **Value** column.
4. Click **Update 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 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	Insert data into a table
Edit	Edit data within a table
Delete	Delete data from table
Change	Change 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 is a widget that 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.

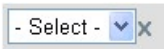


Figure 9: Clear Field Control X

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.

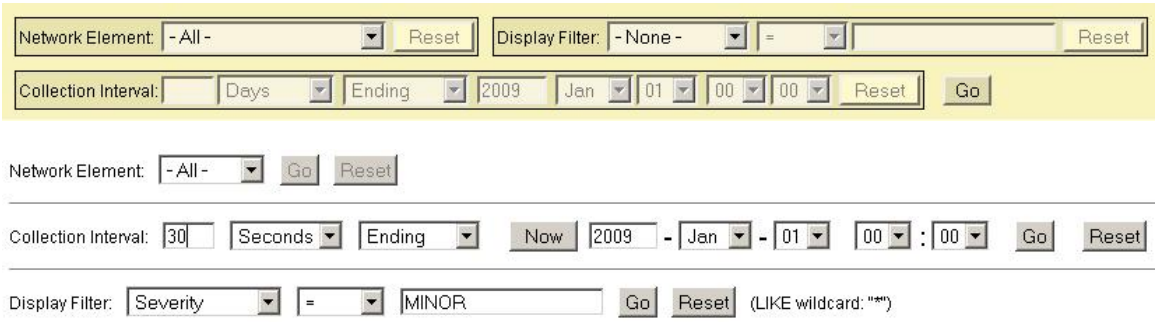


Figure 12: Examples of Filter Styles

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.

Operator	Description
<	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 that 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 the **Add** button 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**, select **Administration > General Options**.

   The **General Options Administration** page appears.

2. Change the value of the **MaxRecordsPerPage** variable.

   Note: MaxRecordsPerPage 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

Offline Charging Solution

Topics:

- *Offline Charging Solution.....32*
- *Introduction to the Charging Proxy Application.....32*
- *Introduction to the Charging Session Binding Repository.....32*

This section describes the purpose of the Offline Charging Solution and its components.

Offline Charging Solution

In order to provide load distribution and failover support for a growing number of Charging Trigger Functions (CTFs) connected to a growing number of Charging Data Functions (CDFs), a Charging Proxy Function (CPF) has been established as an intermediary between the CTFs and the CDFs.

The Charging Proxy Function provides topology hiding. The CPF appears as a single CDF to the CTFs, and as a single CTF to the CDFs.

Messages in a Diameter offline charging session consist of the ACRs from the CTFs to the CDFs and the ACAs from the CDFs to the CTFs.

The Charging Proxy Function consists of the following components:

- Charging Proxy Application (CPA)
- Charging Session Binding Repository (Charging SBR)
- Optional IP Front End (IPFE)

CPA is a DSR Application that is responsible for routing Diameter accounting (Rf) messages that are being exchanged between clients (CTFs) and server (CDFs).

The Charging SBR is a database server application. It stores data that must exist over the life of an accounting session.

IPFE distributes TCP or SCTP traffic among a set of application servers. IPFE is an optional component of the CPF.

DSR's scalability allows the CPF to support up to 16 active CPA MPs.

Introduction to the Charging Proxy Application

CPA is a DSR Application that is responsible for routing Diameter accounting (Rf) messages that are being exchanged between clients (CTFs) and servers (CDFs).

CPA enables load balancing of ACR-Start and ACR-Event messages across CDFs. CPA also sets the preferred CDF value in the Charging SBR. The preferred CDF is used for the duration of the Rf accounting session. CPA updates the preferred CDF in the event of a CDF failover.

CPA is also responsible for triggering Message Copy. Message Copy allows ACR-Start or ACR-Event messages that match a configured rule to be copied to a Diameter Application Server (DAS). Message Copy can be disabled without impacting the other functions of CPA.

Introduction to the Charging Session Binding Repository

The Charging Session Binding Repository (Charging SBR) provides a high availability (HA) distributed database for the DSR Charging Proxy Application (CPA). The Charging SBR stores information that the CPA uses for consistently routing Diameter requests from instances of Charging Trigger Function (CTF) to instances of Charging Data Function (CDF). For any given session, the CPA stores in the

Charging SBR the identity of the CDF that the CPA has chosen to service the Diameter requests for that session, or a session binding. When the CPA routes subsequent Diameter requests for a session, it queries the Charging SBR for the session binding to determine the identity of the serving CDF.

In the basic form, the Charging SBR consists of a Session Binding Database (SBDB) to store session binding data, and a server process to handle requests from the CPA to manipulate session bindings. For scalability, Charging SBR blades are divided into active/standby pairs. The SBDB is logically partitioned across each of the active/standby pairs. Each logical partition corresponds with a Charging SBR subresource. The CPA then submits the request to the selected Charging SBR subresource.

Each session binding record is stored with a timestamp that indicates when the record was last modified. Periodically, stale session binding records are deleted from the SBDB by an internal audit mechanism. The time at which the audit runs and the age at which a binding is considered stale are configurable. The cleanup audit helps to reduce the risk that stale session bindings could prevent the creation of new session bindings. Decreased database performance due to an unnecessarily large SBDB is also remedied by cleaning up stale session binding data.

Congestion in the Charging SBR is determined independently by each partition based on its queue depth. Congestion notifications are included with each Charging SBR response message. The Charging SBR will also monitor the current service time of its request queues. This information is provided with the congestion data included in the Charging SBR response messages. The CPA then judges whether the time for Charging SBR to process a request meets its needs.

If the Charging SBR becomes overloaded or congested, the Charging SBR will shed load in a predictable way in order to control the overload state. The load shedding strategy progressively increases the type of operation shed. Each higher level of congestion adds a new operation to be shed. At 85% congestion, create operations are shed. At 90% congestion, create and update operations are shed. At 95% congestion, read, create and update operations are shed. At 100% congestion, read, create, update and delete operations are shed. As the overload condition lessens, those levels are reversed as the system returns to normal operations.

Chapter 4

Charging Proxy Application

Topics:

- *Pre-Configuration Activities.....35*
- *Configuration.....39*
- *Post-Configuration Activities.....47*

This section covers configuration tasks that must be done prior to configuring CPA, configuring CPA, and tasks that must be done after configuring CPA.

Pre-Configuration Activities

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

- Verify that at least one Charging SBR Server and Charging SBR Server Group have been configured. The configuration of Charging SBR Servers and Server Groups was required for CPA activation.
- Gather information that is required for Diameter , Diameter Common, and CPA configuration.
- Configure Diameter Common components that are required for CPA configuration.
- Configure Diameter Configuration components that are required for CPA configuration.

Verifying Charging SBR Server and Server Group Configuration

Use this task to verify that at least one Charging SBR Server and one Charging SBR Server Group have been configured. The configuration should have been done prior to CPA activation.

1. To verify Charging SBR Server configuration, select **Configuration** > **Servers**.
   The **Configuration > Servers** page appears.
2. Verify that at least one Charging SBR Server is configured.
3. To verify Charging SBR Server Group configuration, select **Configuration** > **Server Groups**.
   The **Configuration > Server Groups** page appears.
4. Verify that at least one Charging SBR Server Group is configured.

Diameter Common Configuration for CPA

The following Diameter Common configuration must be done before CPA 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 CPA.

SOAM Diameter Common Configuration

Diameter Common configuration for MCC Ranges Network Identifiers and MP Profile assignment for CPA is done from the SOAM GUI in a 3-tiered DSR topology.

1. **MPs**

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

Diameter Configuration for CPA

Several Diameter Configuration components must be configured before the CPA can be configured and enabled.

All Diameter Configuration components are configured using the SOAM GUI.

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

1. **Application Id**

   Use the **Diameter** > **Configuration** > **Application Ids [Insert]** page to define an Application Id for the Rf Accounting Diameter interface (3).

   From the **Application Id Value** pulldown list, select **3 - Diameter base accounting**.

2. **CEX Parameters**

   Use the **Diameter** > **Configuration** > **CEX Parameters [Insert]** page to define the Capability Exchange parameters for the Application Id that was configured for use by CPA.

   For the Application Id, select or enter:

   - **Application Id Type** - Accounting
   - **Vendor Specific Application Id**, if the Application Id and Vendor Id will be grouped in a Vendor-specific Application Id AVP
   - **Vendor Id** - if **Vendor Specific Application Id** is selected

3. **CEX Configuration Sets**

   Use the **Diameter** > **Configuration** > **Configuration Sets** > **CEX Configuration Sets [Insert]** page to configure a CEX Configuration Set to be used in connections with CTF Peer Nodes.

   In the CEX Configuration Set, move **3-"Diameter base Accounting"-Accounting-** from the **Available CEX Parameters** to the **Selected CEX Parameters** field.

4. **Local Nodes**

   Use the **Diameter** > **Configuration** > **Local Nodes [Insert]** page to configure Virtual CDF and Virtual CTF Local Nodes.

   To accomplish Topology Hiding, the Charging Proxy Function appears as one large CDF to the CTFs and as one large CTF to the CDFs. The Charging Proxy Function modifies the Origin-Host and Origin-Realm AVPs in each message being routed to a CTF or CDF. The configuration of this capability is done using Virtual CDF and Virtual CTF Local Nodes.

   At least one Virtual CDF Local Node must be provisioned, but two are recommended to provide each CTF Peer a redundant connection to the DSR.

   At least one Virtual CTF Local Node must be provisioned on the DSR.

   The **Realm** and **FQDN** values will be substituted in the Origin-Realm and Origin-Host AVPs.

5. Use the **Diameter** > **Configuration** > **Peer Nodes [Insert]** page to configure Peer Nodes for every CDF, CTF, and Diameter Application Server (DAS).

   For CDF Peer Nodes, the **Replace Dest Realm** and **Replace Dest Host** options must be enabled.

   Do not configure an **Alternate Implicit Route List**. The Peer Route Table will be defined such that there is a Peer Routing Rule for every CDF Peer, so that routing will always be done using a Route List.

6. **Connections**

Use the **Diameter** > **Configuration** > **Connections [Insert]** page to configure Connections to CTFs, CDFs, and Diameter Application Servers.

- At least one Connection must be configured to each CTF, CDF, and DAS.
- Connections communicating with a CTF Peer Node must be associated with a Virtual CDF Local Node.
- Connections communicating with a CTF Peer Node must select a CEX Configuration Set that has the Diameter base accounting Application Id (3) configured.
- Connections communicating with a CDF Peer Node must be associated with a Virtual CTF Local Node.
- On Connections communicating with a CDF Peer Node, enable the **Remote Busy Usage** option, and set the **Remote Busy Abatement Timeout** value to the desired length of time that messages will stop being sent on the CDF connection after the receipt of a DIAMETER_TOO_BUSY response.

7. **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 CPA and other DSR Applications.

8. **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 with Diameter Application ID = 3 are directed to the CPA.

   When defining the **Application Routing Rule**:

   - In the **Conditions** field, set the **Application-Id Operator** to **Equals** and the **Value** to **3 - Diameter base accounting**. For all other Parameters, set the **Operator** to **Always True**.
   - Set the **Application Name** to **CPA**.

9. **Route Groups**

   Use the **Diameter** > **Configuration** > **Route Groups [Insert]** to configure CDF Peer Route Groups and DAS Peer Route Groups.

   - Only Peer Route Groups are used in the Offline Charging Solution.
   - Configure a CDF Pool Peer Route Group that contains all of the CDF Peer Nodes, with each CDF Peer Node having the same **Provisioned Capacity**.
   - For each CDF Peer Node, configure a Peer Route Group containing just this CDF Peer Node. Also configure an alternate Peer Route Group containing all CDF Peer Nodes except this one with each CDF Peer Node having the same **Provisioned Capacity**.
   - For each DAS Peer Node, configure a Peer Route Group containing just this DAS Peer Node.
   - Configure a DAS Pool Peer Route Group that contains all of the DAS Peer Nodes, with each DAS Peer Node having the same **Provisioned Capacity**.

10. **Route Lists**

    Use the **Diameter** > **Configuration** > **Route Lists [Insert]** to configure CDF Route Lists and DAS Route Lists.

- For each Route List configured for the Charging Proxy Function, the **Route Across Route Groups** option should be set to **Enabled** to allow messages to be routed to alternate CDFs if the preferred CDF fails.
- Configure a CDF Pool Route List containing just the CDF Pool Route Group.
- For each CDF, configure a CDF Route List, containing the corresponding CDF Peer Route Group with a priority of 1 and the corresponding alternate CDF Peer Route Group with a priority of 2.
- Configure a DAS Pool Route List containing just the DAS Pool Route Group.
- For each DAS, configure a DAS Route List containing the corresponding DAS Peer Route Group.

11. **Peer Route Tables**

    Use the **Diameter** > **Configuration** > **Peer Route Tables [Insert]** page to configure a Peer Route Table for the Charging Proxy Function.

    Then create Peer Routing Rules to route ACR-Interim and ACR-Stop messages to the preferred CDF peer, or if the preferred CDF Peer is unavailable, then to load balance the message routing to the other CDF Peers.

    Within the Charging Proxy Peer Route Table, for each CDF, create a Peer Routing Rule as follows:

    - In the **Conditions** field:
      - Set the **Destination-Host Operator** to **Equals** and the **Value** to the FQDN of the CDF Peer Node.
      - Set the **Application-Id Operator** to **Equals** and the **Value** to **3 - Diameter base accounting**.
      - For all other **Parameters**, set the **Operator** to **Always True**.
    - **Action** is set to **Route to Peer**.
    - **Route List** is set to the corresponding CDF Route List.
    - **Message Priority** is set to **1**.

    Also create a Peer Routing Rule to load balance the routing of ACR-Start and ACR-Event Request messages across all CDF Peers.

    - In the **Conditions** field:
      - Set the **Destination-Host Operator** to **Absent**.
      - Set the **Application-Id Operator** to **Equals** and the **Value** to **3 - Diameter base accounting**.
      - For all other **Parameters**, set the **Operator** to **Always True**.
    - **Action** is set to **Route to Peer**.
    - **Route List** is set to the corresponding CDF Pool Route List.
    - **Message Priority** is set to **0**.

12. **Application Id** (edit)

    Use the **Diameter** > **Configuration** > **Application Ids [Edit]** page to assign the Charging Proxy Peer Route Table to the Diameter base accounting Application Id.

13. **Reroute On Answer**

    Use the **Diameter** > **Configuration** > **Reroute on Answer [Insert]** page to configure Reroute On Answer to perform alternate routing when a DIAMETER_TOO_BUSY Answer Result-Code is received from a CDF Peer.

    - Set the **Answer Result-Code AVP Value** to **`3004.`**

- For the **Application Id**, select **3 - Diameter base accounting** from the pulldown list.

Configuration

The CPA menu option allows you to perform configuration tasks for the following:

- System Options
- Message Copy
- SBR
- SBR Subresource Mapping

Note: CPA does not require any additional network configuration beyond the standard DSR configuration.

System Options

The **System Options** page shows values for various CPA configuration options.

For more information about each field, see *System Options page elements*.

System Options page elements

This section describes the elements on the **CPA > Configuration > System Options** page.

Table 8: System Options page elements

Field (* indicates required field)	Description	Data Input Notes
Unavailable Action	Action to be taken when the CPA has an Operational State of Degraded or Unavailable.	This field is read-only. Default: Send Answer
Unavailable Action Result Code	Because the Unavailable Action must be Send Answer, if the CPA is not available, this value is used in the Result-Code or Experimental-Result AVP of the Answer message.	Format: Two radio button group with a text box and drop-down box. Default: 3004 DIAMETER_TOO_BUSY
Unavailable Action Vendor ID	If zero, then a Result-Code AVP will be sent when the CPA is not available. If non-zero, then an Experimental-Result AVP will be sent with the Vendor-Id AVP set to this value.	Format: Unsigned integer Default: 0
Unavailable Action Error Message	If a non-null string, this configured string will be appended to the Error-Message AVP that is sent in the Answer response when the CPA is not available.	Format: Text box (string up to 64 characters) Default: CPA Unavailable

Field (* indicates required field)	Description	Data Input Notes
DSR Application-Invoked AVP Insertion	If set to Yes, this AVP will be inserted into the Request message that is routed to prevent multiple invocations of CPA on different DSRs or MPs.	Format: Yes/No Default: No
Shutdown Mode	Allows the operator to specify the shutdown method used when the CPA Admin State is changed to Disabled. The CPA can be disabled using either a graceful or forced shutdown method. Graceful allows in-process transactions to continue for a configurable time period before disabling the CPA. Forced is an immediate shutdown.	Format: Forced/Graceful Default: Graceful
* Shutdown Timer	Number of seconds that the Shutdown Timer will run during a graceful shutdown.	Range: 1 to 15 seconds Default: 5
Generate Answer Result Code	The Result-Code or Experimental-Result AVP value to be populated in the Answer message when the DSR generates an Answer message to the downstream (CTF) peer.	Format: Two radio button group with a text box and drop-down box. The drop-down box contains several Result-Code values and corresponding names. The user can also choose to specify their own Result-Code value in the text box. Range: 1000 - 5999 Default: 3004 DIAMETER_TOO_BUSY
Generate Answer Vendor ID	If zero, then a Result-Code AVP will be sent when the DSR generates an Answer message. If non-zero, then the Experimental-Result AVP will be sent in the Answer message with the Vendor-Id AVP set to this value. The value of the Result-Code or Experimental-Result AVP will be the configured Generate Answer Result Code.	Format: Unsigned integer Default: 0
Generate Answer Error Message	If a non-null string, this configured string will be appended to the Error-Message AVP that is sent in the generated Answer message.	Format: Text box (string up to 64 characters) Default: DSR Generated Answer
Behavior if Session Lookup Error	Behavior to use when CPA attempts to query the preferred CDF that is associated with the given	The range of allowable values in the

Field (* indicates required field)	Description	Data Input Notes
	Diameter session, but the query is not successful. The possible behaviors are • Generate Answer (send an Answer message with the configured Generate Answer Result-Code to the CTF) • Continue Routing (load balance the Request message to an available CDF)	drop-down box shall be: • Generate Answer • Continue Routing Default: Continue Routing

Editing System Options

Use this task to edit the System Options.

1. Select **CPA** > **Configuration** > **System Options**.
   The **CPA > Configuration > System Options** page appears.
2. Update the relevant fields.
   For more information about each field, see *System Options page elements*.
3. Perform one of the following actions:
   - Click **Apply** to save the changes and stay on this page.
   - Click **Cancel** to return to the **CPA > Configuration > System Options** page without saving the changes.

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

Message copy

The Diameter Message Copy feature allows users to forward a copy of a Diameter Request message received by or routed through the Diameter Signaling Router to a Diameter Application Server (DAS peer). This capability is triggered based on the CPA configuration.

A user can specify a triggering condition or rule, and when a Diameter Request meeting the triggering condition is received by the DSR, the message is marked as ready to copy by the application as it is processed. When the response to the request (the answer) is received, if the answer contains the correct result code as specified by the system-wide configuration, the resulting action is executed. In the case of Message Copy, the action is to copy the Request and send the copy to a DAS peer. Message Copy copies only the Diameter portion of the Request that matches a triggering condition; thus, the transport and IP layers are not copied. Lower layer protocols that do not contain Diameter Requests are not copied; thus, Message Copy does not implement a port mirror that replicates everything received on the wire on a specific port to an egress port.

Message Copy elements

This table describes the fields on the **CPA > Configuration > Message Copy** page.

Table 9: Message Copy Elements

Field	Description	Data Input Notes
Message Copy Status	Enable or disable the triggering of Message Copy.	Format: Two radio buttons: • Enable • Disable Default: Disable
Called-Station-ID match string 1	If the Called-Station-Id AVP value in an ACR-Start or ACR-Event message contains this case-sensitive string, then Message Copy will be triggered.	Format: Text box (up to 64 characters) Default: Empty string
Called-Station-ID match string 2	If the Called-Station-Id AVP value in an ACR-Start or ACR-Event message contains this case-sensitive string, then Message Copy will be triggered.	Format: Text box (up to 64 characters) Default: Empty string
Called-Station-ID match string 3	If the Called-Station-Id AVP value in an ACR-Start or ACR-Event message contains this case-sensitive string, then Message Copy will be triggered.	Format: Text box (up to 64 characters) Default: Empty string
Called-Station-ID match string 4	If the Called-Station-Id AVP value in an ACR-Start or ACR-Event message contains this case-sensitive string, then Message Copy will be triggered.	Format: Text box (up to 64 characters) Default: Empty string
DAS Copy Route List 1	Route List for distributing copies of Request messages to Diameter Application Servers. A round robin scheme is used to distribute copies among the configured DAS Copy Route Lists.	Format: Pull down of Route Lists that have been configured on the Diameter > Configuration > Route Lists configuration screen.
DAS Copy Route List 2	Route List for distributing copies of Request messages to Diameter Application Servers. A round robin scheme is used to distribute copies among the configured DAS Copy Route Lists.	Format: Pull down of Route Lists that have been configured on the Diameter > Configuration > Route Lists configuration screen.
DAS Copy Route List 3	Route List for distributing copies of Request messages to Diameter Application Servers. A round robin scheme is used to distribute copies among the configured DAS Copy Route Lists.	Format: Pull down of Route Lists that have been configured on the Diameter > Configuration > Route Lists configuration screen.

Field	Description	Data Input Notes
DAS Copy Route List 4	Route List for distributing copies of Request messages to Diameter Application Servers. A round robin scheme is used to distribute copies among the configured DAS Copy Route Lists.	Format: Pull down of Route Lists that have been configured on the Diameter > Configuration > Route Lists configuration screen.
DAS Copy Route List 5	Route List for distributing copies of Request messages to Diameter Application Servers. A round robin scheme is used to distribute copies among the configured DAS Copy Route Lists.	Format: Pull down of Route Lists that have been configured on the Diameter > Configuration > Route Lists configuration screen.
DAS Copy Route List 6	Route List for distributing copies of Request messages to Diameter Application Servers. A round robin scheme is used to distribute copies among the configured DAS Copy Route Lists.	Format: Pull down of Route Lists that have been configured on the Diameter > Configuration > Route Lists configuration screen.
DAS Copy Route List 7	Route List for distributing copies of Request messages to Diameter Application Servers. A round robin scheme is used to distribute copies among the configured DAS Copy Route Lists.	Format: Pull down of Route Lists that have been configured on the Diameter > Configuration > Route Lists configuration screen.
DAS Copy Route List 8	Route List for distributing copies of Request messages to Diameter Application Servers. A round robin scheme is used to distribute copies among the configured DAS Copy Route Lists.	Format: Pull down of Route Lists that have been configured on the Diameter > Configuration > Route Lists configuration screen.
DAS Copy Route List 9	Route List for distributing copies of Request messages to Diameter Application Servers. A round robin scheme is used to distribute copies among the configured DAS Copy Route Lists.	Format: Pull down of Route Lists that have been configured on the Diameter > Configuration > Route Lists configuration screen.
DAS Copy Route List 10	Route List for distributing copies of Request messages to Diameter Application Servers. A round robin scheme is used to distribute copies among the configured DAS Copy Route Lists.	Format: Pull down of Route Lists that have been configured on the Diameter >

Field	Description	Data Input Notes
		Configuration > Route Lists configuration screen.

Configuring Message Copy

Use this task to configure Message Copy.

1. Select **CPA** > **Configuration** > **Message Copy**.
   The **CPA > Configuration > Message Copy** page appears.
2. Update the relevant fields.
   For more information about each field, see *Message Copy elements*.
3. Perform one of the following actions:
   - Click **Apply** to save the changes and stay on this page.
   - Click **Cancel** to return to the **CPA > Configuration > Message Copy** page without saving the changes.

   Clicking **Apply** when Message Copy is enabled will generate an error message if at least one Called-Station-ID AVP match string and at least one DAS Route List are not configured.

   If a user attempts to delete a Route List that is being referenced as a Message Copy DAS Route List, the deletion will not be allowed.

SBR page

This section describes the configuration functions of the Charging SBR found on the **CPA > Configuration > SBR** page, which specifies when the stale session binding audit will run and how old a binding has to be before it is considered stale.

SBR elements

This table describes the fields on the **CPA > Configuration > SBR** page.

Field (* indicates required field)	Description	Data Input Notes
* SBDB audit Start Time	Time of day in UTC to start the audit process. The audit process removes stale bindings from the Charging SBR. Since the audit window is configurable, the audit process calculates the rate at which to delete records based on the number of expected stale bindings and the configured duration of the daily audit. The longer the audit window is, the slower the deletion rate.	Format: pull-down list Range: 12:00 AM - 11:00 PM, UTC Default: 2:00 AM

Field (* indicates required field)	Description	Data Input Notes
	If your system has a daily period of lower customer activity, you may wish to schedule the audit for that time. Otherwise, you can reduce the performance load of the process by allowing it more time during the day to complete its audit.	
* SBDB audit Stop Time	Time of day in UTC to stop the audit process. Must be at least 1 hour past the start time.	Format: pull-down list Range: 12:00 AM - 11:00 PM, UTC Default: 3:00 AM
* Stale SBDB session binding age	Age after which a session will be considered stale and eligible for removal during audit. Note that increasing the age will increase memory usage. Age is specified in days.	Format: numeric Range: 1-30 Default: 2
* Maximum active session bindings	Session binding count used to calculate the session binding count alarms. Once this setting is reached, the Charging SBR will issue an alarm; however, it will continue to store bindings.	Format: numeric Range: 1 - 100,000,000 Default: 35,000,000
* SBDB Mostly Stale Percentage	Percent of stale session age when a session binding is considered mostly stale. This setting is not used by the audit process. However, it is used to generate measurements.	Format: numeric Range: 1-99 Default: 90

Configuring the Charging SBR

The Charging SBR configuration options set up the audit window, specify when a binding becomes stale, and set some alarm and measurement thresholds.

1. Select **CPA** > **Configuration** > **SBR**.

   The **CPA > Configuration > SBR** page appears.

2. Inspect the defaults.

   For more information on the configuration options, see *SBR elements*.

   It should not be necessary to modify the defaults.

3. Make any changes to the configuration options.
4. Click **Apply** to apply your changes.

   Your changes will go into affect immediately.

SBR Subresource Mapping page

This section describes the configuration found on the **CPA > Configuration > SBR Subresource Mapping** page. A subresource is a logical partition of the Charging SBR.

Caution: The subresource mapping must be configured after the CPA is activated, but before it is enabled. The page can be edited only once.

SBR Subresource Mapping elements

The **SBR Subresource Mapping** page is organized by server group, which must be configured before accepting the configurations on this page. To configure server groups, select **Configuration** > **Server Groups**.

Caution: After configuration, this page becomes read-only.

Element	Description	Data Input Notes
SBR Server Group Name	Server Group Name from the **Configuration > Server Groups** page	This field cannot be edited
Resource Name	The resource name is cSBR.	This field cannot be edited
Subresource Id	A subresource is a logical partition of the Charging SBR consisting of an active/standby pair. The Subresource Id is a monotonically increasing integer starting with 0. An selection of "Not Hosted" indicates that the server group will not be used. The "Not Hosted" ID is typically used only in testing environments. An asterisk after the value field means that the configuration is mandatory.	Format: pull-down list Range: "Not Hosted", 0-*N*, where *N* is the number of subresources-1 Default: 0, 1, 2, 3, ..., *N*

Configuring the Charging SBR subresource mapping

Caution: Subresources must be configured after the CPA is activated.

This screen can be edited only once.

You must apply the configuration before enabling the CPA.

1. Select **CPA** > **Configuration** > **SBR Subresource Mapping**.

   The **CPA > Configuration > SBR Subresource Mapping** page appears.

2. Inspect the defaults for Subresource Ids.

   It should *not* be necessary to modify the defaults. The defaults are correct for a production deployment.

3. If needed for setting up a testing environment, make changes to the configurations.

   If there is a Charging SBR Server Group that you do not intend to use (that is, not host a subresource), change the subresource ID to "Not Hosted". This configuration would be used only in lab testing.

   Subresources must be numbered sequentially, starting with 0 and incremented by 1.

4. Click **Apply**.

   This step is mandatory, even if no changes to the subresource Ids were made.

   A warning displays saying that this screen can be edited only once. The update will be rejected if subresources are not numbered sequentially starting with 0.

5. Click **Confirm** to apply your changes.

Once the changes are confirmed, this page and the configurations for the Charging SBR on the **Configuration > Server Groups** page will be read only.

If you need to reconfigure subresources or Charging SBR server groups, contact the *My Oracle Support (MOS)* for assistance.

Post-Configuration Activities

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

- Enable CPA
- Enable Connections
- Status Verification

Enabling the CPA

Use this task to enable the CPA.

1. From each active SOAM, select **Diameter** > **Maintenance** > **Applications**.
   The **Diameter > Maintenance > Applications** page appears.

2. Under **DSR Application Name**, select each **CPA** 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**.

Enabling Connections

Use this task to enable the connections to the CTFs, CDFs, and Diameter Application Servers.

1. From the active SOAM, select **Diameter** > **Maintenance** > **Connections**.
   The **Diameter > Maintenance > Connections** page appears.
2. Select 1 - 20 connections to enable.

   To select more than one row, press and hold **Ctrl** while you click each row. To select multiple contiguous connections, click the first connection you want, then press and hold **Shift** and select the last connection you want. All the connections between are also selected.

3. Click **Enable**.
   A confirmation box appears.
4. Click **OK**.
   The selected connections are enabled.
5. Verify the connection status on the page.

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

Status Verification

Use this procedure to verify CPA 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**.

DSR Bulk Import and Export

The following documents describe the use and operation of DSR Bulk Import and Export functions:

- *Diameter Common User's Guide*,
- **Help** > **Diameter Common** > **DSR Bulk Import**
- **Help** > **Diameter Common** > **DSR Bulk Export**

The DSR Bulk Import and Export functions can be used to export Diameter, IPFE, and DSR 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.

DSR Bulk Import

The DSR 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 DSR 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 DSR release that is used to import the file.

Files that are created using the DSR 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 on a computer; 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.

The following 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.

DSR Bulk Export

The DSR Bulk Export operation creates ASCII Comma-Separated Values (CSV) files (.csv) containing Diameter , IPFE, and DSR Application configuration data. Exported configuration data can be edited and used with the DSR 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 DSR 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.

The following configuration data can be exported in one Export operation:

- All exportable configuration data in the system

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

Exported files can be written to the File Management Directory in the local File Management area (**Status & Manage > File** 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.

Glossary

A

ACA	Accounting Answer Diameter message type responding to an Accounting Request message.
ACR	Accounting Request Diameter message type for creating an accounting transaction. An ACR is sent by an IMS network element that describes a stage in the processing of a SIP service.
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 (e.g., routing information) as well as authentication, authorization or accounting information.

C

CDF	Charging Data Function
CPA	Capability Point Code ANSI Charging Proxy Application - The Charging Proxy Application (CPA) feature defines a DSR-based Charging Proxy Function (CPF) between the CTFs and the CDFs. The types of CTF include GGSN, PGW, SGW, HSGW, and CSCF/TAS.
CTF	Charging Trigger Function

D

DAS	Diameter Application Server Diameter Agent Server
DSR	Data Set Ready Diameter Signaling Router A set of co-located Message Processors which share common Diameter routing tables and are supported by a pair of OAM servers. A DSR Network Element may consist of one or more Diameter nodes. Delete Subscriber Data Request

G

GUI	Graphical User Interface The term given to that set of items and facilities which provide the user with a graphic means for manipulating screen data rather than being limited to character based commands.

I

IPFE	IP Front End A traffic distributor that routes TCP traffic sent to a target set address by application clients across a set of application servers. The IPFE minimizes the number of externally routable IP addresses required for application clients to contact application servers.

N

NOAM	Network Operations, Administration, and Maintenance

S

SBR	Subsystem Backup Routing

S

	Session Binding Repository - A highly available, distributed database for storing Diameter session binding data
SOAM	System Operations, Administration, and Maintenance Site 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

UTC	Coordinated Universal Time