Oracle® Communications Diameter Signaling Router

SBR User's Guide

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ORACLE®

Oracle Communications Diameter Signaling Router SBR User's Guide

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1

Introduction

Topics:

This chapter contains a brief description of the SBR. The contents include sections about the document scope, audience, and organization, how to find related publications, and how to contact customer assistance.

Overview

The *SBR User's Guide* provides a conceptual overview of SBR's purpose, architecture, and functionality.

It also describes the pages and elements on the SBR GUI (Graphical User Interface), as well as procedures for using the SBR interface.

Scope and Audience

This document is intended for anyone responsible for configuring and using the SBR. Users of this manual must have a working knowledge of telecommunications and network installations.

Manual Organization

This manual is organized into chapters:

- *Introduction* contains general information about the DSR 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, including information about how the interface options are organized, how to use widgets and buttons, and how filtering and other page display options work.
- *SBR Introduction* describes the topology, architecture, components, and functions of the SBR.
- *Configuration* describes configuration of SBR components.
- *Maintenance* describes maintenance and status information for SBR.

Documentation Admonishments

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

Table 1: Admonishments

Icon	Description
DANGER	Danger: (This icon and text indicate the possibility of *personal injury*.)

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

Related Publications

For information about additional publications 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:

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	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 a menu item contains subfolders. • To display submenu items, click the plus character, the folder, or anywhere on the same line. • To select a menu item that does not have submenu items, click on the menu item text or its associated symbol.
Work Area	Right side of panel under status	Consists of three sections: Page Title Area, Page Control Area (optional), and Page Area. • Page Title Area: Occupies the top of the work area. It displays the title of the current page being displayed, date and time, and includes a link to context-sensitive help. • Page Control Area: Located below the Page Title Area, this area shows controls for the Page Area (this area is optional). When available as an option, filter controls display in this area. The Page Control Area contains the optional layout element toolbar, which displays different elements depending on which GUI page is selected. For more information, see *Optional Layout Element Toolbar*. • Page Area: Occupies the bottom of the work area. This area is used for all types of operations. It displays all options, status, data, file, and query screens. Information

Element	Location	Function
		or error messages are displayed in a message box at the top of this section. A horizontal and/or vertical scroll bar is provided when the displayed information exceeds the page area of the screen. When a user first logs in, this area displays the application user interface page. The page displays a user-defined welcome message. To customize the message, see *Customizing the Login Message*.

Main Menu Options

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

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

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

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

Table 3: Main Menu Options

Menu Item	Function
Administration	The Administration menu allows the user to: • General Options. Configure options such as password history and expiration, login message, welcome message, and the number of failed login attempts before an account is disabled • Set up and manage user accounts • Configure group permissions • View session information • Manage sign-on certificates • Authorize IP addresses to access the user interface • Configure SFTP user information • View the software versions report • Upgrade management including backup and reporting • Authenticate LDAP servers • Configure SNMP trapping services • Configure an export server • Configure DNS elements
Configuration	On the NOAM, allows the user to configure: • Network Elements • Network Devices • Network Routes

Menu Item	Function
	• Services • Servers • Server Groups • Resource Domains • Places • Place Associations • Interface and Port DSCP
Alarms and Events	Allows the user to view: • Active alarms and events • Alarm and event history • Trap log
Security Log	Allows the user to view, export, and generate reports from security log history.
Status & Manage	Allows the user to monitor the individual and collective status of Network Elements, Servers, HA functions, Databases, KPIs, system Processes, and Tasks. The user can perform actions required for server maintenance, database management, data, and ISO file management.
Measurements	Allows the user to view and export measurement data.
Transport Manager (optional)	On the SOAM, allows the user to configure adjacent nodes, configuration sets, or transports. A maintenance option allows the user to perform enable, disable, and block actions on the transport entries.
Communication Agent (optional)	Allows the user to configure Remote Servers, Connection Groups, and Routed Services. The user can perform actions to enable, disable, and block connections. Also allows the user to monitor the status of Connections, Routed Services, and HA Services.
SS7/Sigtran (optional)	On the SOAM, allows the user to configure various users, groups, remote signaling points, links, and other items associated with SS7/Sigtran; perform maintenance and troubleshooting activities; and provides a command line interface for bulk loading SS7 configuration data.
Diameter Common (optional)	Allows the user to view or configure: • Dashboard, configure on the NOAM; view on both OAMs • Network Identifiers on the SOAM - MCC Ranges • Network Identifiers on the NOAM - MCCMNC and MCCMNC Mapping • MPs (on the SOAM) - editable Profile parameters and Profile Assignments The DSR Bulk Import and Export functions are available on both OAMs for the data configured on that OAM.
Diameter (optional)	Allows the user to configure, modify, and monitor Diameter routing: • On the NOAMP, Diameter Topology Hiding and Egress Throttle List configuration

Menu Item	Function
	• 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: • 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 NOAMP, allows the user to perform configuration tasks, edit options, and view elements for:
	
	• General Options
	• Access Point Names
	• Policy DRA
	
	    • PCRF Pools
	    • PCRF Sub-Pool Selection Rules
	    • Network-Wide Options
	
	• Online Charging DRA
	
	    • OCS Session State
	    • Realms
	    • Network-Wide Options
	
	• Alarm Settings
	• Congestion Options
	
	Additionally on the NOAMP, users are allowed to perform maintenance tasks, edit options, and view elements for:
	
	• Maintenance
	
	    • SBR Database Status

Menu Item	Function

	• SBR Status
	• SBR Database Reconfiguration Status
	• Policy Database Query
	
	On the SOAM, allows the user to perform configuration tasks, edit options, and view elements for:
	
	• General Options
	• Access Point Names
	• Policy DRA
	
	    • PCRFs
	    • Binding Key Priority
	    • PCRF Pools
	    • PCRF Pool to PRT Mapping
	    • PCRF Sub-Pool Selection Rules
	    • Policy Clients
	    • Suspect Binding Removal Rules
	    • Site Options
	
	• Online Charging DRA
	
	    • OCSs
	    • CTFs
	    • 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 (optional)	On the SOAM, allows the user to perform configuration tasks, edit options, and view elements for the DM-IWF DSR Application: • DM-IWF Options • Diameter Exception On the NOAMP, allows the user to perform configuration tasks, edit options, and view elements for the MD-IWF SS7 Application:

Menu Item	Function
	• MD-IWF Options • Diameter Realm • Diameter Identity GTA • GTA Range to PC • MAP Exception • CCNDC Mapping
RADIUS (optional)	Allows the user to perform configuration tasks, edit system options, and view elements for: • Network Options • Message Authenticator Configuration Sets • Shared Secret Configuration Sets • Ingress Status Server Configuration Sets • Message Conversion Configuration Sets • NAS Node
SBR (optional)	Allows the user to perform configuration tasks, edit system options, and view elements for: • SBR Databases • SBR Database Resizing Plans • SBR Data Migration Plans Additionally, on the NOAMP, users are allowed to perform maintenance tasks, edit options, and view elements for: • Maintenance • SBR Database Status • SBR Status • SBR Database Reconfiguration Status
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.

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Oracle System Login

Wed Jul 8 14:20:00 2015 EDT

Log In
Enter your username and password to log in

Username: [   ]

Password: [   ]

☐ Change password

[Log In]

Welcome to the Oracle System Login.

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

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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*.

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

Figure 5: Tabbed Pages

Figure 6: Tabbed Pages

Reports

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

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

User Account Usage Report

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

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


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

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

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

End of User Account Usage Report

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

Figure 7: Report Output

Customizing the Splash Page Welcome Message

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

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

   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.
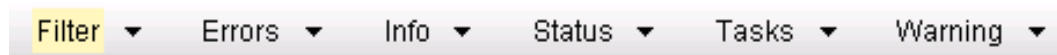
Figure 10: Optional Layout Element Toolbar

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.
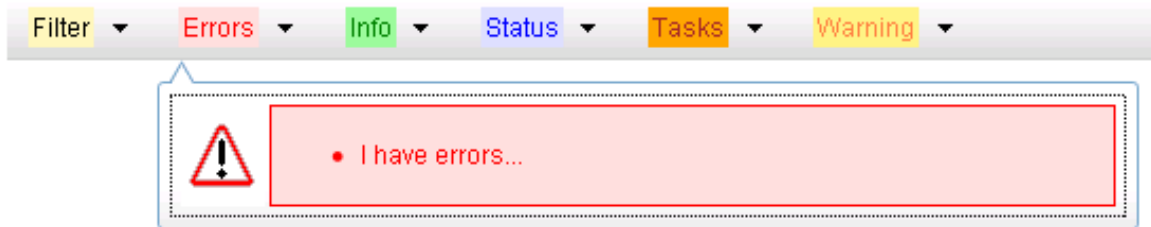
Figure 11: Automatic Error Notification

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

SBR Introduction

Topics:

- *The SBR Database.....33*

This section introduces SBR, key concepts, and basic functionality.

SBR is a feature of the Diameter Signaling Router (DSR), which is part of the Oracle product line of signaling products.

The SBR Database

An SBR Database consists of several fields:

- A user-configured Database Name
- A Database Type (either Session or Binding)
- The Resource Domain Name of the Resource Domain that contains the Policy and Charging SBR Server Groups
- The Number of Server Groups that define the capacity of the SBR Database
- The Place Association that uses the SBR Database

Note: An SBR Database must be configured after configuring Policy and Charging SBR Server Groups, Policy Binding or Policy Session Resource Domains, and Policy Binding Region or Policy and Charging Mated Sites Place Associations.

When using the Policy DRA function of PCA, a Binding type SBR Database is required, plus an instance of a Session type SBR Database for each Policy and Charging Mated Sites Place Association. The Binding SBR Database serves the entire network, or more specifically, the Site Places assigned to the Policy Binding Region Place Association. Each Session SBR Database serves the Site Places defined in the Policy and Charging Mated Sites Place Association.

When using only the Online Charging DRA function of PCA, no Binding type SBR Database is needed, but a Session type SBR Database must still be configured for each Policy and Charging Mated Sites Place Association.

When using both Policy DRA and Online Charging DRA functions of PCA, a single instance of Session type SBR Database supports both policy sessions and online charging sessions for a given Policy and Charging Mated Sites Place Association. Additionally, the SBR Binding Database is still necessary for the Policy DRA function to work.

SBR Databases cannot be edited. If a field must be changed, the SBR Database must be deleted and re-inserted with the corrected value.

For further information on configuring an SBR Database, refer to *Configuration*.

For further information on maintaining an SBR Database, refer to *Maintenance*.

For further information on Policy DRA, Online Charging DRA, and the Policy and Charging Application in general, refer to the *Policy and Charging Application User's Guide*.

Database Growth

SBR Databases can be created with different sized session databases for each Policy and Charging Mated Sites instance. Each instance of the Session SBR Database can be sized appropriately for the expected level of signaling traffic at that set of mated sites.

Session SBR Databases can be resized without loss of policy or charging data and without disruption to policy or charging signaling. Binding SBR Databases can be resized without loss of binding data and without disruption to policy signaling.

For further information about how to resize an SBR database, refer to *SBR Database Resizing Plans*.

SBR Database Resizing

An SBR Resizing Plan is the configuration that identifies the SBR Database to be resized and the Target Resource Domain to which the SBR data will be migrated.

SBR Resizing involves changing the capacity (number of server groups) of an SBR Database by creating a new Resource Domain (called the Target Resource Domain) for the SBR Database and migrating the data from the Initial Resource Domain to the Target Resource Domain. The Target Resource Domain may be larger or smaller than the Initial Resource Domain, allowing the SBR Database to grow or shrink in size.

For further information on configuring SBR Database Resizing Plans, refer to *SBR Database Resizing Plans*.

SBR Data Migration

SBR Data Migration is used when the SBR Database topology for session databases is to be changed. SBR Data Migration is the process of moving data from the Initial to Target SBR Database by creating new records in the target and allowing records in the initial to be removed by normal PCA Diameter signaling.

There are multiple situations in which SBR Data Migration may occur:

- Mating (combining SBR Databases when transitioning from stand-alone PCA DSR sites to mated PCA DSR sites)
- Un-mating (Separating SBR Databases when transitioning from mated PCA DSR sites to stand-alone PCA DSR sites)
- Re-mating (Swapping mate relationships between two sets of mated sites)

For further information on configuring SBR Data Migration Plans, refer to *SBR Data Migration Plans*.

Chapter

4

Configuration

Topics:

The **SBR** > **Configuration** GUI pages for SBR components provide fields for entering the information needed to manage SBR configuration in the DSR.

SBR Configuration

This section describes the **SBR** > **Configuration** GUI pages.

SBR Databases

On the **SBR** > **Configuration** > **SBR Databases** page on an Active NO, an SBR Database can be configured. For each database the Resource Domain, number of Server Groups, and Place Association are defined.

Note: SBR Database is also available to be viewed on the SO GUI. However, these options are only able to be sorted and filtered on the SO. Modifying these options is only permissible on the NO.

The fields are described in *SBR Databases elements*.

SBR Databases elements

Table 8: SBR Databases elements describes the elements on the **SBR** > **Configuration** > **SBR Databases** page on the NO GUI.

Table 8: SBR Databases elements

Fields (* indicates a required field)	Description	Data Input Notes
Database Name*	A name that uniquely identifies the SBR Database.	Format: Text box Default: N/A Range: A 32-character string. Valid characters are alphanumeric and underscore. Must contain at least one alpha and must not start with a digit.
Database Type*	The type of SBR Database.	Format: Pull-down list Default: N/A Range: Binding or Session
Resource Domain*	The Policy Session or Policy Binding Resource Domain that contains the SBR Server Groups configured for use by this database. Select the Resource Domain that will host this database.	Format: Pull-down list Default: N/A Range: Configured Resource Domains matching the selected Database Type that have not already been assigned to a Database.
Number of Server Groups*	The number of SBR Server Groups required to host this database.	Format: Text box

Fields (* indicates a required field)	Description	Data Input Notes
	Enter or change the number of Server Groups necessary to support the desired capacity of the database. If the selected Resource Domain already contains Server Groups, the number of Server Groups in the Resource Domain is displayed in the field, but can be overridden as desired.	Default: N/A Range: 1 to 8
Place Association*	The Policy Binding Region or Policy and Charging Mated Sites Place Association that contains the Sites that will use this database. Select the Place Association that is to use this SBR Database.	Format: Pull-down list Range: Configured Place Associations matching the selected Database Type that have not already been assigned to a Database

Viewing SBR Databases

Use this task to view all configured SBR Databases on the NO GUI.

Select **SBR** > **Configuration** > **SBR Databases**.
The **SBR** > **Configuration** > **SBR Databases** page appears.

The fields are described in *SBR Databases elements*.

Inserting SBR Databases

Use this task to insert an SBR Databases on the NO GUI.

The fields are described in *SBR Databases elements*.

1. Select **SBR** > **Configuration** > **SBR Databases**.
   The **SBR** > **Configuration** > **SBR Databases** page appears.
2. Click **Insert**.
3. Enter a unique Database Name in the **Database Name** field.
4. Select a **Database Type** from the dropdown list.
5. Select a **Resource Domain** from the dropdown list.
6. Enter a number of Server Groups in the **Number of Server Groups** field.
7. Select a **Place Association** from the dropdown list.
8. Click:

   • **Ok** to save the new SBR Database and return to the **SBR** > **Configuration** > **SBR Databases** page.
   • **Apply** to save the new SBR Database and remain on the page.
   • **Cancel** to return to the **SBR** > **Configuration** > **SBR Databases** page without saving any changes.

   Note: If **Ok** or **Apply** is clicked and the maximum number of SBR Databases has already been created, an error message will appear.

Deleting an SBR Database

Use this task to delete an SBR Database.

1. Select **SBR** > **Configuration** > **SBR Databases**.
   The **SBR** > **Configuration** > **SBR Databases** page appears.
2. Select the **SBR Database** to be deleted.
3. Click **Delete**.
   A popup window appears to confirm the delete.
4. Click:

   - **Ok** to delete the SBR Database.
   - **Cancel** to cancel the delete function and return to the **SBR** > **Configuration** > **SBR Databases** page.

   If **Ok** is clicked and a problematic condition exists, an error message appears:

   - The entry no longer exist.
   - A specific SBR Database must be Disabled prior to deletion.
   - A specific SBR Database is referenced by at least one SBR Database Resizing Plan.
   - A specific SBR Database is reference by at least one SBR Data Migration Plan.

SBR Database Resizing Plans

On the **SBR** > **Configuration** > **SBR Database Resizing Plans** page on an Active NO, SBR Database Resizing Plans can be configured. An SBR Database Resizing plan allows for changing the size of a running SBR Database.

Each database is to be resized by migrating records from the Initial Resource Domain to the Target Resource Domain. Creation of an SBR Database Resizing Plan has no effect on the running database. After creating a Resizing Plan, go to the **SBR Database Reconfiguration Status** screen to prepare, start and monitor the migration. Once migration has completed, or has been cancelled, the SBR Database Resizing Plan should be deleted.

Note: SBR Data Migration Plans are configurable only on an Active NO, but are viewable on NO and SO servers.

Resizing Plans can be configured prior to the start of the plan's execution.

The fields are described in *SBR Database Resizing Plans elements*.

SBR Database Resizing Plans elements

Table 9: SBR Database Resizing Plans elements describes the elements on the **SBR** > **Configuration** > **SBR Database Resizing Plans** page on the NO GUI.

Table 9: SBR Database Resizing Plans elements

Fields (* indicates a required field)	Description	Data Input Notes
Plan Name*	A name that uniquely identifies the SBR Database Resizing Plan	Format: Text box Default: N/A Range: A 32-character string. Valid characters are alphanumeric and underscore. Must contain at least one alpha and must not start with a digit.
Database Name*	The SBR Database to be resized	Format: Pull-down list Default: N/A Range: List of configured Databases eligible to be resized
Initial Resource Domain	The Resource Domain configured for the selected database.	This read only field displays the Resource Domain associated with the selected database.
Database Type	The type of SBR Database	This read-only field displays the Database Type associated with the selected database.
Initial Number of Server Groups	The number of Server Groups hosting this database.	This read only field displays the number of Server Groups contained in the Initial Resource Domain.
Target Resource Domain*	The Resource Domain into which the database is to be migrated. Select the Resource Domain that will host the resized database	Format: Pull-down list Default: N/A Range: Configured Resource Domains eligible for use as a target resource domain for this resizing plan
Target Number of Server Groups*	The total number of Policy SBR Server Groups required to support the migrated or resized database. Enter the total number of Server Groups necessary to support the capacity of the resized database, including any server groups that will be reused from the original resource domain.	Format: Text box Default: N/A Range:1 to 8

Viewing SBR Database Resizing Plans

Use this task to view all configured SBR Database Resizing Plans on the NO or SO GUIs.

Select **SBR** > **Configuration** > **SBR Database Resizing Plans**.
The **SBR** > **Configuration** > **SBR Database Resizing Plans** page appears.

The fields are described in *SBR Database Resizing Plans elements*.

Inserting SBR Database Resizing Plans

Use this task to insert an SBR Database Resizing Plans on the NO GUI.

The fields are described in *SBR Database Resizing Plans elements*.

1. Select **SBR** > **Configuration** > **SBR Database Resizing Plans**.
   The **SBR** > **Configuration** > **SBR Database Resizing Plans** page appears.
2. Click **Insert**.
3. Enter a unique Plan Name in the **Plan Name** field.
4. Select a **Database Name** from the dropdown list.
5. The **Initial Resource Domain** field is read only.
6. The **Database Type** field is read only.
7. The **Initial Number of Server Groups** field is read only.
8. Select a **Target Resource Domain** from the dropdown list.
9. The **Target Number of Server Groups** field initially displays the number of Server Groups configured for the selected **Target Resource Domain**. However, this value may be modified to any value from 1 to 8. Refer to *Editing SBR Database Resizing Plans* for information on modifying the **Target Number of Server Groups** value.
10. Click:

    - **Ok** to save the new SBR Database Resizing Plan and return to the **SBR** > **Configuration** > **SBR Database Resizing Plans** page.
    - **Apply** to save the new SBR Database Resizing Plan and remain on the page.
    - **Cancel** to return to the **SBR** > **Configuration** > **SBR Database Resizing Plans** page without saving any changes.

    If **Ok** or **Apply** is clicked and a problematic condition exists, an error message appears:

    - Field value is missing
    - Syntax is invalid
    - A Field value isn't unique
    - The operation failed because the selection for a field is no longer valid
    - An Insert failed because the maximum number of SBR Database Resizing Plans have already been created
    - An Insert failed because the SBR Database selected for resizing is not an active database
    - An Insert failed because the SBR Database selected for resizing is already configured in another SBR Database resizing Plan
    - An Insert failed because the SBR Database selected for resizing is already configured in another SBR Data Migration Plan

- An Operation failed because the Target Resource Domain selected is already configured as the Resource Domain for another SBR Database
- An Operation failed because the Target Resource Domain selected is already configured as the Target Resource Domain for another SBR Resizing Plan
- An Operation failed because the Target Resource Domain selected must have the same Resource Domain Profile as the Resource Domain configured for the selected SBR Database

Editing SBR Database Resizing Plans

Use this task to edit an SBR Database Resizing Plans on the NO GUI.

The fields are described in *SBR Database Resizing Plans elements*.

1. Select **SBR** > **Configuration** > **SBR Database Resizing Plans**.
   The **SBR** > **Configuration** > **SBR Database Resizing Plans** page appears.
2. Click **Edit**.
3. Edit the Plan Name in the **Plan Name** field.
4. Select a **Database Name** from the dropdown list.
5. The **Initial Resource Domain** field is read only.
6. The **Database Type** field is read only.
7. The **Initial Number of Server Groups** field is read only..
8. Select a **Target Resource Domain** from the dropdown list.
9. If needed, edit the total number of Server Groups needed to support the capacity of the resized database in the **Target Number of Server Groups** field.
10. Click:

    - **Ok** to save the edited SBR Database Resizing Plan and return to the **SBR** > **Configuration** > **SBR Database Resizing Plans** page.
    - **Apply** to save the edited SBR Database Resizing Plan and remain on the page.
    - **Cancel** to return to the **SBR** > **Configuration** > **SBR Database Resizing Plans** page without saving any changes.

    If **Ok** or **Apply** is clicked and a problematic condition exists, an error message appears:

- Field value is missing
- Syntax is invalid
- A Field value isn't unique
- The operation failed because the selection for a field is no longer valid
- An Edit failed because the maximum number of SBR Database Resizing Plans have already been created
- An Edit failed because the SBR Database selected for resizing is not an active database
- An Edit failed because the SBR Database selected for resizing is already configured in SBR Database resizing Plan <Plan Name>
- An Edit failed because the SBR Database selected for resizing is already configured in SBR Data Migration Plan <Plan Name>
- An Operation failed because the Target Resource Domain selected is already configured as the Resource Domain for SBR Database <SBR Database Name>
- An Operation failed because the Target Resource Domain selected is already configured as the Target Resource Domain for SBR Resizing Plan <Plan Name>

- An Operation failed because the Target Resource Domain selected must have the same Resource Domain Profile as the Resource Domain configured for the selected SBR Database

Deleting an SBR Database Resizing Plan

Use this task to delete an SBR Database Resizing Plan.

Note: The **SBR** > **Configuration** > **SBR Database Resizing Plans** page is also available to be viewed on the SO GUI. However, these options are only able to be sorted and filtered on the SO. Modifying these options is only permissible on the NO.

1. Select **SBR** > **Configuration** > **SBR Database Resizing Plans**.
   The **SBR** > **Configuration** > **SBR Database Resizing Plans** page appears.
2. Select the **SBR Database Resizing Plan** to be deleted.
3. Click **Delete**.
   A popup window appears to confirm the delete.
4. Click:

   - **Ok** to delete the SBR Database Resizing Plan.
   - **Cancel** to cancel the delete function and return to the **SBR** > **Configuration** > **SBR Database Resizing Plans** page.

   If **Ok** is clicked, but the SBR Database Resizing Plan is not in the Planned administrative state or in the Complete administrative state with an operational status of Migration Plan Completed, an error is displayed.

SBR Data Migration Plans

On the **SBR** > **Configuration** > **SBR Data Migration Plans** page on an Active NO, an SBR Data Migration Plan can be configured.

SBR Data Migration is the process of moving data from an Initial SBR Database to a Target SBR Database by creating new records in the target and allowing records in the initial to be removed by normal PCA Diameter signaling.

Creation of an SBR Data Migration Plan has no effect on either database. After creating a Data Migration Plan, go to the **SBR Database Reconfiguration Status** screen to prepare, start and monitor the migration. Once migration has completed, or has been cancelled, the SBR Data Migration Plan should be deleted.

Note: SBR Data Migration Plans are configurable only on an Active NO, but are viewable on NO and SO servers.

Data Migration Plans can be configured prior to the start of the plan's execution.

The fields are described in *SBR Data Migration Plans elements*.

SBR Data Migration Plans elements

Table 10: SBR Data Migration Plans elements describes the elements on the **SBR** > **Configuration** > **SBR Data Migration Plans** page on the NO GUI.

Table 10: SBR Data Migration Plans elements

Fields (* indicates a required field)	Description	Data Input Notes
Plan Name*	A name that uniquely identifies the SBR Data Migration Plan.	Format: Text box Default: N/A Range: A 32-character string. Valid characters are alphanumeric and underscore. Must contain at least one alpha and must not start with a digit.
Migration Type*	The type of data migration plan that this plan is to be a part of.	Format: Pull-down list Default: N/A Range: Un-Mating, Mating, Re-Mating
Initial Database*	A name that uniquely identifies the database from which records are to be migrated.	Format: Pull-down list Default: N/A Range: List of configured Databases eligible to be the source of a migration
Initial Place Association	The Place Association configured to use the Initial Database.	This read only field displays the Place Association configured for the Target Database.
Target Database*	A name that uniquely identifies the database to which records are to be migrated.	Format: Pull-down list Default: N/A Range: List of configured Databases eligible to be the target of a migration
Target Place Association	The Place Association configured to use the Target database.	This read only field displays the Place Association configured for the Target Database.

Viewing SBR Data Migration Plans

Use this task to view all configured SBR Data Migration Plans on the NO or SO GUIs.

Select **SBR** > **Configuration** > **SBR Data Migration Plans**.
The **SBR** > **Configuration** > **SBR Data Migration Plans** page appears.

The fields are described in *SBR Data Migration Plans elements*.

Inserting SBR Data Migration Plans

Use this task to insert an SBR Data Migration Plans on the NO GUI.

The fields are described in *SBR Data Migration Plans elements*.

1. Select **SBR** > **Configuration** > **SBR Data Migration Plans**.
   The **SBR** > **Configuration** > **SBR Data Migration Plans** page appears.
2. Click **Insert**.
3. Enter a unique Plan Name in the **Plan Name** field.
4. Select a **Migration Type** from the dropdown list.
5. Select an **Initial Database** from the dropdown list.
6. The **Initial Place Assoication** field is read only.
7. Select a **Target Database** from the dropdown list.
8. The **Target Place Assoication** field is read only.
9. Click:

   - **Ok** to save the new SBR Data Migration Plan and return to the **SBR** > **Configuration** > **SBR Data Migration Plans** page.
   - **Apply** to save the new SBR Data Migration Plan and remain on the page.
   - **Cancel** to return to the **SBR** > **Configuration** > **SBR Data Migration Plans** page without saving any changes.

   If **Ok** or **Apply** is clicked and a problematic condition exists, an error message appears:

   - A Field value is missing
   - Syntax is invalid
   - A Field value must be unique
   - An Operation failed because the selection for the field is invalid
   - An Insert failed because the maximum number of SBR Data Migration Plans have already been created
   - An Insert failed because the SBR Database selected as the Initial Database is not an active database
   - An Insert failed because the SBR Database selected as the Initial Database is already configured in a specific SBR Database Resizing Plan
   - An Insert failed because the SBR Database selected and Target Database must have the same Database Type
   - An Insert failed because a specific SBR Data Migration Plan already exists with the same Initial and Target Databases
   - An Insert failed because SBR Data Migration is not supported for Binding Databases
   - An Insert failed because a new SBR Data Migration Plan conflicts with an existing SBR Data Migration Plan because the Initial Database of the new Plan is configured as the Target Database of the existing plan
   - An Insert failed because a new SBR Data Migration Plan conflicts with the SBR Data Migration Plan because the Target Database of the new Plan is configured as the Initial Database of the existing plan

Deleting an SBR Data Migration Plan

Use this task to delete an SBR Data Migration Plan.

1. Select **SBR** > **Configuration** > **SBR Data Migration Plans**.
   The **SBR** > **Configuration** > **SBR Data Migration Plans** page appears.

2. Select the **SBR Data Migration Plan** to be deleted.

3. Click **Delete**.
   A popup window appears to confirm the deletion.

4. Click:

   - **Ok** to delete the SBR Data Migration Plan.
   - **Cancel** to cancel the delete function and return to the **SBR** > **Configuration** > **SBR Data Migration Plans** page.

   If **Ok** is clicked, but the SBR Data Migration Plan is not in the Planned administrative state or in the Complete administrative state with an operation status of Migration Plan Complete, an error message is displayed. The Data Migration Plan can be deleted only when the Data Migration Plan is in the Planned administrative state or is in the Completed administrative state with operational status of Migration Plan Completed.

Chapter

5

Maintenance

Topics:

This chapter describes or indicates where to find information that can be used for SBR:

- Maintenance and status information that is maintained by the SBR Configuration and Maintenance components and displayed on the **SBR** > **Maintenance** pages.
- Descriptions of SBR alarms, KPIs, and measurements

SBR Maintenance

This section describes the **SBR** > **Maintenance** GUI pages on the NOAM.

SBR Database Status

The **SBR** > **Maintenance** > **SBR Database Status** page is used to prepare, enable, disable, and monitor the status of SBR Databases that have been configured on the **SBR** > **Configuration** > **SBR Databases**.

Fields are described in *SBR Database Status elements*.

SBR Database Status elements

Table 11: SBR Database Status Pane elements describes the elements on the **SBR** > **Maintenance** > **SBR Database Status** page.

The main SBR Database Status pane shows the details for a configured SBR Database.

Table 11: SBR Database Status Pane elements

Elements	Description
Database Name	The name of the configured SBR Database
Administrative State	The state that the operator commands the SBR Database to be in (Disable, Prepare, or Enable)
Operational Status	The state that the SBR Database is actually in, as reported by the resource users and resource providers of the database
Resource User Operational Reason	The status of the SBR Database as reported by all resource users of the database
Resource Provider Operational Reason	The status of the SBR Database as reported by all resource providers (such as the active server of each SBR server group hosting the database) of the database
Reconfiguration in Progress	Set to No if no SBR Database Reconfiguration is in progress that contains this database. Set to Resizing if a Resizing Plan for that database is in progress. Set to Data Migration if an SBR Data Migration Plan specifying the SBR Database as either the Initial Database or the Target Database is in progress
Database Type	Set to Session if the SBR Database Type is Session. Set to Binding if the SBR Database Type is Binding. Suffixed with (Target) if the SBR Database is the target of an SBR Data Migration Plan

The Resource User pane and the Resource Provider panes provide additional details when the Resource User Operational Status or Resource Provider Operational Status for an SBR Database are colored yellow or red, which indicates a problem. If no problems exist, the Resource User and Resource Provider panes are empty.

Managing an SBR Database

In order to use the SBR Database, configure the options on the **SBR Database Status** screen.

1. Select the new SBR Database row and click **Prepare**. Preparing the database allows the user to verify connectivity between the SBR Database and all users of that SBR Database before the SBR Database is used by the PCA application.

   If the operational status changes to Prepared, then

   - All ComAgent connections applicable to the database are connected
   - An active SBR server is available for each Policy and Charging SBR Server Group in the SBR Database's Resource Domain
   - All resource users have received notification that all portions of the SBR Database (one portion per SBR server group) are available

   Once the SBR Database is in the Prepare administrative state, then the operational status can take a value:

   - Preparing - At least one resource user of the SBR Database cannot successfully access at least one portion of the SBR Database
   - Prepared - All resource users of the SBR Database can successfully access all portions of the SBR Database

2. Select the Prepared SBR Database row and click **Enable**. Enabling the database allows the PCA application to begin using the database to store and retrieve binding or session records

   If the operational status was Preparing at the time **Enable** was clicked, then some resource users cannot successfully access the SBR Database. A confirmation dialog appears to warn that the database is not entirely ready to be Enabled. The user can choose to cancel the Enable or proceed despite the warning. If the user proceeds, the operational status in the Enable state will likely be either Unavailable or Degraded.

   Once the SBR Database is in the Enable administrative state, the **SBR Database Status** screen can be used to monitor the status of the database. An Enabled database will have one of several operational statuses:

   - Normal - Everything related to the SBR Database is functioning normally
   - Degraded - At least one resource user of the SBR Database cannot successfully access at least one portion of the database
   - Unavailable - None of the resource users of the SBR Database can successfully access any portion of the database
   - Congested - At least one of the resource users of the SBR Database is experiencing congestion for at least one portion of the SBR Database. This problem could be due to congestion at an active SBR server of the database, or due to congestion of a ComAgent connection between the resource user and an active SBR server. Both Degraded and Unavailable take precedence over Congested. For example, if an SBR Database is both Degraded and Congested, then the Operational Status will be Degraded.

3. If it becomes necessary to Disable an SBR Database, select the row for the desired SBR Database on the **SBR Database Status** screen and click **Disable**.

   If the SBR Database was in the Enable administrative state prior to clicking **Disable**, a confirmation dialog appears to warn about impacts on the PCA application. The user can choose to cancel the **Disable** or proceed despite the warning.

If the SBR Database was in the Prepare administrative state prior to clicking **Disable**, no confirmation dialog appears since the database is not being used by PCA.

Once **Disable** is clicked, the operational status takes on one of several values:

- Users Detaching - waiting for all resource users to detach from the SBR Database
- Providers Detaching - waiting for all resource providers to detach from the SBR Database
- Disabled - all resource users and resource providers are detached from the SBR Database and the SBR Database may be safely deleted

SBR Status

The **SBR** > **Maintenance** > **SBR Status** page displays a collapsed or expanded detailed report for SBR. The data is displayed within Server Groups by configured Place Associations.

Fields are described in *SBR Status elements*.

SBR Status elements

Table 12: SBR Status elements describes the elements on the **SBR** > **Maintenance** > **SBR Status** page, which displays SBR Server Status data within Server Groups that are assigned to each type of Place Association.

Each tab name was configured on the **Configuration** > **Place Associations** GUI page.

Table 12: SBR Status elements

Elements	Description	Data Input Notes
Binding Region tab	A list of all configured Server Groups that are assigned to the Binding Region Place Association. The Resource Domain Name and the Resource Domain Profile of each Server Group is shown. The Server Name, Resource HA Role of the Server, the server's Congestion Level, and a list of Sub Resources Hosted by the server are shown for each Server in the expanded list.	The page is view-only. The Server Group in each row under the tab can be expanded or collapsed by clicking on the + symbol, to list the Servers that are assigned to that Server Group.
Mated Site tab	A list of all configured Server Groups that are assigned to that Mated Pair Place Association. The Resource Domain Name and the Resource Domain Profile of each Server Group are shown. The Server Name, Resource HA Role of the Server, the server's Congestion Level, and a list of Sub Resources Hosted by the server are shown for each Server in the expanded list. **Note:** There can be multiple Mated Site tabs	

SBR Database Reconfiguration Status

The **SBR** > **Maintenance** > **SBR Database Reconfiguration Status** page is used to prepare, cancel, start, complete, and monitor SBR Database Resizing Plans and SBR Data Migration Plans (collectively referred to as Reconfiguration Plans) that were configured on the **SBR** > **Configuration** > **SBR Database Resizing Plans** and **SBR** > **Configuration** > **SBR Data Migration Plans** screens.

Fields are described in *SBR Database Reconfiguration Status elements*.

SBR Database Reconfiguration Status elements

Table 13: Reconfiguration Status Pane elements describes the elements on the **SBR** > **Maintenance** > **SBR Database Reconfiguration Status** page.

The main Reconfiguration Status pane shows the details for a configured SBR Reconfiguration Plan.

Table 13: Reconfiguration Status Pane elements

Elements	Description
Plan Name	A name that uniquely identifies the Reconfiguration Plan
Plan Type	Indicates whether a Reconfiguration Plan is Resizing or Data Migration
Administrative State	The state that the reconfiguration Plan is desired to be in (Planned, Prepare, Start, Cancel)
Progress	Indicates the number of records remaining in the Initial Resource Domain or Initial SBR Database as the migration progresses out of the number of records that were in the Initial Resource Domain or Initial SBR Database when the Reconfiguration Plan was started
Operational Status	The state that the Reconfiguration Plan is actually in, as reported by the resource users and resource providers of the database
Resource User Operational Reason	The status of the Reconfiguration Plan as reported by all resource users of the database
Resource Provider Operational Reason	The status of the Reconfiguration Plan as reported by all resource providers (such as the active server of each SBR server group hosting the database) of the database.

The Resource User pane and the Resource Provider panes are empty when no row is selected in the Reconfiguration Status pane. If a row is selected in the Reconfiguration Status pane and the Resource User Operational reason cell for that row has a red or yellow background, the Resource User pane displays rows showing the operation status for all resource users that are not in the desired state according to the Administrative State of the row. Similarly, if the Resource Provider Operational Reason cell for that row has a red or yellow background, the Resource Provider pane displays rows for all resource providers that are not in the desired state.

Managing an SBR Reconfiguration Plan

The **SBR Database Reconfiguration Status** screen allows Reconfiguration Plans to be managed and monitored. As soon as a Reconfiguration Plan is successfully configured, it appears on the **SBR Database Reconfiguration Status** screen in the Planned administrative state. From this point onwards until the reconfiguration plan is completed, the **SBR Database Reconfiguration Status** screen is used to control and monitor the migration.

The basic steps for any Reconfiguration Plan are as follows:

1. Prepare the Reconfiguration Plan
2. Start the Reconfiguration Plan
3. Monitor the progress of Reconfiguration Plan
4. Complete the Reconfiguration Plan

Note: If a problem arises with the basic steps after starting a Reconfiguration Plan, there is an option to Abort the plan. By aborting the plan, the Reconfiguration Plan is returned to the Planned administrative state where records are read from and written to the Initial Resource Domain or SBR Database only. If a Reconfiguration is Aborted, already migrated session or binding records (those which are stored in the Target Resource Domain or SBR Database) will be scheduled for removal by the SBR audit such that the corresponding Diameter Sessions get re-established and stored in the Initial Resource Domain or SBR Database.

All rows of the **SBR Database Reconfiguration Status** screen are automatically refreshed every 10 seconds. The automatic refresh can be paused by clicking the **Pause Updates** checkbox. The screen can also be refreshed manually by navigating away from the **SBR Database Reconfiguration Status** screen, then returning.

The six buttons on the screen are disabled unless a row is selected in the Reconfiguration Status pane. If a button is clicked when the row is not in the appropriate state for that button, an error message is displayed indicating why the button is not valid for the row. For example, a Reconfiguration Plan cannot be Started unless it has been Prepared first.

The NOAM knows from configuration data and the Reconfiguration Plan Administrative State which servers are resource users and resource providers for a given Reconfiguration Plan. If the NOAM detects missing merge data from any of the expected resource users or resource providers, the NOAM server reports these servers as Unknown because the status of the servers is not known. Server merge data can be missing at the NOAM if there is a problem with the server itself, or if there is a problem with the merge data communication between the MP server and the NOAM server.

Each Reconfiguration Plan starts out in the Planned Administrative State with Progress indicating Not Started. The Operational status is Ready if all resource users have received notification from all relevant resource providers that the resource provider is available. If any resource user has not received a notification that its resource providers are available (for example, due to problems with the resource provider, or to ComAgent connection problems), the Operational Status is Not Ready.

Reconfiguration Plans in the Planned Administrative State have Resource User and Resource Provider Operational Reason values that correspond to the information seen on the **SBR Database Status** screen for the SBR Database of a Resizing Plan, or the Initial SBR Database for a Data Migration Plan. These values because only the status of the initial resource is examined when in the Planned State.

As long as a Reconfiguration Plan is in the Planned Administrative State, the Reconfiguration Plan may be deleted or changed. Deletion of a Reconfiguration Plan causes the row for that plan to disappear from the **SBR Database Reconfiguration Status** screen. Changing a Reconfiguration Plan has no effect until the plan is prepared for execution again.

Predicting the Duration of an SBR Reconfiguration Plan

During execution of an SBR Database Resizing Plan or SBR Data Migration Plan, data is migrated by creating new records on the target Resource Domain or SBR Database. The old record created prior to starting the reconfiguration plan in the initial Resource Domain or SBR Database are removed over time as the sessions or bindings are terminated normally by policy or charging Diameter signaling.

Because the migration is driven by normal Diameter signaling, predicting the duration of an SBR Reconfiguration can be difficult unless accurate information is available for the hold-times of sessions and bindings.

Some sessions may last longer and prevent the migration from completing in the predicted time frame. in such cases, the migration can be forced to end or accelerated by requesting that remaining sessions be removed by sending RAR messages including a Session-Release-Cause AVP.

Histogram measurements provide reliable information on session and binding hold-times. Each measurement provides a count for a specific time duration. Refer to the *DSR Measurements Reference* for details on the specific measurements.

Preparing a Reconfiguration Plan

The first step in executing a Reconfiguration Plan is to prepare the plan. This is accomplished by selecting the desired Reconfiguration Plan and clicking **Prepare**. If **Prepare** is clicked when the Reconfiguration Plan is in the Not Ready Operational Status, a confirmation dialog appears to explain that it is recommended to resolve resource user and resource provider problems prior to preparing the Reconfiguration Plan. The confirmation dialog allows the user to cancel or proceed anyway.

When a Reconfiguration Plan is prepared, some validations are performed to ensure that the Reconfiguration Plan is configured correctly and that the initial SBR Database is enabled. If these checks pass, the resource users are instructed to begin communicating with the resource providers of the Target Resource Domain or Target SBR Database. This action allows for resolution of any configuration or communication problems prior to actually starting the Reconfiguration Plan.

Cancelling a Reconfiguration Plan

Prior to clicking **Start** to start execution of a Reconfiguration Plan, **Cancel** can be used to cancel preparation for the Reconfiguration Plan if necessary.

Selecting a Reconfiguration Plan that is in the Prepare Administrative State and clicking **Cancel** causes first the resource users, then the resource providers, to detach from the Target Resource Domain or Target SBR Database and return the plan to the Planned Administrative State. This has no effect on the running SBR Database that was to be reconfigured.

Note: Detaching normally occurs very quickly. It is unlikely that Operational Status of Users Detaching or Providers Detaching will be captured by refreshing the **Reconfiguration Status** screen.

If some of the Resource Users do not detach from the Target resources, then there are likely replication problems preventing the detach command from reaching those resource users, or merging problems preventing those resource users from reporting that they have detached.

If a Resource Provider does not detach from the Target resources, then there are likely replication problems preventing the detach command from reaching that resource provider, or merging problems preventing that resource provider from reporting that it has detached.

After a Reconfiguration Plan is cancelled, the plan can be altered or deleted.

Starting a Reconfiguration Plan

After the Reconfiguration Plan is in the Prepare Administrative State, the SBR Reconfiguration Plan can be started by selecting the row and clicking **Start**.

Note: Once migration is started, it cannot be reversed.

If **Start** is clicked for a Reconfiguration Plan with Operational Status of Preparing, a confirmation dialog appears advising to resolve resource user and resource provider problems prior to starting the migration. The user can choose to cancel the starting of the migration and resolve problems, or choose to continue and start the migration anyway. If **Start** is clicked for a Reconfiguration Plan with Operational Status of Prepared, the Administrative State is set to Start, the Operational Status is set to Migration Started, and the migration of SBR data begins.

After starting a Reconfiguration Plan the Operational Status changes to Migration Started for a short period before transitioning to Migration Coordinated. The reason for the Migration Started status is to solve race conditions that could occur as all resource users begin executing data migration logic. When **Start** is clicked, the NOAM replicates a command down to all resource users to begin data migration. Since this command cannot reach every resource user at the exact same instant, some resource users may begin migration before others are aware that migration is starting. This difference can result in split bindings in which one session for a subscriber and APN is routed to one PCRF and another session for the same subscriber and APN is routed to a different PCRF. To avoid this race condition, the resource users are put into a special mode where they create records in both the initial and target resources. This mode lasts until all resource users report that they have started migration, or until a timer expires in less than a minute and the NOAM commands them to go to the Migration Coordinated mode.

Once in the Migration Coordinated mode, the resource users create all new records in the Target Resource Domain or Target SBR Database and look for all records there first. If a record is not found in the Target, another query is launched to the Initial Resource Domain or Initial SBR Database. The Migration Coordinated mode continues until the data migration is completed.

Monitoring the Progress of an SBR Reconfiguration Plan

As soon as a Reconfiguration Plan is in the Start Administrative State, the Progress cell of the row is updated to indicate the number of records remaining in the Initial Resource Domain or Initial SBR Database as the migration progresses out of the number of records that were in the Initial Resource Domain or Initial SBR Database when the Reconfiguration Plan was started.

The progress numbers are refreshed by the SBR audit at a statically configured interval (defaulting to every 10 seconds). These progress updates can be seen each time the **SBR Database Reconfiguration Status** screen is refreshed, allowing the progress of the Reconfiguration Plan to be monitored.

The number of records is decremented in the initial SBR database when a session or binding records is deleted through Policy and Charging Diameter signaling.

The Reconfiguration Plan is complete when the Progress indicates there are zero records remaining and the Operational Status is changed to Data Migration Complete - Click Complete to Finish.

Note: Because the SBR audit is designed to audit one table at a time, there will be periods when no progress updates are reported if there are multiple tables to be audited.

Aborting an SBR Reconfiguration Plan

An ongoing SBR Reconfiguration can be aborted by clicking **Abort**. This action is an emergency back-out procedure and not recommended unless absolutely necessary. When an SBR Reconfiguration Plan enters the Abort state, the Target SBR Database (in case of a Data Migration type Reconfiguration

Plan) or the Target Resource Domain of an SBR Database (in case of a Resizing type Reconfiguration Plan) is abandoned, meaning all Resource User servers stop creating and retrieving records in the target location. The SBR Audit then starts cleaning up the already migrated records. However, in the window where there exist some bound sessions in the target location that were created after the start of the SBR Reconfiguration, there are chances of split-bindings getting created if session creation messages arrive for those subscribers on binding capable Diameter interfaces. The length of this window will depend on the number of sessions already migrated before the SBR Reconfiguration was aborted.

SBR Audit cleans up the migrated records by looking for records in the Target Location and sending Gx RAR messages including the Session-Release-Cause AVP. SBR Audit uses the Session Integrity Service module of PCA's Policy DRA function to schedule the sessions for removal. When the Policy Gateway receives the RAR message, it should follow it up with a Session Termination message and then re-establish the session for the subscriber. This new Session will be created in the Initial SBR Database or Initial Resource Domain. All migrated sessions will thereby gradually be moved from the Target Location to the Initial Location.

As soon as a Reconfiguration Plan is in the Abort Administrative State, the Progress cell of the row is updated to indicate x of y Records Remain To be Cleaned Up, where x is replaced by the number of recording remaining in the Target Resource Domain or Target SBR Database as the migration abort cleanup progresses, and y is replaced by the number of records that were in the Target Resource Domain or Target SBR database when the Reconfiguration Plan was aborted.

The progress numbers are refreshed by the SBR Audit at a statistically configured interval (defaulting to every ten seconds). These progress updates can be seen each time the **SBR Database Reconfiguration Status** screen is refreshed, allowing for monitoring for the progress of the Reconfiguration Plan clean up. The cleanup is complete when the Progress reads 0 of y Records Remain To Be Cleaned Up and the Operational Status is changed to Abort Completed - Click Complete to Finish.

If either the user does not wish to wait for the SBR Audit to clean up all migrated sessions (such as when the Policy Gateway does not initiate session tear-downs) or the user wants to avoid sending a large amount of (throttled) RAR traffic towards the PCEFs, then the user can choose to Force Complete the Abort Cleanup by clicking **Complete**.

Completing an SBR Reconfiguration Plan

Once a Reconfiguration Plan is started, records are migrated from the Initial Resource Domain or Initial SBR Database to the Target Resource Domain or Target SBR Database as session or binding records are created and removed as a result of PCA Diameter signaling. Once all the records are removed from the initial SBR resource domain and the operation status changes to Data Migration Complete, click **Complete** to finish the migration. Clicking **Complete** once the migration has finished (without being aborted) causes several thigns to occur:

- Administrative State changes to Complete
- Resource Users detach from the initial resource
- After Resource Users have detached, Resource Providers detach
- For an SBR Database Resizing Plan, the Resource Domain of the SBR Database is replaced with the Target Resource Domain of the Resizing Plan
- For an SBR Data Migration Plan, the Initial SBR Database is Disabled and the Target SBR Database is Enabled
- For an SBR Data Migration Plan, the Initial SBR Database is set to the Target SBR Database in the Data Migration Plan

Some long lived sessions or bindings can cause the data migration to take longer to complete. To force the migration to complete, **Complete** can be clicked while the Reconfiguration Plan is still in the

Migration Coordinated Operational Status. If **Complete** is clicked, a confirmation dialog appears with options:

- Cancel the attempt to Complete the migration and let the migration proceed
- Force an end to the migration, abandoning any un-migrated records in the Initial Resource Domain or the Initial SBR Database

If there are a lot of records remaining to be migrated, cancelling is recommended.

Forcing an end to the migration is not recommended because any records that have not yet been migrated will be deleted even though the sessions or bindings they represent may still be valid. If these records are deleted, signaling failures or split bindings may result.

Accelerating an SBR Reconfiguration Plan

Accelerating the migration of an SBR Reconfiguration Plan (by clicking **Accelerate**) is generally a better option than cancelling an SBR Reconfiguration Plan.

Accelerating the migration for a binding database reconfiguration causes the binding audit to look for non-migrated bindings. If such a binding is found, an RAR is sent to the policy client that created the binding, including a Session-Release-Cause AVP asking the policy client to terminate the session. When the policy client terminates the session and creates a new session, that record is created in the target and is successfully migrated.

Accelerating the migration for a session database reconfiguration causes the session to look for non-migrated binding capable sessions. If such a session is found, an RAR is sent to the policy client that created the binding capable session, including a Session-Release-Cause AVP asking the policy client to terminate the session. When the policy client terminates the session and creates a new session, that record is created in the target and is successfully migrated. Acceleration of a session database reconfiguration has no effect on binding dependent or binding independent sessions. However, such sessions are short-lived and are less likely to hinder migration.

Accelerating migration causes signaling disruptions since binding capable sessions are being torn down and recreated. However, split bindings do not occur.

Alarms, KPIs, and Measurements

This section describes the type of alarm, KPI, and measurements information that is available for SBR, as well as how to access the information in the DSR GUI.

SBR Alarms and Events

The SBR alarms and events are described in the *DSR Alarms and KPIs Reference* and the DSR online help for alarms and events.

Active alarms and events and alarm and event history can be displayed on the **Alarms & Events** > **View Active** and **Alarms & Events** > **View History** GUI pages.

SBR KPIs

Key Performance Indicators, or KPIs, provide a means to convey performance information to the user in near real-time. All the KPIs for SBR are displayed on the **Status & Manage** > **KPIs** GUI page. Selecting the tab for a server and a label under the tab displays the KPI information for the selected server.

The SBR KPIs are described in the *DSR Alarms and KPIs Reference* and the DSR Alarms and KPIs online help.

SBR Measurements

Measurements for SBR are collected and reported in various measurement groups.

A measurement report and a measurement group can be associated with a one-to-one relationship. A measurements report can be generated with report criteria selected on the **Measurements** > **Reports** GUI page.

The *DSR Measurements Reference* and online help explain the report selection criteria, and describe each measurement in each measurement group.

Glossary

D

DSR

Diameter Signaling Router

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

G

GUI

Graphical User Interface

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

N

NOAM

Network Operations, Administration, and Maintenance

S

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.