

Oracle@ Communications Diameter Signaling Router

Session Binding Repository User Guide



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The Oracle logo, consisting of a solid red square with the word "ORACLE" in white, uppercase, sans-serif font centered within it.

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1

Introduction

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

Revision History

Date	Description
April 2022	Not updated in this release.
December 2021	Not updated in this release.
June 2016	Initial release.
June 2016	Updated based on support for U-SBR.

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.
- [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.

My Oracle Support

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

Call the Customer Access Support 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 My Oracle Support, select **2**.

You are connected to a live agent who can assist you with My Oracle Support registration and opening a support ticket.

My Oracle Support is available 24 hours a day, 7 days a week, 365 days a year.

2

SBR Introduction

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

SBR provides a common database framework to host database solutions for native or custom applications. The major functionalities of the SBR infrastructure include:

- A common framework to host a generic database that can be used by multiple and different custom applications and for many built-for-purpose databases for some other applications such as PCA or GLA
- A common configuration and maintenance system to enable users to configure and manage databases for various types of applications, and a common control for database audit
- A common communication mechanism to allow various applications to communicate with different generic or built-for-purpose databases using the DSR ComAgent routing services and a common stack event library
- A common High Availability (HA) policy management and Resource/Sub-resource management for various database
- A common set of Alarms, Events, KPIs, and Measurements for database usages that are applicable for all applications

An SBR Database consists of several fields:

- A user-configured Database Name
- A Database Type (Session, Binding, or Universal)
- The name of the Resource Domain that contains the SBR Server Groups
- The Number of Server Groups that define the capacity of the SBR database
- The Place Association that uses the SBR database
- The Owner Application that shows which application has the privileges to write, read, and manage the configured SBR database



Note:

An SBR database must be configured after configuring SBR server groups, resource domains, and binding region, application region, or mated sites place associations.

To use an SBR database, it must register to the local ComAgent for the registered resource (identified by the resource IDs) as resource providers to be used by registered resource

users (applications) for the same registered resource. Registering to a ComAgent as a resource provider requires configuring the SBR server topology and the SBR database on the **SBR**, and then **Configuration**, and then **SBR Databases** page, as well as preparing the configured SBR database on the **SBR**, and then **Maintenance**, and then **SBR Database Status** page.

Once the SBR database is configured and prepared, it is registered to ComAgent as a ComAgent provider for the assigned resource ID and the assigned sub-resource IDs. Then, the SBR database can be enabled by activating applications that own and use the SBR database.

While multiple applications may use the same SBR database, the database can have only one owner application associated with it.

The life cycle of a SBR database is related to the application that owns the database:

- While a SBR database can be configured without an owner application being specified at the configuration, the SBR database can't be prepared or enabled without an owner application being configured
- After the owner application is activated and configured in the SBR database configuration, the SBR database can be prepared and then be enabled.
- The SBR database can be used by the owner application and other custom applications.
- The SBR database can be deleted only if the SBR database is configured with no owner application specified. The owner application field in the SBR database configuration is None.

For further information on configuring an SBR Database, refer to [Configuration](#).

For further information on maintaining an SBR Database, refer to [Maintenance](#).

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 is 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 is to be changed for session databases or universal databases. 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 or stand-alone DCA sites to mated DCA sites)
- Un-mating (Separating SBR Databases when transitioning from mated PCA DSR sites to stand-alone PCA DSR sites or mated DCA sites to stand-alone DCA 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](#).

SBR Database High Availability

The SBR infrastructure provides a High Availability (HA) database solution for native and custom applications. Two HA policies are used for the SBR databases and various HA configurations are supported (such as Active, Active/Standby, Active/Spare, Active/Standby/Spare, and Active/Standby/Spare/Spare). Binding SBR Databases are associated with one HA policy, while Session and Universal SBR Databases are associated with a different policy. Universal SBR Databases can coexist on the same SBR server groups with Session SBR Databases. However, Universal SBR Databases cannot coexist on the same server groups with Binding SBR Databases.

SBR Databases Audit

SBR performs audit functions on all SBR database tables to verify the validities and staleness of the database records and remove those invalid or stale records from the databases.

The frequency of audit functions is configured in the **Audit Operation Rate** field on the **SBR**, and then **Configuration**, and then **Database Options** GUI page. The SBR database audit function runs continuously through all SBR database tables until it is suspended automatically due to the local SBR MP congestion. Audit suspension can occur for several reasons:

- Congestion of the SBR server running in the audit
- Binding audit will not send audit messages to session SBRs that are in congestion
- Binding audit is suspended if session integrity messaging reaches an engineering configurable level

The **Audit Operation Rate** applies to all SBR Database audits, regardless of the database type.

Each active SBR server runs the audit independently:

- Each table is audited no more than once per ten minute period
- Each active SBR generates an audit statistics report for each table it audits whenever a pass of that table is completed

At the end of each audit cycle, the SBR audit function generates a report with all the audit statistics.

3

Configuration

The **SBR**, and then **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**, and then **Configuration** pages.

SBR Databases

On the **SBR**, and then **Configuration**, and then **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 Database elements](#).

SBR Database elements

[Table 3-1](#) describes the elements on the **SBR**, and then **Configuration**, and then **SBR Databases** page on the NO GUI.

Table 3-1 SBR Database 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. Select Binding for a Policy Binding database, select Session for a Policy DRA or Online Charging DRA Session database, or select Universal for a Universal SBR database.	Format: List Default: N/A Range: Binding, Session, or Universal

Table 3-1 (Cont.) SBR Database Elements

Fields (* indicates a required field)	Description	Data Input Notes
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: 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. 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.	Format: Text box Default: N/A Range: 1 to 8
Place Association*	The Place Association that contains the Places (Sites) that will use this database. Select the Place Association that is to use this SBR Database.	Format: List Range: Configured Place Associations matching the selected Database Type that have not already been assigned to a Database
Owner Application	The name of the application that owns the configured SBR DB. <ul style="list-style-type: none"> If the database type is Session, PCA is automatically displayed as the Owner Application If the database type is Binding, PCA is automatically displayed as the Owner Application If the database type is Universal, select the Owner Application for the SBR database 	Format: List Default: None Range: None, PCA, and configured DCA application names

Inserting SBR Databases

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

The fields are described in [SBR Database elements](#).

1. Select **SBR**, and then **Configuration**, and then **SBR Databases**.
2. Click **Insert**.
3. Enter a unique Database Name in the **Database Name** field.
4. Select a **Database Type** from the list.
5. Select a **Resource Domain** from the list.
6. Enter a **Number of Server Groups**.
7. Select a **Place Association** from the list.

8. Select an **Owner Application** from the list.
9. Click:
 - **Ok** to save the new SBR Database and return to the **SBR**, and then **Configuration**, and then **SBR Databases** page.
 - **Apply** to save the new SBR Database and remain on the page.
 - **Cancel** to return to the **SBR**, and then **Configuration**, and then **SBR Databases** page without saving any changes.

Editing an SBR Database

Use this task to edit an SBR Database on the NO GUI.
The fields are described in [SBR Database elements](#).

1. Select **SBR**, and then **Configuration**, and then **SBR Databases**.
2. Select a database from the list to edit.
If the database is enabled, an error displays.
3. Click **Edit**.
4. Edit the Database Name in the **Database Name** field.
5. Select a **Database Type** from the list.
6. Select a **Resource Domain** from the list.
7. If needed, edit the **Number of Server Groups**.
8. Select a **Place Association** from the list.
9. Select an **Owner Application** from the list.
10. Click:
 - **OK** to save the edited SBR Database and return to the **SBR**, and then **Configuration**, and then **SBR Database** page.
 - **Apply** to save the edited SBR Database and remain on the page.
 - **Cancel** to return to the **SBR**, and then **Configuration**, and then **SBR Database** page without saving any changes.

Deleting an SBR Database

Use this task to delete an SBR Database.

1. Select **SBR**, and then **Configuration**, and then **SBR Databases**.
The **SBR**, and then **Configuration**, and then **SBR Databases** page appears.
2. Select the **SBR Database** to be deleted.
3. Click **Delete**.
A dialog box appears to confirm the delete.
4. Click:
 - **Ok** to delete the SBR Database.
 - **Cancel** to cancel the delete function and return to the **SBR**, and then **Configuration**, and then **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**, and then **Configuration**, and then **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 before starting the plan's execution.

The fields are described in [SBR Database Resizing Plans elements](#).

SBR Database Resizing Plans elements

[Table 3-2](#) describes the elements on the **SBR**, and then **Configuration**, and then **SBR Database Resizing Plans** page on the NO GUI.

Table 3-2 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.

Table 3-2 (Cont.) SBR Database Resizing Plans Elements

Fields (* indicates a required field)	Description	Data Input Notes
Database Name*	The SBR Database to be resized	Format: 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: 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

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**, and then **Configuration**, and then **SBR Database Resizing Plans**.
The **SBR**, and then **Configuration**, and then **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 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 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**, and then **Configuration**, and then **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**, and then **Configuration**, and then **SBR Database Resizing Plans** page without saving any changes.

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**, and then **Configuration**, and then **SBR Database Resizing Plans**.
2. Select a database from the list to edit.
If the database is enabled, an error displays.
3. Click **Edit**.
4. Edit the **Plan Name**.
5. Select a **Database Name** from the list.
6. The **Initial Resource Domain**, **Database Type**, and **Initial Number of Server Groups** fields are read only.
7. Select a **Target Resource Domain** from the list.
8. 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.
9. Click:
 - **OK** to save the edited SBR Database Resizing Plan and return to the **SBR**, and then **Configuration**, and then **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**, and then **Configuration**, and then **SBR Database Resizing Plans** page without saving any changes.

Deleting an SBR Database Resizing Plan

Use this task to delete an SBR Database Resizing Plan.

 **Note:**

The **SBR**, and then **Configuration**, and then **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**, and then **Configuration**, and then **SBR Database Resizing Plans**.

The **SBR**, and then **Configuration**, and then **SBR Database Resizing Plans** page appears.

2. Select the **SBR Database Resizing Plan** to be deleted.

3. Click **Delete**.

A dialog box 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**, and then **Configuration**, and then **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**, and then **Configuration**, and then **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 3-3](#) describes the elements on the **SBR**, and then **Configuration**, and then **SBR Data Migration Plans** page on the NO GUI.

Table 3-3 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: 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: 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: 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.

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**, and then **Configuration**, and then **SBR Data Migration Plans**.
The **SBR**, and then **Configuration**, and then **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 list.
5. Select an **Initial Database** from the list.
6. The **Initial Place Association** field is read only.

7. Select a **Target Database** from the list.
8. The **Target Place Association** field is read only.
9. Click:
 - **Ok** to save the new SBR Data Migration Plan and return to the **SBR**, and then **Configuration**, and then **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**, and then **Configuration**, and then **SBR Data Migration Plans** page without saving any changes.

Deleting an SBR Data Migration Plan

Use this task to delete an SBR Data Migration Plan.

1. Select **SBR**, and then **Configuration**, and then **SBR Data Migration Plans**.
The **SBR**, and then **Configuration**, and then **SBR Data Migration Plans** page appears.
2. Select the **SBR Data Migration Plan** to be deleted.
3. Click **Delete**.
A dialog box 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**, and then **Configuration**, and then **SBR Data Migration Plans** page.

Database Options

Click **SBR**, and then **Configuration**, and then **Database Options** on an Active NO to configure database options.

The fields are described in [Database Options elements](#).

Database Options elements

[Table 3-4](#) describes the elements on the **SBR**, and then **Configuration**, and then **Database Options** page on the NO GUI.

Table 3-4 Database Options Elements

Field	Description	Data Input Notes
Audit Operation Rate	The maximum rate at which the database records are validated. The users may exchange the database audit rate based on, for example, Diameter signalling traffic load, the number of databases to be audited, and the size of the databases. The larger the rate it, the more impact on the system performance the audit may cause.	Format: Text box Default: 50000 per second Range: 25000-50000 per second

Editing Database Options

Use this task to edit database options on the NO GUI.

1. Select **SBR**, and then **Configuration**, and then **Database Options**.

The **SBR**, and then **Configuration**, and then **Database Options** page appears.
The fields are described in [Database Options elements](#).

2. Edit the **Audit Operation Rate**.

3. Click:

- **Apply** to save the data written to the database and update the General Options screen.
- **Cancel** to avoid making changes to the configuration data.

4

Maintenance

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**, and then **Maintenance** pages.
- Descriptions of SBR alarms, KPIs, and measurements

SBR Maintenance

This section describes the **SBR**, and then **Maintenance** GUI pages on the NOAM.

SBR Database Status

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

Fields are described in [SBR Database Status elements](#).

SBR Database Status elements

[Table 4-1](#) describes the elements on the **SBR**, and then **Maintenance**, and then **SBR Database Status** page.

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

Table 4-1 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

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 box 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 is likely 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 has 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 is 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 box 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 box 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**, and then **Maintenance**, and then **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 4-2](#) describes the elements on the **SBR**, and then **Maintenance**, and then **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**, and then **Place Associations** GUI page.

Table 4-2 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**, and then **Maintenance**, and then **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**, and then **Configuration**, and then **SBR Database Resizing Plans** and **SBR**, and then **Configuration**, and then **SBR Data Migration Plans** screens.

Fields are described in [SBR Database Reconfiguration Status elements](#).



Note:

Oracle recommends calling [My Oracle Support](#) for assistance with SBR Database Reconfiguration.

SBR Database Reconfiguration Status elements

[Table 4-3](#) describes the elements on the **SBR**, and then **Maintenance**, and then **SBR Database Reconfiguration Status** page.

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

Table 4-3 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) are 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 box appears to explain that it is recommended to resolve resource user and resource provider problems prior to preparing the Reconfiguration Plan. The confirmation dialog box 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 box 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 are 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 depends 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 is created in the Initial SBR database or Initial Resource Domain. All migrated sessions are thereby gradually 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 records 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 toward 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 things 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 box 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 are 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**, and then **View Active** and **Alarms & Events**, and then **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**, and then **KPIs** 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**, and then **Reports** GUI page.

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