EAGLE® XG Diameter Signaling Router

Charging Proxy Application (CPA)

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Chapter 1

Introduction

Topics:

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

Overview

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

The document provides procedures to:

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

Scope and Audience

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

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

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

Manual Organization

This document is organized into the following chapters:

- *Introduction* contains general information about the CPA help documentation, the organization of this manual, and how to get technical assistance.
- *Charging Proxy Application* provides information about configuring System Options, Message Copy, Session Binding Repository, and SBR Subresource Mapping.

Documentation Admonishments

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

Table 1: Admonishments

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

	WARNING: (This icon and text indicate the possibility of *equipment damage*.)
	CAUTION: (This icon and text indicate the possibility of *service interruption*.)

Customer Care Center

The Tekelec Customer Care Center is your initial point of contact for all product support needs. A representative takes your call or email, creates a Customer Service Request (CSR) and directs your requests to the Tekelec Technical Assistance Center (TAC). Each CSR includes an individual tracking number. Together with TAC Engineers, the representative will help you resolve your request.

The Customer Care Center is available 24 hours a day, 7 days a week, 365 days a year, and is linked to TAC Engineers around the globe.

Tekelec TAC Engineers are available to provide solutions to your technical questions and issues 7 days a week, 24 hours a day. After a CSR is issued, the TAC Engineer determines the classification of the trouble. If a critical problem exists, emergency procedures are initiated. If the problem is not critical, normal support procedures apply. A primary Technical Engineer is assigned to work on the CSR and provide a solution to the problem. The CSR is closed when the problem is resolved.

Tekelec Technical Assistance Centers are located around the globe in the following locations:

Tekelec - Global

Email (All Regions): support@tekelec.com

- **USA and Canada**

  Phone:

  1-888-FOR-TKLC or 1-888-367-8552 (toll-free, within continental USA and Canada)

  1-919-460-2150 (outside continental USA and Canada)

  TAC Regional Support Office Hours:

  8:00 a.m. through 5:00 p.m. (GMT minus 5 hours), Monday through Friday, excluding holidays
- **Caribbean and Latin America (CALA)**

  Phone:

  USA access code +1-800-658-5454, then 1-888-FOR-TKLC or 1-888-367-8552 (toll-free)

  TAC Regional Support Office Hours (except Brazil):

  10:00 a.m. through 7:00 p.m. (GMT minus 6 hours), Monday through Friday, excluding holidays

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    Phone:

0-800-555-5246 (toll-free)

- **Brazil**

  Phone:

  0-800-891-4341 (toll-free)

  TAC Regional Support Office Hours:

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  1230-020-555-5468
- **Colombia**

  Phone:

  01-800-912-0537
- **Dominican Republic**

  Phone:

  1-888-367-8552
- **Mexico**

  Phone:

  001-888-367-8552
- **Peru**

  Phone:

  0800-53-087
- **Puerto Rico**

  Phone:

  1-888-367-8552 (1-888-FOR-TKLC)
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  0800-176-6497

- **Europe, Middle East, and Africa**

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  - **Software Solutions**

    Phone:

+33 3 89 33 54 00

- **Asia**
  - **India**

    Phone:

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  - **Singapore**

    Phone:

    +65 6796 2288

    TAC Regional Support Office Hours:

    9:00 a.m. through 6:00 p.m. (GMT plus 8 hours), Monday through Friday, excluding holidays

Emergency Response

In the event of a critical service situation, emergency response is offered by the Tekelec Customer Care Center 24 hours a day, 7 days a week. 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 the Tekelec Customer Care Center.

Locate Product Documentation on the Customer Support Site

Access to Tekelec's Customer Support site is restricted to current Tekelec customers only. This section describes how to log into the Tekelec Customer Support site and locate a document. Viewing the document requires Adobe Acrobat Reader, which can be downloaded at www.adobe.com.

1. Log into the *Tekelec Customer Support* site.

   Note: If you have not registered for this new site, click the **Register Here** link. Have your customer number available. The response time for registration requests is 24 to 48 hours.

2. Click the **Product Support** tab.
3. Use the Search field to locate a document by its part number, release number, document name, or document type. The Search field accepts both full and partial entries.
4. Click a subject folder to browse through a list of related files.
5. To download a file to your location, right-click the file name and select **Save Target As**.

Chapter 2

Charging Proxy Application

Topics:

The Charging Proxy Application (CPA) menu options allow you to perform configuration tasks, edit system options, and view elements for:

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

Configuration

CPA is a DSR Application that is responsible for routing Diameter accounting (Rf) messages that are being exchanged between clients (CTFs) and servers (CDFs). The CPA application resides in the Diameter Application Layer (DAL) of the Diameter Plug-In.

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

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

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

System Options

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

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

System Options page elements

This section describes the elements on the **System Options** page.

Table 2: System Options page elements

Elements	Description	Data Input Notes
Unavailable Action	Action to be taken when the CPA has an operational state of Degraded or Unavailable.	Default: Send Answer
Unavailable Action Result Code	Because the Unavailable Action must be Send Answer, if the DSR Application is not available, this value is used in the Result-Code or Experimental-Result AVP of the Answer message.	Format: Two radio button group with a text box and drop-down box. Default: 3004 DIAMETER_TOO_BUSY
Unavailable Action Vendor ID	If zero, then a Result-Code AVP will be sent when the DSR application is not available. If non-zero, then an Experimental-Result AVP will be sent with the Vendor-Id AVP set to this value.	Format: Unsigned integer Default: 0
Unavailable Action Error Message	If a non-null string, then an Error-Message AVP will be sent in the Answer response containing this string when the DSR application is not available.	Format: Text box (string up to 64 characters) Default: CPA Unavailable

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

Elements	Description	Data Input Notes
Behavior if Session Lookup Error	Behavior to use when CPA attempts to query the preferred CDF that is associated with the given Diameter session, but the query is not successful. The possible behaviors are • Generate Answer (send an Answer message with the configured Generate Answer Result-Code to the CTF) • Continue Routing (load balance the Request message to an available CDF)	The range of allowable values in the drop-down box shall be: • Generate Answer • Continue Routing Default: Continue Routing

Editing System Options

Use this task to edit the System Options.

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

   If **Apply** is clicked and any of the following conditions exist, an error message appears:
   - Any required field is empty; no value was entered
   - The entry in any field is not valid (wrong data type or out of the valid range)

Message copy

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

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

Message Copy elements

This table describes the fields on the Message Copy page.

Table 3: Message Copy Elements

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

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

Editing Message Copy

Use this task to edit the Message Copy.

1. Select **CPA ➤ Configuration ➤ Message Copy**.
   The **CPA Configuration Message Copy** page appears.
2. Update the relevant fields.
   For more information about each field, see *Message Copy elements*.
3. Perform one of the following actions:
   - Click **Apply** to save the changes and stay on this page.

- Click **Cancel** to return to the **CPA Configuration System Options** page without saving the changes.

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

If a user attempts to delete a Route List from the Diameter folder and that Route List is being referenced from the CPA GUI in a Message Copy DAS Route List, then the deletion will not be allowed.

Introduction to the Session Binding Repository

The Session Binding Repository (SBR) provides a high availability (HA) distributed database for the DSR Charging Proxy Application (CPA). The SBR stores information that the CPA uses for consistently routing Diameter requests from instances of Charging Trigger Function (CTF) to instances of Charging Data Function (CDF). For any given session, the CPA stores in the SBR the identity of the CDF that the CPA has chosen to service the Diameter requests for that session, or a session binding. When the CPA routes subsequent Diameter requests for a session, it queries the SBR for the session binding to determine the identity of the serving CDF.

In the most basic form, the SBR consists of a COMCOL IDB (referred to as SBDB) in which to store session binding data, and a server process to handle requests from the CPA to manipulate session bindings. For scalability, SBR blades are divided into active/standby pairs. The SBDB is logically partitioned across each of the active/standby pairs when the CPA hashes over the Session-ID to compute which of the logical partitions owns (or will own, in the case of a session creation) the Session-ID. This logical partition corresponds with the SBR subresource. The CPA then submits the request to the selected SBR subresource. The SBR does not know the scheme for distributing sessions among the subresources. The distribution of sessions evenly among the subresources is accomplished solely by the hash function in the CPA. Consequently, if the sessions are not evenly distributed, the SBR cannot redistribute them.

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

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

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

SBR page

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

SBR elements

An asterisk after the value field means that the configuration is mandatory.

Element	Description	Data Input Notes
SBDB audit Start Time	Time of day in UTC to start the audit process. The audit process removes stale bindings from the SBR. Since the audit window is configurable, the audit process calculates the rate at which to delete records based on the number of expected stale bindings and the configured duration of the daily audit. The longer the audit window is, the slower the deletion rate. If your system has a daily period of lower customer activity, you may wish to schedule the audit for that time. Otherwise, you can reduce the performance load of the process by allowing it more time during the day to complete its audit.	Format: pull-down list Range: 12:00 AM - 11:00 PM, UTC Default: 2:00 AM
SBDB audit Stop Time	Time of day in UTC to stop the audit process. Must be at least 1 hour past the start time.	Format: pull-down list Range: 12:00 AM - 11:00 PM, UTC Default: 3:00 AM
Stale SBDB session binding age.	Age after which a session will be considered stale and eligible for removal during audit. Note that increasing the age will increase memory usage. Age is specified in days.	Format: numeric Range: 1-30 Default: 2
Maximum active session bindings.	Session binding count used to calculate the session binding count alarms.	Format: numeric Range: 1 - 100,000,000

Element	Description	Data Input Notes
	Once this setting is reached, the SBR will issue an alarm; however, it will continue to store bindings.	Default: 35,000,000
SBDB Mostly Stale Percentage.	Percent of stale session age when a session binding is considered mostly stale. This setting is not used by the audit process. However, it is used to generate measurements.	Format: numeric Range: 1-99 Default: 90

Configuring the SBR

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

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

   The **CPA -> Configuration -> SBR** page appears.
2. Inspect the defaults.

   For more information on the configurations, see *SBR elements*.

   It should not be necessary to modify the defaults.
3. Make any changes to the configurations.
4. Click **Apply** to apply your changes.

   Your changes will go into affect immediately.

SBR Subresource Mapping page

This section describes the configurations found on the **SBR Subresource Mapping** page. A subresource is a logical partition of the Session Binding Repository.

CAUTION

CAUTION: The subresource mapping must be configured after you activate the CPA, but before you enable it.

SBR Subresource Mapping elements

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

CAUTION

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

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

Configuring the SBR subresource mapping

CAUTION

CAUTION: Subresources must be configured after the CPA application is activated.

This screen can be edited only once.

You must accept the configuration to enable the CPA application.

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

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

2. Inspect the defaults for Subresource Ids.

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

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

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

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

4. Click **Apply**.

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

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

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

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

If you need to reconfigure subresources or SBR server groups, contact the Tekelec Customer Care Center for assistance.

Chapter 3

Copyright, notice, trademarks, and patents

Topics:

This section provides important information about copyrights, notices, trademarks, and patents associated with this product.

EAGLE XG Diameter Signaling Router (DSR) - Copyright, Notice, Trademarks, and Patents

Notice

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RoHS 5/6 - As of July 1, 2006, all products that comprise new installations shipped to European Union member countries will comply with the EU Directive 2002/95/EC "RoHS" (Restriction of Hazardous Substances). The exemption for lead-based solder described in the Annex will be exercised. RoHS 5/6 compliant components will have unique part numbers as reflected in the associated hardware and installation manuals.

WEEE - All products shipped to European Union member countries comply with the EU Directive 2002/96/EC, Waste Electronic and Electrical Equipment. All components that are WEEE compliant will be appropriately marked. For more information regarding Tekelec's WEEE program, contact your sales representative.

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Patents

This product may be covered by one or more of the following U.S. and foreign patents:

U.S. Patent Numbers:

6,795,546; 6,901,262; 6,967,956; 7,043,000; 7,190,959; 7,286,516; 7,318,091; 7,383,298; 7,403,537; 7,406,159; 7,466,807; 7,633,872; 7,633,969; 7,650,367; 7,706,343; 7,743,131; 7,804,789; 7,860,799; 7,916,685; 8,179,885; 8,224,928;

Foreign Patent Numbers:

EP 1314324; EP 1568203; EP 1846832; EP 1847076; ZL 200780017383.1;

Glossary

A

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

C

CDF	Charging Data Function
CPA	Charging Proxy Application A local application running on the DSR.
CTF	Charging Trigger Function

D

DAL	DSR Application Layer
DAS	Diameter Application Server
DRL	Diameter Routing Layer The software layer of the Eagle XG Diameter stack that implements Diameter routing.
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.

D

A DSR Network Element may consist of one or more Diameter nodes.

S

SBR	Session Binding Repository A highly available, distributed database for storing Diameter session binding data.