EAGLE® XG Diameter Signaling Router

Full Address Based Resolution (FABR)

910-6578-001 Revision B

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Chapter 1

Introduction

Topics:

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

Overview

The Full Address Based Resolution (FABR) document provides information about how to use the DSR GUI to configure the FABR application.

The document provides procedures to configure:

- Applications
- Exceptions
- Default Destinations
- Address Resolutions
- System Options

Scope and Audience

This *FABR Help* is intended for anyone responsible for configuring and using the Full Address Based Resolution application. Users of this manual must have a working knowledge of telecommunications, network installations, and the Diameter Signaling Router (DSR).

Manual Organization

This document is organized into the following chapters:

- *Introduction* contains general information about the FABR help documentation, the organization of this manual, and how to get technical assistance.
- *Full Address Based Resolution* describes the function of the FABR application.
- *Configuration* describes how to configure the FABR application, including Applications, Exceptions, Default Destinations, Address Resolutions, and System Options.

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

  - **Argentina**

    Phone:

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

- **Brazil**

  Phone:

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

  TAC Regional Support Office Hours:

  8:00 a.m. through 5:48 p.m. (GMT minus 3 hours), Monday through Friday, excluding holidays
- **Chile**

  Phone:

  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)
- **Venezuela**

  Phone:

  0800-176-6497

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

  Regional Office Hours:

  8:30 a.m. through 5:00 p.m. (GMT), Monday through Friday, excluding holidays

  - **Signaling**

    Phone:

    +44 1784 467 804 (within UK)
  - **Software Solutions**

    Phone:

+33 3 89 33 54 00

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

    Phone:

    +91 124 436 8552 or +91 124 436 8553

    TAC Regional Support Office Hours:

    10:00 a.m. through 7:00 p.m. (GMT plus 5 1/2 hours), Monday through Saturday, excluding holidays
  - **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

Full Address Based Resolution

Topics:

This section provides an overview of the function of the Full Address Based Resolution (FABR) application.

Full Address Based Resolution overview

Full Address Based Resolution (FABR) is a DSR enhanced routing application that enables network operators to resolve the designated Diameter server (IMS HSS, LTE HSS, PCRF, OCS, OFCS, and AAA) addresses based on Diameter Application ID, Command Code, Routing Entity Type, and Routing Entity addresses, and route the Diameter request to the resolved destination. The FABR application validates the ingress Diameter request message, retrieves the Application ID and Command Code from it and determines the desired routing entity type to be decoded from the message, based on the configuration. The FABR application extracts the routing entity address from user-configured Attribute-Value Pairs (AVPs) in the ingress message and sends the routing entity address, if extracted successfully, to an off-board DP/SDS for destination address resolution.

Configuration of Remote Servers (DP in case of DSR and DSR in case of DP) is performed from the Communication Agent (ComAgent) section of the respective application (DSR and DP) configuration screens.

Note: Use **Communication Agent ➤ Configuration ➤ Remote Servers** and **Communication Agent ➤ Configuration ➤ Connection Group** to perform this configuration.

A Routing Entity supported by FABR is one of the User Identities of :

- International Mobile Subscriber Identity (IMSI)
- Mobile Subscriber Integrated Services Digital Network (Number) (MSISDN)
- IP Multimedia Private Identity (IMPI)
- IP Multimedia Public Identity (IMPU)

The resolved Destination address can be any combination of a Realm and Fully Qualified Domain Name (FQDN), such as Realm-only, FQDN-only, or Realm and FQDN.

The FABR application will replace the Destination-Host and/or Destination-Realm AVP in the ingress Request message with the corresponding values of the resolved Destination, and forward the message to the DSR Relay Agent for egress routing into the network.

Chapter 3

Configuration

Topics:

This section describes the procedures used to configure the FABR application.

Configuration overview

The **FABR ➤ Configuration** pages allow you to manage FABR application configuration. FABR routing configuration can be of these categories:

- Routing Diameter traffic to FABR.

  Use **Diameter ➤ Configuration ➤ Application Routing Rules** for diameter requests to conditionally be communicated to FABR.

- Configuring off-board database servers (remote servers called DPs) that support address lookup/destination resolution and connections to these remote servers.

  Use **Communication Agent ➤ Configuration ➤ Remote Servers** and **Communication Agent ➤ Configuration ➤ Connection Group** to perform this configuration.

Prior to using the FABR configuration pages, you should:

- Configure the network topology. This includes network elements, servers, server groups, and network devices and routes.

  Note: For information about configuring the DSR network topology, see the **Diameter** online help.

  Note: For information about configuring the DP and SDS, see the **SDS OAM** section of the online help.

- Configuration of Remote Servers (DP in case of DSR and DSR in case of DP) is performed from the Communication Agent (ComAgent) section of the respective application (DSR and DP) configuration screens.

Remote Servers are configured using the Communication Agent Remote Server Configuration GUI. The most important attribute of a Communication Agent Remote Server is an IP Address that can be reached via a server's Internal Management Interface (IMI). The IP address uniquely identifies the Remote Server and provides the means by which Communication Agent can establish transport connections to/from the Remote Server. The Remote Server attributes include:

- Name
- IP Address
- Connection Mode: {client, server}
- Local Server Group: group of servers that should connect to the Remote Server

Note: Use **Communication Agent ➤ Configuration ➤ Remote Servers** and **Communication Agent ➤ Configuration ➤ Connection Group** to perform this configuration.

Adding a remote server to the network includes:

- Entering a unique name for the remote server in the **Remote Server Name** field.

  The **Remote Server Name** should be a unique name within the system.

  The name must meet these requirements:

  - Maximum length of 32 characters
  - Valid characters are
    - Alphabetic (A through Z, uppercase or lowercase)

  - Numeric (0 through 9)
  - Underscore (_)
- The name must contain at least one alphabetic character
- The name can not start with a numeric character

- Entering the IP address of the remote server in the **Remote Server IP Address** field.

  The IP Address should be a valid IPv4 address in dot notation format (for example: 255.255.255.255).
- Configuring a mode of operation from the **Remote Server Mode** drop down list.

  The Mode in which the Remote Server operates can be configured as a:

  - **Client** – where the servers in the local server group will accept connections initiated by the remote server
  - **Server** – where the servers in the local server group will each initiate a connection to the remote server

- Assigning the remote server to a Connection Group.
- Configure DP nodes in "Server" connection mode on DSR nodes.
- Configure DSR MP nodes in "Client" connection mode on DPs.

The operational status of what was provisioned can be verified by using the Communication Agent maintenance screens (refer to the Communication Agent online help).

- **Main ➤ Communication Agent ➤ Maintenance ➤ Connection Status** to verify that all remote server connections added are shown as "InService" on all local servers.
- **Main ➤ Communication Agent ➤ Maintenance ➤ Routed Service Status** to verify that the status is "Available" for all local servers that are provisioned to connect

FABR configuration typically occurs in the following order:

1. Add a **Supported Diameter Application**.
2. If necessary, configure a **Destination**.
3. If necessary, edit **Routing Exceptions**.

   Note: If you need to configure a Routing Exception Action of 'Forward To Destination', configure a Destination.
4. Configure an **Address Resolution**.
5. If necessary, change the **System Options**.

Applications configuration

The **Applications** page allows you to access the attributes associated with the supported Diameter applications.

From the **Applications** page, you can:

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

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

- Edit a supported Diameter application.
- Delete a supported Diameter application.

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

Applications configuration elements

This table describes the fields on the Applications View, Insert, and Edit pages. Data Input Notes only apply to the Insert and Edit pages; the View page is read-only.

Table 2: Applications Configuration Elements

Field	Description	Data Input Notes
Application ID	Application ID in a Diameter message The Application ID is an IANA-assigned Diameter Application ID, which is a 32-bit field that is mandatory in all Diameter messages. It is commonly used for screening and routing messages between Diameter nodes. If a combination of the Application ID and Command Code already exists, an error message appears.	Format: Radio button to select Pulldown list or text box entry Range: Available Application IDs (0–4294967295)
Application Name	Name of the Application corresponding to the Application ID. If provisioned, this overrides any existing application name.	Format: Alphanumeric and underscore (_) Range: 1–32 characters; Must contain at least one alphabetic character and must start with alphanumeric or underscore.
Routing Mode (Read only)	Method of routing for Request messages received containing the Diameter Application ID	Format: Disabled pulldown list with a value of **Proxy**.

Viewing supported Diameter applications

Use this task to view currently configured supported Diameter applications.

Select **FABR ➤ Configuration ➤ Applications**.
The **FABR Configuration Applications** page appears.

The Applications page appears with a list of supported Diameter applications. This list of applications can be filtered to display only desired applications. The fields are described in *Applications configuration elements*.

Inserting a supported Diameter application

Use this task to add a new Diameter application.

Inserting a supported Application automatically adds Routing Exceptions (**Unknown Command Code**, **No valid Routing Entity Address**, **No Address Match Found**, **DP Errors**, and **DP Congestion**) with the **Routing Exception Action** set to Forward Unchanged.

1. Select **FABR ➤ Configuration ➤ Applications**.
   The **FABR Configuration Applications** page appears.
2. Click **Insert**.
   The **FABR Configuration Applications [Insert]** page appears.
3. Click on a Radio button to choose how the Application ID is selected.
   - Text box to manually enter an Application ID.
   - Drop down list, select the Application ID in the Diameter message.

     Note: The Application IDs presented in this list are those created using **Main Menu ➤ Diameter ➤ Application Ids**.
4. Note that the **Routing Mode** field is disabled.
5. Perform one of the following actions:
   - Click **OK** to save the application and return to the **FABR Configuration Applications** page.
   - Click **Apply** to save the application and stay on this page.

     Note: If field validations succeed after clicking either **OK** or **Apply**, the new Application is saved and an informational message about the automatic addition of the Routing Exceptions appears.
   - Click **Cancel** to return to the **FABR Configuration Applications** page without saving the changes.

   If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:
   - The **Application ID** is empty; no value was entered or selected
   - The **Application ID** is not unique; it already exists in the system
   - The entry in any field is not valid (wrong data type or out of the valid range)
   - The maximum number of supported Diameter applications (16) is already defined in the system

Editing a supported Diameter application

Use this task to edit a supported Diameter Application entry.

1. Select **FABR ➤ Configuration ➤ Applications**.
   The **FABR Configuration Applications** page appears.
2. Select the Application you want to edit, then click **Edit**.
   The **FABR Configuration Applications [Edit]** page appears.

Note: An error message appears if the Application has already been removed.

3. From the **Application ID** drop down list, select the Application ID in the Diameter message.
4. Note that the **Routing Mode** field is disabled.
5. Perform one of the following actions:

   - Click **OK** to save the application and return to the **FABR Configuration Applications** page.
   - Click **Apply** to save the application and stay on this page.
   - Click **Cancel** to return to the **FABR Configuration Applications** page without saving the changes.

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

   - The **Application Name** is not unique; it already exists in the system
   - The entry in the **Application Name** field is not valid (wrong data type or out of the valid range)

Deleting a supported Diameter application

Use this task to delete a supported Diameter application entry.

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

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

   Note: An error message appears if the Application has already been removed.

3. Perform one of the following actions:

   - Click **OK** to delete the application.
   - Click **Cancel** to cancel the delete function and return to the **FABR Configuration Applications** page.

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

   - The Application is in use by an Address Resolution

Exceptions configuration

The **Exceptions** page allows you to specify the routing procedure to invoke when FABR is unable to resolve an address to a Destination for each supported Diameter Application and Routing Exception Type.

There are Routing Exception entries automatically inserted with the **Routing Exception Action** set to Forward Unchanged as the default action for a supported Diameter application entry when that application entry is added.

- **Unknown Command Code**

- **No valid Routing Entity Address**
- **No Address Match Found**
- **DP Errors**
- **DP Congestion**

Similarly, these Routing Exceptions that are associated with an application entry are automatically deleted when that application entry is deleted.

From the **Exceptions** page, you can:

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

Exceptions configuration elements

This table describes the fields on the Exceptions View and Edit pages only.

Table 3: Exceptions Configuration Elements

Field	Description	Data Input Notes
Application ID (Read only)	Application ID in a Diameter message	N/A
Application Name (Read only)	Name of the application corresponding to the Application ID	N/A
Routing Exception Type (Read only)	The routing exception that prevented address resolution. This field displays one of the following values: • Invalid command code • Valid address not found • Valid address was found did not match a provisioned address or address range	N/A
Routing Exception Action	Action that FABR takes associated with the **Routing Exception Type**	Format: Radio buttons Range: • Forward Unchanged • Forward to Destination • Send Answer with Result-Code AVP • Send Answer with Experimental-Result AVP • Abandon Request

Field	Description	Data Input Notes
Destination	Destination to where the message is forwarded associated with the **Routing Exception Type**. This field is enabled when the **Routing Exception Action** is set to Forward to Destination.	Format: Pulldown list Range: Available user-configured destinations
Result-Code Value	Answer code associated with this **Routing Exception Type**. This field is enabled when the **Routing Exception Action** is set to either Send Answer with Result-Code AVP or Send Answer with Experimental-Result AVP.	Format: • Selection text box; numeric • Selection pulldown list Range: • Selection box: 1000–5999 • Selection pulldown list: available Diameter answer codes
Vendor-ID	Value returned in the Vendor-ID AVP of the answer message associated with this **Routing Exception Type**. This field is enabled when the **Routing Exception Action** is set to Send Answer with Experimental-Result AVP.	Format: Text box; numeric Range: 1–4294967295
Error Message	Value returned in the Error-Message AVP of the answer message. This field is enabled when the **Routing Exception Action** is set to either Send Answer with Result-Code AVP or Send Answer with Experimental-Result AVP.	Range: 0–64 characters Default: Null string

Viewing Exceptions

Use this task to view currently configured Exceptions.

Select **FABR ➤ Configuration ➤ Exceptions**.
The **FABR Configuration Exceptions** page appears. This list of applications and associated Routing Exception information can be filtered to display only desired items.

Editing a Routing Exception

Use this task to edit a Routing Exception.

1. Select **FABR ➤ Configuration ➤ Exceptions**.
   The **FABR Configuration Exceptions** page appears.
2. Select the Application ID/Name you want to edit, then click **Edit**.
   The **FABR Configuration Exceptions [Edit]** page appears.

Note: An error message appears if the Application has already been removed.

3. Update the relevant fields.

   For more information about each field, see *Exceptions configuration elements*.

   - An error is displayed if "Vendor-ID" is not configured when "Send Answer with Experimental-Result AVP" is selected as a value for "Routing Exception Action".
   - An error is displayed if "Destination" is not configured when "Forward to Destination" is selected as a value for "Routing Exception Action".
   - An error is displayed if "Result-Code Value" is not configured when "Send Answer with Result-Code AVP" or "Send Answer with Experimental-Result AVP" is selected as a value for "Routing Exception Action".

4. Perform one of the following actions:

   - Click **OK** to save the edited exception entry and return to the **FABR Configuration Exceptions** page.
   - Click **Apply** to save the edited exception entry and stay on this page.
   - Click **Cancel** to return to the **FABR Configuration Exceptions** page without saving the changes.

Default Destinations configuration

The **Default Destinations** page contains the attributes associated with a Default Destination to where FABR routes a message. FABR uses these attributes to modify the contents of a received message before forwarding the message.

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

From the **Destinations** page, you can:

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

Default Destinations configuration elements

This table describes the fields on the Default Destinations View, Insert, and Edit pages.

Table 4: Destinations Configuration Elements

Field	Description	Data Input Notes
Name	Unique name of the Destination If a duplicate Name is entered or the Name is not specified, an error message appears.	Format: Alphanumeric and underscore (_) Range: 1–32 characters; cannot start with a digit and must contain at least one alphabetic character
Realm	Realm of the Default Destination The **Realm** and **Fully Qualified Domain Name** cannot both be empty; otherwise, an error message appears.	Format: Text box; Realm is a case-insensitive string consisting of a list of labels separated by dots, where a label may contain letters, digits, dashes ('-') and underscore ('_'). A label must start with a letter, digit or underscore and must end with a letter or digit. Underscores may be used only as the first character. A label must be at most 63 characters long and a Realm must be at most 255 characters long. At least Realm or Fully Qualified Domain Name is required to configure a Destination.[Default = n/a; Range = A valid Realm.]
Fully Qualified Domain Name	Unique Fully Qualified Domain Name of the Default Destination If a duplicate FQDN is entered, an error message appears. The **Fully Qualified Domain Name** and **Realm** cannot both be empty; otherwise, an error message appears.	

Viewing Destinations

Use this task to view currently configured Default Destinations.

Select **FABR ➤ Configuration ➤ Default Destinations**.
The **FABR Configuration Default Destinations** page appears. This list of destinations can be filtered to display only desired items.

Inserting a Destination

Use this task to add a new Destination.

1. Select **FABR ➤ Configuration ➤ Destinations**.
   The **FABR Configuration Destinations** page appears.
2. Click **Insert**.
   The **FABR Configuration Destinations [Insert]** page appears.
3. Enter a unique name for the destination in the **Name** field.
4. Enter the realm in the **Realm** field.
5. Enter a unique FQDN in the **Fully Qualified Domain Name** field.
6. Perform one of the following actions:

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

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

   - Both the **Realm** and **Fully Qualified Domain Name** are empty; no value was entered
   - The **Name** or **Fully Qualified Domain Name** is not unique; it already exists in the system
   - The entry in any field is not valid (wrong data type or out of the valid range)
   - The required **Name** is empty
   - The number of Destinations (128) is already defined in the system

Editing a Default Destination

Use this task to edit a Default Destination.

1. Select **FABR ➤ Configuration ➤ Default Destinations**.
   The **FABR Configuration Default Destinations** page appears.
2. Select the Destination you want to edit, then click **Edit**.
   The **FABR Configuration Default Destinations [Edit]** page appears.

   Note: An error message appears if the Destination has already been removed.

3. Update the relevant fields.

   For more information about each field, see *Default Destinations configuration elements*.

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

4. Perform one of the following actions:

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

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

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

Deleting a Default Destination

Use this task to delete a Default Destination. A Default Destination cannot be deleted if it is being used by a Routing Exception. Before this task is performed, delete the association with any Routing Exception either by changing the Routing Exception Action to something other than "Forward To Destination", or by deleting the Supported Application, thereby deleting the associated Routing Exceptions.

1. Select **FABR ➤ Configuration ➤ Default Destinations**.
   The **FABR Configuration Destinations** page appears.
2. Select the Destination you want to delete, then click **Delete**.
   A popup window appears.
3. Perform one of the following actions:
   - Click **OK** to delete the destination.
   - Click **Cancel** to cancel the delete function and return to the **FABR Configuration Default Destinations** page.

   If **OK** is clicked and the following condition exists, an error message appears:
   - The Destination is in use by a Routing Exception.

Address Resolutions configuration

FABR performs off-board database lookups for user identities decoded from Diameter messages. The **Address Resolutions** page allows you to configure which (and how) user identities are to be decoded from the messages. You provision combinations of Diameter Application ID, and Command Code (the key that is matched to the messages) and configure the Routing Entity Type(s) to be decoded and a prioritized list of AVPs from which to decode these entity types. An Address Resolution supports up to two prioritized Routing Entity Types for each Application ID and command Code.

- Primary Routing Entity Type (highest priority)
- Secondary Routing Entity Type (lowest priority)

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From the **Address Resolutions** page, you can:

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

Address Resolutions configuration elements

This table describes the fields on the Address Resolutions View, Insert, and Edit pages. Data Input Notes only apply to the Insert and Edit pages; the View page is read-only.

Table 5: Address Resolutions Configuration Elements

Field	Description	Data Input Notes
Application ID	Application ID in a Diameter message The Application ID is an IANA-assigned Diameter Application ID, which is a 32-bit field that is mandatory in all Diameter messages. It is commonly used for screening and routing messages between Diameter nodes. If a combination of the Application ID and Command Code already exists, an error message appears.	Format: Pulldown list Range: Available Application IDs (0–4294967295)
Command Code	Command Code in a Diameter message If a combination of the Application ID and Command Code already exists, an error message appears.	Format: Pulldown list Range: Available Command Codes
Primary Routing Entity and Secondary Routing Entity sections		
Routing Entity	Routing Entity type The same Routing Entity Type cannot be selected for both the Primary and the Secondary Routing Entity; if the same type is selected, an error message appears. If the Routing Entity Type is not specified for the Primary Routing Entity, an error message appears.	Format: Pulldown list Range: • IMSI • MSISDN • IMPI • IMPU
Primary AVP	Primary AVP used for extracting the Routing Entity address The same Primary AVP and Secondary AVP cannot be selected for either the Primary Routing Entity or for the Secondary Routing Entity; if the same AVP is selected, an error message appears. If Primary AVP is not selected for the Primary Routing Entity, an error message appears.	Format: Pulldown list Will be used for extracting the Routing Entity address. Range of User Identity routing entity types include: • Public Identity • ServiceInfo.Subscription-Id(0) • ServiceInfo.Subscription-Id(1) • ServiceInfo.Subscription-Id(2) • ServiceInfo.Subscription-Id(3) • Subscription-Id(0) • Subscription-Id(1) • Subscription-Id(2) • Subscription-Id(3) • UserIdentity.MSISDN • UserIdentity.Public-Identity • UserName
Secondary AVP	Secondary AVP used for extracting the Routing Entity address The same Primary AVP and Secondary AVP cannot be selected for either the Primary Routing Entity or for the Secondary Routing Entity; if the same AVP is selected, an error message appears.	

Field	Description	Data Input Notes
		• Wildcarded-Public-Identity
Destination Type	Type of Destination for this Routing Entity Type.	Format: Pulldown list Range: • IMS-HSS • LTE-HSS • PCRF • OCS • OFCS • AAA • USERDEF1 • USERDEF2

Viewing Address Resolutions

Use this task to view currently configured Address Resolutions.

Select **FABR ➤ Configuration ➤ Address Resolutions**.
The **FABR Configuration Address Resolutions** page appears. This list of Addess Resolutions can be filtered to display only desired records.

Inserting an Address Resolution

Use this task to add a new Address Resolution.

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

1. Select **FABR ➤ Configuration ➤ Address Resolutions**.
   The **FABR Configuration Address Resolutions** page appears.
2. Click **Insert**.
   The **FABR Configuration Address Resolutions [Insert]** page appears.
3. Select an application ID from the **Application ID** pulldown list.

   Note: The Application IDs presented in this list are those created using **Main Menu ➤ FABR ➤ Configuration ➤ Applications**.

4. Select the appropriate command code from the **Command Code** pulldown list.

   Note: The Command Codes presented in this list are those created using **Main Menu ➤ Diameter ➤ Command Codes** .

5. For the Primary Routing Entity section, perform the following:
   a) Select the appropriate Routing Entity type from the **Routing Entity** pulldown list.
   b) Select the Primary AVP from the **Primary AVP** pulldown list.
   c) If needed, select the Secondary AVP from the **Secondary AVP** pulldown list.

d) Select the type of destination from the **Destination Type** pulldown list.

6. If needed, for the Secondary Routing Entity section, perform the following:
   a) Select the appropriate Routing Entity type from the **Routing Entity Type** pulldown list.
   b) Select the Primary AVP from the **Primary AVP** pulldown list.
   c) If needed, select the Secondary AVP from the **Secondary AVP** pulldown list.
   d) Select the type of destination from the **Destination Type** pulldown list.
7. Perform one of the following actions:

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

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

   - The combination of **Application ID** and **Command Code Value** is not unique; it already exists in the system
   - The entry in any field is not valid (wrong data type or out of the valid range)
   - Any required field is empty
   - An **Address Resolution** with the **Primary Routing Entity** missing **Routing Entity**,**Primary AVP**, or **Destination Type**.
   - Duplicate Routing Entity Types were selected in the **Primary** and **Secondary** Routing Entity sections
   - Duplicate AVPs were selected in the **Primary AVP** and **Secondary AVP** fields
   - The maximum number of Address Resolutions (128) is already defined in the system

Editing an Address Resolution

Use this task to edit an Address Resolution.

1. Select **FABR ➤ Configuration ➤ Address Resolution**.
   The **FABR Configuration Address Resolutions** page appears.
2. Select the Address Resolution you want to edit, then click **Edit**.
   The **FABR Configuration Address Resolutions [Edit]** page appears.

   Note: An error message appears if the Address Resolution has already been removed.

3. Update the relevant fields.
   For more information about each field, see *Address Resolutions configuration elements*.

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

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

4. Perform one of the following actions:

   - Click **OK** to save the changes and return to the **FABR Configuration Address Resolutions** page.

- Click **Apply** to save the changes and stay on this page.
- Click **Cancel** to return to the **FABR Configuration Address Resolutions** page without saving the changes.

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

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

Deleting an Address Resolution

Use this task to delete an Address Resolution.

1. Select **FABR ➤ Configuration ➤ Address Resolutions**.
   The **FABR Configuration Address Resolutions** page appears.
2. Select the Address Resolution you want to delete, then click **Delete**.
   A popup window appears.

   Note: An error message appears if the Address Resolution has already been removed.

3. Perform one of the following actions:

   - Click **OK** to delete the Address Resolution.
   - Click **Cancel** to cancel the delete function and return to the **FABR Configuration Address Resolutions** page.

System Options configuration

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

System Options elements

This table describes the fields on the System Options page.

Table 6: System Options Elements

Field	Description	Data Input Notes
ASCII Excluded Digits	List of ASCII characters to ignore while parsing MSISDN digits from a raw AVP data field of AVP Type UTF8String. If an invalid character is entered, an error message appears.	Format: Text boxes Default = n/a Range = ASCII printable characters except '%', '@', ':' and ';'
Exclude Space	Defines whether ASCII character space is ignored while parsing MSISDN digits from a raw AVP data field of AVP Type UTF8String If checked, ASCII character space is ignored. If not checked, ASCII character space is not ignored.	Format: Check box Range: Checked, unchecked Default: Unchecked
TBCD Excluded Digits	Defines whether the associated digits is ignored while parsing digits from a raw AVP data field of AVP Type OctetString encoded as a TBCD-string If checked, digits is ignored. If not checked, digits is not ignored.	Format: Check boxes Range: Checked, unchecked for each option: *(1010), #(1011), a(1100), b(1101), c(1110) Default: Unchecked
Allow Subsequent FABR Invocation	Enables the subsequent invocation of FABR on a different DSR node in the network	Format: Check box Range: Checked, unchecked Default: Unchecked
Remove Destination-Host	If checked, FABR deletes any instance of "Destination-Host" AVPs in the message when performing "Realm only" resolution.	Format: Check box Range: Checked, unchecked Default: Unchecked
Realm	Value to be placed in the Origin-Realm AVP of the Answer message generated by FABR. A Realm must be paired with a Fully Qualified Domain Name. If entering a value for Realm, then a value for Fully Qualified Domain Name must also be entered; otherwise, an error message appears. If a value is not entered, the local node Realm for the egress connection is used.	Default = n/a; Range = A valid Realm

Field	Description	Data Input Notes
Fully Qualified Domain Name	Value to be placed in the Origin-Host AVP of the Answer message generated by FABR A Fully Qualified Domain Name must be paired with a Realm. If entering a value for Fully Qualified Domain Name, then a value for Realm must also be entered; otherwise, an error message appears. If not configured, local node FQDN for the egress connection is used.	Default = n/a; Range = A valid FQDN
Resource Exhaustion Result-Code	Result-Code or Experimental-Result-Code value to be returned in an Answer message when a message is not successfully routed because of internal resource being exhausted If Vendor-Id is configured, this result-code value is encoded as Experimental-Result-Code AVP; otherwise the result-code is encoded as Result-Code AVP.	Format: • Selection text box; numeric • Selection pulldown list Range: • Selection box: 1000–5999 • Pulldown list: available Code values Default: 3004
Resource Exhaustion Error Message	Error-Message AVP value to be returned in an Answer message when a message is not successfully routed because of internal resource being exhausted	Range: 0–64 characters Default: FABR Resource Exhausted
Resource Exhaustion Vendor-Id	Vendor-Id AVP value to be returned in an Answer message when a message is not successfully routed because of internal resource being exhausted	Format: Text box; numeric Range: 1–4294967295
Application Unavailable Action	Defines action to be taken when FABR is not available to process messages If the Default Route option is selected, an entry must be provided for the Application Unavailable Route List.	Format: Radio buttons Range: • Continue Routing • Default Route • Send Answer with Result-Code AVP • Send Answer with Experimental-Result AVP Default: Continue Routing

Field	Description	Data Input Notes
Application Unavailable Route List	Defines where the requests will be routed when FABR is not available. Peer Routing Rules will be bypassed. A route list must be entered if Default Route is selected as the **Application Unavailable Action**.	Format: Pulldown list Range: Available Route List entries
Application Unavailable Result-Code	Result-Code or Experimental-Result-Code value to be returned in an Answer message when a message is not successfully routed because FABR is not available. If Vendor-Id is configured, this result-code value is encoded as Experimental-Result-Code AVP; otherwise the result-code is encoded as Result-Code AVP. A code must be entered if either the Send Answer with Result-Code AVP or the Send Answer with Experimental Result-Code AVP option is selected as the **Application Unavailable Action**.	Format: • Selection Text box; numeric • Selection pulldown list Range: • Selection box: 1000–5999 • Pulldown list: available Code values Default: 3002
Application Unavailable Error Message	Error-Message AVP value to be returned in an Answer message when a message is not successfully routed because FABR is not available. A message can be entered, if needed, when either the Send Answer with Result-Code AVP or the Send Answer with Experimental Result-Code AVP option is selected as the **Application Unavailable Action**.	Range: 0–64 characters Default: FABR Unavailable
Application Unavailable Vendor-Id	Vendor-Id AVP value to be returned in an Answer message when a message is not successfully routed because FABR is not available. A vendor-Id must be entered if the Send Answer with Experimental Result-Code AVP option is selected as the **Application Unavailable Action**.	Format: Text box; numeric Range: 1–4294967295

Editing System Options

Use this task to edit System Options.

1. Select **FABR ➤ Configuration ➤ System Options**.
   The **FABR Configuration System Options** page appears.
2. Update the relevant fields.
   For more information about each field, see *System Options 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 **FABR Configuration System Options** page without saving the changes.

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

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

Chapter 4

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.

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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

ComAgent	Communication Agent A common infrastructure component delivered as part of a common plug-in, which provides services to enable communication of message between application processes on different servers.
Communication Agent	See ComAgent.

D

Destination	The node to which the signaling link traffic is routed. This destination is identified by a point code, either a full point code or a cluster point code.
DP	Data Processor The repository of subscriber data on the individual DSR node elements. The DP hosts the full address resolution database.
DSR	Diameter Signaling Router

D

	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.

F

FABR	Full Address Based Resolution Provides an enhanced DSR routing capability to enable network operators to resolve the designated Diameter server addresses based on individual user identity addresses in the incoming Diameter request messages.
Full Address Based Resolution	See FABR.

I

IANA	Internet Assigned Numbers Authority An organization that provides criteria regarding registration of values related to the Diameter protocol.
IMPI	IP Multimedia Private Identity
IMPU	IP Multimedia Public Identity
IMSI	International Mobile Subscriber Identity

M

MP	Message Processor The role of the Message Processor is to provide the application

M

	messaging protocol interfaces and processing. However, these servers also have OAM&P components. All Message Processors replicate from their Signaling OAM's database and generate faults to a Fault Management System.
MSISDN	Mobile Station International Subscriber Directory Number The MSISDN is the network specific subscriber number of a mobile communications subscriber. This is normally the phone number that is used to reach the subscriber.

R

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

S

SDS	Subscriber Database Server Subscriber Database Server (SDS) provides the central provisioning of the Full-Address Based Resolution (FABR) data. The SDS, which is deployed geo-redundantly at a Primary and Disaster recovery site, connects with the Query Server and the Data Processor System Operations, Administration, and

S

Maintenance (DP SOAM) servers at each Diameter Signaling Router (DSR) site or a standalone DP site to replicate and recover provisioned data to the associated components.