Oracle® Communications Diameter Signaling Router

Diameter Mediation User's Guide

910-6920-001 Revision A

May 2014

ORACLE®

Oracle® Communications Diameter Mediation User's Guide

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Chapter 1

Introduction

Topics:

The Diameter *Mediation* document provides information about how to use the Mediation GUI to perform Diameter Signaling Router tasks.

Overview

The *Diameter Mediation* document provides information about how to use the Mediation GUI to perform Diameter Signaling Router (DSR) tasks.

The document provides the following types of information:

- Creation and modification of Rule Templates
- Provision rules and data in Rule Sets

Scope and Audience

This manual is intended for personnel who perform Diameter Signaling Router tasks.

This manual contains procedures for performing the creation and modification of Rule Templates tasks using the Mediation GUI.

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

Documentation Admonishments

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

Table 1: Admonishments

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

Document Organization

This document is organized into the following chapters:

- *Introduction* contains general information about the Mediation help documentation, the organization of this manual, and how to get technical assistance.
- *Diameter Mediation* contains information about how to use Diameter Mediation to solve interoperability problems by creating rules to manipulate header parts and Attribute-Value Pairs (AVPs) in incoming routed messages.

Customer Care Center

Oracle's 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 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.

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.

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

Related - Global

Email (All Regions): support@tekelec.com

- **USA and Canada**

  Phone:

  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:

  +1-919-460-2150

  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

- **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:

    +91-124-465-5098 or +1-919-460-2150

    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 Oracle's 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 Oracle's Tekelec Customer Care Center.

Related Publications

The Diameter Signaling Router (DSR) documentation set includes the following publications, which provide information for the configuration and use of DSR and related applications.

Getting Started includes a product overview, system architecture, and functions. It also explains the DSR GUI features including user interface elements, main menu options, supported browsers, and common user interface widgets.

Feature Notice describes new features in the current release, provides the hardware baseline for this release, and explains how to find customer documentation on the Oracle Customer Support Site.

Roadmap to Hardware Documentation provides links to access manufacturer online documentation for hardware related to the DSR.

Operation, Administration, and Maintenance (OAM) Guide provides information on system-level configuration and administration tasks for the advanced functions of the DSR, both for initial setup and maintenance.

Communication Agent User's Guide explains how to use the Communication Agent GUI pages to configure Remote Servers, Connection Groups, and Routed Servers, and to maintain configured connections.

Diameter User's Guide explains how to use the Diameter GUI pages to manage the configuration and maintenance of Diameter Configuration components, including Local and Peer Nodes, Connections, Configuration Sets, Peer Routing Rules, Application Route Tables, System Options, and DNS options; describes the functions of Diameter Message Copy; and describes DSR capacity and congestion controls.

Diameter Mediation User's Guide describes the functions of Diameter Mediation, and explains how to use the Diameter Mediation GUI pages (nested inside the Diameter GUI folder) to configure and test Rule Templates, how to use the Formatting Value Wizard, and how to configure Rule Sets.

IP Front End (IPFE) User's Guide explains how to the use the IPFE GUI pages to configure IPFE to distribute IPv4 and IPv6 connections from multiple clients to multiple nodes.

Range-Based Address Resolution (RBAR) User's Guide explains how to use the RBAR GUI pages to configure RBAR to route Diameter end-to-end transactions based on Diameter Application ID, Command Code, Routing Entity Type, and Routing Entity address ranges and individual addresses.

Full-Address Based Resolution (FABR) User's Guide explains how to use the FABR GUI pages to configure FABR to resolve designated Diameter server addresses based on Diameter Application ID, Command Code, Routing Entity Type, and Routing Entity addresses.

Charging Proxy Application (CPA) and Offline Charging Solution User's Guide describes the Offline Charging Solution and explains how to use the CPA GUI pages to set System Options for CPA, configure the CPA's Message Copy capability, and configure the Session Binding Repository for CPA.

Policy DRA User's Guide describes the topology and functions of the Policy Diameter Routing Agent (Policy DRA) DSR Application and the Policy Session Binding Repository, and explains how to use the GUI pages to configure Policy DRA.

Gateway Location Application (GLA) User's Guide describes the functions of retrieving subscriber data stored in Policy Session Binding Repository (pSBR) provided by Policy DRA and explains how to use the GUI pages to configure GLA.

DSR Alarms, KPIs, and Measurements Reference provides detailed descriptions of alarms, events, Key Performance Indicators (KPIs), and measurements; indicates actions to take to resolve an alarm, event, or unusual Diameter measurement value; and explains how to generate reports containing current alarm, event, KPI, and measurement information.

DSR Administration Guide describes DSR architecture, functions, configuration, and tools and utilities (IPsec, Import/Export, DIH, and database backups); and provides references to other publications for more detailed information.

Locate Product Documentation on the Customer Support Site

Oracle customer documentation is available on the web at the Oracle Technology Network (OTN) site, *http://docs.oracle.com*. You do not have to register to access these documents. Viewing these files requires Adobe Acrobat Reader, which can be downloaded at *www.adobe.com*.

1. Log into the Oracle Customer Support site at *http://docs.oracle.com*.
2. Under **Applications**, click the link for **Communications**.
   The **Oracle Communications Documentation** window opens with Tekelec shown near the top.
3. Click **Oracle Communications Documentation for Tekelec Products**.
4. Navigate to your Product and then the Release Number, and click the **View** link (the **Download** link will retrieve the entire documentation set).
5. To download a file to your location, right-click the PDF link and select **Save Target As**.

Chapter 2

Diameter Mediation

Topics:

The Diameter Mediation feature allows easy creation of Mediation Rules.

Mediation overview

Diameter message mediation helps to solve interoperability issues by using rules to manipulate header parts and Attribute-Value Pairs (AVPs) in an incoming routable message, when data in the message matches some specified conditions at a specified point of message processing. Tasks of the "if condition matches, then do some action" type can be solved in the most efficient way.

The Diameter Mediation feature extends the CAPM (Computer-Aided Policy Making) framework to allow for easy creation of Mediation rules for use in 3G, LTE and IMS networks. Mediation Rule Templates are created to define the Conditions that must be matched in a message and the Actions that are applied to modify the message contents.

- A Condition defines a part of the message that is used in the comparison, an operator for the type of comparison, and a type of data that must match the data in the message part. Two or more Conditions in the same Rule Template are collectively referred to as a Condition Set; the Conditions are "AND"ed in the comparison process.
- An Action can be adding, altering, or deleting AVPs; modifying the message header Flags, Length, Command-Code, or Application-ID; or other operations. Two or more Actions in a Rule Template are collectively referred to as an Action Set.

  A Message Copy Action can also be defined to trigger Diameter Message Copy for copying a message to a DAS.

Mediation can be performed on:

- Routable Diameter messages only (Mediation is not supported on Diameter CEA and CER, DWR and DWA, and DPR and DPA messages)
- Specific Diameter interfaces or all Diameter interfaces ("interfaces" refers to Diameter Application Ids and not hardware/network interfaces)

Mediation Message Copy can be performed only for Request messages, and is ignored if set at Mediation Trigger Point ATP1.

After a Rule Template definition is complete, a Rule Set can be generated from the Rule Template. The data needed for the Conditions and the Actions is provisioned in the generated Rule Set. A Mediation rule is an instance of the data needed for the execution of Mediation logic. The actual data needed for the Conditions and the Actions is provisioned in one or more rules in the generated Rule Set. All of the rules associated with one Mediation Rule Template are collectively referred to as the Rule Set for the Rule Template. See Rule Sets.

Rule Sets can be associated with pre-defined Request or Answer Trigger points in the DSR message processing logic. When message processing reaches a Trigger point and the Conditions in an associated Rule Set are met, the Actions for that Rule Set are applied to the message. The changes to the message content can result in modifying the message processing behavior at that Trigger point in the processing logic. See Triggers

Diameter Mediation provides a Rule Templates interface, a Rule Sets interface, and other GUI screens:

- The Rule Templates interface is used primarily for the creation and modification of Rule Templates.

  When the Mediation feature is activated in the system and "Meta-Administrator" privileges are activated for the feature, the Rule Templates folder appears under the Mediation folder in the Diameter left-hand GUI menu.

The "Meta-Administrator" privileges can be deactivated later, so that the Rule Templates folder does not appear under the Mediation folder. This can be to prevent unauthorized modification of the created Rule Templates in the system.

A user, who could be designated as the "Meta-Administrator", can use the Rule Templates GUI screens and other Mediation GUI screens to perform the following tasks:

- Add, edit, and delete Enumeration Types, AVP Dictionary entries, and Vendors that are used in creating Rule Templates (see *Enumerations*, *Custom Dictionary*, and *Vendors*)
- Create, modify, delete, copy, import, and export Rule Templates (see *Rule Templates*)
- Add help text to a Rule Template; the help text will be available for the Rule Set that is generated from the Rule Template (see *Rule Templates*)
- Associate Rule Sets with Triggers, and remove Rule Set associations with Triggers (see *Triggers*)
- Set the Action Error Handling property of a Rule Set (see *State and Properties*)
- Change the state of a Rule Template (see *State and Properties*)

  When a Rule Template is being created or modified, it is in the Development state.

  The Rule Template state can be changed from Development to Test to allow its Rule Set to be tested or to allow the Rule Template to be exported.

  The Rule Template state can be changed to Active to enable use of its generated Rule Set for live traffic.

  The Rule Template state can be changed from Test or Active back to Development to allow modification of the Rule Template (all existing rule provisioning for its associated Rule Sets will be deleted).

- The Rule Sets interface is used primarily for the provisioning of rules and actual data in Rule Sets.

  After a Rule Template has been created, the generation of the Rule Set from the Rule Template creates an entry in the Mediation Rule Sets GUI folder.

  A user, who could be designated as the "Rule Set Administrator", can use the Rule Sets entries, Enumerations, Triggers, and State & Properties GUI screens, and other GUI screens to perform the following tasks, but cannot create, modify, copy, or export Rule Templates:

  - Add a rule to a Rule Set, and provision the actual data that is used by the rule in the message matching process (see *Rule Sets*)
  - Edit and delete rules in Rule Sets (see *Rule Sets*)
  - Delete Rule Sets (see *Rule Sets*)
  - Change the state of a Rule Template (see *State and Properties*)

    The Rule Template state can be changed to Test for testing its Rule Sets or to Active for enabling its Rule Sets for use with live traffic.

    When "Meta-Administrator" privileges are deactivated, the state cannot be changed back to Development.

  - Set the Action Error Handling property of a Rule Set (*State and Properties*)
  - Test a Rule Set

    A Diagnostics Tool is available to test Mediation rules before they are subjected to live traffic in the network. The DSR Diagnostics Tool logs the rules applied, Actions taken, and other diagnostics information when a test message is injected into the system. The tool generates traffic and sends Diameter Messages on a test connection. As a test message traverses the system,

the DSR application logic generates diagnostics messages at Trigger points. The **Diameter > Reports > Diagnostics Tool** GUI is used to view the diagnostics log reports. See Reports in the DSR Diameter User Guide.

- Associate Rule Sets with Triggers, and remove Rule Set associations with Triggers (see *Triggers*)
- Import previously exported Rule Templates (see *State and Properties*)

  The state of an imported Rule Template is set to Test by default.

- View the Enumeration types that can be used in the rules (see *Enumerations*)
- View the Vendors that can be used in Rule Templates (see *Vendors*)

Mediation-Triggered Diameter Message Copy

The Rule Template "Message Copy" Action can be defined to trigger Diameter Message Copy for messages that are processed by Diameter Mediation.

The Message Copy Action triggers Diameter Message Copy, and specifies the Message Copy Configuration Set (MCCS) that contains the Request/Answer content criteria to be used by the Message Copy function to copy the message to a DAS. The Message Copy Configuration Set specifies a Route List for the DAS. See Configuration in the DSR Diameter User Guide.

The Message Copy Action is ignored if set at ATP10 (Diameter Answer message prior to be forwarded to connection).

If Message Copy is triggered for the same message from multiple locations, the Message Copy Configuration Set for the latest Message Copy triggering prevails.

In the case of Request re-route due to invalid Result-Code, only the Message Copy Configuration Set that is associated with the Answer that completes the transaction at ATP1 is considered.

The Message Copy is performed after the completion of the original transaction. The copy of the message is not processed by the Mediation Triggering Points.

Rule Templates

Rule Templates are created by:

- Formulating the Conditions against which to match incoming requests or responses
- Defining the Mediation Actions that are applied to the message when the Conditions match

Note: The "Meta-Administrator" privileges must be activated for the Diameter Mediation feature before the Rule Templates GUI screens can be accessed to create and modify Rule Templates.

A Rule Template is created by configuring Settings, Conditions, and Actions.

Settings

Settings are the main Rule Template properties:

- **Rule Template Name**: A placeholder for meaningful text to describe the purpose of the Rule Template and Rule Set.
- **Message type support**: The type of message processing that is supported by a Rule Template; either a Request, an Answer, or both. In Diameter Mediation, both Request and Answer are supported, and the element value cannot be changed.

Conditions

One or more (up to 5) matching expressions (Conditions) can be defined in a Rule Template. The expressions are combined into one logical expression with "AND" operators, so that the request or response matches the condition set if all of the expressions are true. If no matching expression is defined, the message unconditionally matches.

Each matching expression consists of a left-hand value or operand, an operator, and a right-hand value or operand.

- **Left value**: Allows accessing any part of a message, any information stored by the previous Rule Template, and any information that the application resolves runtime.
- **Operator**: Allows comparison of the Left value and the Right value
- **Right value**: Allows performing the syntax check for the entered data on the generated **Rule Sets** page.

Conditions can be configured to cause Mediation to use fast database lookups of the rule data. See *Fast Search*.

Actions

Actions indicate what to do when the conditions match (such as modify the part of a message, forward a message, send a reply, insert or remove headers, or set attributes for further processing). Actions implement the mediation of a message.

When the message processing reaches a selected triggering point, the Conditions of the Rule Template are examined for the message. If the Conditions match, Mediation Actions are applied to the message. The Actions allow manipulation of some particular part of the message, adding or deleting information in the message, forwarding the message to a specific destination, or triggering of Diameter Message Copy to send a copy of the message to a DAS.

The Actions to take when a Mediation operation is triggered and its Condition Set is matched are defined in the Rule Template. Actions belonging to the same Rule Template form an Action Set. See *Rule Template elements* for the Actions available in Rule Templates.

On the **Diameter > Mediation > Rule Templates** page, you can perform the following actions:

- Filter the list of Rule Template Names to display only the desired Rule Templates.
- Click the **Insert** button.

  The **Diameter Mediation Rule Templates [Insert]** page opens. You can add a new Rule Templates and its values. See *Adding a Rule Template*. If the maximum number of Rule Templates (100) already exist in the system, the **Rule Templates [Insert]** page will not open, and an error message is displayed.

- Click the **Import** button.

  The **Diameter > Mediation > Rule Templates [Import]** page opens. You can import a Rule Template from a location outside the Diameter system, to which the Rule Template was previously exported from Mediation. See *Importing a Rule Template*. If the maximum number of Rule Templates (100) already exist in the system, the **Rule Templates [Import]** page will not open, and an error message is displayed.

- Select a Rule Template Name in the list, and click the **Copy** button.

  The **Diameter > Mediation > Rule Templates [Copy]** page opens. You can change the information for the copied Rule Template to create a new Rule Template. See *Copying a Rule Template*. If the

maximum number of Rule Templates (100) already exist in the system, the **Rule Templates [Copy]** page will not open, and an error message is displayed.

- Select a Rule Template Name in the list, and click the **Edit** button.

  The **Diameter > Mediation > Rule Templates [Edit]** page opens. You can edit the selected Rule Template. See *Changing a Rule Template*.

- Select a Rule Template Name in the list, and click the **Delete** button to remove the selected Rule Template. See *Deleting a Rule Template*.

- Select a Rule Template Name in the list, and click the **Export** button.

  The **Diameter > Mediation > Rule Templates [Export]** page opens. You can export the selected Rule Template to a location outside of the Diameter system. See *Exporting a Rule Template*.

- Select a Rule Template Name in the list, and click the **Set Help** button.

  The **Diameter > Mediation > Rule Templates [Set Help]** page opens. You can create online help for the selected Rule Template. See *Adding online help to a Rule Template*.

Fast Search

The **Fast Search** option is used to cause Mediation to use fast database lookups. If Fast Search is not used, the values of each condition are checked one-by-one until the first match is found.

The **Fast Search** option appears as the first element for each condition that is defined in the **Conditions** section for a Rule Template. The **Fast Search** option is not editable; it serves only to indicate whether Fast Search will or will not be used for the condition:

All of the conditions with the **Fast Search** option enabled must precede any conditions without Fast Search enabled in the Rule Set list. If any conditions without Fast Search enabled precede conditions with Fast Search enabled, a database lookup could fall back to slow search because of the order of the conditions.

The value of the **Fast Search** option is determined by the Operator and the Right value that are selected for the condition. The Fast Search value is either the “Yes” (check mark) sign or the “No”(red circle with a red line through it) sign.

- Fast Search is supported only by the “equals”, “begins with (longest match)”, “begins with”, “is within”, “exists”, “does not exist”, “is true”, “is false” Operators.
- If a “no” sign is displayed for the Fast Search option, then the Operator “=^^” (begins with – longest match) is disabled (cannot be selected) in the Operator drop down list for the condition.
- Regardless of the Operator, the Fast Search option is supported if the Right value is a Fixed value (a data value was entered in the Rule Template, and the value cannot be changed in the Rule Set).
- Regardless of the Operator, the Fast Search option is not supported if the “xl-value” Right value type is selected without a Fixed value.

The “Yes” sign is displayed for the Fast Search option if:

- One of the Operators “==” (equals), “=^^” (begins with-longest match), “=^ (begins with)”, “is within”, “exists”, “does not exist”, “is true, “is false” is selected and the Right value type is not “xl-value”.
- The **Default value** is **Fixed** regardless of the selected Operator and Right value type; and either the condition is the first one in the Condition Set, or all the conditions above it also have a “Yes” sign for the Fast Search option.

In any other case, the “No” sign is displayed.

When the selected Operator, the order of the conditions, or the Right value type changes, then every Fast Search “Yes” and “No” value has to be reevaluated and redrawn, and the Case-sensitive check box is either enabled or disabled accordingly.

If a “Yes” sign has to be changed to “No” under the Fast Search heading as a result of the reevaluation, and the related Operator “=^^” (begins with-longest match) was selected, a dialog box is displayed to confirm disabling of Fast Search:

Case-sensitive lookup depends on the **Fast Search** option; the check box is unchecked and disabled if Fast Search is also disabled. The **Case-sensitive** check box is enabled only for the Octet-String and UTF8String Right value types.

Rule Template elements

Table 2: Rule Template elements describes the information that can be contained in a Rule Template. Some of these elements appear only when adding, editing, or copying a Rule Template.

Table 2: Rule Template elements

Element	Description	Data Input Notes
Settings: This section contains basic information for the Rule Template.		
Rule Template Name	Name used to label this Rule Template in this application. This field is required.	Format: a-z, A-Z, 0-9, -, ., @, and _ ("Unset" cannot be used as a Rule Template Name.) Range: 1-255 characters
Message Support Type	Indicates the type of message processing that is supported by the Rule Template (Request, Answer, or both). The Message Support Type depends on the selected conditions and actions.	Format: Check marks Range: Request, Answer, or both are checked. Default: Both are checked This field cannot be edited.
Conditions: This section defines a set of zero to five matching expressions. The defined matching expressions are combined to make one logical expression with AND operators, so the set matches on the message if all the expressions are true. If no matching expression is defined, the message unconditionally matches. OR operators can be simulated by setting up multiple Rule Templates. All conditions are supported by both requests and replies.		
Fast Search	If check marked, fast database lookups are used. Otherwise, the values of the specified field are checked one-by-one until the first match is found. See *Fast Search*.	Format: Check mark (Yes) or red circle with red line through it (No); not editable Range: Yes sign or No sign Default: Yes sign

Element	Description	Data Input Notes

	The value of the Fast Search option is determined by:
	• The selected Operator, the Right value type, and the Default value
	  • Yes (check mark) if one of the following Operators is selected and the Right value type is not "xl-value":
	  • equals (==)
	  • begins with-longest match (=^^)
	  • begins with (=^)
	  • is within
	  • exists
	  • does not exist
	  • is true
	  • is false
	• The Condition evaluation order; Conditions are ANDed as follows:
	  • Yes (check mark) if the Condition is the first one in the Conditions section or all Conditions above this one also have a Yes check mark for the Fast Search option.
	  • No sign for other cases.
	Fast Search is not automatically disabled when "any" instance of an AVP is looked up in the condition. Fast Search must be manually disabled for the selected instance number of "any". Disabling the Fast Search can be achieved, for example, by selecting an "xl-value" as the Right value.
		All Conditions with the Fast Search option checked must precede the others to maintain the Fast Search.
		When the Default value is Fixed, Fast Search is enabled regardless of the selected Operator and Right value type.

Name	The name for the Left value to display for a Condition on the Rule Set page. This field is required.	Format: Text string Range: 1 to 64 characters
Description	The description that appears for a Condition on the **Rule Sets** page. If possible, provide information such as the format to be used (such as text string or telephone number format) and the range of values (such as 1 to 255 characters).	Format: descriptive text Range: 1 to 255 characters string

Element	Description	Data Input Notes
Left value	The left-hand value in a Condition. The Left value typically refers to a regular or grouped AVP component (AVP header parts or value) or a Diameter Header component. Grouped AVPs that have a depth of one are supported (one or more AVPs at the same level within an AVP). This field is required. The value can be defined using the *Formatting Value Wizard*.	Format: Text box Range: See *Formatting Value Wizard*
Operator	The operator being used to compare Left value and Right value in a Condition. "Exist" and "not exist" operators are used to check the presence of the specified Left-hand value. "Is true" and "is not true" operators are used to verify whether the specified Left value is not 0 or equals 0 (is empty in the case of a string type).	Format: Pulldown list Range: See *Table 3: Rule Template Condition Operators* Default: equals (==)
	Case Sensitive Allows the comparison to be looked up considering case. Case-sensitive search is possible only together with Fast Search. Without Fast Search, the lookup is always case-insensitive. The check box is enabled for OctetString and UTF8String Right values.	Format: Check box Range: Checked or not checked Default: Not checked (not case-sensitive)
Right value	The type of data that is compared to the field in the message (specified by the Left value) in a Condition to determine if there is a match and Mediation should be performed. The Right value can be: • Empty; the Optional check box is checked (it can be left empty in the rule provisioning in a Rule Set), or the Right value is not used by the selected Operator (such as "exists"). • One of the Right value types shown in the Range: list. Actual data of the specified type is entered in a rule in the Rule Set that is	Format: Pulldown list Range: Right value types are: • Integer32 • Integer64 • Unsigned32 • Unsigned64 • Float32 • Float64 • Address (IPv4 or IPv6 IP address) • Time (number of seconds since 0h on 1 January 1900) • UTF8string • DiameterIdentity (FQDN or Realm)

Element	Description	Data Input Notes
	generated from the Rule Template, to use in the comparison. • An actual data value of the selected Right value type, provisioned in the Default value field of the Condition in the Rule Template.	• DiameterURI • IP/Netmask (IPv4 or IPv6 Netmask) • Enumerated (available Enum values; prefaced by "enum:") • OctetString • xl-value (references to AVPs, LAVPs, or parts of the Diameter message) • Regular expression (Perl 5 regular expression) Default: Integer32 All previously provisioned Enumerated Types shall be listed prefixed with “enum:”. For example: “enum: xyz”.
	Default value: An actual data value to display for the Right value of a Condition on the Rule Set page. When the Default value is Fixed, Fast Search is enabled regardless of the selected Operator and Right value type.	Format: Text box Range: Data value that is valid for selected Right value type. When OctetString or UTF8String is selected, any human-readable character is valid. When the "xl-value" type is selected, all Default value entries must be xl-values.
	Optional: The Optional check box can be checked so that the Right value data could be deleted or left empty in the Rule Set rule, or unchecked indicating that the Right value data must be entered and can be changed in the Rule Set rule.	Format: Check box Range: Check mark or no check mark Default: Checked
	Fixed: Indicates that the Right value data that is entered in the Default value in the Rule Template Condition is actual data, and cannot be changed in the Rule Set rule.	Format: Check box Range: Check mark or no check mark Default: Not checked
Actions: This section specifies the possible settings for each action to be taken for this Rule Template. All conditions are supported by both requests and replies.		
New Action	Add a new Action to the list that is applied when the conditions of the Rule Template match on the message.	Format: Pulldown list Range: Actions listed in this section of this table.

Element	Description	Data Input Notes
Actions performed on the Diameter Header		
Modify Diameter Header Parts	Allows modifying or overwriting of the Version, Command Code, and Application ID components of the Diameter Header. **Note:** Modifying values in the Diameter Header can result in incompatibility with the standard defined in IETF RFC3588bis (draft-ietf_dime_rfc3588bix-26.txt) *Diameter Base Protocol*.	**Header Part** - the component to modify Format: Pulldown list Range: Version, Command Code, Application ID Default: Version **Overwrite to** - the new value of the component Format: Integer Range: New value; 8-bit, 24-bit, or 32-bit unsigned integer
Set Command Flags	Allows modifying of one or more Command Flags in the processed message, including the reserved flags: • Set Command Flag • Clear Command Flag • Keep original value Flags R, P, E, and T are supported; r4, r5, r6, and r7 are reserved for future use: • R - Request; shows whether the message is a Request or a Response. • P - Proxiable; shows if the message can be proxied, relayed, or redirected, or it must be locally processed. • E - Error; shows if the message contains protocol or semantic errors. • T - Shows that a message can potentially be a retransmitted message after a link fail-over, or is used to aid removal of duplicate messages.	Format: Radio buttons for each Command Flag, to set, clear, or keep the flag: Range: Set : R, P, E, T, r4, r5, r6, r7 Clear: R, P, E, T, r4, r5, r6, r7 Keep: R, P, E, T, r4, r5, r6, r7 Default: Keep original
Actions performed on the Diameter Payload (AVPs) Most of these actions can be applied to a regular AVP, to a Grouped AVP, or to an AVP within the Grouped AVP. To perform the action on a regular or Grouped AVP, the supported AVP definition from the dictionary and the instance number or value must be specified. The value is valid only for some of the actions. For actions that are performed on an AVP within a Grouped AVP, the parent AVP and its instance number must be specified. If an AVP is not present in the dictionary, it is unknown by the Mediation feature and must be defined in the dictionary before the specified action can be performed.		

Element	Description	Data Input Notes
Many of the actions allow xl-values, which can be defined using the *Formatting Value Wizard*.		
Add AVP	Add an AVP to the message. The Flags and the Value must be set for the new AVP. For Grouped AVPs, • If the AVP is added within a Grouped AVP, the Parent AVP and its Instance must be specified. • A Parent AVP can be added if it not present in the message; Flags for the added Parent AVP must be set. • If the Parent AVP is not found in the message and is not added to the message, the action will fail. Flags V, M and P are supported; r3, r4, r5, r6 and r7 are reserved for future use. • V - Vendor-Specific; indicates whether the optional Vendor-ID field is present in the AVP header. When set, the AVP Code belongs to the specific vendor code address space. • M - Mandatory; indicates whether support of the AVP is required. If an AVP with the M bit set is received by a Diameter client, server, proxy, or translation agent and either the AVP or its value is unrecognized, the message MUST be rejected. Diameter Relay and Redirect Agents MUST NOT reject messages with unrecognized AVPx. AVPs with the M bit cleared are informational only. A receiver of a message with an AVP that is not supported, or whose value is not supported, can simply ignore the AVP. • P - Indicates the need for encryption for end-to-end security. Diameter base protocol specifies which AVPs must be protected by end-to-end security measures (encryption) if the message is to pass through a Diameter agent. If a message includes any of those AVPs, the message must not be sent unless there is end-to-end security between	**Parent AVP:** Format: Pulldown list Range: Available AVPs **Instance:** Format: Pulldown list Range: First, Second, Third Fourth, Fifth **Add new AVP:** Format: Pulldown list Range: Available AVPs **Set Flags**: Format: Check box for each flag Range: V, M, P, r3, r4, r5, r6, r7 **Set Value:** Format: Text box and link to *Formatting Value Wizard*, or pulldown list and link to *Formatting Value Wizard* Range: **Add parent AVP if it is not present** Format: Check box Range: Checked or unchecked

Element	Description	Data Input Notes
	the originator and the recipient of the message.	
Delete AVP	Delete a specified AVP in the message. If the Instance of the specified AVP is All, the action is applied to all instances of the AVP or Grouped AVP in the message. If the specified AVP is within a Grouped AVP, the Parent AVP and its Instance must be specified. If the specified AVP is the last AVP within the Grouped AVP, the action can be defined to also delete the Parent AVP. If the specified AVP is a Grouped AVP, the Grouped AVP and all of the AVPs within the group are deleted. If the deleted AVP has been the last AVP within the Grouped AVP, then **Delete parent AVP if it is empty** can be checked to delete the Parent AVP as well. If the specified AVP is not found in the message, the Delete AVP action is considered to be successful.	**Parent AVP:** Format: Pulldown list Range: Available AVPs **Instance:** Format: Pulldown list Range: First, Second, Third Fourth, Fifth **Delete AVP:** Format: Radio button for Instance with pulldown list; radio button for With the value with text box or pulldown list and link to Formatting Value Wizard Range: Instance: First, Second, Third, Fourth, Fifth, All With the value: Text, or pulldown list values that vary with selected AVP to delete (see *Formatting Value Wizard*) **Delete parent AVP if it is empty** Format: Check box Range: Checked or unchecked; default is checked
Save AVP	Store a specified top-level AVP from the message into the buffer associated with the transaction. A saved AVP is stored in the buffer as long as the transaction exists. Saved AVPs can be accessed through the *Formatting Value Wizard* as corresponding Linking-AVPs with the same AVP and instance number. If the Instance of the specified AVP is All, the action saves all instances of the AVP in the message. **Note:** A grouped AVP can be saved and restored, but sub-AVPs within the stored or restored grouped AVP cannot be	**Save AVP:** Format: Pulldown list; radio button for Instance with pulldown list; radio button for With the value with text box or pulldown list and link to *Formatting Value Wizard* Range: Pulldown list: Available AVPs Instance: First, Second, Third, Fourth, Fifth, All With the value: Text, or pulldown list values that vary with selected

Element	Description	Data Input Notes
	retrieved (such as with @msg.avp["name"][index].avp["name"][index]), modified, or removed. If the same AVP is saved multiple times (the action is applied multiple times), the saved value is overwritten each time the AVP is saved. If the specified AVP is not found in the message, the Save AVP action is considered to have failed.	AVP to delete (see *Formatting Value Wizard*)
Restore AVP	Restore a top-level AVP that has been previously stored. AVPs can be restored in the message by either appending each AVP to the message or by replacing all of the same existing AVPs. The instance number of the saved AVP must be specified, to find the appropriate Linking-AVP (LAVP) that was stored. **Note:** A Grouped AVP can be saved and restored, but sub-AVPs within the stored or restored Grouped AVP cannot be retrieved (such as with @msg.avp["name"][index].avp["name"][index]), modified, or removed.	**Restore AVP:** Format: Pulldown list Range: Available AVPs **Instance:** Format: Pulldown list Range: First, Second, Third Fourth, Fifth **Delete before restore:** Format: Check box Range: Checked, unchecked; default is unchecked.
Set LAVP	Allows constructing a top-level non-Grouped AVP by setting the Flags and specifying the value, and placing it into the buffer associated with the Diameter transaction. The AVP can be accessed as a Linking-AVP through the *Formatting Value Wizard*. The value is stored in the buffer as long as the transaction exists. The LAVP can be used for the Restore AVP action. • Instance - A new AVP overwrites any existing AVP with the same instance number. • Set Value • The Input field is available when the selected LAVP has a data format other than "Enumerated".	**Set LAVP** - Specifies the LAVP to be set into the buffer associated with the transaction. Format: Pulldown list Range: All non-Grouped AVPs from the dictionary Default: First non-Grouped AVP definition from the dictionary **Instance** - The instance number of the AVP within the buffer of the transaction. Format: Pulldown list Range: First, Second, Third, Fourth, Fifth Default: First **Set Flags** - (see Flag definitions in Add AVP)

Element	Description	Data Input Notes
	• The Pulldown list is available when the selected LAVP has the data format "Enumerated". • An error message appears if the entered value of the Input field is not an x1-value and does not correspond to the data format required by the selected AVP. • Value type: Select the type of value that can be assigned to this Linking-AVP. Possible value types are the same as those for the Right value in the Conditions section of this page. • Default Value: Default value to assign to this Linking-AVP and to display on the **Rule Sets** page. Enter a 1 to 255 character string. • Descr: Add text here to describe this AVP. This description appears on the **Rule Sets** page. A maximum of 255 characters can be entered. • Optional: Click to make this AVP optional on the **Rule Sets** page. • Delete: Click to delete an existing Linking-AVP.	• If the flag must be set, the flag is checked and disabled. • If the flag must not be set, the flag is unchecked and disabled. • If the flag can be set, the check box is available to be changed. Format: Check boxes for the flags Range: V, M, P, r3, r4, r5, r6, r7 Default: From the dictionary **Set Value** - Specifies the value of the LAVP. **Input field** Format: Value entered through the Formatting Value Wizard page (click the Wizard link). Range: Values available in the *Formatting Value Wizard*. Default: N/A **Pulldown list:** Format: Pulldown list Range: All of the values of the corresponding Enumerated Type Default: First value of the Enumerated Type
Actions that allow modifying an AVP If the specified AVP is not found in the message, the action is considered to have failed.		
Change AVP Code	Replace an AVP definition with a new one, keeping the original AVP value and flag that are not strictly defined in the dictionary (that can be set). Allows changing the Code of the specified AVP and modifying its Flags.	**Parent AVP:** Format: Pulldown list Range: Available AVPs **Instance:** Format: Pulldown list Range: First, Second, Third Fourth, Fifth **Old AVP:** Format: Pulldown list; radio button for Instance with pulldown list; radio button for With the value with

Element	Description	Data Input Notes
		text box or pulldown list and link to *Formatting Value Wizard* Range: Pulldown list: Available AVPs Instance: First, Second, Third, Fourth, Fifth With the value: Text, or pulldown list values that vary with selected AVP (see *Formatting Value Wizard*) **New AVP** Format: Pulldown list Range: Available AVPs
Change AVP Flags	Allows setting, clearing, and keeping the original value of AVP flags. Flags V, M and P are supported; r3, r4, r5, r6 and r7 are reserved for future use. • V - Vendor-Specific; indicates whether the optional Vendor-ID field is present in the AVP header. When set, the AVP Code belongs to the specific vendor code address space. • M - Mandatory; indicates whether support of the AVP is required. If an AVP with the M bit set is received by a Diameter client, server, proxy, or translation agent and either the ABP or its value is unrecognized, the message MUST be rejected. Diameter Relay and Redirect Agents MUST NOT reject messages with unrecognized AVPx. AVPs with the M bit cleared are informational only. A receiver of a message with an AVP that is not supported, or whose value is not supported, can simply ignore the AVP. • P - Indicates the need for encryption for end-to-end security. Diameter base protocol specifies which AVPs must be protected by end-to-end security measures (encryption) if the message is to pass through a Diameter agent. If a message includes any of those AVPs, the message must not be sent unless	**Parent AVP** Format: Pulldown list Range: Available AVPs **Instance** - The instance number of the AVP within the buffer of the transaction. **AVP** Format: Pulldown list; radio button for Instance with pulldown list; radio button for With the value with text box or pulldown list and link to Formatting Value Wizard; Set Flag, Clear Flag, and Keep original radio buttons for flags. Range: Pulldown list: Available AVPs Instance: First, Second, Third, Fourth, Fifth With the value: Text, or pulldown list values that vary with selected AVP (see *Formatting Value Wizard*) Flags: V, M, P, r3, r4, r5, r6, r7

Element	Description	Data Input Notes
	there is end-to-end security between the originator and the recipient of the message.	
Set AVP Value	Allows overwriting of the value of an AVP.	**Parent AVP:** Format: Pulldown list Range: Available AVPs **Instance:** Format: Pulldown list Range: First, Second, Third Fourth, Fifth **AVP:** Format: Pulldown list; radio button for Instance with pulldown list; radio button for With the value with text box or pulldown list and link to *Formatting Value Wizard* Range: Instance: First, Second, Third, Fourth, Fifth With the value: Text, or pulldown list values that vary with selected AVP (see *Formatting Value Wizard*) **Set Value:** Format: Text box or pulldown list and link to *Formatting Value Wizard* Range: Text, or pulldown list values that vary with selected AVP (see *Formatting Value Wizard*)
Strip from AVP Value	Strips the defined number of characters from either the beginning or the ending of the AVP value. This action can be used in combination with the Prefix/Suffix to AVP Value action.	**Parent AVP:** Format: Pulldown list Range: Available AVPs **Instance:** Format: Pulldown list Range: First, Second, Third Fourth, Fifth **AVP:** Format: Pulldown list; radio button for Instance with pulldown list;

Element	Description	Data Input Notes
		radio button for With the value with text box and link to *Formatting Value Wizard* Range: Pulldown list: Available AVPs Instance: First, Second, Third, Fourth, Fifth With the value: Text (see *Formatting Value Wizard*) **Strip from:** Format: Radio buttons, text box Range: Radio button for Beginning of the value; radio button for End of the value; text - number of characters to strip
Prefix/Suffix to AVP Value	Add the defined data as a prefix or suffix to the AVP value. This action can be used in combination with the Strip for AVP Value action.	**Parent AVP:** Format: Pulldown list Range: Available AVPs **Instance:** Format: Pulldown list Range: First, Second, Third Fourth, Fifth **AVP:** Format: Pulldown list; radio button for Instance with pulldown list; radio button for With the value with text box and link to *Formatting Value Wizard*; radio buttons for Prefix or Suffix; text box for prefix or suffix with link to *Formatting Value Wizard* Range: Pulldown list: Available AVPs Instance: First, Second, Third, Fourth, Fifth With the value: Text box (see *Formatting Value Wizard*) Radio buttons: Prefix to the value, Suffix to the value

Element	Description	Data Input Notes
		Text: The prefix or suffix (see *Formatting Value Wizard*)
Substitute in AVP Value	Use a defined pattern to locate a field in the AVP value, and replace the data in the field with the specified new data.	**Parent AVP:** Format: Pulldown list Range: Available AVPs **Instance:** Format: Pulldown list Range: First, Second, Third Fourth, Fifth **AVP:** Format: Pulldown list; radio button for Instance with pulldown list; radio button for With the value with text box and link to *Formatting Value Wizard* Range: Pulldown list: Available AVPs Instance: First, Second, Third, Fourth, Fifth With the value: Text box (see *Formatting Value Wizard*) **Pattern:** Format: Text box Range: Patten to locate the field **Replacement:** Format: Text box Range: Text of the replacement data (see *Formatting Value Wizard*)
Other Actions		
Message Copy	Trigger Diameter Message Copy for the message, based on the values in the Message Copy Configuration Set that is specified for the Action. See Configuration in the DSR Diameter User Guide.	Format: Pulldown list for **Select Message Copy Configuration Set** field Range: Default; configured Message Copy Configuration Sets Default: "-Select-"
Execute Rule template	**Note:** The value needs to be set at the time the new Rule Template is defined.	Format: Pulldown list

Element	Description	Data Input Notes
	Only Rule Templates in "Test" or "Active" state are listed in the pulldown list. This field is displayed on **Diameter Mediation Rule Template** Insert and Edit pages, but not on the View page.	Range: Available Rule Templates in "Test" and "Active" states Default: First Rule Template Name in the list
Exit from Execution Trigger	Exits from the Execution Trigger, bypassing any subsequent Rule Set associated with it.	N/A

Table 3: Rule Template Condition Operators describes the Operators that can be used between the Left Value and the Right value in a Rule Template Condition.

The value can be an AVP, another part of a Diameter message, a constant, or an internal variable.

Table 3: Rule Template Condition Operators

Operator	Operator Type	Returns true when...
		Example of use
equals (==)	Generic	Value exists AND equals...
		@msg.command.code==316
does not equal (!=)	Generic	Value does not exist OR does not equal...
		@msg.command.code!=316
begins with (longest match) (=^^)	String	Value exists AND begins with (longest match)...
		@msg.avp["Destination-Realm"]=^^test
begins with (=^)	String	Value exists AND begins with...
		@msg.avp["Destination-Realm"]=^testlb
does not begin with (!=^)	String	Value does not exist OR does not begin with...
		@msg.avp["Destination-Realm"]!=^testlb
ends with (=$)	String	Value exists AND ends with...
		@msg.avp["Origin-Host"][1]=$entity.com
does not end with (!=$)	String	Value does not exist OR does not end with...
		@msg.avp["Origin-Host"][1]!=$entity.com
regular expression match (=~)	String	Value exists AND matches the regular expression...
		@msg.avp[Session-Id]!=~.*\.example\..*
regular expression does not match (!=~)	String	Value does not exist OR does not match the regular expression...
		@msg.avp["Session-Id"]!=~.*\example\..*

Operator	Operator Type	Returns true when... Example of use
less than (<)	Numeric	Value exists AND is less than... @msg.avp["Validity-Time"]<30
greater than (>)	Numeric	Value exists AND is greater than... @msg.avp["Validity-Time"]>30
less than or equal to (<=)	Numeric	Value exists AND is less than or equal to... @msg.avp["Validity-Time"]<=30
greater than or equal to (>=)	Numeric	Value exists AND is greater than or equal to... @msg.avp["Validity-Time"]>=30
is within	Subnet	Value exists AND is within... @msg.avp["Served-Party-IP-Address] is within 192.168.0.0/24
is not within	Subnet	Value does not exist OR is not within... @msg.avp["Served-Party-IP-Address] is not within 192.168.0.0/24
exists		AVP specified as Left value exists... @msg.avp["Vendor-Specific-Application"] exists
does not exist		AVP specified as Left value does not exist... @msg.avp["Vendor-Specific-Application"] does not exist
is true		AVP specified as Left value exists AND it is not empty/non-zero... @msg.avp["Disconnect-Cause"] is true
is false		AVP specified as Left value does not exist OR it is empty/0... @msg.avp["Disconnect-Cause"] is false
"is true" and "is false" work only on numbers (Integer32, Integer32, Unsigned32, Unsigned64, Float32, Float64, Enumerated, Time) and strings (OctetString, UTF8String, DiameterIdentity, DiameterURI). For an IP Address, "is true" always succeeds; the address can be converted to a string that is never empty. If the condition cannot be evaluated (for example, the AVP does not exist or the xl-value is incompatible), then "is true" will fail and "is false" will succeed.		

Based on the type of operator selected, the Left value and the Right value are converted according to the rules in *Table 4: Rule Template Condition Conversion Rules*.

Table 4: Rule Template Condition Conversion Rules

Left value Type	Operator Type	Right value Type	Conversion
-	String	-	Convert Left value and Right value to strings.
-	Numeric	-	Convert Left value and Right value to numbers.
-	Subnet	-	Convert Left value to an IP address. Convert Right value to a subnet
String	Generic	String	No conversion is needed.
Numeric	Generic	Numeric	No conversion is needed.
IP address	Generic	IP address	No conversion is needed.
String	Generic	Numeric	Convert Left value to a number.
Numeric	Generic	String	Convert Right value to a number.
IP address	Generic	String	Convert Right value to an IP address.
String	Generic	IP address	Convert Left value to an IP address.
None of these cases			Conversion cannot be done.
Operators by Type (see also *Table 3: Rule Template Condition Operators*)			
String	=~, !=~, =^, =^^, !=^, =$, !=$		
Numeric	<, >, <=, >=		
Subset	is within, is not within		
Generic	==, !=		

The conversion fails if the input value is reasonably not convertible to the new format (such as the numeric input cannot be converted to an IP Address).

If the conversion is impossible or fails, the condition is evaluated to false unless the operator is negated (begins with !, or "is not within").

For float to string conversion, the double argument is rounded and converted to decimal notation in the style [-]ddd.dddddd, with 6 characters of precision. If the conversion does not fit into 21 characters, then it will fail.

For IPv6 to string conversion, the following rules apply:

- Leading zeros are ignored (01->1)
- Lowercase to uppercase (ffff->FFFF)
- 1:0:0:0:0:0:0:0->1:0:0:0:0:0:0:0
- 1::2->1:0:0:0:0:0:0:2
- ::ffff->0:0:0:0:0:0:0:FFFF
- ffff::->FFFF:0:0:0:0:0:0:
- ::->0:0:0:0:0:0:0:0

Viewing Rule Templates

Use this procedure to view all existing Rule Templates.

Select **Diameter** > **Mediation** > **Rule Templates**.

The **Diameter > Mediation > Rule Templates** page appears.

Adding a Rule Template

Use this procedure to define a new Rule Template. A maximum of 64 Rule Templates can be defined.

There are three sections of the **Diameter > Mediation > Rule Templates [Insert]** page: **Settings**, **Conditions**, and **Actions**. For a list of Rule Template elements and their definitions, see *Rule Template elements*.

After the definition is complete and the Rule Template State is set to "Active" or "Test", this Rule Template appears as a Rule Set in the **Diameter** > **Mediation** > **Rule Sets** menu folder.

1. If Mediation-Triggered Message Copy will be used (the Message Copy Action will be selected in one or more Rule Templates), the following Diameter Configuration is required before each Action can be configured.
   a) Configure one or more Route Groups that will be used for one or more Route Lists for the Message Copy DAS.
   b) Configure one or more Route Lists for the DAS.
   c) Configure one or more Message Copy Configuration Sets that can be assigned to one or more Rule Template Message Copy Actions.
2. Verify that the required Diameter Mediation Enumeration Types, AVP Dictionary entries, and Vendors have been defined in the system.

   Use the following GUI pages to view the entries, and to access the GUI pages to enter, change, or delete entries as needed

   - *Enumerations*
   - *All-AVP Dictionary*
   - *Vendors*
3. Select **Diameter** > **Mediation** > **Rule Templates**.

   The **Diameter > Mediation > Rule Templates** page opens.
4. Click the **Insert** button.

   The **Diameter > Mediation > Rule Templates [Insert]** page opens.

   If the maximum number of Rule Templates (100) already exist in the system, the **Rule Templates [Insert]** page will not open, and an error message is displayed.
5. Enter the **Settings** values for the Rule Template.
   a) Enter the name for the Rule Template in the **Name** text box.

      The Name describes the purpose of the Rule Template.
   b) The **Message type support** for the Rule Template cannot be provisioned.

      Request and **Answer** are both supported.

6. Enter the values to define up to 5 Conditions in the Rule Template.

   Note: A Rule Template can be defined with no Conditions. It will unconditionally match for all processed messages.

   The order in which conditions appear on the **Diameter > Mediation > Rule Templates** page determines the order in which the conditions are processed. The **Up** and **Down** buttons are used to change the order of processing.

   The **Fast Search** check mark or stop symbol displayed for a condition is determined by the **Operator** and the **Optional** fields. A check mark appears for **Fast Search** when the **Operator** is either "equals", "begins with-longest match", or "begins with", and the **Optional** element is not check marked.

   A check mark in **Optional** indicates that a matching expression is optional. This means that the user can leave this condition's **Value** field blank on the **Diameter > Mediation > Rule Set** page, and this condition will then not be used during message processing.

   a) Enter a **Name** for the condition. This name appears on the generated **Rule Set** page after this Rule Template is saved.
   b) Enter a **Left value** in the text box, or use the *Formatting Value Wizard* to select the components of the Left value.

      The Left value appears in the text box.

   c) Select an **Operator** from the pulldown menu.
   d) Select a **Right value** from the pulldown list.
   e) Provide a **Default value** for the Right value that will appear on the **Rule Set** page that is generated from the Rule Template.
   f) Click the appropriate check boxes to display a check mark in the boxes that apply for this Rule Template.

      Click the **Case sensitive** check box to indicate that the values must match in case as well as content.

      Click the **Optional** check box to indicate that the user can decide to exclude the matching expression form the condition set by leaving the Right value empty.

      Click the **Fixed** check box to indicate that the Right value cannot be changed in the rule.

   g) To add another condition, click **Add** and repeat the substeps in this step for each additional condition.

7. Enter the values to define one or more Actions in the Rule Template.

   When any defined Conditions are met, the Actions specified in this section of the page are taken. At least one Action must be specified for a Rule Template.

   a) From the **New Action** pulldown list, select an Action to take for this Rule Template.
   b) Click **[Add]** to open the GUI fields for the selected Action.
   c) Enter the information in the fields. The fields are described in *Rule Template elements*.

8. When the Rule Template definition is complete, click:

   - **OK** to save the Rule Template and return to the **Diameter > Mediation > Rule Templates** page. The Rule Template Name appears in the list on the page.
   - **Apply** to save the Rule Template and remain on the **Diameter > Mediation > Rule Templates [Insert]** page for additional changes.
   - **Cancel** to return to the **Diameter > Mediation > Rule Templates** page without saving the Rule Template.

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

- Any of the Default value fields in the Conditions contain a value that cannot fit into the range of the selected Right value with a supported Operator.
- Any of the Default value fields in the Conditions contain a value that is not valid or is not the correct format for the selected Right value with a supported Operator.
- Adding the new Rule Template would cause the maximum number (100) of Rule Templates allowed in the system to be exceeded.

9. If you want to add online help to describe this Rule Template in its generated Rule Set, perform the *Adding online help to a Rule Template* procedure. Then continue with *Step 10*.
10. When the Rule Template definition is complete, go to the **Diameter Mediation State & Properties** page.
    a) Change the Rule Template **State** from Development to either Test or Active.
    b) Set the **Action Error Handling** property.

    After the Rule Template definition is completed and saved, the Rule Template state and properties can be changed to make the Rule Template available for testing and to generate the Rule Set from the Rule Template.

    The Rule Template state can be changed to Test to allow testing, provisioning of the Rule Set data, and associating the Rule Set with a Trigger (see *Triggers*) before the Rule Set is used in live traffic.

    The state can be changed to Active after the testing is successful, the Rule Set data is provisioned, the Rule Set is associated with a Trigger, and the Rule Set is ready to use in live traffic.

11. If one or more Rule Template Actions for Message Copy have been configured, go to the **Diameter > Configuration > System Options** page, select the **Message Copy Options** tab, and select the **Enabled** radio button for the **Message Copy Feature** element.

Adding online help to a Rule Template

When a Rule Template is created, online help can be added to the Rule Template to describe it in its generated Rule Set.

After online help is added, when the user clicks the context-sensitive help icon in the upper right corner of the associated **Diameter > Mediation > Rule Sets {name}** page, this online help explains how to use the **Diameter > Mediation > Rule Sets {name}** page to configure the Rule Set.

This help is standalone, and is not part of the online help provided by Customer Care Center as part of the Mediation feature.

Use this procedure to add context-sensitive online help to an existing Rule Template:

1. Select **Diameter** > **Mediation** > **Rule Templates**.

   The **Diameter > Mediation > Rule Templates** page appears.

2. Select the **Rule Template Name** to which online help will be added.
3. Click **Set Help**.

   The **Diameter > Mediation > Rule Templates [Set Help]** page appears.

4. Change the contents of the **Title** box to an appropriate title for this help.

The Rule Template Name appears in the **Title** box as the default.

5. In the **Text** field, add specific details on how to configure a rule using this Rule Set, such as a procedure and result. You can also add detail on how the various fields interrelate, and provide any cautions to prevent loss of data.
6. To see how the help text you have entered will look from the **Rule Set** page, click **Preview**.

   A separate window opens and displays the help text.

   Close the preview window when you are finished previewing the help text.

7. When the help page is complete, click:

   - **OK** to save the help page and return to the **Diameter > Mediation > Rule Templates** page.
   - **Apply** to save the changes and remain on the **Diameter > Mediation > Rule Templates [Set Help]** page for additional changes.
   - **Cancel** to return to the **Diameter > Mediation > Rule Templates** page without saving any changes.

   The new help text is now available from the help icon on the **Diameter > Mediation > Rule Sets {name}** page for this Rule Template.

Rule Templates Help elements

When **Set Help** is clicked for an existing Rule Template on the **Diameter Mediation Rule Templates** page, the following information appears:

Table 5: Rule Templates Help elements

Element	Description	Data Input Notes
Title	Title to appear at the top of the Help page. This field is required when providing Help.	Format: Text string Range: 1-64 characters
Text	Detailed explanation of this Rule Set: how to use it and description of any interrelated features.	Format: Text string (HTML tags allowed) Range: 1 - 1500 characters
Path	(Generated and used by software)	

Copying a Rule Template

Use this procedure to copy an existing Rule Template and save it as a new Rule Template. For a list of Rule Template elements and their definitions, see *Rule Template elements*.

1. Select **Diameter** > **Mediation** > **Rule Templates**.

   The **Diameter > Mediation > Rule Templates** page appears.

2. Select the Rule Template that you want to copy.
3. Click **Copy**.

   The **Diameter > Mediation > Rule Templates [Copy]** page appears.

If the maximum number of Rule Templates (100) already exist in the system, the **Rule Templates [Copy]** page will not open, and an error message is displayed.

4. Enter a different **Rule Template Name** for the new Rule Template.
5. Make any changes as needed.
6. Click:
   - **OK** to save the definition and return to the **Diameter > Mediation > Rule Templates** page.
   - **Apply** to save the definition and remain on the **Diameter > Mediation > Rule Templates [Copy]** page.
   - **Cancel** to return to the **Diameter > Mediation > Rule Templates** page without saving any changes.

Changing a Rule Template

Use this procedure to change values for an existing Rule Template (for a list of Rule Template elements and their definitions, see *Rule Template elements*).

When a Rule Template is in the Development state, all elements can be changed.

After the Rule Template state has been changed to Test or Active, only the following elements can be changed. The Rule Template state must be set back to Development to change any other elements (all provisioning of rules for the Rule Template will be lost when the state is changed back to Development). (See *State and Properties*.)

- Rule Template Name
- Name of the Conditions
- Default value of the Conditions (except when the Fixed box has been checked)
- Description of the Condition
- Default value of the Actions (except for the value of the "Execute Rule Template")

1. Select **Diameter** > **Mediation** > **Rule Templates**.

   The **Diameter > Mediation > Rule Templates** page appears.

2. Click **Edit** on the Rule Template row to be changed.

   The **Diameter > Mediation > Rule Templates [Edit]** page appears.

3. Change **Conditions** and **Actions** as needed.
4. Click:
   - **OK** to save the changes and return to the **Diameter > Mediation > Rule Templates** page.
   - **Apply** to save the changes and remain on the **Diameter > Mediation > Rule Templates [Edit]** page.
   - **Cancel** to return to the **Diameter > Mediation > Rule Templates** page without saving any changes.

Importing a Rule Template

A Rule Template can be imported into the DSR system using the **Import** function on the **Diameter > Mediation > Rule Templates** page.

Existing Rule Templates can be imported. Existing Rule Templates are previously defined Rule Templates that have been exported from Diameter Mediation using the **Export** function.

The Mediation version in the file selected for importing must be compatible with the DSR release into which the file is imported.

A successfully imported Rule Template file appears in the list on the **Diameter > Mediation > Rule Templates** page, the **Diameter > Mediation > State & Properties** page, and as a Rule Set in the **Diameter** > **Mediation** > **Rule Sets** menu folder (no Rule Set is generated if the only Action is "Execute Rule Template").

The imported Rule Template is automatically set to the "Test" state.

The Enumeration Types that are used in the Rule Template are imported, if they do not already exist in the system.

If the selected Rule Template references another Rule Template (as an Execute Rule Template action) that is not already present in the system, the referenced Rule Template is also imported (unless there is already a Rule Template with the same Name but a different definition).

Use the following procedure to import an existing Rule Template that is located outside of the DSR file system (stored on a local computer):

1. Select **Diameter** > **Mediation** > **Rule Templates**.

   The **Diameter > Mediation > Rule Templates** page appears.

2. Click **Import**.

   The **Diameter > Mediation > Rule Templates [Import]** page appears.

   If the maximum number of Rule Templates (100) already exist in the system, the **Diameter > Mediation > Rule Templates [Import]** page will not open, and an error message is displayed.

3. Click **Browse** to open the **Choose File** popup window.
4. Navigate to the location of the Rule Template file you want to import, and select the file.
5. With the Rule Template filename displayed in the **File name** field, click **Open**.

   The filename appears in the **Choose a file to import** field.

6. Click **Import File**.

   If the Import File button is clicked and any of the following conditions exist, the file is not imported and an error message appears:

   - The selected file does not exist
   - The selected file is larger than 1 MB
   - The selected file has wrong .xml structure or missing data
   - The Mediation version of the file is not compatible with the DSR system into which the file is being imported
   - The Name field of the imported Rule Template is empty
   - Any Operator field in a Condition contains an operator that is not valid
   - Any Right value field in a Condition

- A value type specifies an Enumerated Type that is not defined either in the system or in the imported file
- A Condition or Action in the selected file includes an Enumerated Type that is already present in the system, but that contains different Enumerated Type values
- The selected file contains an Action that is not defined in the system
- The selected file contains more than the allowed maximum number of Conditions (5)
- A Condition in the selected file includes a Right value that is not supported by the selected Operator
- The Right value of a Condition in the file is not a supported value type
- The selected file contains more than the allowed maximum number of Actions (5), unless the maximum number is exceeded because of automatically added final actions (some actions actually result in multiple actions)
- Importing the file would cause the allowed maximum number of Rule Templates (100) in the system to be exceeded
- The selected Rule Template references another Rule Template (as an Execute Rule Template action) that is not present in the system
- The selected file contains mutually exclusive Actions (that cannot be used together in the same Rule Template)

Exporting a Rule Template

Use this procedure to export a Rule Template from within the DSR to an external location, such as your hard drive or a memory stick.

The selected file is saved in .xml format, and contains the following information:

- The Rule Template without any provisioned data
- All of the Enumeration Type definitions with the possible values to which the Rule Template refers
- Mediation version number
- Help pages related to the Rule Template

Note: The Export button is not available (grayed out) for Rule Templates that are in the "Development" state (see the **Diameter > Mediation > State and Properties** page).

1. Select **Diameter** > **Mediation** > **Rule Templates**.

   The **Diameter > Mediation > Rule Templates** page appears.

2. Select the **Rule Template Name** row for the Rule Template to be exported.
3. Click the **Export** button.

   A **File Download** popup window appears.

4. Click **Browse** to pop up the **Choose File** window.
5. Navigate to the location to which you want to export the Rule Template.
6. Click **Export File**.

   The selected file is saved to the specified location.

Deleting a Rule Template

When a Rule Template is deleted, it is removed from the entire system, including the **Diameter > Mediation > State and Properties** page, the **Diameter > Mediation > Triggers** page, and the **Daimeter > Mediation > Rule Sets** page.

Any Rule Sets that were generated from this Rule Template are also deleted automatically.

If a Rule Set belonging to the selected Rule Template is enabled for live traffic ("Active" state on the **State and Properties** page), an error message appears indicating that the Rule Template cannot be deleted as long as it is being used by the system for live traffic.

Use this procedure to delete an existing Rule Template.

1. Select **Diameter** > **Mediation** > **Rule Templates**.

   The **Diameter > Mediation > Rule Templates** page appears.

2. Select the **Rule Template Name** of the Rule Template to be removed.
3. Click **Delete**.
4. A popup window appears to confirm the delete when the selected Rule Template is in the "Development" state or the "Test" state (see the **State and Properties** page).
   - Click **OK** to confirm the delete.
   - Click **Cancel** to cancel the delete function and return to the **Diameter > Mediation > Rule Templates** page.
5. If the selected Rule Template has any data provisioned, another confirmation popup window appears indicating that all of the provisioned data that belongs to any Rule Set generated from the Rule Template will be deleted.
   - Click **OK** to confirm the delete of the provisioned data.
   - Click **Cancel** to cancel the delete function and return to the **Diameter > Mediation > Rule Templates** page.

Formatting Value Wizard

The Formatting Value Wizard is a popup window available from both the **Diameter** > **Mediation** > **Rule Templates** Insert/Edit/Copy pages and the **Diameter** > **Mediation** > **Rule Sets** Insert/Edit pages. The wizard simplifies entry of xl-formatted strings, which require specific syntax coding. Both Log and Add Header functions require xl-formatted string coding.

An xl-formatted string can contain references to the state of the server, or to the message being processed. For example, `%@ruri.user` refers to the user part of the Request `URI` within an xl-formatted string. The references are replaced with their actual value before the log message is issued, or before the string is appended to the Request.

Formatting Value Wizard elements

When **[wizard]** is clicked, the information shown in *Table 6: Formatting Value Wizard elements* appears:

Table 6: Formatting Value Wizard elements

Element	Description
Value	The value of the variable in xl-format. The components of this value can be entered manually, by clicking on one or more specifiers, or both.
Specifiers	List of elements that can be part of an xl-formatted string. A specifier is either a single item, or a group of items forming a sublist. Every specifier that is selected is put into the Value field where the cursor is currently located. The Specifiers are described in *Table 7: Formatting Value Wizard Specifiers*.
Preview	The readable description of the xl-formatted string in the Value field.

The specifiers described in *Table 7: Formatting Value Wizard Specifiers* can be used to create or update the variables in the Value field.

Note: [*Index*] that is either a [<*number*>] or [*any*] can be excluded from all of the expressions that refer to the first instance of the AVP.

The instance number "any" can be present in the Left value of the Condition only once.

The instance number "any" can be present in the Right value of the Condition only once.

Table 7: Formatting Value Wizard Specifiers

Specifier			
New Line	**Sub-Items**	**xl-formatted Value**	**Preview Value**
		\r\n	 (This causes a line break on the GUI screen.)
String Constant	Type the string constant	*string constant*	{"*string constant*"}
Diameter Head	**Sub-Items**	**xl-formatted Value**	**Preview Value**
	Version	@msg.version	{Version}
	Message Length	@msg.length	{Message Length}
	Command Flags: R	@msg.command.flags.R	{R Command Flag}
	Command Flags: P	@msg.command.flags.P	{P Command Flag}
	Command Flags: E	@msg.command.flags.E	{E Command Flag}
	Command Flags: T	@msg.command.flags.T	{T Command Flag}
	Command Flags: r4	@msg.command.flags.r4	{r4 Command Flag}
	Command Flags: r5	@msg.command.flags.r5	{r5 Command Flag}
	Command Flags: r6	@msg.command.flags.r6	{r6 Command Flag}

Specifier			
	Command Flags: r7	@msg.command.flags.r7	{r7 Command Flag}
	Application ID	@msg.application_id	{Application ID}
	Hop-by-Hop Identifier	@msg.hbh_id	{Hop-to-Hop Identifier}
	End-to-End Identifier	@msg.e2e_id	{End-to-End Identifier}
AVP	**Sub-Items**		
	Parent AVP Pulldown list containing all AVP definitions from the dictionary that have the type "Grouped".		
	Parent AVP Instance number Pulldown list containing the index of the Parent AVP, if a Parent AVP is selected (First, Second, Third, Fourth, Fifth).		
	AVP Pulldown list containing all AVP definitins from the dictionary (except for the case where the selected Parent AVP is grouped; then only those AVPs that belont the group are available).		
	AVP instance number Pulldown list containing the indexes of AVP (First, Second, Third, Fourth, Fifth, Any).		
	AVP Component Pulldown list containing the following components: • Data • Data Length • AVP Code • Flag V • Flag M • Flag P • Flag r3 • Flag r4 • Flag r5 • Flag r6 • Flag r7 • Vendor-ID Flags V, M, and P are supported; flags r3, r4, r5, r6, and r7 are reserved for future use.		
	xl-formatted Value		
	@msg.avp[“*name*”] @msg.avp[“*name*”][*index*] @msg.avp[“*name*”][*index*].code @msg.avp[“*name*”][*index*].flags.V		

Specifier	
	@msg.avp[“*name*”][*index*].flags.M
	@msg.avp[“*name*”][*index*].flags.P
	@msg.avp[“*name*”][*index*].flags.r3
	@msg.avp[“*name*”][*index*].flags.r4
	@msg.avp[“*name*”][*index*].flags.r5
	@msg.avp[“*name*”][*index*].flags.r6
	@msg.avp[“*name*”][*index*].flags.r7
	@msg.avp[“*name*”][*index*].vendor_id
	@msg.avp[“*name*”][*index*].data
	@msg.avp[“*name*”][*index*].data_length
	@msg.avp[“*name*”][*index*].avp[“*name*”][*index*]
	@msg.avp[“*name*”][*index*].avp[“*name*”][*index*].code
	@msg.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.V
	@msg.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.M
	@msg.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.P
	@msg.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.r3
	@msg.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.r4
	@msg.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.r5
	@msg.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.r6
	@msg.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.r7
	@msg.avp[“*name*”][*index*].avp[“*name*”][*index*].vendor_id
	@msg.avp[“*name*”][*index*].avp[“*name*”][*index*].data
	@msg.avp[“*name*”][*index*].avp[“*name*”][*index*].data_length
	Preview Value
	{AVP:“*Name*”}
	{AVP:“*Name*”[*Index*]}
	{AVP:“*Name*”[*Index*].Code}
	{AVP:“*Name*”[*Index*].Flag V}
	{AVP:“*Name*”[*Index*].Flag M}
	{AVP:“*Name*”[*Index*].Flag P}
	{AVP:“*Name*”[*Index*].Flag r3}
	{AVP:“*Name*”[*Index*].Flag r4}
	{AVP:“*Name*”[*Index*].Flag r5}

Specifier	
	{AVP:"*Name*"[*Index*].Flag r6}
	{AVP:"*Name*"[*Index*].Flag r7}
	{AVP:"*Name*"[*Index*].Vendor-ID}
	{AVP:"*Name*"[*Index*].Data}
	{AVP:"*Name*"[*Index*].Data_Length}
	{AVP:"*Parent AVP Name*"[*Index*]."*AVP Name*"[*Index*]}
	{AVP:"*Parent AVP Name*"[*Index*]."*AVP Name*"[*Index*].Code}
	{AVP:"*Parent AVP Name*"[*Index*]."*AVP Name*"[*Index*].Flag V}
	{AVP:"*Parent AVP Name*"[*Index*]."*AVP Name*"[*Index*].Flag M}
	{AVP:"*Parent AVP Name*"[*Index*]."*AVP Name*"[*Index*].Flag P}
	{AVP:"*Parent AVP Name*"[*Index*]."*AVP Name*"[*Index*].Flag r3}
	{AVP:"*Parent AVP Name*"[*Index*]."*AVP Name*"[*Index*].Flag r4}
	{AVP:"*Parent AVP Name*"[*Index*]."*AVP Name*"[*Index*].Flag r5}
	{AVP:"*Parent AVP Name*"[*Index*]."*AVP Name*"[*Index*].Flag r6}
	{AVP:"*Parent AVP Name*"[*Index*]."*AVP Name*"[*Index*].Flag r7}
	{AVP:"*Parent AVP Name*"[*Index*]."*AVP Name*"[*Index*].Vendor-ID}
	{AVP:"*Parent AVP Name*"[*Index*]."*AVP Name*"[*Index*].Data}
	{AVP:"*Parent AVP Name*"[*Index*]."*AVP Name*"[*Index*].Data_Length}
Linking AVP	**Sub-Items**
	Parent Linking-AVP Pulldown list containing all AVP definitions from the dictionary that have the type "Grouped".
	Parent Linking-AVP Instance number Pulldown list containing the indexes of the Parent AVP (First, Second, Third, Fourth, Fifth, Any).
	Linking-AVP Pulldown list containing all AVP definitions from the dictionary (except for the case where the selected Parent AVP is grouped; then only those AVPs that belong to the group are available). **Note:** Sub-LAVPs within a grouped LAVP cannot be retrieved (such as with @msg.avp["name"][index].avp["name"][index]), modified, or removed.
	Linking-AVP Instance number Pulldown list containing the indexes of the AVP. (First, Second, Third, Fourth, Fifth, Any)
	Linking-AVP Component

Specifier	
	Pulldown list containing the following components: • AVP Code • Flag V • Flag M • Flag P • Flag r3 • Flag r4 • Flag r5 • Flag r6 • Flag r7 • Vendor ID • Data • Data Length Flags V, M, and P are supported; flags r3, r4, r5, r6, and r7 are reserved for future use.
	xl-formatted Value
	@store.avp[“*name*”] @store.avp[“*name*”][*index*] @store.avp[“*name*”][*index*.code] @store.avp[“*name*”][*index*].flags.V @store.avp[“*name*”][*index*].flags.M @store.avp[“*name*”][*index*].flags.P @store.avp[“*name*”][*index*].flags.r3 @store.avp[“*name*”][*index*].flags.r4 @store.avp[“*name*”][*index*].flags.r5 @store.avp[“*name*”][*index*].flags.r6 @store.avp[“*name*”][*index*].flags.r7 @store.avp[“*name*”][*index*].length @store.avp[“*name*”][*index*].vendor_id @store.avp[“*name*”][*index*].avp[“*name*”][*index*] @store.avp[“*name*”][*index*].avp[“*name*”][*index*].code @store.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.V @store.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.M @store.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.P @store.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.r3 @store.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.r4 @store.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.r5

Specifier	
	@store.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.r6 @store.avp[“*name*”][*index*].avp[“*name*”][*index*].flags.r7 @store.avp[“*name*”][*index*].avp[“*name*”][*index*].vendor-id @store.avp[“*name*”][*index*].avp[“*name*”][*index*].data @store.avp[“*name*”][*index*].avp[“*name*”][*index*].data_length
	Preview Value
	{LAVP:“*Name*”} {LAVP:“*Name*”[*Index*]} {LAVP:“*Name*”[*Index*].Code} {LAVP:“*Name*”[*Index*].Flag V} {LAVP:“*Name*”[*Index*].Flag M} {LAVP:“*Name*”[*Index*].Flag P} {LAVP:“*Name*”[*Index*].Flag r3} {AVP:“*Name*”[*Index*].Flag r4} {AVP:“*Name*”[*Index*].Flag r5} {LAVP:“*Name*”[*Index*].Flag r6} {LAVP:“*Name*”[*Index*].Flag r7} {LAVP:“*Name*”[*Index*].Vendor-ID {LAVP:“*Name*”[*Index*].Data} {LAVP:“*Name*”[*Index*].Data_Length} {LAVP:“*Parent LAVP Name*”[*Index*]."*LAVP Name*"[*Index*]} {LAVP:“*Parent LAVP Name*”[*Index*]."*LAVP Name*"[*Index*].Code} {LAVP:“*Parent LAVP Name*”[*Index*]."*LAVP Name*"[*Index*].Flag V} {LAVP:“*Parent LAVP Name*”[*Index*]."*LAVP Name*"[*Index*].Flag M} {LAVP:“*Parent LAVP Name*”[*Index*]."*LAVP Name*"[*Index*].Flag P} {LAVP:“*Parent LAVP Name*”[*Index*]."*LAVP Name*"[*Index*].Flag r3} {LAVP:“*Parent LAVP Name*”[*Index*]."*LAVP Name*"[*Index*].Flag r4} {LAVP:“*Parent LAVP Name*”[*Index*]."*LAVP Name*"[*Index*].Flag r5} {LAVP:“*Parent LAVP Name*”[*Index*]."*LAVP Name*"[*Index*].Flag r6} {AVP:“*Parent LAVP Name*”[*Index*]."*LAVP Name*"[*Index*].Flag r7} {LAVP:“*Parent LAVP Name*”[*Index*]."*LAVP Name*"[*Index*].Vendor-ID} {LAVP:“*Parent LAVP Name*”[*Index*]."*LAVP Name*"[*Index*].Data} {LAVP:“*Parent LAVP Name*”[*Index*]."*LAVP Name*"[*Index*].Data_Length}

<table>
<tr><td>Specifier</td><td colspan="3"></td></tr>
<tr><td rowspan="11">Functions</td><td>Sub-Items</td><td>xl-formatted Value</td><td>Preview Value</td></tr>
<tr><td>Length of</td><td>strlen(<string></td><td>{Length of (<string>)}</td></tr>
<tr><td colspan="3">Used to determine the length of a number and then to determine if additional digits should be prepended or removed.

For example, if a 7-digit number is received, a default area code might have to be prepended to the number.

“Length of” always works on string types. If the parameter happens to be a number, then it will be automatically treated as a string by these functions. Hence, strlen(123) will work the same as strlen("123"), and return 3.

The input of the function "string" might include other xl-values such as contants, Diameter Header parts, AVP or LAVP parts, or other functions.</td></tr>
<tr><td>Hash</td><td>hash(<string>, <range>)</td><td>{Hash (<string>), <range>)}</td></tr>
<tr><td colspan="3">Used for making a routing decision based on the hash generated on the "session-id" AVP. This AVP is present in charging messages such as ACR and CCR.

For example, if session-id hashes to 1, then set dest-host to host1, if it hashes to 2, then set dest-host to host2.

Because all messages in a session need to go to the same host and they all have the same session-id, the mechanism can be used to send them to the same host without maintaining state.

The input of the function "string" might include other xl-values such as contants, Diameter Header parts, AVP or LAVP parts, or other functions.</td></tr>
<tr><td>Substring</td><td>substr(<string>, <position>,<length>)

Postion can be negative, (counted from the end).</td><td>Substring (<string>,<position>, <length>)}</td></tr>
<tr><td colspan="3">Used to inspect a part of a string or number and make changes if needed.

For example, if the first 4 characters match "+011", then delete the characters.

“Substring” works always on string types.

The input of the function "position" specifies the position(character) at whch the counting of the substring will start. Position 0 inidcates the first character of the string. -1 indicates the last character of the string.

The input of the function "length" specifies the number of characters to include in the substring.

The specified substring will be extracted.

For example: substr(@msg.avp["APN-OI-Replacement"][1],0,5)</td></tr>
<tr><td>X hours</td><td>hour2sec(<hours>)</td><td>{<x>hours}</td></tr>
<tr><td>Y minutes</td><td>min2sec(<minutes>)</td><td>{<y>minutes}</td></tr>
</table>

Specifier			
	GMT	time( )	{GMT time}
	Can be used to perform time of day routing. Certain AVPs carry time, which can be compared against a specified hour and minute to perform time of day routing. The inputs "hours" or "minutes" might include other xl-values.		
Operators	Provide the ability to perform mathematical operations on the AVP. • Plus • Minus	• + • -	• + • -
Back Reference	Number of occurence of the back reference: input field for one digit; default is 0.	\<number>	\<*number*>
	Because Back Reference can be part of only a replacement string, this specifier is presented only for the **Substitute in AVP Value** Action.		

Using the Formatting Value Wizard

Use the following procedure to code an xl-formatted string using the wizard. See *Formatting Value Wizard elements* for:

- A list of wizard elements and their descriptions
- A list of xl-code specifiers, their sub-items, xl-formatted values, and preview values

1. On a **Diameter > Mediation** GUI page, click **Wizard**.

   The wizard popup window appears.

2. Click the specifier you want to add to the Value, or type characters directly into the Value field.

   If a specifier requires additional information, a popup window prompts for this information.

   The selected characters or specifier in xl-format appears in the **Value** field. The specifier description also appears in the **Preview** section of the window.

3. Add additional specifiers or text as needed.
4. When the Value is complete, click **Ok**.

   The xl-formatted string appears in the **Value** field on the **GUI** page.

Enumerations

An Enumeration Type (Enum Type) consists of a name and a set of values. The purpose of the Enum Type is to strictly define the possible values of a data input field.

The allowed values are comma-separated items, which might optionally contain colons. If an item contains a colon, then everything before the colon is a label and everything after the colon is a value. If an item does not contain a colon, then the value and the label are the same.

Pre-defined Enum Types are provided with the Diameter Mediation feature. New Enum Types can be defined with their possible values. When a new Enum Type is created, it automatically appears in the **Conditions** section of the **Diameter > Mediation > Rule Templates** Insert, Copy, and Edit pages, within the list of Right value types. The Enum Type must be created before a Rule Template Condition can use it. The values of the Enum Type used by the Mediation Rule Set can be modified after the Rule Template has been created.

When a Right value of a Rule Template Condition is set to an Enum Type, the actual value can be set in a rule only to one of the valid values of the specified Enum Type. This is enforced by presenting a pulldown list instead of an input field on the **Diameter > Mediation > Rule Sets** [Insert] and [Edit] pages.

On the **Diameter > Mediation > Enumerations** page, you can perform the following actions:

- Filter the list of Enumerations to display only the desired Names.
- Click the **Insert** button.

  The **Diameter > Mediation > Enumerations [Insert]** page opens. You can add a new Enumeration Type and its values. See *Adding an Enumeration*.

  If the maximum number of Enumeration Types (64) already exist in the system, the **Diameter > Mediation > Enumerations [Insert]** page will not open, and an error message is displayed.
- Select the **Name** of an Enumeration in the list, and click the **Edit** button.

  The **Diameter > Meditation > Enumerations [Edit]** page opens. You can edit the selected Enumeration Type. See *Editing an Enumeration*.
- Select the **Name** of an Enumeration Type in the list, and click the **Delete** button to remove the selected Enumeration Type. See *Deleting an Enumeration*.

Mediation Enumerations elements

Table 8: Mediation Enumeration elements describes the fields on the **Diameter > Mediation > Enumerations** View, Insert, and Edit pages. Data Input Notes apply only to the Insert and Edit pages; the View page is read-only.

Table 8: Mediation Enumeration elements

Element	Description	Data Input Notes
Name	Name used to label this Enumeration Type in the system. A unique value is required in this field.	Format: String, with valid characters a-z, A-Z, 0-9, dash (-), period (.), @, and underscore (_) Range: 1-64 characters
Values	Comma-separated list of possible values. The allowed values are comma-separated items, which might optionally contain colons. If an item contains a colon, then everything before the colon is a label and everything after the colon is a value. If an item does not contain a colon, then the value and the label are the same. A value is required in this field.	Format: List of values that can be separate items (a,b,c) or in the form of <label>:<value> (a:1, b:2,c:3). Range: 1-2048 characters

Viewing Enumerations

Use this task to view all configured Mediation Enumerations.

The use of Mediation Enumerations is described in *Enumerations*.

Select **Diameter** > **Mediation** > **Enumerations**.

The **Diameter > Mediation > Enumerations** page appears with a list of configured Enumerations and their values. The fields are described in *Mediation Enumerations elements*.

Adding an Enumeration

The following procedure can be used to configure a new Enumeration Type.

A new Enumeration Type can be used when defining **Rule Template Conditions** and **Linking-AVPs**.

The fields are described in *Mediation Enumerations elements*.

1. Select **Diameter** > **Mediation** > **Enumerations**.

   The **Diameter > Mediation > Enumerations** page appears.

2. Click **Insert**.

   The **Diameter > Mediation > Enumerations [Insert]** page appears.

   Note: If the maximum number of Mediation Enumerations (64) has already been configured in the system, the **Diameter > Mediation > Enumerations [Insert]** page will not open, and an error message will appear.

3. Enter a unique **Name** for the Enumeration Type that is being added.
4. Enter one or more **Values** to associate with this Enumeration Name. Use a comma to separate multiple values.
5. Click:
   - **OK** to save the changes and return to the **Diameter > Mediation > Enumerations** page.

     OK is not available until a **Name** is entered.
   - **Apply** to save the changes and remain on the **Diameter > Mediation > Enumerations [Insert]** page.

     Apply is not available until a **Name** is entered.
   - **Cancel** to return to the **Diameter > Mediation > Enumerations** page without saving any changes.

   If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:
   - The **Name** or **Value** contains characters that are not valid
   - The **Value** is empty (not entered)
   - The **Name** is not unique
   - Creating this new Enum Type will cause the allowed maximum number of Enum Types (64) to be exceeded

Editing an Enumeration

Use this procedure to change the Name, or Values, or both, associated with an Enumeration.

An item cannot be removed from the comma-separated list of values that is already used by the configured data of a Rule Template or by the Rule Template.

The fields are described in *Mediation Enumerations elements*.

1. Select **Diameter** > **Mediation** > **Enumerations**.

   The **Diameter > Mediation > Enumerations** page appears.
2. Select the row containing the Enumeration to be changed.
3. Click the **Edit** button.

   The**Diameter > Mediation > Enumerations [Edit]** page appears.
4. Change the **Name** or **Values**, or both, associated with the selected Enumeration.
5. Click:
   - **OK** to save the changes and return to the **Diameter > Mediation > Enumerations** page.

     OK is not available if the **Name** field is empty.
   - **Apply** to save the changes and remain on the **Diameter > Mediation > Enumerations [Edit]**.

     Apply is not available if the **Name** field is empty.
   - **Cancel** to return to the **Diameter > Mediation > Enumerations** page without saving any changes.

   If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:
   - The **Name** or **Value** contains characters that are not valid

- The **Name** is not unique
- An item has been removed from the comma-separated list of values that is already used by the configured data of a Rule Template or by the Rule Template

Deleting an Enumeration

Use the following procedure to delete an Enumeration.

An Enumeration Type cannot be deleted if any Rule Templates refer to the Enumeration Type.

1. Select **Diameter** > **Mediation** > **Enumerations**.

   The **Diameter > Mediation > Enumerations** page appears.

2. Select the **Name** of the Enumeration Type to be deleted.
3. Click the **Delete** button.

   A popup window appears to confirm the delete.

4. Click **OK**.

   - **OK** delete the Enum Type and return to the **Diameter > Mediation > Enumerations** page.
   - **Cancel** to cancel the delete function and return to the **Diameter > Mediation > Enumerations** page.

   When **OK** is clicked and any configured Rule Templates refer to the Enum Type that is being deleted, the Enum Type is not deleted and an error message appears.

Triggers

An execution trigger defines a triggering point within the message processing logic. When the triggering point is reached, the mediation operations (Rule Sets) associated with that triggering point are executed. The type of the Trigger defines whether the triggering point is part of the request or the answer processing.

The available triggering points are pre-defined. One or more Rule Sets can be associated with a Trigger. The Triggers described in *Table 9: Diameter Mediation Triggers* and shown in *Figure 1: Diameter Mediation Trigger Points* are available for Diameter Mediation.

The behavior of an MP is exactly the same with and without a Trigger if no Rule Set is associated with the Trigger.

Note: CEA, CER, DWA, DWR, DPA, and DPR messages are never handled by the Mediation feature.

The Rule Set can be defined to be executed as a part of the Actions of another Rule Set, or it can be triggered at some specific point of the message processing

Rule Sets that are associated with a Trigger are executed in the sequence in which they are listed under the Trigger name on the **Diameter > Mediation > Triggers** page.

Associations of a Trigger with new Rule Sets can be added, existing associations can be removed, and the sequence of the Rule Set Name list can be changed to modify the MP behavior based on the Rule Set execution.

Table 9: Diameter Mediation Triggers

Execution Trigger Name	Message Type	Triggering Point
Diameter request message received from connection	Request	Request Trigger Point 1; occurs upon receipt of a request
Diameter request message ready to be forwarded to connection	Request	Request Trigger Point 10; occurs just before forwarding the request upstream
Diameter answer message received from connection	Response	Answer Trigger Point 1; occurs upon receipt of an answer
Diameter answer message ready to be forwarded to connection	Response	Answer Trigger Point 10; occurs just before forwarding the answer downstream

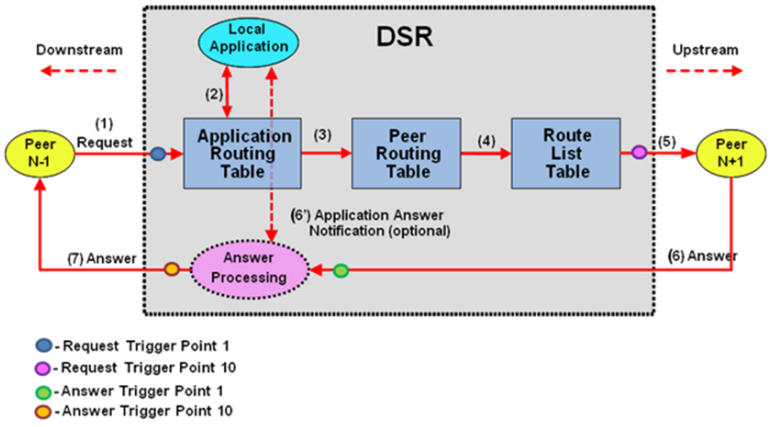

Figure 1: Diameter Mediation Trigger Points

On the Diameter > Mediation > Triggers page, you can perform the following actions:

- Click the **Insert** button under a Trigger name.

  The **Diameter > Mediation > Triggers [Insert]** page opens. You can associate a new Rule Set with the Trigger. See *Associating a Rule Set with a Trigger*.

- Select a Rule Set Name in the list under a Trigger name, and click the **Remove** button.

  The association of the Rule Set with the the Trigger can be removed, and the Rule Set Name is deleted from the list for the Trigger. See *Removing the Association of a Rule Set with a Trigger*

- Use the **Up** and **Down** buttons to alter the sequence of execution of the Rule Sets associated with a Trigger.
  - For a selected Rule Set Name, clicking the **Up** button under the Rule Set Name list moves the selected Rule Set Name one position toward the top or beginning of the list.
  - For a selected Rule Set Name, clicking the **Down** button under the Rule Set Name list moves the selected Rule Set Name one position toward the bottom or end of the list.

Mediation Triggers elements

Table 10: Mediation Triggers elements describes the fields on the **Diameter > Mediation > Triggers** and **Diameter > Mediation > Triggers [Insert]** pages. Data Input Notes apply only to the **Diameter > Mediation > Triggers [Insert]** page; the Triggers page is read-only.

Table 10: Mediation Triggers elements

Element	Description	Data Input Notes
Rule Set Name	The name of each Rule Set that is associated with a Trigger and executed by the triggering point. .	**Triggers page:** The Rule Sets that are associated with a Trigger are listed under the name of the associated Trigger. **Triggers [Insert] page:** Format: Pulldown list Range: The Rule Sets (supported by the Trigger and in the "Active" or "Test" state) are listed in the **Rule Set Name** pulldown list. Default: First Rule Set that is supported by the Trigger and is in the "Active" or "Test" state.
Live	A yes sign (check mark) indicates that the Rule Set has been set to the "Active" state (enabled for the live traffic).	The Rule Set state is set on the **State & Properties** page for the Rule Template Name that corresponds to the Rule Set.

Viewing Triggers

The operation of Diameter Mediation Triggers is explained in *Triggers*.

To view all existing Mediation Triggers, select **Diameter** > **Mediation** > **Triggers**.

The **Diameter > Mediation > Triggers** page appears, with a list of existing Triggers, and with the Rule Sets that are associated with each Trigger listed under the Trigger name. The fields on the page are described in *Mediation Triggers elements*.

Associating a Rule Set with a Trigger

Use this procedure to associate a Rule Set with a Trigger.

Only Rule Sets with Rule Templates in "Test" or "Active" state can be associated with a Trigger.

1. Select **Diameter** > **Mediation** > **Triggers**.

   The **Diameter > Mediation > Triggers** page appears.

2. Click **Insert** under the Trigger with which the new Rule Set is to be associated.

   The **Diameter > Mediation > Triggers [Insert]** page opens.

   The **Diameter > Mediation > Triggers [Insert]** page does not open and an error message appears if any of the following conditions exist:

   - There are no Rule Sets that support the Trigger and that are in the "Active" or "Test" state
   - Associating another Rule Set to the Trigger would cause the total allowed number of associated "Test" Rule Sets (10) or "Active" Rule Sets (5) to be exceeded

3. Select the desired **Rule Set Name** from the pulldown list.

   The default is the first Rule Set in the pulldown list.

4. The newly assigned Rule Set appears at the bottom of the list of Rule Sets for the Trigger. If the Rule Set sequence needs to be changed, use the **Up** and **Down** buttons to move the Rule Sets to different positions in the list.

   Clicking a Rule Set and the **Up** button moves the selected Rule Set up one position toward the top of the list.

   Clicking a Rule Set and the **Down** button moves the selected Rule Set down one position toward the bottom of the list.

   The Live column will show a check mark if the Rule Template for the newly associated Rule Set is in the "Active" state for use with live traffic (see the **State & Properties** page).

5. Click:

   - **OK** to save the new Rule Set association and return to the **Diameter > Mediation > Triggers** page.
   - **Apply** to save the new Rule Set association and remain on the **Diameter > Mediation > Triggers [Insert]** page.

   If **OK** or **Apply** is clicked and the selected Rule Set no longer exists (was deleted by another user), an error message appears.

Removing the Association of a Rule Set with a Trigger

Use the following procedure to remove the association of a Rule Set with a Trigger and delete the Rule Set Name from the list for the Trigger.

1. Select **Diameter** > **Mediation** > **Triggers**.

   The **Diameter > Mediation > Triggers** page appears.

2. Select the **Rule Set Name** in the list under the Trigger name.
3. Click the **Remove** button below the **Rule Set Name** list for the Trigger.

   A popup window appears to confirm the removal.

4. Click:

   - **OK** to remove the association of the Rule Set with the Trigger and delete the Rule Set Name from the list for the Trigger.
   - **Cancel** to cancel the Remove function and return to the **Diameter > Mediation > Triggers** page.

State and Properties

The **Diameter > Mediation > State & Properties** page lists all of the Rule Templates that are configured in the system, and shows the State and Action Error Handling setting for each Rule Template.

Each Rule Template is in one of the following states at any point of time:

- Development
- Test
- Active

The Action Error Handling defines the error handling strategy to be used if any Action in the Rule Template fails.

Each Rule Template starts in the “Development” state when it is being created. Rule Templates in the Development state cannot be assigned to Triggers.

After all of the necessary Conditions and Actions have been added, the Rule Template must be set to the “Test” state, to indicate that the Rule Template is complete. A Rule Set entry is generated in the Rule Sets Left-hand Menu folder; the Rule Set can be provisioned with actual data in one or more rules, and can be associated with a Trigger. In the "Test" state, only limited changes can be made to the contents of the Rule Template.(See *Rule Templates*.)

The Rule Template state can be set back to "Development" only when the " Meta-Administrator" privileges are activated for the Diameter Mediation feature. All provisioned data for the Rule Template will be lost if the state is set back to "Development".

The Rule Template state can be set to "Test" or the association between the Rule Set and a Trigger can be removed to disable the Rule Set for live traffic.

In the “Test” state a Mediation Rule Set does not affect the live traffic, but the operator can test the newly created, imported, or modified Rule Set that was generated from the Rule Template. The Diagnostics Tool can be used to exercise and test the Rule Templates in the “Test” state, along with Rule Templates in the “Active” state. See Maintenance in the DSR Diameter User Guide and Reports in the DSR Diameter User Guide.

When the state of a Rule Template is set to "Active", the Rule Set associated with the Rule Template begins to participate in processing of real traffic messages.

The **Import** function from the **Diameter > Mediation > Rule Templates** page is duplicated on the **Diameter > Mediation > State & Properties** page for use when the "Meta-Administrator" privileges are not activated and the **Diameter > Mediation > Rule Templates** page cannot be accessed. An imported Rule Template is set to "Test" state.

On the **Diameter > Mediation > State & Properties** page, you can perform the following actions:

- Filter the list to display only the desired Rule Templates.
- Sort the entries in the list, by clicking the column headings. By default, the list is in alphabetical order by **Rule Template Name**.
- Click **Import Rule Template** to import a previously exported Rule Template from a location outside of the DSR system. See *Importing a Rule Template*.

  If importing a Rule Template would cause the maximum number of Rule Templates (100) in the system to be exceeded, the Rule Template is not imported and an error message appears.

- Select a **Rule Template Name** in the list, and click **Edit**. You can change the **State** and **Action Error Handling** for the selected Rule Template. See *Editing State and Properties*.

  When the "Meta-Administrator" privileges are not activated for the Diameter Mediation feature, the state of a Rule Template cannot be changed back to "Development".

- Select a **Rule Template Name** in the list, and click **Delete** to remove the selected Rule Template from the list. See *Deleting a Rule Template*.

  When a Rule Template is deleted from the **Diameter > Mediation > State & Properties** page, it is deleted from all other pages at the same time.

Mediation State & Properties elements

Table 11: Mediation State & Properties elements describes the fields on the **Diameter > Mediation > State & Properties** and **Diameter > Mediation > State & Properties [Edit]** pages. Data Input Notes apply only to the **Diameter > Mediation > State & Properties [Edit]** page; the **Diameter > Mediation > State & Properties** page is read-only.

Table 11: Mediation State & Properties elements

Element	Description	Data Input Notes
Rule Template Name	The name of a configured Rule Template.	The **Diameter > Mediation > State & Properties [Edit]** page shows **Selected Rule Template**; the Name cannot te edited.
State	The state of the Rule Template. "Development" - the Rule Template is disabled for any live or test traffic; it is under development. "Test" - the the Rule Sets entry is generated and the Rule Set is enabled only for the special test messages. "Active" - the Rule Template and Rule Set are enabled for any kind of traffic.	Format: pulldown list Range: Development (only for creating and modifying Rule Templates), Test, Active Default: Development
Action Error Handling	Specifies the type of error handling to be used if an Action in a Rule Template fails.	Format: pulldown list Ramge: ignore the error, immediately exit from the rule template, immediately exit from the trigger point Default: ignore the error

Importing a Rule Template

A Rule Template can be imported into the DSR system using the **Import Rule Template** action on the **Diameter > Mediation > State & Properties** page.

Existing Rule Templates can be imported. Existing Rule Templates are previously generated Rule Templates that have been exported from Diameter Mediation using the **Export** action on the **Diameter > Mediation > Rule Templates** page.

Use the following procedure to import a Rule Template located outside of the DSR file system (stored on the local computer):

1. Select **Diameter** > **Mediation** > **State & Properties**.

   The **Diameter > Mediation > State & Properties** page appears.

2. Click **Import Rule Template**.

   The **Diameter > Mediation > State & Properties [Import]** page appears.

3. Click **Browse** to open the **Choose File** popup window.
4. Navigate to the location of the Rule Template file that you want to import.
5. With the Rule Template filename displayed in the **File name** field, click **Open**.

   The filename appears in the **Choose a file to import** field.

6. Click **Import File**.

   The selected Rule Template file is imported, and appears in the **Rule Template Name** list on the **Diameter > Mediation > State & Properties** page.

Editing State and Properties

Use this procedure to change the state and properties associated with a Rule Template. The changes take effect immediately after **OK** or **Apply** is clicked.

The state of a Rule Template can be changed to or from the "Development" state only when the "Meta-Administrator" privileges are activated for the Diameter Mediation feature.

A Rule Template state cannot be changed from "Test" to "Development" for a Rule Template that is referenced by another instance such as another Rule Template or the Execution Trigger.

When a Rule Template state is changed back to "Development", any associated Rule Sets will be deleted from the **Rule Sets** folder.

The fields are described in *Mediation State & Properties elements*.

1. Select **Diameter** > **Mediation** > **State & Properties**.

   The **Diameter > Mediation > State & Properties** page appears.

2. Select the row containing the Rule Template to be changed.
3. Click the **Edit** button.

   The **Diameter > Mediation > State & Properties [Edit]** page appears.

4. Change the **State** or **Action Error Handling**, or both, associated with the selected Rule Template.
5. Click:
   - **OK** to save the changes and return to the **Diameter > Mediation > State & Properties** page.
   - **Apply** to save the changes and remain on **Diameter > Mediation > State & Properties [Edit]** page.
   - **Cancel** to return to the **Diameter > Mediation > State & Properties** page without saving any changes.

   If **OK** or **Apply** is clicked, and the Rule Template state was changed to "Active", and the maximum number of Active Rule Templates (5) already exists in the system, an error message appears.

   When the state of a Rule Template is changed from "Test" to "Development" and the Rule Template is not referenced anywhere, a popup window appears to confirm the change to "Development" state.

   When the state of a Rule Template is changed from "Development" to "Test", a new Rule Set appears in the left-hand GUI menu **Rule Sets** folder; the Rule Set has the same name as the Rule Template. (If the Rule Template contains only the "Execute Rule Template" Action, then a Rule Set is not generated.) If the new Rule Set has help defined in the Rule Template, the **Help** folder in the left-hand GUI menu is updated to include the Rule Set help.

Deleting a Rule Template

Use the following procedure to delete a Rule Template from the **Diameter > Mediation > State & Properties** list.

When a Rule Template is deleted from the **Diameter > Mediation > State & Properties** page, it is deleted from all other pages at the same time.

1. Select **Diameter** > **Mediation** > **State & Properties**.

   The **Diameter > Mediation > State & Properties** page appears.

2. Select the **Rule Template Name** to be deleted.
3. Click the **Delete** button.

   A popup window appears to confirm the delete.

4. Click:
   - **OK** to delete the Rule Template and return to the **Diameter > Mediation > State & Properties** page.
   - **Cancel** to cancel the delete function and return to the **Diameter > Mediation > State & Properties** page.

Base Dictionary

The **Diameter > Mediation > Base Dictionary** page allows the operator to view the basic AVPs that are familiar to the system (defined in the Base Diameter Standard, and in Diameter Applications such as Diameter Credit Control Application and S6a interface).

The AVP Attribute Name, AVP Code, AVP Flag settings, Vendor ID, and Data Type are included in the AVP definition.

If the Data Type is Enumerated, the name of the Enumerated Type is also included.

If the Data Type is Grouped, the list of Grouped AVPs appears in the dictionary.

Proprietary and additional standard AVP definitions can be added in the Custom Dictionary. See *Custom Dictionary*. Custom Dictionary entries are not displayed on the Base Dictionary View page.

The AVP definitions in the Base Dictionary can be changed (overwritten) only by specifying them in the Custom Dictionary with a different definition. The AVP Code, Vendor ID, and Attribute Name must remain the same in the changed definition.

AVP names that are defined in the dictionary can be used in creating Rule Templates and in provisioning Rule Sets.

On the **Diameter > Mediation > Base Dictionary** page, you can perform the following actions:

- Filter the list to display only the desired entries. (The Flags cannot be filtered.)
- Sort the list entries in ascending or descending order in a column, by clicking the column heading. The default order is by Attribute Name in alphabetical order. The Flags cannot be sorted.
- Select an AVP definition in the list, and click the **View** button.

  The **Diameter > Mediation > Base Dictionary [View]** page appears. The detailed definition for the selected AVP is displayed. The fields are described in *Mediation Base Dictionary elements*.

Mediation Base Dictionary elements

Table 12: Mediation Base Dictionary Elements describes the fields on the **Mediation > Base Dictionary** view-only pages.

Table 12: Mediation Base Dictionary Elements

Field	Description	Data Notes
Attribute Name	Name of the AVP; the unique combination of AVP Code - Vendor Id.	Format: alphanumeric, underscore (_), and dash (-). Range: 1 - 255 characters
AVP Code	AVP Code	Format: numberic Range: 0-4294967295
Vendor-ID	Vendor-ID	Format: pulldown list

Field	Description	Data Notes
		Range: all configured Vendors
Flags	Setting indicator for AVP Flags: V, M, P, r3, r4, r5, r6, r7 Flags V, M, and P are supported; r3, r4, r5, r6 and r7 are reserved for future use. • V - Vendor-Specific; indicates whether the optional Vendor-ID field is present in the AVP header. When set, the AVP Code belongs to the specific vendor code address space. • M - Mandatory; indicates whether support of the AVP is required. If an AVP with the M bit set is received by a Diameter client, server, proxy, or translation agent and either the AVP or its value is unrecognized, the message MUST be rejected. Diameter Relay and Redirect Agents MUST NOT reject messages with unrecognized AVPs. AVPs with the M bit cleared are informational only. A receiver of a message with an AVP that is not supported, or whose value is not supported, can simply ignore the AVP. • P - Indicates the need for encryption for end-to-end security. Diameter base protocol specifies which AVPs must be protected by end-to-end security measures (encryption) if the message is to pass through a Diameter agent. If a message includes any of those AVPs, the message must not be sent unless there is end-to-end security between the originator and the reciipient of the message.	Format: 3 buttons for each flag Range: Must, Must Not, May be set for each flag
Data Type	AVP data format If the Data Type is "Enumerated", the name of the Enumerated Type is indicated in the dictionary. If the Data Type is "Grouped", the list of grouped AVPs is included in the dictionary.	Format: pulldown list Range: all available AVP data formats

Field	Description	Data Notes
Include AVP in the group	Include an AVP into the Grouped AVP This field is active when the selected Data Type is Grouped.	Format: pulldown list, Add AVP and Delete AVP buttons Range: all available AVPs from the Base Dictionary and the Custom Dictionary. If a Base Dictionary entry has been overwritten in the Custom Dictionary, only the Custom Dictionary entry appears in the list.
Protocol	Protocol standard where the AVP is defined.	Format: string Range: up to 64 characters

Viewing an existing AVP Dictionary entry

Use the following task to view a selected Mediation Base Dictionary AVP entry.

On the **Diameter > Mediation > Base Dictionary** page:

1. Select an AVP entry in the list.
2. Click the **View** button.

   The **Diameter > Mediation > Base Dictionary [View]** page displays the attributes that are configured for the selected AVP dictionary entry.
3. Click the **Cancel** button to return to the **Diameter > Mediation > Base Dictionary** page..

Custom Dictionary

The **Diameter > Mediation > Custom Dictionary** page displays all proprietary AVPs defined by the operator in the system. Base Dictionary AVPs are not displayed in the Custom Dictionary list.

AVP names that are defined in the dictionary can be used in creating Rule Templates and in provisioning Rule Sets.

The Attribute Name, AVP Code, AVP Flag settings, Vendor ID, and Data Type must be specified in the AVP definition.

If the Data Type is Enumerated, the name of the Enumerated Type is also included.

If the Data Type is Grouped, the list of Grouped AVPs appears in the dictionary.

The values for AVP definitions are described in *Mediation Custom Dictionary elements*.

The **Diameter > Mediation > Custom Dictionary** page allows the operator to:

- Add new proprietary AVPs and additional standard AVPs familiar to the system
- Overwrite AVP definitions in the Base Dictionary, by specifying them in the Custom Dictionary with a different definition. The AVP Code, Vendor ID, and Attribute Name must remain the same in the changed definition.

  If the Attribute Name of an AVP appears in both the Base and Custom Dictionaries, the Custom Dictionary definition is used when the AVP is selected in Rule Template Actions and Conditions.

On the **Diameter > Mediation > Custom Dictionary** page, you can perform the following actions:

- Filter the list to display only the desired entries. All column headings are supported in the filters except the Flags.
- Sort the list entries in ascending or descending order in a column (except for Flags), by clicking the column heading. By default, the AVPs are sorted by Attribute Name in alphabetical order.
- Click the **Insert** button.

  The **Diameter > Mediation > Custom Dictionary [Insert]** page opens. You can add a new AVP and its values.

  If the maximum number of AVPs (1024) already exist in the system, the **Diameter > Mediation > Custom Dictionary [Insert]** page will not open, and an error message is displayed.

- Select an AVP definition in the list, and click the **Edit** button.

  The **Diameter > Mediation > Custom Dictionary [Edit]** page appears. The detailed definition for the selected AVP is displayed. You can change the AVP definition except for the AVP Code, Vendor ID, and Attribute Name.

- Select an AVP definition in the list, and click the **Delete** button to remove the selected AVP definition from the dictionary.

Mediation Custom Dictionary elements

Table 13: Mediation Custom Dictionary Elements describes the fields on the **Diameter > Mediation > Custom Dictionary** view, [Insert], and [Edit] pages.

Table 13: Mediation Custom Dictionary Elements

Field	Description	Data Input Notes
Attribute Name	Name of the AVP; the unique combination of AVP Code - Vendor Id. The field is required.	Format: alphanumeric, underscore (_), and dash (-). Range: 1 - 255 characters
AVP Code	AVP Code The field is required.	Format: numeric Range: 0-4294967295
Vendor-ID	Vendor-ID The field is required.	Format: pulldown list Range: all configured Vendors

Field	Description	Data Input Notes
Flags	AVP Flags V, M, P, r3, r4, r5, r6, r7 When the operator tries to modify the AVP flags in the message, setting and clearing of the flag depends on the value defined in the dictionary. If the flag has a value "Must" be set or "Must Not" be set, modifying of the flag is restricted accordingly. If the flag has a value of "May" be set, the operator can change the flag without any limitations. Flags V, M and P are supported; r3, r4, r5, r6 and r7 are reserved for future use. • V - Vendor-Specific; indicates whether the optional Vendor-ID field is present in the AVP header. When set, the AVP Code belongs to the specific vendor code address space. • M - Mandatory; indicates whether support of the AVP is required. If an AVP with the M bit set is received by a Diameter client, server, proxy, or translation agent and either the AVP or its value is unrecognized, the message MUST be rejected. Diameter Relay and Redirect Agents MUST NOT reject messages with unrecognized AVPs. AVPs with the M bit cleared are informational only. A receiver of a message with an AVP that is not supported, or whose value is not supported, can simply ignore the AVP. • P - Indicates the need for encryption for end-to-end security. Diameter base protocol specifies which AVPs must be protected by end-to-end security measures (encryption) if the message is to pass through a Diameter agent. If a message includes any of those AVPs, the message must not be sent unless there is end-to-end security between the originator and the recipient of the message.	Format: 3 buttons for each flag Range: Must, Must Not, May for each flag
Data Type	AVP Data Format The field is required.	Format: pulldown list Range: all available AVP data formats

Field	Description	Data Input Notes
Include AVP in the group (insert and edit pages only)	Include an AVP into the Grouped AVP This field is active when the selected Data Type is Grouped. To include another AVP in the Grouped AVP, click on the **Add AVP** button. A new row for AVP selection appears. To remove an AVP from the Grouped AVP, click on the **Delete AVP** button.	Format: pulldown list, Add AVP and Delete AVP buttons Range: all available AVPs from the Base Dictionary and the Custom Dictionary. If a Base Dictionary entry has been overwritten in the Custom Dictionary, only the Custom Dictionary entry appears in the list.
Protocol	Protocol standard where the AVP is defined. The field is required.	Format: string Range: up to 64 characters

Adding a new AVP Dictionary entry

Use the following task to add a new AVP Dictionary entry to the Custom Dictionary, or overwrite a Base Dictionary AVP.

The attributes are described in *Mediation Custom Dictionary elements*.

1. Select **Diameter** > **Mediation** > **Custom Dictionary**.

   The **Diameter > Mediation > Custom Dictionary** page appears.

   The **Diameter > Mediation > Custom Dictionary** page will not open if the maximum number of AVPs (1024) have already been created in the dictionary.

2. Click the **Insert** button.

   The **Diameter > Mediation > Custom Dictionary [Insert]** page opens.

3. Enter the attribute values for the new AVP, or customize a Base Dictionary AVP by changing fields except the Attribute Name, AVP Code, and Vendor-ID.
4. Click:

   - **OK** to save the changes and return to the **Diameter > Mediation > Custom Dictionary** page.
   - **Apply** to save the changes and remain on the **Diameter > Mediation > Custom Dictionary [Insert]** page.
   - **Cancel** to return to the **Diameter > Mediation > Custom Dictionary** page without saving any changes.

   If **OK** or **Apply** is clicked and if a Base Dictionary entry is overwritten and the original entry is used by any Rule Templates, the original entry is used until the application is restarted.

Changing an existing AVP Dictionary entry

Use the following task to change an existing Custom Dictionary AVP entry.

Note: Base Dictionary entries cannot be edited directly. To change a Base Dictionary entry, use the *Adding a new AVP Dictionary entry* procedure to enter a new AVP in the Custom Dictionary that has the same Attribute Name, AVP Code, and Protocol as the Base Dictionary entry that you want to change. Enter different values for the attributes that you want to change.

The fields are described in *Mediation Custom Dictionary elements*.

1. Select **Diameter** > **Mediation** > **Custom Dictionary**.

   The **Diameter > Mediation > Custom Dictionary** page appears.

2. In the list, select the entry to be changed, and click the **Edit** button.

   The **Diameter > Mediation > Custom Dictionary [Edit]**page appears.

3. Change the available attributes as needed .

   The Attribute Name, AVP Code, and Protocol cannot be changed.

4. Click:

   - **OK** to save the changes and return to the **Diameter > Mediation > Custom Dictionary** page.
   - **Apply** to save the changes and remain on the **Diameter > Mediation > Custom Dictionary [Edit]** page.

     Cancel to return to the **Diameter > Mediation > Custom Dictionary** page without saving any changes.

   If the old version of the AVP is referred to by any Rule Template, the application must be restarted to begin use of the changed AVP. The old version will be used until the restart is done.

Deleting an AVP dictionary entry

Use the following procedure to delete an AVP entry from the Custom Dictionary.

1. Select **Diameter** > **Mediation** > **Custom Dictionary**.

   The **Diameter > Mediation > Custom Dictionary** page appears.

2. Select the **Attribute Name** of the AVP entry to be deleted.
3. Click the **Delete** button.

   A popup window appears to confirm the delete.

4. Click:

   - **OK** to delete the AVP and return to the **Diameter > Mediation > Custom Dictionary** page.
   - **Cancel** to return to the**Diameter > Mediation > Custom Dictionary** page without deleting the AVP.

   When **OK** is clicked and any configured Rule Template or Rule Set refers to the AVP that is being deleted, the AVP is not deleted and an error message appears.

All-AVP Dictionary

The **Diameter > Mediation > All-AVP Dictionary** page allows the operator to view all AVP entries that are in the Base and Custom Dictionaries. The Base Dictionary entries are black and the Custom Dictionary entries are blue. (The term "AVP Dictionary" refers to the combined contents of the Base and Custom Dictionaries.)

Note: If a Base Dictionary AVP has been overwritten in the Custom Dictionary, only the Custom Dictionary entry is shown in the All-AVP Dictionary list.

The list and the entries cannot be changed from this page.

Proprietary and additional standard AVP definitions can be added in the Custom Dictionary. See *Custom Dictionary*.

The AVP definitions in the Base Dictionary can be changed (overwritten) by specifying them in the Custom Dictionary with a different definition. The code, Vendor ID, and attribute name must remain the same in the changed definition. See *Base Dictionary* and *Custom Dictionary*.

On the **Diameter > Mediation > All-AVP Dictionary** page, you can perform the following actions:

- Filter the list to display only the desired entries.
- Sort the list entries in ascending or descending order in a column, by clicking the column heading (except the flag headings).
- Select an AVP definition in the list, and click the **View** button.

  The **Diameter > Mediation > All-AVP Dictionary > [View]** page appears. The detailed definition for the selected AVP is displayed (the definition cannot be changed on this page). The definition elements are described in *Mediation All-AVP Dictionary elements*.

Mediation All-AVP Dictionary elements

Table 14: Mediation All-AVP Dictionary elements describes the fields on the **Diameter > Mediation > All-AVP Dictionary** pages.

Table 14: Mediation All-AVP Dictionary elements

Field	Description	Data Notes
Attribute Name	Name of the AVP; the unique combination of AVP Code - Vendor Id.	Format: alphanumeric, underscore (_), and dash (-). Range: 1 - 255 characters
AVP Code	AVP Code	Format: numeric Range: 0-4294967295
Vendor-ID	Vendor-ID	Format: pulldown list

Field	Description	Data Notes
		Range: all configured Vendors
Flags	AVP Flags V, M, P, r3, r4, r5, r6, r7 Flags V, M, and P are supported; r3, r4, r5, r6 and r7 are reserved for future use. • V - Vendor-Specific; indicates whether the optional Vendor-ID field is present in the AVP header. When set, the AVP Code belongs to the specific vendor code address space. • M - Mandatory; indicates whether support of the AVP is required. If an AVP with the M bit set is received by a Diameter client, server, proxy, or translation agent and either the AVP or its value is unrecognized, the message MUST be rejected. Diameter Relay and Redirect Agents MUST NOT reject messages with unrecognized AVPs. AVPs with the M bit cleared are informational only. A receiver of a message with an AVP that is not supported, or whose value is not supported, can simply ignore the AVP. • P - Indicates the need for encryption for end-to-end security. Diameter base protocol specifies which AVPs must be protected by end-to-end security measures (encryption) if the message is to pass through a Diameter agent. If a message includes any of those AVPs, the message must not be sent unless there is end-to-end security between the originator and the recipient of the message.	Format: 3 buttons for each flag Range: Must, Must Not, May for each flag
Data Type	AVP Data Format	Format: pulldown list Range: all available AVP data formats
Include AVP in the group	Include an AVP into the Grouped AVP This field is active when the selected Data Type is Grouped.	Format: pulldown list, Add AVP and Delete AVP buttons Range: all available AVPs from the Base Dictionary and the Custom Dictionary. If a

Field	Description	Data Notes
		Base Dictionary entry has been overwritten in the Custom Dictionary, only the Custom Dictionary entry appears in the list.
Protocol	Protocol standard where the AVP is defined.	Format: string Range: up to 64 characters

Viewing an existing All-AVP Dictionary entry definition

Use the following task to view a selected Mediation All-AVP Dictionary AVP entry definition. (The definition cannot be changed on this page.)

1. Select **Diameter** > **Mediation** > **All-AVP Dictionary**.
   The **Diameter > Mediation > All-AVP Dictionary** page appears.
2. Select an AVP entry in the list and click the **View** button.
   The **Diameter > Mediation > All-AVP Dictionary [View]** page displays the attributes that are configured for the selected AVP dictionary entry.
3. Click the **Cancel** button to return to the **Diameter > Mediation > All-AVP Dictionary** page.

Vendors

The **Diameter > Mediation > Vendors** page lists the Names and IDs of all Vendors made known to the system.

Vendors are used in defining new Vendor-specific AVPs in the Custom Dictionary.

On the **Diameter > Mediation > Vendors** page, you can perform the following actions:

- Filter the list of Vendors to display only the desired Vendors.
- Sort the displayed Vendors by ascending or descending Vendor ID or Vendor Name, by clicking the column heading.
- Click the **Insert** button.

  The **Diameter > Mediation > Vendors [Insert]** page opens. You can add a new Vendor. See *Adding a Vendor*.

  If the maximum number of Vendors (128) already exist in the system, the **Diameter > Mediation > Vendors [Insert]** page will not open, and an error message is displayed.

- Select a Vendor row in the list, and click the **Edit** button.

  The **Diameter > Mediation > Vendors [Edit]** page opens. You can edit the Vendor Name for the selected Vendor. See *Editing a Vendor Name*.

The **Diameter > Mediation > Vendors [Edit]** page will not open if the selected Vendor is used in any of the AVP definitions in the dictionary.

- Select a Vendor row in the list, and click the **Delete** button to remove the selected Vendor. See *Deleting a Vendor*.

  A Vendor cannot be deleted if it is used in any AVP definitions in the AVP Dictionary.

Mediation Vendors elements

Table 15: Mediation Vendors elements describes the fields on the **Diameter > Mediation > Vendors** View, Insert, and Edit pages. Data Input Notes apply only to the Insert and Edit pages; the View page is read-only.

Table 15: Mediation Vendors elements

Element	Description	Data Input Notes
Vendor-ID	A number that identifies the Vendor. The number must be unique within the Custom Dictionary. The field is required.	Format: 32-bit integer Range: 1-4294967295
Vendor Name	Name of a Vendor that implements a Vendor-Specific Diameter AVP. A unique name is required in this field.	Format: Character string Range: 1-255 characters

Viewing Vendors

The use of Mediation Vendors is described in *Vendors*.

To view all configured Mediation Vendors, select **Diameter** > **Mediation** > **Vendors**.

The **Diameter > Mediation > Vendors** page appears with a list of configured Vendors. The fields are described in *Mediation Vendors elements*.

Adding a Vendor

The following procedure can be used to configure a new Vendor.

The fields are described in *Mediation Vendors elements*.

1. Select **Diameter** > **Mediation** > **Vendors**.

   The **Diameter > Mediation > Vendors** page appears.

2. Click **Insert**.

The **Diameter > Mediation > Vendors [Insert]** page appears.

If the maximum number of Vendors (128) has already been configured in the system, the **Diameter > Mediation > Vendors [Insert]** page will not open, and an error message will appear.

3. Enter a unique **Vendor Name** for the Vendor that is being added.
4. Enter a **Vendor ID** for the Vendor.
5. Click:
   - **OK** to save the changes and return to the **Diameter > Mediation > Vendors** page.
   - **Apply** to save the changes and remain on the **Diameter > Mediation > Vendors [Insert]** page.
   - **Cancel** to return to the **Diameter > Mediation > Vendors [Insert]** page without saving any changes.

   If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:
   - The Vendor Name or Vendor ID contains any characters that are not valid or are out of the allowed range
   - The Vendor Name or Vendor ID is empty (not entered)
   - The Vendor Name is not unique

Editing a Vendor Name

Use this procedure to change a Vendor Name.

The Vendor ID cannot be changed.

The Vendor Name cannot be changed if the Vendor is used in any of the AVP definitions in the dictionary.

The fields are described in *Mediation Vendors elements*.

1. Select **Diameter** > **Mediation** > **Vendors**.
   The **Diameter > Mediation > Vendors** page appears.
2. Select the Vendor Name to be changed.
3. Click the **Edit** button.
   The **Diameter > Mediation > Vendors [Edit]** page appears.
4. Change the Vendor Name of the selected Vendor.
5. Click:
   - **OK** to save the changes and return to the **Diameter > Mediation > Vendors** page
   - **Apply** to save the changes and remain on the **Diameter > Mediation > Vendors [Edit]** page.
   - **Cancel** to return to the **Diameter > Mediation > Vendors** page without saving any changes.

   If **OK** or **Apply** is clicked and any of the following conditions exist, an error message appears:
   - The Vendor Name is not unique
   - The Vendor Name contains characters that are not valid

Deleting a Vendor

Use the following procedure to delete a Vendor.

A Vendor cannot be deleted if the Vendor is used in any AVP definitions in the dictionary.

1. Select **Diameter** > **Mediation** > **Vendors**.

   The **Diameter > Mediation > Vendors** page appears.

2. Select the row that contains the Vendor to be deleted.
3. Click the **Delete** button.

   A popup window appears to confirm the delete.

4. Click:

   - **OK** to delete the Vendor.
   - **Cancel** to cancel the delete function and return to the **Diameter > Mediation > Vendors** page.

   If the Vendor is used in any AVP definitions in the dictionary, the Vendor is not deleted and an error message appears.

Rule Sets

A Rule Set is generated from a Rule Template that was defined on the **Diameter > Mediation > Rule Templates** page, when the Rule Template state is changed from Development to Test or Active. The **Diameter** > **Mediation** > **Rule Sets** GUI folder contains an entry for each generated Rule Set. If no Rule Sets have been generated, the **Rule Sets** folder contains no entries. All rules in a Rule Set are specific to the Rule Template from which the Rule Set was generated.

Clicking a **Rule Sets** entry opens the **Diameter > Mediation > Rule Sets > {name}** GUI page for the Rule Set (**{name}** is the name of the Rule Set).

The **Diameter > Mediation > Rule Sets > {name}** page displays the following columns:

- Move the rule

  A **Move the rule** column appears at the left and at the right of the rules list when there are rules that are allowed to be moved up or down in the list to change the order of rule execution.

  Up and **Down** buttons in the **Move the rule** columns can be used to move a rule up one position in the list or down one position in the list each time the button is clicked.

  Up and **Down** buttons appear in the **Move the rule** columns for a rule or rule group when the order of the rules is allowed to be changed, with the following restrictions:

  - When the **Filter** function or clicking a Condition column heading is used to sort the columns, the **Move the rule** columns are not displayed. The **Restore Order** button can be clicked to return the list to its original order.
  - If all of the conditions in the rule support **Fast Search**, then the **Move the rule** columns are not displayed. See *Fast Search*.
  - If there is at least one condition that does not support **Fast Search**, then the **Up** and **Down** buttons are displayed according to the following rules:

- All of the rules that support **Fast Search** always appear in the list before any rules that do not support **Fast Search**.
- The rows that have exactly the same data in the conditions that support **Fast Search** form a group. Rows can be moved only within their group; the **Up** and **Down** buttons are enabled and disabled accordingly.

  Table 16: Example of Default Ordering of Rules in a Rule Set shows an example of default ordering of rules.

  Table 16: Example of Default Ordering of Rules in a Rule Set

Fast-search condition 1	Fast-search condition 2	Non fast-search condition 3
abc	1	-
abc	12	-
abc	-	-
abcd	1	-
abcd	1	a1
abcd	-	b1
-	1	a1
-	1	b1
-	-	-

- Conditions

  One column appears for each condition that is defined in the Rule Template that generated the Rule Set. The columns appear from left to right in the same order that the conditions are defined in the Rule Template for the Rule Set. The heading of each column is the Condition Name. Each entry in a condition column is the data that was entered in the Right value field of the condition for the rule.

  Each condition column heading can be clicked to sort the rules by the ascending or descending alphabetical order of the values in that column. The column contents can be used to filter the rules that are displayed in the list.

- Actions

  One column heading appears for each Action that is assigned to the conditions in the Rule Template for the Rule Set. The columns appear from left to right in the same order that the Actions are defined in the Rule Template. The Action columns cannot be sorted by clicking the heading; their contents can be used to filter the rules that are displayed in the list

- Action Attribute sub-columns for each Action

  Sub-columns appear for the attributes of each Action. The sub-columns cannot be sorted by clicking the heading; their contents can be used to filter the rules that are displayed in the list. All of the conditions in a Rule Template use the same Actions; the Action attributes can be assigned different values in different rules in the Rule Set.

Each row across the columns is created (inserted) in the list when a rule is provisioned. The rules on a **Diameter Rule Sets > {name} page** are looked up in the database in the order in which they are listed on the page. By default, the rules are sorted in the list by condition in the following order:

- First the conditions, in alphabetical order from left to right, that have the **Fast Search** option enabled
- Followed by any conditions, in the order that they were provisioned, that do not have the **Fast Search** option enabled.
- Though all rules in a Rule Set have the same conditions available, rules can be provisioned with one or more of the conditions “empty” (with no values), indicating that the condition is always matched in message processing. The rules with empty conditions are listed after the rules that contain values for the same conditions.

The **Rule Sets** folder entries to view, insert (provision), change, or delete rules in Rule Sets.

When a Rule Set entry is selected in the **Rule Sets** folder, the **Diameter > Mediation > Rule Sets > {name}** page opens for the selected Rule Set.

On each **Diameter > Mediation > Rule Sets > {name}** page, a user can perform the following actions:

- Filter by the column contents, to display only the rules with the desired contents.
- If the **Move a rule** columns are displayed and contian **Up** and **Down** buttons, move rules up and down in the list to change the order of execution of the rules in the Rule Set.
- Click **Insert** to add a new rule.

  The **Diameter > Mediation > Rule Sets > {name} [Insert]** page opens.

  The **Diameter > Mediation > Rule Sets > {name} [Insert]** page will not open if adding a new rule will cause the allowed maximum number of rules in the Rule Set (250) to be exceeded.

  The **Diameter > Mediation > Rule Sets > {name} [Insert]** page will not open if adding a new rule will cause the allowed maximum total number of rules in the system (25000) to be exceeded.

  Rule Templates without any conditions form a special case, because their provisioned rule unconditionally matches. The Rule Sets generated from these Rule Templates allow only one rule to be provisioned.

- Click **Delete All Rules** to delete all of the rules that have been provisioned for this Rule Set.
- Select a rule and click **Edit**.

  The **Diameter > Mediation > Rule Sets > {name} [Edit]** page opens. You can change the Values of the Conditions and Actions for the selected rule.

- Select a rule and click **Delete** to delete the rule from the Rule Set list.

User-defined Rule Sets

Rule Templates that are defined using the **Diameter > Mediation > Rule Templates** page generate new Mediation Rule Sets when the Rule Template is set to the "Test" or "Active" state. These generated Rule Sets appear in the **Diameter** > **Mediation** > **Rule Sets** GUI menu.

If no Mediation Rule Sets have been generated from Rule Templates, rather than being a menu, **Rule Sets** is a page that displays "NO Rule Sets are defined yet".

Adding a user-defined Rule Set

If no Mediation Rule Sets are defined, **Mediation > Rule Sets** is a page that displays "NO Mediation Rule Sets are defined yet", and no Mediation Rule Sets are available to be added here. To define a Mediation Rule Set, use the **Mediation > Rule Templates** page.

Rule Sets elements - View page

Table 17: Rule Sets Elements - View Page describes the elements that appear on each **Diameter > Mediation > Rule Sets > {name}** page.

Table 17: Rule Sets Elements - View Page

Element	Description	Data Notes
Move the rule	Used to move a rule up or down in the list, to change the order of execution of the rules. The rules are executed in the order shown in the list, from the top of the list to the bottom of the list. The element appears at the left of and at the right of each rule row.	Format: Buttons in two columns under the heading Range: Up, Down One, both, or no buttons appear in the columns, depending on the rule definition.
All Conditions defined on the Rule Template page for this Rule Set	Each condition name has a separate column in the list.	Format, Range, and Default Value vary depending on the Rule Template that was configured for the Rule Set.
All Actions defined on the Rule Template page for this Rule Set	Each Action defined for this Rule task has a separate column in the list that shows the name of the Action, and one or more sub-columns that show the attributes that were defined for the Action and the current values of the attributes. If the Parent AVP or AVP is indexed, then the index is displayed in the square brackets after the AVP attribute name. If an AVP is looked up in the message by its value, “AVP” shall contain the value prefixed with “=” (if it is a constant) or an xl-value prefixed with “=” (if it is an xl-value).	Format, Range, and Default Value vary depending on the Rule Template that was configured for the Rule Set.

Element	Description	Data Notes
	A value can be prefixed with an appropriate indicator of its type or function (such as =, beginning, end, prefix, or suffix).	
Each rule in the Rule Set is a row in the list. The Values assigned to the Conditions and the Values assigned to each attribute of the Actions for a rule are shown in the row for that rule.		

Rule Sets elements - Insert and Edit Pages

Table 18: Maximum Allowed Rule Sets and Rules indicates the maximum number of Rule Sets and rules that are allowed.

Table 18: Maximum Allowed Rule Sets and Rules

Description	Value
Maximum number of provisioned rules in the system	25000
Maximum number of provisioned rules per Rule Set	250

Table 19: Rule Sets Elements - Insert and Edit Pages describes the elements that are shown on a **Diameter > Mediation > Rule Sets > {name}** [Insert] or [Edit] page.

Table 19: Rule Sets Elements - Insert and Edit Pages

Element	Description	Data Input Notes
Field: This element has two sections: IF and THEN.		
IF	The list of Condition names (if any Conditions were defined for the Rule Template). AND appears between each two Conditions.	Format: Name of the Condition, followed by its Operator The name and operator cannot be entered or changed.
THEN	The name of each Action that was defined for the Rule Template.	Format: Name An Action cannot be deleted and a new Action cannot be defined for the rule.
Value: This element shows the fields for the Condition and Action data Values that can be entered or changed. For the [Insert] page, the fields are either empty or show default values. For the [Edit] page, the fields show the currently defined or default values.		

Element	Description	Data Input Notes
Condition expression Right value	For each defined Condition in the rule, the data value for the Right value type in the Condition. If the **Optional** check box was checked in the Rule Template for this Rule Set, the Right value can be empty (not provisioned). A red asterisk appears after each data value that is required (not optional) in the rule. If the **Fixed** check box was checked in the Rule Template for this Rule Set, the Right value cannot be changed in the rules. If the selected Right value type was an **Enumerated Type**, then the Value column contains a pulldown list with the corresponding Enumerated Type values, unless the selected Operator was "exists", "does not exist", "is true" or "is false".	Format: text box Range: Varies depending on the Right value type Default: Varies depending on the Right value type See *Rule Template elements*. The *Formatting Value Wizard* is available to provision Condition Right values that are xl-formatted values; click **[wizard]** that appears after the data value field.
Action fields	The fields to use to define the data values for Action attributes.	Format: Varies for each type of attribute Range: Varies for each type of attribute See *Rule Template elements*. The *Formatting Value Wizard* is available to provision Action attributes that are xl-formatted values; click **[wizard]** that appears after the data value field.
Description	The description that was defined in the Rule Template for a Condition or an Action on the **Rule Sets** page. The description can provide information such as the format to be used (such as text string or telephone number format) and the range of values (such as 1 to 255 characters).	Format: descriptive text Range: 1 to 255 characters string

Adding a Rule to a Rule Set

Use this procedure to define a new rule in a Rule Set. A maximum of 250 rules can be defined in one Rule Set.

There are two sections of a **Diameter > Mediation > Rule Sets > {name} [Insert]** page: **IF** (zero, one, or more Conditions) and **THEN** (an Action). For a list of the Rule Template elements that appear in a rule and their definitions, see *Rule Template elements*.

When a Rule Template is in the "Active" or "Test" state, this Rule Template appears as a Rule Set in the **Diameter** > **Mediation** > **Rule Sets** menu folder. The order in which rules appear on a **Diameter > Mediation > Rule Sets > {name}** page determines the order in which the conditions are processed. The **Up** and **Down** buttons next to the rules can be used to change the order of processing.

1. Select **Diameter** > **Mediation** > **Rule Sets** > **{name}**.

   The selected **Diameter > Mediation > Rule Sets > {name}** page opens.

2. Click the **Insert** button.

   The **Diameter > Mediation > Rule Sets > {name} [Insert]** page opens.

   If the maximum number of rules are already defined for the Rule Set (250) , the **Diameter > Mediation > Rule Sets > {name} [Insert]** page will not open, and an error message is displayed.

3. Enter the Value for each condition that appears under **IF** in the **Field** section for the new rule.
4. Enter the Value for each attribute of the Action that appears under **THEN** in the **Field** section for the new rule.
5. When the rule definition is complete, click:

   - **OK** to save the new rule and return to the **Diameter > Mediation > Rule Sets > {name}** page. The rule name appears in the list on the page.
   - **Apply** to save the new rule and remain on the **Diameter > Mediation > Rule Sets > {name} [Insert]** page for additional changes.
   - **Cancel** to return to the **Diameter > Mediation > Rule Sets > {name}** page without saving the changes.

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

   - Any mandatory input fields are empty
   - Any input Value fields in the Conditions or Actions did not conform to the required syntax defined by the Right value type or the Action definition
   - Another rule exists within the Rule Set with the same Values in the Condition section; the rule Condition already exists in the Rule Set
   - Adding the new rule would cause the allowed maximum number (250) of rules in a Rule Set in the system to be exceeded
   - Adding the new rule would cause the allowed maximum number (250000) of rules in the system to be exceeded

6. When the Rule Set definition and testing are complete, go to the **Diameter Mediation State & Properties** page.

   a) Change the Rule Template **State** from Test to Active.
   b) Set the **Action Error Handling** property, if needed.

   The state can be changed to Active after the testing is successful, the Rule Set data is provisioned, the Rule Set is associated with a Trigger, and the Rule Set is ready to use in live traffic.

Deleting All Rules from a Rule Set

Use this procedure to delete all rules from a Rule Set.

1. Select **Diameter** > **Mediation** > **Rule Sets** > **{name}**.

   The selected **Diameter > Mediation > Rule Sets > {name}** page appears.

2. Click **Delete All Rules**.

   A popup window appears to confirm the delete.

3. On the popup window, click:

   - **OK** to delete all rules and return to the **Diameter > Mediation > Rule Sets > {name}** page.
   - **Cancel** to cancel the delete operation and return to the **Diameter > Mediation > Rule Sets > {name}** page.

Changing a Rule in a Rule Set

Use this procedure to change values for a rule in a Rule Set (for a list of Rule Sets elements and their definitions, see *Rule Sets elements - Insert and Edit Pages*):

1. In the **Diameter** > **Mediation** > **Rule Sets** folder, select the Rule Set that contains the rule to be edited.

   The **Diameter > Mediation > Rule Sets > {name}** page appears for the selected Rule Set.

2. Select the rule that needs to be changed.
3. Click **Edit**.

   The **Diameter > Mediation > Rule Sets > {name} [Edit]** page appears.

4. Change values for Conditions under **IF** and Actions under **THEN** as needed.
5. Click:

   - **OK** to save the changes and return to the **Diameter > Mediation > Rule Sets > {name}** page.
   - **Apply** to save the changes and remain on the **Diameter > Mediation > Rule Sets > {name} [Edit]** page.
   - **Cancel** to return to the **Diameter > Mediation > Rule Sets > {name}** page without saving any changes.

Deleting One Rule from a Rule Set

Use this procedure to delete one rule from a Rule Set.

1. Select **Diameter** > **Mediation** > **Rule Sets** > **{name}**.

   The selected **Diameter > Mediation > Rule Sets > {name}** page appears.

2. Select the row for the rule to be deleted.
3. Click **Delete**.

   A popup window appears to confirm the delete.

4. On the popup window, click:
   - **OK** to delete the rule and return to the **Diameter > Mediation > Rule Sets > {name}** page.
   - **Cancel** to cancel the delete operation and return to the **Diameter > Mediation > Rule Sets > {name}** page.

Glossary

#

3G	3rd Generation An International Telecommunication Union (ITU) specification for the third generation of mobile communications technology. 3G promises increased bandwidth and works over wireless air interfaces such as GSM, TDMA, and CDMA. The new EDGE air interface has been developed specifically to meet the bandwidth needs of 3G.

A

ATP1	Mediation trigger point located immediately after the Diameter Routing Function decodes an ingress Request message received from the Diameter Transport Function.
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

CAPM	Computer-aided policy making
CEA	Capability-Exchange-Answer

C

	The Diameter response that the prepaid rating engine sends to the Mobile Originated application during capability exchanges.
CER	Capabilities-Exchange-Request A Diameter message that the Mobile Originated application sends to a prepaid rating engine to perform a capability exchange. The CER (indicated by the Command-Code set to 257 and the Command Flags' 'R' bit set) is sent to exchange local capabilities.The prepaid rating engine responds with a Capability-Exchange-Answer (CEA) message.

D

DAS	Diameter Application Server Diameter Agent Server
Diameter	Diameter can also be used as a signaling protocol for mobility management which is typically associated with an IMS or wireless type of environment. Diameter is the successor to the RADIUS protocol. The MPE device supports a range of Diameter interfaces, including Rx, Gx, Gy, and Ty. Protocol that provides an Authentication, Authorization, and Accounting (AAA) framework for applications such as network access or IP mobility. Diameter works in both local and roaming AAA situations. Diameter can also be used as a signaling protocol for mobility management which is typically associated with an IMS or wireless type of environment.

D

Diameter Signaling Router	A set of co-located Message Processors which share common Diameter routing tables and are supported by a pair of OAM servers. A DSR Network Element may consist of one or more Diameter nodes.
DPA	Disconnect-Peer-Answer A message used by a Diameter node to answer the Disconnect-Peer-Request (DPR).
DPR	Disconnect-Peer-Request A message used by a Diameter node to inform its peer of its intent to disconnect the transport layer. Upon receipt of a DPR, the Disconnect-Peer-Answer (DPA) is returned.
DWA	Device-Watchdog-Answer A Diameter message used with the Device-Watchdog-Request (DWR) message to proactively detect connection failures. If no traffic is detected on a connection between the Mobile Originated application and the prepaid rating engine within the configured timeout period, a DWR message is sent to the prepaid rating engine. If the prepaid rating engine fails to respond with a DWA within the required time, the connection is closed with the prepaid rating engine and initiates failover procedures. All new and pending requests are then sent to the secondary server.
DWR	Device-Watchdog-Request

D

	A Diameter message used with the Device-Watchdog-Answer (DWA) message to proactively detect connection failures. If no traffic is detected on a connection between the Mobile Originated application and the Diameter server within the configured timeout period, a DWR message is sent to the Diameter Server. If the Diameter server fails to respond within the required time, the connection is closed with the Diameter server and initiates failover procedures. All new and pending requests are then sent to the secondary Diameter server.

G

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

I

IMS	IP Multimedia Subsystem These are central integration platforms for controlling mobile communications services, customer management and accounting for mobile communications services based on IP. The IMS concept is supported by 3GPP and the UMTS Forum and is designed to provide a wide range of application scenarios for individual and group communication.

L

LTE	Long Term Evolution The next-generation network beyond 3G. In addition to enabling

L	
	fixed to mobile migrations of Internet applications such as Voice over IP (VoIP), video streaming, music downloading, mobile TV, and many others, LTE networks will also provide the capacity to support an explosion in demand for connectivity from a new generation of consumer devices tailored to those new mobile applications.
M	
MCCS	Message Copy Configuration Set
P	
pSBR	Policy SBR
R	
Rule	An association between a Filter and an Action Set.