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Diameter Signaling Router

DSR Security App Using Mediation Example Procedure

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Oracle Communications DSR Security Application Using Mediation Example Procedure User's Guide, Release 8.5

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Disclaimer: This is just a reference to an example for creating security application using DSR Mediation functionality.

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1. Introduction

1.1 Purpose and Scope

This document provides a sample procedure required to build a security application using mediation.

No additional software installation is required before executing this procedure. The standard DSR installation procedure loads all required software. You do need to activate the Mediation feature before implementing the security application.

1.2 Overview of Security Application

- Most of the Diameter security vulnerabilities are for interconnect from roaming networks through IPX or directly from roaming partner networks.
- DEA is considered as the only point of contact into and out of an operator's network at the Diameter application level.
- Attacks are induced in operator's home network through Diameter messages passing through DEA.
- Security threats currently being discussed for SS7 are around below mentioned attacks:
 - Location tracking
 - Call intercept
 - Subscriber Denial of Service
 - Subscriber Account fraud
 - SMS SPAMS
- DSR based Diameter Security Counter measures can be used to mitigate different diameter attacks.
- Diameter security countermeasures shall be implemented using ART or Mediation rules based screening.
- In this user guide, we use Mediation to configure and implement Diameter security countermeasures (Security Application).
- Diameter Security Countermeasures shall be applied on:
 - Ingress messages received from the peers of external foreign network
 - Egress messages sent from home network to external foreign network.
- For the purposes of applying countermeasures, subscribers are classified into one of following three types:
 - Inbound roaming subscribers: Security countermeasures are applicable for visited network subscribers roaming in home network
 - Outbound roaming subscribers: Security countermeasures are applicable for home network subscribers roaming in visited network
 - Non-Roaming home network subscribers: Security countermeasures are applicable for home network subscribers who are not roaming outside home network

2. Example Procedure

This section list the steps followed to build the sample security application using mediation. The security application uses various countermeasure checks. User may vary the templates (add/delete/modify) as per their needs.

Test Setup topology: DSR Setup with 1 NO + 1 SO + 1 MP. In the example (sample testing), DSR 80.14.1 is used with 1 NO + 1 SO + 1 MP and taken as reference in this user guide.

2.1 Define Internal Variables

The internal variable provides inputs (i.e., Peer Type, Roamer Type, etc.) to templates, which implements countermeasures, generates alarms, and drops the vulnerable message.

To configure Internal Variables:

1. Launch an active SO GUI.
2. Navigate to Main Menu -> Diameter -> Mediation -> Internal Variables Screen.
3. Click Insert to insert each internal variable individually.
4. Define the internal variables as shown in Table 1 and shown in Figure 1 as reference. The templates set and read these internal variables.

Table 1: Internal Variables

| Variable Name | Description | Type | Default Value |
|----------------------|--|-----------|---------------|
| \$msgDisallowed | If true, then message is not allowed further; false then message is allowed, and it is still tracked by other templates. | Integer32 | 0 |
| \$foreignIngressPeer | If true, then message is from foreign network to home network. | Integer32 | 0 |
| \$foreignEgressPeer | If true, then message is from home network to foreign network. | Integer32 | 0 |
| \$inboundRoaming | If true, then subscriber is inbound subscriber. | Integer32 | 0 |
| \$outboundRoaming | If true, then subscriber is outbound subscriber. | Integer32 | 0 |
| \$index | Used as an index to delete the multiple occurrence of an AVP in one shot | Integer32 | 0 |

Main Menu: Diameter -> Mediation -> Internal Variables

Filter* ▾

Table Description: Internal Variables Table

| Variable Name | Type | Default Value | Description |
|--------------------|-----------|---------------|--|
| foreignEgressPeer | Integer32 | 0 | It determines whether peer is foreign peer or not for egress message. |
| foreignIngressPeer | Integer32 | 0 | It determines whether peer is foreign peer or not. |
| inboundRoaming | Integer32 | 0 | If non-zero, it decides the message is from inbound roaming subscriber. |
| index | Integer32 | 0 | Use as an index to delete the multiple occurrence of an AVP in one shot. |
| msgDisallowed | Integer32 | 0 | if non-zero then message will not be allowed. |
| outboundRoaming | Integer32 | 0 | If non-zero, it decides the message is from outbound roaming subscriber. |

Figure 1: Define Internal Variables

2.2 Define Measurements

Measurements calculate the number of vulnerable messages dropped by the Security application. For each type of countermeasure, create an entry.

To configure Measurements,

1. Launch an active SO GUI.
2. Navigate to Main Menu -> Diameter -> Mediation -> Measurements.
3. Click **Insert** to insert each measurement individually.

Use the measurements from Table 2 and shown in Figure 2 as a reference for this example.

Table 2: Measurements

| Measurement Name | Description |
|----------------------------------|--|
| measurement_inbound_10 | Application ID and CC whitelist for inbound roamers |
| measurement_outbound_20 | Application ID and CC whitelist for outbound roamers |
| measurement_DRWhitelist_40 | DR whitelist |
| measurement_DestRealm_ER_100 | Destination Realm Egress Request |
| measurement_Handle_RRecordAVP_60 | Handle Route Record AVP |
| measurement_OH_ends_with_OR_50 | OH ends with OR |
| measurement_ORWhitelist_30 | OR whitelist |

Main Menu: Diameter -> Mediation -> Measurements

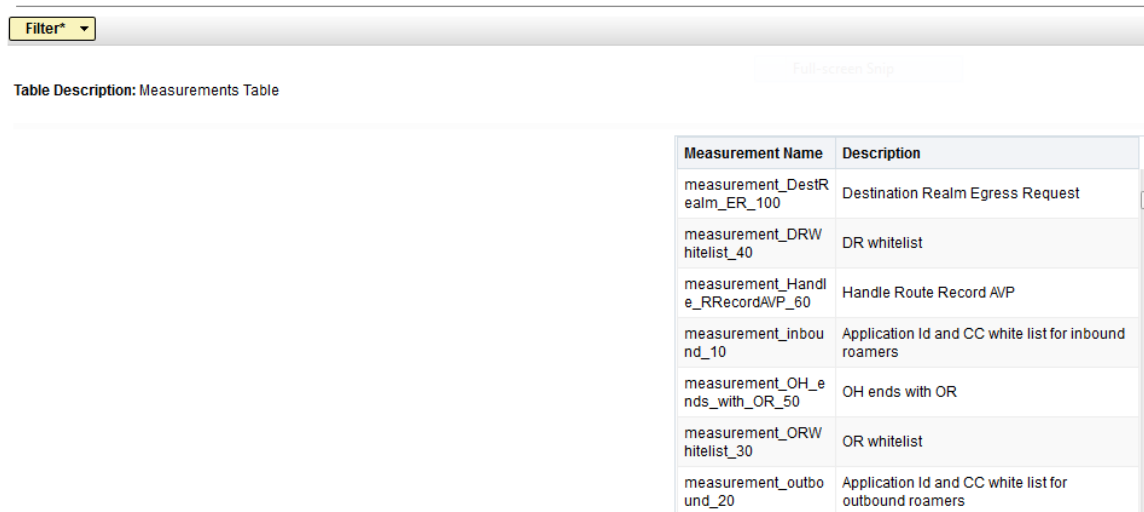


Figure 2: Screenshot of Measurements

2.3 Add AVP to DSR Custom Dictionary

Add the following AVPs to the DSR custom dictionary:

2.3.1 OC-Supported-Features AVP

```
OC-Supported-Features ::= < AVP Header: 621 >
    [ OC-Feature-Vector ]
    * [ AVP ]
```

2.3.2 OC-OLR AVP

```

OC-OLR ::= < AVP Header: 623 >
           < OC-Sequence-Number >
           < OC-Report-Type >
           [ OC-Reduction-Percentage ]
           [ OC-Validity-Duration ]
           * [ AVP ]

```

2.3.3 DRMP AVP

The DRMP (AVP code 301) is an Enumerated type. Use Figure 3 as a reference.

Main Menu: Diameter -> AVP Dictionary -> Custom Dictionary

Filter* ▾

Table Description: Custom Dictionary Table

| Attribute Name | AVP Code | V | M | P | r3 | r4 | r5 | r6 | r7 | Vendor ID | Data Type | Protocol |
|-------------------------|----------|---|-----|-----|-----|-----|-----|-----|-----|-----------|-----------------------------|----------|
| DRMP | 301 | 0 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0 | Participant-Access-Priority | 3GPP |
| OC-Feature-Vector | 622 | 0 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0 | Unsigned64 | 3GPP |
| OC-OLR | 623 | 0 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0 | Grouped | RFC 7683 |
| OC-Reduction-Percentage | 627 | 0 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0 | Unsigned32 | RFC6733 |
| OC-Report-Type | 626 | 0 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0 | CC-Unit-Type | RFC6733 |
| OC-Sequence-Number | 624 | 0 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0 | Unsigned64 | RFC6733 |
| OC-Supported-Features | 621 | 0 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0 | Grouped | 3GPP |
| OC-Validity-Duration | 625 | 0 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0 | Unsigned32 | RFC6733 |

Figure 3: Screenshot of DRMP AVP

2.4 Ruleset Configuration

To implement all six counter measures, configure the 14 Mediation templates. A few of these templates are common (i.e., not related to any specific counter measure), which performs generic actions like computing Peer Type/Roamer Type, generating alarms, pegging corresponding counters, and dropping the vulnerable messages. The remaining templates implement the counter measure specific business logic.

Refer to Table 1 to see counter measures to template mapping.

Table 3: Mediation Templates

| Counter Measure Name | Used Template |
|--|----------------------------|
| Application-ID Whitelist Screening | Template 2 & 3 |
| Application-ID and Command Code Consistency Check | Template 2 & 3 |
| Origin Realm and Destination Realm Whitelist Screening | Template 4, 5 & 11 |
| Origin host and Origin Realm Consistency Check | Template 6 |
| Route-Record Validation | Template 7 |
| Removal of Blacklisted AVPs | Template 9a, 9b, 12a & 12b |

2.4.1 Template 1: Roaming Scenario Identification

This template computes Peer Type [Foreign or Home Peer], Roamer Type [Inbound or Outbound roamer], which is used by remaining templates.

It is associated with trigger point RTP1.

Template Definition

If @dsr.ingress.peer equals list of foreign peers

Then

Set Internal Variable: \$foreignIngressPeer = 1

Set Internal Variable \$outboundRoaming = (@msg.avp["User-Name"][1].imsi.mccmnc == <LOCAL MCCMNC>)

Set Internal Variable: \$inboundRoaming = !\$outboundRoaming

This template sets internal variables if ingress peer is listed in a foreign peer list.

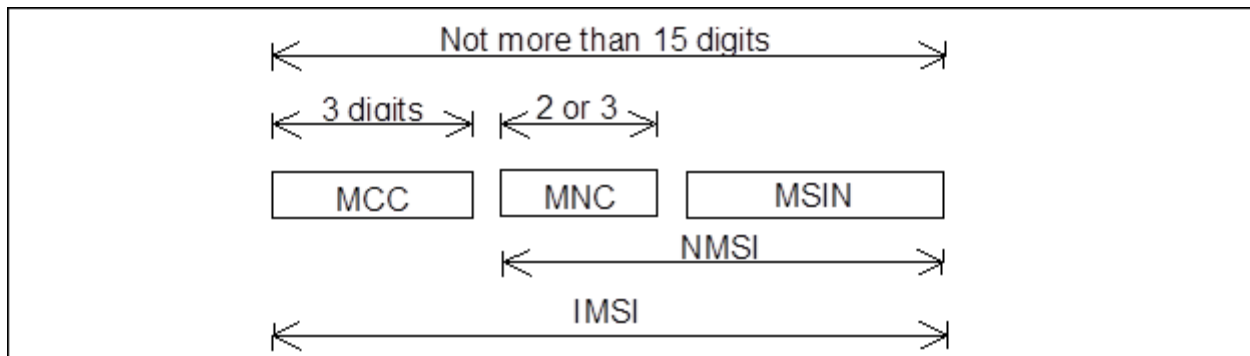
If the peer is in the whitelist then, check IMSI (International Mobile Subscriber Identity) from User-Name AVP to find out the home network of this user.

If the MCCMNC (extracted from IMSI) is equal to the local MCCMNC, then this subscriber is an **outbound** roaming subscriber.

If the MCCMNC (extracted from IMSI) is not equal to the local MCCMNC, then this subscriber is an **inbound** roaming subscriber.

How to Extract MCC and MNC from IMSI Stored in USIM

The value of MNC (two or three digits) depends on the value of MCC.



In our sample testing, we used the following IMSIs:

Table 4: Sample IMSIs

| MCC | MNC | Country | IMSI | Network |
|-----|-----|---------|-----------------|----------------------------|
| 404 | 17 | India | 404179712345678 | Home Network Subscriber |
| 460 | 02 | China | 460022112345678 | Foreign Network Subscriber |

These IMSIs have been used for outbound and inbound subscriber in our sample testing and can be used as a reference.

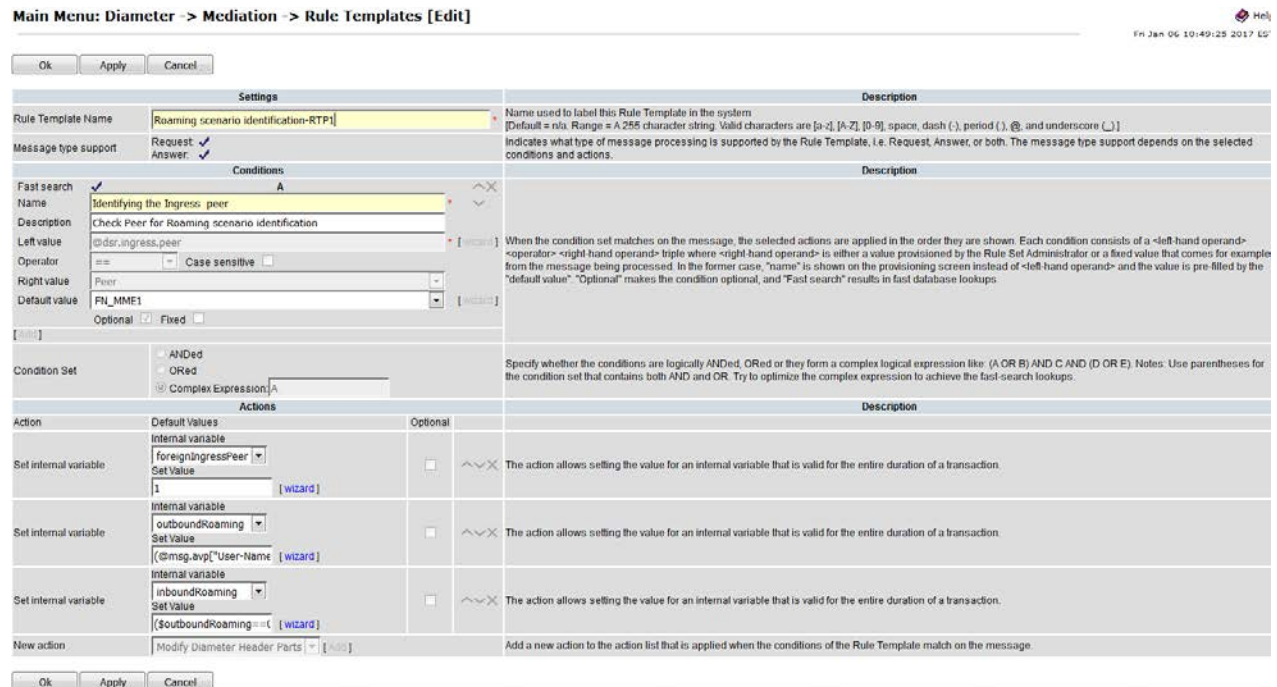


Figure 4: Screenshot of Roaming Scenario Identification Template

2.4.2 Template 2: Application ID and CC WhiteList for Inbound Roamers

This template is applicable for the subscriber marked as Valid Inbound Subscriber by Template 1 “Roaming Scenario Identification.”

If the diameter message is for inbound subscriber, then this template is executed.

This template checks for \$msgDisallowed (to allow this message or not), @msg.application_id (to check that application ID is in the whitelist or not) and @msg.command.code (to check that this command code is allowed or not).

If above conditions are satisfied, then it allows the message by setting \$msgDisallowed = 0.

If not satisfied, then it abandons the message by setting \$msgDisallowed = 10. 10 indicates “Application ID and CC whitelist for inbound roamers” template check fails for this message. Hence, every template sets a different msgDisallowed value in case of failure.

It is associated with trigger point RTP1.

Template Definition

```

IF      $inboundRoaming           is          true
AND    $msgDisallowed             is          false
AND    @msg.application_id         equals     list of application IDs
AND    @msg.command.code           equals     list of command-codes per application ID
THEN   Set Internal Variable:      $msgDisallowed = 0 for all the rules except the default rule:
                                       $msgDisallowed = 10
    
```

Note: CC can be optional, i.e., App-ID can be put on the whitelist without setting any CC. If you decide not to put CC in the whitelist, then only the App-ID filters the messages irrespective of CC in messages.

| Settings | | |
|--|---|--|
| Rule Template Name | Application Id and CC white list for inbound roamers-RTP1 * | Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid c |
| Message type support | Request: <input checked="" type="checkbox"/> Answer: <input checked="" type="checkbox"/> | Indicates what type of message processing is support conditions and actions. |
| Conditions | | |
| Fast search | <input checked="" type="checkbox"/> | A |
| Name | Check for InboundRoamers * | |
| Description | Check for InboundRoamers | |
| Left value | \$inboundRoaming * | [wizard] |
| Operator | is true Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | [wizard] |
| | Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search | <input checked="" type="checkbox"/> | B |
| Name | Check for msgDisallowed * | |
| Description | Check for msgDisallowed | |
| Left value | \$msgDisallowed * | [wizard] |
| Operator | is false Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | [wizard] |
| | Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search | <input checked="" type="checkbox"/> | C |
| Name | Check for ApplicationId * | |
| Description | Check for ApplicationId | |
| Left value | @msg.application_id * | [wizard] |
| Operator | == Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | 16777251 | [wizard] |
| | Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search | <input checked="" type="checkbox"/> | D |
| Name | Check for CommandCode * | |
| Description | Check for CommandCode | |
| Left value | @msg.command.code * | [wizard] |
| Operator | == Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | 360 | [wizard] |
| | Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search | <input checked="" type="checkbox"/> | B |
| Name | Check for msgDisallowed * | |
| Description | Check for msgDisallowed | |
| Left value | \$msgDisallowed * | [wizard] |
| Operator | is false Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | [wizard] |
| | Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search | <input checked="" type="checkbox"/> | C |
| Name | Check for ApplicationId * | |
| Description | Check for ApplicationId | |
| Left value | @msg.application_id * | [wizard] |
| Operator | == Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | 16777251 | [wizard] |
| | Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search | <input checked="" type="checkbox"/> | D |
| Name | Check for CommandCode * | |
| Description | Check for CommandCode | |
| Left value | @msg.command.code * | [wizard] |
| Operator | == Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | 360 | [wizard] |
| | Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/> | |
| Condition Set | <input checked="" type="radio"/> ANDed <input type="radio"/> ORed <input type="radio"/> Complex Expression: A AND B AND C AND D | Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) A the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-search k |
| Actions | | Description |
| Action | Default Values | Optional |
| Set internal variable | Internal variable msgDisallowed Set Value 0 [wizard] | <input type="checkbox"/> |
| | | The action allows setting the value for an internal variable that is valid for the entire duration of a transaction. |
| New action | Modify Diameter Header Parts [wizard] | Add a new action to the action list that is applied when the conditions of the Rule Template match on the message. |
| <input type="button" value="Ok"/> <input type="button" value="Apply"/> <input type="button" value="Cancel"/> | | |

Figure 5: Screenshot of Application ID and CC Whitelist for Inbound Roamers Configured Template

2.4.3 Template 3: Application ID and CC Whitelist for Outbound Roamers

This template is applicable for the subscriber marked as Valid Outbound Subscriber by Template 1 (i.e., roaming scenario identification).

If the diameter message is from outbound subscriber, then this template is executed.

This template checks for \$msgDisallowed (to allow this message or not), @msg.application_id (to check that application ID is in the whitelist or not) and @msg.command.code (to check that this command code is allowed or not).

If above conditions satisfied, then it allows the message by setting \$msgDisallowed = 0.

If not satisfied, then it abandons the message by setting \$msgDisallowed = 20. 20 indicates “Application ID and CC whitelist for outbound roamers” template check fails for this message. Hence, every template sets a different msgDisallowed value in case of failure.

It is associated with trigger point RTP1.

Template Definition

| | | | |
|------|------------------------|--|--|
| IF | \$inboundRoaming | is | true |
| AND | \$msgDisallowed | is | false |
| AND | @msg.application_id | equals | list of application IDs |
| AND | @msg.command.code | equals | list of command-codes per application ID |
| THEN | Set Internal Variable: | \$msgDisallowed = 0 for all the rules except the default rule: \$msgDisallowed = 20 | |

Note: CC can be optional, i.e., App-ID can be put on the whitelist without setting any CC. If you decide not to put CC in the whitelist, then only the App-ID filters the messages irrespective of CC in messages.

Main Menu: Diameter -> Mediation -> Rule Templates [Edit]

Fri Jan 06 12

| Settings | | Description |
|--|---|--|
| Rule Template Name | Application Id and CC white list for outbound roamers-RTP1 | Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @, and underscore] |
| Message type support | Request: <input checked="" type="checkbox"/> Answer: <input checked="" type="checkbox"/> | Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The message type depends on the selected conditions and actions. |
| Conditions | | Description |
| <p>Fast search <input checked="" type="checkbox"/> A</p> <p>Name: Check for Outbound Romers</p> <p>Description: Check for Outbound Romers</p> <p>Left value: \$outboundRoaming</p> <p>Operator: is true Case sensitive <input type="checkbox"/></p> <p>Right value: Integer32</p> <p>Default value: [wizard]</p> <p>Optional <input type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| <p>Fast search <input checked="" type="checkbox"/> B</p> <p>Name: Check for msgDisallowed</p> <p>Description: Check for msgDisallowed</p> <p>Left value: \$msgDisallowed</p> <p>Operator: is false Case sensitive <input type="checkbox"/></p> <p>Right value: Integer32</p> <p>Default value: [wizard]</p> <p>Optional <input type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| <p>Fast search <input checked="" type="checkbox"/> C</p> <p>Name: Check for ApplicationId</p> <p>Description: Check for ApplicationId</p> <p>Left value: @msg.application_id</p> <p>Operator: == Case sensitive <input type="checkbox"/></p> <p>Right value: Integer32</p> <p>Default value: 16777251</p> <p>Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| <p>Name: Check for msgDisallowed</p> <p>Description: Check for msgDisallowed</p> <p>Left value: \$msgDisallowed</p> <p>Operator: is false Case sensitive <input type="checkbox"/></p> <p>Right value: Integer32</p> <p>Default value: [wizard]</p> <p>Optional <input type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| <p>Fast search <input checked="" type="checkbox"/> C</p> <p>Name: Check for ApplicationId</p> <p>Description: Check for ApplicationId</p> <p>Left value: @msg.application_id</p> <p>Operator: == Case sensitive <input type="checkbox"/></p> <p>Right value: Integer32</p> <p>Default value: 16777251</p> <p>Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| <p>Fast search <input checked="" type="checkbox"/> D</p> <p>Name: Check for Commandcode</p> <p>Description: Check for Commandcode</p> <p>Left value: @msg.command.code</p> <p>Operator: == Case sensitive <input type="checkbox"/></p> <p>Right value: Integer32</p> <p>Default value: 316</p> <p>Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| <p>Condition Set</p> <p><input checked="" type="radio"/> ANDed</p> <p><input type="radio"/> ORed</p> <p><input type="radio"/> Complex Expression: A AND B AND C AND D</p> | | |
| Actions | | Description |
| Action | Default Values | Optional |
| Set internal variable | Internal variable: msgDisallowed Set Value: 0 [wizard] | <input type="checkbox"/> |
| New action | Modify Diameter Header Parts [Add] | Add a new action to the action list that is applied when the conditions of the Rule Template match on the message. |

Figure 6: Screenshot of Application ID and CC Whitelist for Outbound Roamers Configured Template

2.4.4 Template 4: OR Whitelist

This template checks the Origin Realm of the incoming diameter message against the whitelist of Origin Realms. If the message's Origin Realm is in the whitelist, then the diameter message is allowed for further processing, otherwise it is not.

This template checks for \$foreignIngressPeer (whitelisted foreign peer), \$msgDisallowed (to allow this message or not), and @msg.avp["Origin-Realm"] (to check that message's Origin Realm is in the whitelist or not).

If above conditions are satisfied, then it allows the message by setting \$msgDisallowed = 0.

If not satisfied, then it abandons the message by setting \$msgDisallowed = 30. 30 indicates "OR whitelist" template check fails for this message. Hence, every template sets a different msgDisallowed value in case of failure.

It is associated with trigger point RTP1.

Template Definition

| | | | |
|------|--------------------------|--|-------------|
| IF | \$foreignIngressPeer | is | true |
| AND | \$msgDisallowed | is | false |
| AND | @msg.avp["Origin-Realm"] | equals | list of ORs |
| THEN | Set Internal Variable: | \$msgDisallowed = 0 for all the rules except the default rule: \$msgDisallowed = 30 | |

Note: The Origin-Realm is an optional condition. If you do not want to check origin realm, then use the empty value of origin realm or do not use this template.

Main Menu: Diameter -> Mediation -> Rule Templates [Edit]

Help

Fri Jan 06 12:52:24 2017 EST

| Settings | | Description |
|--|---|--|
| Rule Template Name | OR Whitelist-RTP1 | Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @, and underscore (_)] |
| Message type support | Request: <input checked="" type="checkbox"/> Answer: <input checked="" type="checkbox"/> | Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The message type support depends on the selected conditions and actions. |
| Conditions | | Description |
| Fast search | <input checked="" type="checkbox"/> | |
| Name | Check for Foreign Ingress Peer | When the condition set matches on the message, the selected actions are applied in the order they are shown. Each condition consists of a <left-hand operand> <operator> <right-hand operand> triple where <right-hand operand> is either a value provisioned by the Rule Set Administrator or a fixed value that comes for example from the message being processed. In the former case, "name" is shown on the provisioning screen instead of <left-hand operand> and the value is pre-filled by the "default value". "Optional" makes the condition optional, and "Fast search" results in fast database lookups. |
| Description | Check for Foreign Ingress Peer | |
| Left value | \$foreignIngressPeer | |
| Operator | is true Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | |
| Optional | <input type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search | <input checked="" type="checkbox"/> | |
| Name | Check for msgDisallowed | |
| Description | Check for msgDisallowed | |
| Left value | \$msgDisallowed | |
| Operator | is false Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | |
| Optional | <input type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search | <input checked="" type="checkbox"/> | |
| Name | Check for Origin Realm AVP | |
| Description | Check for Origin Realm AVP | |
| Left value | @msg.avp["Origin-Realm"][1].data | |
| Operator | == Case sensitive <input type="checkbox"/> | |
| Right value | DiameterIdentity | |
| Default value | fwmm1.com | |
| Optional | <input checked="" type="checkbox"/> Fixed <input type="checkbox"/> | |
| [Add] | | |
| Name | Check for Foreign Ingress Peer | When the condition set matches on the message, the selected actions are applied in the order they are shown. Each <left-hand operand> <operator> <right-hand operand> triple where <right-hand operand> is either a value provisioned Administrator or a fixed value that comes for example from the message being processed. In the former case, "name" is shown on the provisioning screen instead of <left-hand operand> and the value is pre-filled by the "default value". "Optional" makes the condition optional, and "Fast search" results in fast database lookups. |
| Description | Check for Foreign Ingress Peer | |
| Left value | \$foreignIngressPeer | |
| Operator | is true Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | |
| Optional | <input type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search | <input checked="" type="checkbox"/> | |
| Name | Check for msgDisallowed | |
| Description | Check for msgDisallowed | |
| Left value | \$msgDisallowed | |
| Operator | is false Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | |
| Optional | <input type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search | <input checked="" type="checkbox"/> | |
| Name | Check for Origin Realm AVP | |
| Description | Check for Origin Realm AVP | |
| Left value | @msg.avp["Origin-Realm"][1].data | |
| Operator | == Case sensitive <input type="checkbox"/> | |
| Right value | DiameterIdentity | |
| Default value | fwmm1.com | |
| Optional | <input checked="" type="checkbox"/> Fixed <input type="checkbox"/> | |
| [Add] | | |
| Condition Set | <input checked="" type="radio"/> ANDED <input type="radio"/> ORed <input type="radio"/> Complex Expression: A AND B AND C | Specify whether the conditions are logically ANDED, ORed or they form a complex logical expression like: (A OR B) AND C. Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve fast lookups. |
| Actions | | Description |
| Action | Default Values | Optional |
| Set internal variable | Internal variable msgDisallowed Set Value 0 | <input type="checkbox"/> |
| New action | | Modify Diameter Header Parts [Add] |
| The action allows setting the value for an internal variable that is valid for the entire duration of a transaction. | | |
| Add a new action to the action list that is applied when the conditions of the Rule Template match on the message. | | |

Figure 7: Screenshot of OR Whitelist Configured Template

2.4.5 Template 5: DR Whitelist

After successful execution of Template 4 “OR Whitelist,” if \$msgDisallowed is 0 (message is still allowed for further processing), then Template 5 DR Whitelist is executed.

This template checks the Destination Realm of the incoming diameter message against the whitelist of Destination Realms. If the Destination Realm is in the whitelist, then the diameter message is allowed for further processing.

This template checks for \$foreignIngressPeer (whitelisted foreign peer), \$msgDisallowed (to allow this message or not), and @msg.avp["Destination-Realm"] (to check that Destination Realm is in the whitelist or not).

If above conditions are satisfied, then it allows the message by setting \$msgDisallowed = 0.

If not satisfied, then it abandons the message by setting \$msgDisallowed = 40. 40 indicates “DR whitelist” template check fails for this message. Hence, every template sets different msgDisallowed value in case of failure.

It is associated with trigger point RTP1.

Template Definition

```

IF      $foreignIngressPeer      is      true
AND     $msgDisallowed           is      false
AND     @msg.avp["Destination-Realm"] equals list of DRs
THEN    Set Internal Variable:    $msgDisallowed = 0 for all the rules except the default rule:
                                     $msgDisallowed = 40
    
```

Note: The Destination-Realm is an optional condition. If you do not want to check the destination realm, then use the empty value of destination realm or do not use this template.

Main Menu: Diameter -> Mediation -> Rule Templates [Edit]

Fri Jan

| Settings | Description |
|--|---|
| Rule Template Name: DR whitelist-RTP1 * | Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space (-), period (.), @, and ur |
| Message type support: Request <input checked="" type="checkbox"/> Answer: <input checked="" type="checkbox"/> | Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The mess depends on the selected conditions and actions. |
| Conditions | |
| Description | |
| Fast search <input checked="" type="checkbox"/> A | When the condition set matches on the message, the selected actions are applied in the order they are shown. Each co <left-hand operand> <operator> <right-hand operand> triple where <right-hand operand> is either a value provisioned b Administrator or a fixed value that comes for example from the message being processed. In the former case, "name" is provisioning screen instead of <left-hand operand> and the value is pre-filled by the "default value". "Optional" makes the "Fast search" results in fast database lookups. |
| Name: Check for Foreign Ingress Peer * | |
| Description: Check for Foreign Ingress Peer | |
| Left value: \$foreignIngressPeer * [wizard] | |
| Operator: is true Case sensitive <input type="checkbox"/> | |
| Right value: Integer32 | |
| Default value: [wizard] | |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search <input checked="" type="checkbox"/> B | |
| Name: Check for msgDisallowed * | |
| Description: Check for msgDisallowed | |
| Left value: \$msgDisallowed * [wizard] | |
| Operator: is false Case sensitive <input type="checkbox"/> | |
| Right value: Integer32 | |
| Default value: [wizard] | |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search <input checked="" type="checkbox"/> C | |
| Name: Check for Destination-Realm AVP * | |
| Description: Check for Destination-Realm AVP | |
| Left value: @msg.avp["Destination-Realm"][1].data * [wizard] | |
| Operator: == Case sensitive <input type="checkbox"/> | |
| Right value: DiameterIdentity | |
| Default value: homme1.com [wizard] | |
| Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/> | |
| [Add] | |
| Name: Check for Foreign Ingress Peer * | When the condition set matches on the message, the selected actions are applied in the order they are shown. Each condition c <left-hand operand> <operator> <right-hand operand> triple where <right-hand operand> is either a value provisioned by the Ru Administrator or a fixed value that comes for example from the message being processed. In the former case, "name" is shown provisioning screen instead of <left-hand operand> and the value is pre-filled by the "default value". "Optional" makes the conditi "Fast search" results in fast database lookups. |
| Description: Check for Foreign Ingress Peer | |
| Left value: \$foreignIngressPeer * [wizard] | |
| Operator: is true Case sensitive <input type="checkbox"/> | |
| Right value: Integer32 | |
| Default value: [wizard] | |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search <input checked="" type="checkbox"/> B | |
| Name: Check for msgDisallowed * | |
| Description: Check for msgDisallowed | |
| Left value: \$msgDisallowed * [wizard] | |
| Operator: is false Case sensitive <input type="checkbox"/> | |
| Right value: Integer32 | |
| Default value: [wizard] | |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | |
| Fast search <input checked="" type="checkbox"/> C | |
| Name: Check for Destination-Realm AVP * | |
| Description: Check for Destination-Realm AVP | |
| Left value: @msg.avp["Destination-Realm"][1].data * [wizard] | |
| Operator: == Case sensitive <input type="checkbox"/> | |
| Right value: DiameterIdentity | |
| Default value: homme1.com [wizard] | |
| Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/> | |
| [Add] | |
| Condition Set: <input checked="" type="radio"/> ANDed <input type="radio"/> ORed <input type="radio"/> Complex Expression: A AND B AND C | Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C AND (Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast lookups. |
| Actions | |
| Description | |
| Action: Set internal variable | Default Values: Internal variable: msgDisallowed Set Value: 0 [wizard] Optional: <input type="checkbox"/> [wizard] |
| The action allows setting the value for an internal variable that is valid for the entire duration of a transaction. | |
| New action: [Modify Diameter Header Parts] [Add] | |
| Add a new action to the action list that is applied when the conditions of the Rule Template match on the message. | |

Figure 8: Screenshot of DR Whitelist Configured Template

2.4.6 Template 6: OH Ends with OR

After successful screening of the diameter message with Template 5 “DR whitelist,” if the internal variable \$msgDisallowed is still false, then it means the diameter message is allowed for further processing and Template 6 “Origin Host Ends with Origin Realm” is executed.

This template picks the Origin-Host and Origin-Realm AVP from the diameter message and it checks that the Origin-Host is ending with Origin-Realm or not.

If not, then it abandons the diameter message and sets \$msgDisallowed = 50.

It also checks for \$foreignIngressPeer and \$msgDisallowed in the same way as it has been tested by the previous template.

It is associated with trigger point RTP1.

Template Definition

```

IF      $foreignIngressPeer      is      true
AND    $msgDisallowed           is      false
AND    @msg.avp["Origin-Host"]  does not end with  "." + @msg.avp["Origin-Realm"]
THEN   Set Internal Variable:    $msgDisallowed = 50
    
```

Below is the screen shot of configured template “OH ends with OR”:

Main Menu: Diameter -> Mediation -> Rule Templates [Edit]

Ok
Apply
Cancel

| Settings | Description |
|---|---|
| Rule Template Name: OH ends with OR-RTP1 * | Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], s |
| Message type support: Request: <input checked="" type="checkbox"/> Answer: <input checked="" type="checkbox"/> | Indicates what type of message processing is supported by the Rule Template, i.e. F depends on the selected conditions and actions. |
| Conditions | |
| A | |
| Fast search: <input checked="" type="checkbox"/> | |
| Name: Check for Foreign Ingress Peer * | |
| Description: Check for Foreign Ingress Peer | |
| Left value: \$foreignIngressPeer * [wizard] | |
| Operator: is true Case sensitive: <input type="checkbox"/> | |
| Right value: Integer32 | |
| Default value: [wizard] | |
| Optional: <input type="checkbox"/> Fixed: <input type="checkbox"/> | |
| B | |
| Fast search: <input checked="" type="checkbox"/> | |
| Name: Check for msgDisallowed * | |
| Description: Check for msgDisallowed | |
| Left value: \$msgDisallowed * [wizard] | |
| Operator: is false Case sensitive: <input type="checkbox"/> | |
| Right value: Integer32 | |
| Default value: [wizard] | |
| Optional: <input type="checkbox"/> Fixed: <input type="checkbox"/> | |
| C | |
| Fast search: <input checked="" type="checkbox"/> | |
| Name: Check for Origin-Host AVP * | |
| Description: Origin-Host AVP Value does not ends with Origin-Realm AVP Value | |
| Left value: @msg.avp["Origin-Host"][1].data * [wizard] | |
| Operator: !=\$ Case sensitive: <input type="checkbox"/> | |
| Right value: xl-value | |
| Default value: ". " + @msg.avp["Origin-Realm"] [wizard] | |
| Optional: <input type="checkbox"/> Fixed: <input checked="" type="checkbox"/> | |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Name: Check for Foreign Ingress Peer *</p> <p>Description: Check for Foreign Ingress Peer</p> <p>Left value: \$foreignIngressPeer * [wizard]</p> <p>Operator: is true Case sensitive: <input type="checkbox"/></p> <p>Right value: Integer32</p> <p>Default value: [wizard]</p> <p>Optional: <input type="checkbox"/> Fixed: <input type="checkbox"/></p> </div> <div style="width: 45%;"> <p>When the condition set matches on the message, the selected actions are applied in the order they are shown. Each condition consist <left-hand operand> <operator> <right-hand operand> triple where <right-hand operand> is either a value provisioned by the Rule Set Administrator or a fixed value that comes for example from the message being processed. In the former case, "name" is shown on the provisioning screen instead of <left-hand operand> and the value is pre-filled by the "default value". "Optional" makes the condition opti "Fast search" results in fast database lookups.</p> </div> </div> | |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Fast search: <input checked="" type="checkbox"/></p> <p>Name: Check for msgDisallowed *</p> <p>Description: Check for msgDisallowed</p> <p>Left value: \$msgDisallowed * [wizard]</p> <p>Operator: is false Case sensitive: <input type="checkbox"/></p> <p>Right value: Integer32</p> <p>Default value: [wizard]</p> <p>Optional: <input type="checkbox"/> Fixed: <input type="checkbox"/></p> </div> <div style="width: 45%;"> <p>When the condition set matches on the message, the selected actions are applied in the order they are shown. Each condition consist <left-hand operand> <operator> <right-hand operand> triple where <right-hand operand> is either a value provisioned by the Rule Set Administrator or a fixed value that comes for example from the message being processed. In the former case, "name" is shown on the provisioning screen instead of <left-hand operand> and the value is pre-filled by the "default value". "Optional" makes the condition opti "Fast search" results in fast database lookups.</p> </div> </div> | |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Fast search: <input checked="" type="checkbox"/></p> <p>Name: Check for Origin-Host AVP *</p> <p>Description: Origin-Host AVP Value does not ends with Origin-Realm AVP Value</p> <p>Left value: @msg.avp["Origin-Host"][1].data * [wizard]</p> <p>Operator: !=\$ Case sensitive: <input type="checkbox"/></p> <p>Right value: xl-value</p> <p>Default value: ". " + @msg.avp["Origin-Realm"] [wizard]</p> <p>Optional: <input type="checkbox"/> Fixed: <input checked="" type="checkbox"/></p> </div> <div style="width: 45%;"> <p>When the condition set matches on the message, the selected actions are applied in the order they are shown. Each condition consist <left-hand operand> <operator> <right-hand operand> triple where <right-hand operand> is either a value provisioned by the Rule Set Administrator or a fixed value that comes for example from the message being processed. In the former case, "name" is shown on the provisioning screen instead of <left-hand operand> and the value is pre-filled by the "default value". "Optional" makes the condition opti "Fast search" results in fast database lookups.</p> </div> </div> | |
| <p>Condition Set: <input checked="" type="radio"/> ANDed <input type="radio"/> ORed <input type="radio"/> Complex Expression: A AND B AND C</p> <p>Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C AND (D OR E). Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-search lookups.</p> | |
| Actions | |
| Action: Set internal variable | Description: The action allows setting the value for an internal variable that is valid for the entire duration of a transaction. |
| Default Values: Internal variable: msgDisallowed Set Value: 50 [wizard] | |
| Optional: <input type="checkbox"/> | |
| New action: Modify Diameter Header Parts [Add] | Add a new action to the action list that is applied when the conditions of the Rule Template match on the message. |

Ok
Apply
Cancel

Figure 9: Screenshot of OH Ends with OR Configured Template

2.4.7 Template 7: Handle Route Record AVP

After successful screening of diameter message with Template 6 “OH Ends with OR,” if the internal variable \$msgDisallowed is still false, it means the diameter message is allowed for further processing and Template 7 “Handle Route Record AVP” is executed.

This template basically iterated through all the route record AVPs which are present in the diameter message and will compare each rout record AVP with blacklist of Realms. If any Rout Record AVP from diameter message match with ANY realm from blacklisted realms then it will abandoned the message by setting \$msgDisallowed = 60.

It is associated with trigger point RTP1.

Template Definition

```

IF      $foreignIngressPeer          is          true
AND    $msgDisallowed                is          false
AND    `@msg.avp["Route-Record"][[any].data  ends with  list of realms
THEN   Set Internal Variable:        $msgDisallowed = 60
    
```

Note: In this template, we are using ANY keyword, which acts as a loop and iterates through all the route record AVPs to find out blacklisted realms present in any of the route record AVPs. Create one rule for each blacklisted realm.

The right hand side type is set to xl-value to a force slow-search.

Main Menu: Diameter -> Mediation -> Rule Templates [Edit]

| Settings | | Description |
|---|---|--|
| Rule Template Name | Handle RouteRecord AVP | Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space (-), period (.), @, & |
| Message type support | Request: <input checked="" type="checkbox"/> Answer: <input checked="" type="checkbox"/> | Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The depends on the selected conditions and actions. |
| Conditions | | Description |
| Fast search | <input checked="" type="checkbox"/> | |
| A | | |
| Name | Check for Foreign Ingress Peer | |
| Description | Check for Foreign Ingress Peer | |
| Left value | \$foreignIngressPeer | [wizard] |
| Operator | is true <input type="checkbox"/> Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | [wizard] |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | | |
| Fast search | <input checked="" type="checkbox"/> | |
| B | | |
| Name | Check for msgDisallowed | |
| Description | Check for msgDisallowed | |
| Left value | \$msgDisallowed | [wizard] |
| Operator | is false <input type="checkbox"/> Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | [wizard] |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | | |
| Fast search | <input type="checkbox"/> | |
| C | | |
| Name | Check for RouteRecord AVP | |
| Description | RouteRecord AVP, if any Route-Record AVP is ending with blacklisted rez | |
| Left value | @msg.avp["Route-Record"] [any].data | [wizard] |
| Operator | = \$ <input type="checkbox"/> Case sensitive <input type="checkbox"/> | |
| Right value | xl-value | |
| Default value | blstmme1.com | [wizard] |
| Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/> | | |
| [Add] | | |
| Name | Check for Foreign Ingress Peer | |
| Description | Check for Foreign Ingress Peer | |
| Left value | \$foreignIngressPeer | [wizard] |
| Operator | is true <input type="checkbox"/> Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | [wizard] |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | | |
| Fast search | <input checked="" type="checkbox"/> | |
| B | | |
| Name | Check for msgDisallowed | |
| Description | Check for msgDisallowed | |
| Left value | \$msgDisallowed | [wizard] |
| Operator | is false <input type="checkbox"/> Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | [wizard] |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | | |
| Fast search | <input type="checkbox"/> | |
| C | | |
| Name | Check for RouteRecord AVP | |
| Description | RouteRecord AVP, if any Route-Record AVP is ending with blacklisted rez | |
| Left value | @msg.avp["Route-Record"] [any].data | [wizard] |
| Operator | = \$ <input type="checkbox"/> Case sensitive <input type="checkbox"/> | |
| Right value | xl-value | |
| Default value | blstmme1.com | [wizard] |
| Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/> | | |
| [Add] | | |
| Condition Set | <input checked="" type="radio"/> ANDed <input type="radio"/> ORed <input type="radio"/> Complex Expression: A AND B AND C | Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve lookups. |
| Actions | | Description |
| Action | Default Values | Optional |
| Set internal variable | Internal variable msgDisallowed Set Value 60 [wizard] | <input type="checkbox"/> |
| New action | Modify Diameter Header Parts [Add] | Add a new action to the action list that is applied when the conditions of the Rule Template match on the message. |

Figure 10: Screenshot of Handle Route Record AVP Configured Template

2.4.8 Template 8: Handle Disallowed Requests

Template 8 picks certain AVPs from the diameter message, and tests them again with certain countermeasure, which you configure.

If the diameter message fails at any countermeasure, then \$msgDisallowed is set to a non-zero integer.

This template acts on the \$msgDisallowed value.

Template 8 takes three types of action, but you can be modify the requirements.

- **Peg Counter:** Count the number of disallowed request.
- **Raise Alarm:** Include the value of \$msgDisallowed in the alarm description.
- **Abandon** the diameter message.

It is associated with trigger point RTP1.

Template Definition

| | | |
|------|-----------------|---|
| IF | \$msgDisallowed | is true |
| THEN | Peg counter | Count the number of disallowed ingress requests |
| | Raise alarm | Include the value of \$msgDisallowed in the alarm description |
| | Abandon message | |

Main Menu: Diameter -> Mediation -> Rule Templates [Edit]

Ok
Apply
Cancel

| Settings | | Description |
|---|--|---|
| Rule Template Name | Handle disallowed requests * | Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @, ar |
| Message type support | Request <input checked="" type="checkbox"/> Answer: <input checked="" type="checkbox"/> | Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The r |
| Conditions | | Description |
| Fast search <input checked="" type="checkbox"/> | | |
| Name | Check for msgDisallowed * | |
| Description | Check for msgDisallowed | |
| Left value | \$msgDisallowed * | When the condition set matches on the message, the selected actions are applied in the order they are shown. Ea |
| Operator | = | |
| Right value | Integer32 | |
| Default value | 0 | |
| | Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | |
| Condition Set | <input checked="" type="radio"/> ANDed <input type="radio"/> ORed <input type="radio"/> Complex Expression: A | Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) / |
| Actions | | Description |
| Assert Alarm/Event | Alarm/Event Mediation Generic Alarm -- Major <input checked="" type="checkbox"/> Additional info [" + "Error Code :-" + \$ [wizard] | This action allows raising an alarm if the conditions for the rule match. |
| Peg Counter | Measurement measurement_1012 <input checked="" type="checkbox"/> | Peg selected measurement |
| Abandon Message | <input type="checkbox"/> | Silently drop the message. The action is supported by Requests and Answers. |
| Exit from Execution Trigger | <input type="checkbox"/> | Exit from the Execution Trigger bypassing any subsequent Rule Template in it |
| New action | Modify Diameter Header Parts [Add] | Add a new action to the action list that is applied when the conditions of the Rule Template match on the message. |

Ok
Apply
Cancel

Figure 11: Screenshot of Handle Disallowed Requests Configured Template

2.4.9 Template 9a: Remove DOIC AVP

After successful execution of Template 8 “Handle Disallowed Requests,” if the message has failed at any countermeasure check, then the “Handle Disallowed Requests” template abandons the message (As per current configuration).

Once the diameter message passes all the above countermeasure checks (\$msgDisallowed is still 0), then Template 9a “Remove DOIC AVP” is executed.

It checks for DOIC AVP (OC-Supported-Features and OC-OLR AVPs). If it is present in the diameter message, then it deletes the DOIC AVPs and forwards the message for further processing.

It is associated with trigger point RTP1.

Template Definition

```

IF      $foreignIngressPeer          is          true
AND    @msg.avp["OC-Supported-Features"] exists
OR     @msg.avp["OC-OLR"]           exists
THEN   Delete AVP                    OC-Supported-Features
       Delete AVP                    OC-OLR
    
```

Main Menu: Diameter -> Mediation -> Rule Templates [Edit]

Ok
Apply
Cancel

| Settings | Description | |
|--|--|--|
| Rule Template Name: Remove DOIC AVP-RTP1 | Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @] | |
| Message type support: Request: <input checked="" type="checkbox"/> Answer: <input checked="" type="checkbox"/> | Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. T depends on the selected conditions and actions. | |
| Conditions | | |
| A | | |
| Fast search: <input checked="" type="checkbox"/> Name: Check for foreignIngressPeer Description: Check for foreignIngressPeer Left value: \$foreignIngressPeer Operator: is true <input type="checkbox"/> Case sensitive <input type="checkbox"/> Right value: Integer32 Default value: [wizard] | When the condition set matches on the message, the selected actions are applied in the order they are shown. <left-hand operand> <operator> <right-hand operand> triple where <right-hand operand> is either a value provided by the Administrator or a fixed value that comes for example from the message being processed. In the former case, "Fast search" results in fast database lookups. | |
| Fast search: <input type="checkbox"/> Name: Check for AVP OC-Supported-Features Description: Check for AVP OC-Supported-Features Left value: @msg.avp["OC-Supported-Features"][1].data Operator: exists <input type="checkbox"/> Case sensitive <input type="checkbox"/> Right value: Integer32 Default value: [wizard] | | |
| Fast search: <input type="checkbox"/> Name: Check for OC-OLR AVP Description: Check for OC-OLR AVP Left value: @msg.avp["OC-OLR"][1].data Operator: exists <input type="checkbox"/> Case sensitive <input type="checkbox"/> Right value: Integer32 Default value: [wizard] | | |
| [Add] | | |
| Condition Set: <input type="radio"/> ANDED <input type="radio"/> ORed <input checked="" type="radio"/> Complex Expression: A AND (B OR C) | | |
| Name: Check for AVP OC-Supported-Features Description: Check for AVP OC-Supported-Features Left value: @msg.avp["OC-Supported-Features"][1].data Operator: exists <input type="checkbox"/> Case sensitive <input type="checkbox"/> Right value: Integer32 Default value: [wizard] | | |
| Fast search: <input type="checkbox"/> Name: Check for OC-OLR AVP Description: Check for OC-OLR AVP Left value: @msg.avp["OC-OLR"][1].data Operator: exists <input type="checkbox"/> Case sensitive <input type="checkbox"/> Right value: Integer32 Default value: [wizard] | | |
| [Add] | | |
| Condition Set: <input type="radio"/> ANDED <input type="radio"/> ORed <input checked="" type="radio"/> Complex Expression: A AND (B OR C) | | |
| Actions | | |
| Action: Delete AVP Default Values: Delete parent AVP if it is empty: <input type="checkbox"/> Instance: OC-Supported-Features \$index OC-Feature-Vector: [Add] With the value: [wizard] | Optional: <input type="checkbox"/> Description: The action allows deleting a specified AVP in the message. | |
| Action: Delete AVP Default Values: Delete parent AVP if it is empty: <input type="checkbox"/> Instance: OC-OLR \$index OC-Reduction-Percentage: [Add] With the value: [wizard] | Optional: <input type="checkbox"/> Description: The action allows deleting a specified AVP in the message. | |
| New action: Modify Diameter Header Parts [Add] | Add a new action to the action list that is applied when the conditions of the Rule Template match on the message. | |

Ok
Apply
Cancel

Figure 12: Screenshot of Remove DOIC AVP Configured Template

2.4.10 Template 9b: Remove DRMP AVP

After successful execution of Template 8 “Handle Disallowed Requests,” if the message has failed at any countermeasure check, then the “Handle Disallowed Requests” template abandons the message (As per current configuration).

Once the diameter message passes all the above countermeasure checks (\$msgDisallowed is still 0), then Template 9b “Remove DRMP AVP” is executed.

It checks for DRMP AVP. If it is present in the diameter message, then it deletes the DRMP AVP and forwards the message for further processing.

It is associated with trigger point RTP1.

Template Definition

```

IF      $foreignIngressPeer      is      true
AND    @msg.avp["DRMP"]         exists
THEN   Delete AVP               DRMP
    
```

| Settings | | Description |
|--|--|---|
| Rule Template Name | Remove DRMP AVP-RTP1 | Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @, and underscore (_)] |
| Message type support | Request: <input checked="" type="checkbox"/> Answer: <input checked="" type="checkbox"/> | Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The message type support depends on the selected conditions and actions. |
| Conditions | | Description |
| <p>Fast search <input checked="" type="checkbox"/> A</p> <p>Name: Check for Foreign Ingress Peer</p> <p>Description: Check for Foreign Ingress Peer</p> <p>Left value: \$foreignIngressPeer</p> <p>Operator: is true Case sensitive <input type="checkbox"/></p> <p>Right value: Integer32</p> <p>Default value: [wizard]</p> <p>Optional <input type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| <p>Fast search <input checked="" type="checkbox"/> B</p> <p>Name: Check for DRMP AVP</p> <p>Description: Check for DRMP AVP</p> <p>Left value: @msg.avp["DRMP"][1].data</p> <p>Operator: exists Case sensitive <input type="checkbox"/></p> <p>Right value: Integer32</p> <p>Default value: [wizard]</p> <p>Optional <input type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| Condition Set | <input checked="" type="radio"/> ANded <input type="radio"/> ORed <input type="radio"/> Complex Expression: A AND B | Specify whether the conditions are logically ANded, ORed or they form a complex logical expression like: (A OR B) AND C AND (D OR E) Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-search lookups. |
| Actions | | Description |
| Action | Default Values Delete parent AVP if it is empty: <input type="checkbox"/> Instance: DRMP All With the value: [wizard] | The action allows deleting a specified AVP in the message. |
| New action | Modify Diameter Header Parts [Add] | Add a new action to the action list that is applied when the conditions of the Rule Template match on the message. |

Ok Apply Cancel

Figure 13: Screenshot of Remove DRMP AVP Configured Template

2.4.11 Template 10: Roaming Scenario Identification

Template 10 checks for an egress peer before sending the diameter message to the connection.

It checks for application ID s6a, which is fixed in the current configuration; egress peer (check for egress foreign peer); and command code. In the sample configuration, only two commands are allowed: AIR and ULR.

If the condition is satisfied, then the diameter message is marked for keeping track by setting \$foreignEgressPeer = 1.

It is associated with trigger point RTP10.

Template Definition

| | | | | |
|------|------------------------|--------|-------------------------|---------------|
| IF | @msg.application_id | equals | S6a | |
| AND | @dsr.egress.peer | equals | list of | foreign peers |
| AND | @msg.command.code | equals | AIR | |
| OR | @msg.command.code | equals | ULR | |
| THEN | Set Internal Variable: | | \$foreignEgressPeer = 1 | |

| Settings | | Description |
|---|---|---|
| Rule Template Name | Roaming scenario identification-RTP10 * | Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @ |
| Message type support | Request: <input checked="" type="checkbox"/> Answer: <input checked="" type="checkbox"/> | Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. It depends on the selected conditions and actions. |
| Conditions | | Description |
| <p>Fast search <input checked="" type="checkbox"/> A ^X</p> <p>Name Identifying the Egress peer * ^v</p> <p>Description Check Peer for Roaming scenario identification</p> <p>Left value @dsr.egress.peer * [wizard]</p> <p>Operator == Case sensitive <input type="checkbox"/></p> <p>Right value Peer</p> <p>Default value FN_HSS1 [wizard]</p> <p>Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| <p>Fast search <input checked="" type="checkbox"/> B ^X</p> <p>Name Check for Application ID * ^v</p> <p>Description Check for Application ID</p> <p>Left value @msg.application_id * [wizard]</p> <p>Operator == Case sensitive <input type="checkbox"/></p> <p>Right value Integer32</p> <p>Default value 16777251 [wizard]</p> <p>Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| <p>Fast search <input checked="" type="checkbox"/> C ^X</p> <p>Name Check for Command code * ^v</p> <p>Description Check for Command code</p> <p>Left value @msg.command.code * [wizard]</p> <p>Operator == Case sensitive <input type="checkbox"/></p> <p>Right value Integer32</p> <p>Default value 316 [wizard]</p> <p>Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| <p>[Add]</p> <p>Condition Set</p> <p><input checked="" type="radio"/> ANDed <input type="radio"/> ORed <input type="radio"/> Complex Expression: A AND B AND C</p> | | Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B AND C AND D). Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the best lookups. |
| Actions | | Description |
| <p>Fast search <input checked="" type="checkbox"/> A ^X</p> <p>Name Identifying the Egress peer * ^v</p> <p>Description Check Peer for Roaming scenario identification</p> <p>Left value @dsr.egress.peer * [wizard]</p> <p>Operator == Case sensitive <input type="checkbox"/></p> <p>Right value Peer</p> <p>Default value FN_HSS1 [wizard]</p> <p>Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| <p>Fast search <input checked="" type="checkbox"/> B ^X</p> <p>Name Check for Application ID * ^v</p> <p>Description Check for Application ID</p> <p>Left value @msg.application_id * [wizard]</p> <p>Operator == Case sensitive <input type="checkbox"/></p> <p>Right value Integer32</p> <p>Default value 16777251 [wizard]</p> <p>Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| <p>Fast search <input checked="" type="checkbox"/> C ^X</p> <p>Name Check for Command code * ^v</p> <p>Description Check for Command code</p> <p>Left value @msg.command.code * [wizard]</p> <p>Operator == Case sensitive <input type="checkbox"/></p> <p>Right value Integer32</p> <p>Default value 316 [wizard]</p> <p>Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/></p> | | |
| <p>[Add]</p> <p>Condition Set</p> <p><input checked="" type="radio"/> ANDed <input type="radio"/> ORed <input type="radio"/> Complex Expression: A AND B AND C</p> | | Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C AND D. Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the best lookups. |
| Actions | | Description |
| Action | Default Values | Optional |
| Set internal variable | Internal variable foreignEgressPeer Set Value 1 [wizard] | <input type="checkbox"/> ^X |
| <p>New action</p> <p>Modify Diameter Header Parts [Add]</p> | | Add a new action to the action list that is applied when the conditions of the Rule Template match on the message. |

Figure 14: Screenshot of Roaming Scenario Identification Configured Template

2.4.12 Template 11: Destination-Realm Whitelist

Once the Template 10 “Roaming Scenario Identification” successfully executes, and \$foreignEgressPeer is set to 1, Template 11 checks for Destination Realm AVP.

If the Destination Realm of the current diameter message is in the Destination Realm whitelist, then the \$msgDisallowed is set to 0; otherwise, \$msgDisallowed is 100, where 100 indicates the “Destination-Realm Whitelist” template check failed.

It is associated with trigger point RTP10.

Template Definition

| | | | |
|------|-------------------------------|---|-------------|
| IF | \$foreignEgressPeer | is | true |
| AND | \$msgDisallowed | is | false |
| AND | @msg.avp["Destination-Realm"] | equals | list of DRs |
| THEN | Set Internal Variable: | \$msgDisallowed = 0 for all the rules except the default rule: \$msgDisallowed = 100 | |

| Settings | | Description |
|---|---|--|
| Rule Template Name | Destination-Realm whitelist-RTP10 | Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @, and _] |
| Message type support | Request: <input checked="" type="checkbox"/> Answer: <input checked="" type="checkbox"/> | Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The rule depends on the selected conditions and actions. |
| Conditions | | Description |
| Fast search | <input checked="" type="checkbox"/> | |
| Name | Check for Foreign Egress Peer | |
| Description | Check for Foreign Egress Peer | |
| Left value | \$foreignEgressPeer | [wizard] |
| Operator | is true Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | [wizard] |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | | |
| Fast search | <input checked="" type="checkbox"/> | |
| Name | Check for msgDisallowed | |
| Description | Check for msgDisallowed | |
| Left value | \$msgDisallowed | [wizard] |
| Operator | is false Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | [wizard] |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | | |
| Fast search | <input checked="" type="checkbox"/> | |
| Name | Check for Destination-Realm AVP | |
| Description | Check for Destination-Realm AVP | |
| Left value | @msg.avp["Destination-Realm"][1].data | [wizard] |
| Operator | == Case sensitive <input type="checkbox"/> | |
| Right value | DiameterIdentity | |
| Default value | fwhss1.com | [wizard] |
| Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/> | | |
| [Add] | | |
| Condition Set | <input checked="" type="radio"/> ANDed <input type="radio"/> ORed <input type="radio"/> Complex Expression: A AND B AND C | Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C. Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-search lookups. |
| Actions | | Description |
| Name | Check for Foreign Egress Peer | |
| Description | Check for Foreign Egress Peer | |
| Left value | \$foreignEgressPeer | [wizard] |
| Operator | is true Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | [wizard] |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | | |
| Fast search | <input checked="" type="checkbox"/> | |
| Name | Check for msgDisallowed | |
| Description | Check for msgDisallowed | |
| Left value | \$msgDisallowed | [wizard] |
| Operator | is false Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | [wizard] |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | | |
| Fast search | <input checked="" type="checkbox"/> | |
| Name | Check for Destination-Realm AVP | |
| Description | Check for Destination-Realm AVP | |
| Left value | @msg.avp["Destination-Realm"][1].data | [wizard] |
| Operator | == Case sensitive <input type="checkbox"/> | |
| Right value | DiameterIdentity | |
| Default value | fwhss1.com | [wizard] |
| Optional <input checked="" type="checkbox"/> Fixed <input type="checkbox"/> | | |
| [Add] | | |
| Condition Set | <input checked="" type="radio"/> ANDed <input type="radio"/> ORed <input type="radio"/> Complex Expression: A AND B AND C | Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C AND (D OR E). Note Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-search lookups. |
| Actions | | Description |
| Action | Default Values | Optional |
| Set internal variable | Internal variable msgDisallowed Set Value 0 [wizard] | <input type="checkbox"/> |
| | | The action allows setting the value for an internal variable that is valid for the entire duration of a transaction. |
| New action | Modify Diameter Header Parts [Add] | Add a new action to the action list that is applied when the conditions of the Rule Template match on the message. |

Figure 15: Screenshot of Destination-Realm Whitelist Configured Template

2.4.13 Template 12a: Remove DOIC AVP

This template's behavior is same as Template 9a, but association to trigger point is different and this works for egress peer.

It checks for DOIC AVP (OC-Supported-Features and OC-OLR AVPs). If it is present in the diameter message, then it deletes the AVPs and forwards the message for further processing.

It is associated with trigger point RTP10.

Template Definition

| | | | |
|------|-----------------------------------|-----------------------|------|
| IF | \$foreignEgressPeer | is | true |
| AND | @msg.avp["OC-Supported-Features"] | exists | |
| OR | @msg.avp["OC-OLR"] | exists | |
| THEN | Delete AVP | OC-Supported-Features | |
| | Delete AVP | OC-OLR | |

Main Menu: Diameter -> Mediation -> Rule Templates [Edit] Sat Jan 07 02

Ok Apply Cancel

| Settings | | Description |
|--|--|--|
| Rule Template Name | Remove DOIC AVP-RTF10 | Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @, and underscore (_)] |
| Message type support | Request <input checked="" type="checkbox"/> Answer <input checked="" type="checkbox"/> | Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The message type support depends on the selected actions. |
| Conditions | | Description |
| Fast search <input checked="" type="checkbox"/> A | | |
| Name | Check for Foreign Egress Peer | |
| Description | Check for Foreign Egress Peer | |
| Left value | \$foreignEgressPeer | |
| Operator | is true <input type="checkbox"/> Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | | |
| Fast search <input checked="" type="checkbox"/> B | | |
| Name | Match for OC-Supported-Feature AVP | |
| Description | Match for OC-Supported-Feature AVP | |
| Left value | @msg.avp["OC-Supported-Features"][1].data | |
| Operator | exists <input type="checkbox"/> Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | | |
| Fast search <input checked="" type="checkbox"/> C | | |
| Name | Match for OC-OLR AVP | |
| Description | Match for OC-OLR AVP | |
| Left value | @msg.avp["OC-OLR"][1].data | |
| Operator | exists <input type="checkbox"/> Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | | |
| Fast search <input checked="" type="checkbox"/> C | | |
| Name | Match for OC-Supported-Feature AVP | |
| Description | Match for OC-Supported-Feature AVP | |
| Left value | @msg.avp["OC-Supported-Features"][1].data | |
| Operator | exists <input type="checkbox"/> Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | | |
| Fast search <input checked="" type="checkbox"/> C | | |
| Name | Match for OC-OLR AVP | |
| Description | Match for OC-OLR AVP | |
| Left value | @msg.avp["OC-OLR"][1].data | |
| Operator | exists <input type="checkbox"/> Case sensitive <input type="checkbox"/> | |
| Right value | Integer32 | |
| Default value | | |
| Optional <input type="checkbox"/> Fixed <input type="checkbox"/> | | |
| Condition Set | <input type="checkbox"/> ANDed <input type="checkbox"/> ORed <input checked="" type="checkbox"/> Complex Expression (A AND (B OR C)) | Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C AND (D OR E). Notes: Use parentheses for the complex set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-search lookups. |
| Actions | | Description |
| Action | Default Values | Optional |
| Delete AVP | Delete parent AVP if it is empty: <input type="checkbox"/> Instance OC-Supported-Features <input type="text" value="sindex"/> <input checked="" type="checkbox"/> OC-Feature-Vector <input type="text"/> <input type="button" value="Add"/> With the value: <input type="text"/> <input type="button" value="Clear"/> | <input type="checkbox"/> <input checked="" type="checkbox"/> |
| Delete AVP | Delete parent AVP if it is empty: <input type="checkbox"/> Instance OC-OLR <input type="text" value="sindex"/> <input checked="" type="checkbox"/> OC-Reduction-Percentage <input type="text"/> <input type="button" value="Add"/> With the value: <input type="text"/> <input type="button" value="Clear"/> | <input type="checkbox"/> <input checked="" type="checkbox"/> |
| New action | Modify Diameter Header Parts <input type="text"/> <input type="button" value="Add"/> | Add a new action to the action list that is applied when the conditions of the Rule Template match on the message. |

Ok Apply Cancel

Figure 16: Screenshot of Remove DOIC AVP Configured Template

2.4.14 Template 12b: Remove DRMP AVP

This template behavior is same as template 9b but association to trigger point is different and this will work for egress peer.

It checks for DRMP AVP. If it is present in the diameter message, then it deletes the DFRMP AVP and forwards the message for further processing.

It is associated with trigger point RTP10.

Template Definition

```
IF      $foreignEgressPeer           is           true
AND    @msg.avp["DRMP"]             exists
THEN   Delete AVP                   DRMP
```

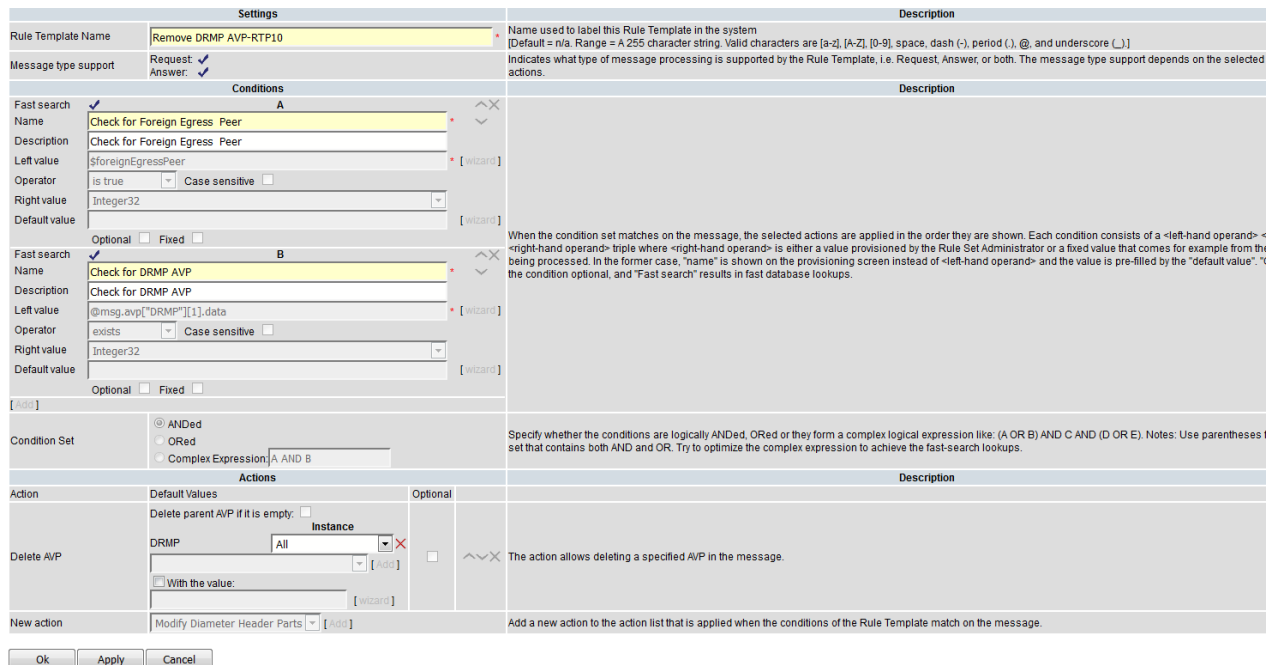


Figure 17: Screenshot of Configured Template

2.5 Insert Rules within a Rule Set

Insert rules within each rule set according to configuration. The condition value within each rule can be customized according to requirements.

In this sample application testing, templates are created (see screenshots of each of the Templates in Figure 4 though Figure 17) and rules are added accordingly in each template.

To insert a rule into the rule set:

1. Navigate to Main Menu -> Diameter -> Mediation -> Rule Sets.
2. Select a rule set and click Insert.

The following screenshots display each rule set with rules that can be used as a reference.

Main Menu: Diameter -> Mediation -> Rule Sets -> Roaming scenario identification-RTP1

Display Filter: - None - = Reset Go

IF A
THEN Set internal variable, Set internal variable, Set internal variable

Displaying Records 1-4 of 4 | First | Prev | 1 | Next | Last | Restore Order

| Rule Id | A | Set internal variable | | Set internal variable | | Set internal variable | |
|---------|---------|------------------------------|-------------------|-----------------------|---|-----------------------|------------------------|
| | | Identifying the Ingress peer | Internal variable | Set Value | Internal variable | Set Value | Internal variable |
| 48 | FN_HSS1 | foreignIngressPeer | 1 | outboundRoaming | (@msg.avp["User-Name"][1].imsi.mccmnc==40417) | inboundRoaming | (\$outboundRoaming==0) |
| 49 | FN_HSS2 | foreignIngressPeer | 1 | outboundRoaming | (@msg.avp["User-Name"][1].imsi.mccmnc==40417) | inboundRoaming | (\$outboundRoaming==0) |
| 46 | FN_MME1 | foreignIngressPeer | 1 | outboundRoaming | (@msg.avp["User-Name"][1].imsi.mccmnc==40417) | inboundRoaming | (\$outboundRoaming==0) |
| 47 | FN_MME2 | foreignIngressPeer | 1 | outboundRoaming | (@msg.avp["User-Name"][1].imsi.mccmnc==40417) | inboundRoaming | (\$outboundRoaming==0) |

Displaying Records 1-4 of 4 | First | Prev | 1 | Next | Last | Restore Order

Insert Import Delete All Rules Edit Delete Export Show Counters >> Pause Updates

Figure 18: Template 1: Roaming Scenario Identification

IF A AND B AND C AND D
THEN Set internal variable

Displaying Records 1-6 of 6 | First | Prev | 1 | Next | Last | Restore Order

| Rule Id | A | B | C | D | Set internal variable | |
|---------|--------------------------|-------------------------|-------------------------|-----------------------|-----------------------|-----------|
| | Check for InboundRoamers | Check for msgDisallowed | Check for ApplicationId | Check for CommandCode | Internal variable | Set Value |
| 169 | IS TRUE | IS FALSE | 16777251 | 317 | msgDisallowed | 0 |
| 170 | IS TRUE | IS FALSE | 16777251 | 319 | msgDisallowed | 0 |
| 171 | IS TRUE | IS FALSE | 16777251 | 320 | msgDisallowed | 0 |
| 172 | IS TRUE | IS FALSE | 16777251 | 322 | msgDisallowed | 0 |
| 173 | IS TRUE | IS FALSE | 16777252 | | msgDisallowed | 0 |
| 174 | IS TRUE | IS FALSE | | | msgDisallowed | 10 |

Displaying Records 1-6 of 6 | First | Prev | 1 | Next | Last | Restore Order

Figure 19: Template 2: Application ID and CC Whitelist for Inbound Roamers

Displaying Records 1-6 of 6 | First | Prev | 1 | Next | Last | Restore Order

| Rule Id | A | B | C | D | Set internal variable | |
|---------|---------------------------|-------------------------|-------------------------|-----------------------|-----------------------|-----------|
| | Check for Outbound Romers | Check for msgDisallowed | Check for ApplicationId | Check for Commandcode | Internal variable | Set Value |
| 175 | IS TRUE | IS FALSE | 16777251 | 316 | msgDisallowed | 0 |
| 176 | IS TRUE | IS FALSE | 16777251 | 318 | msgDisallowed | 0 |
| 177 | IS TRUE | IS FALSE | 16777251 | 321 | msgDisallowed | 0 |
| 178 | IS TRUE | IS FALSE | 16777251 | 323 | msgDisallowed | 0 |
| 179 | IS TRUE | IS FALSE | 16777252 | | msgDisallowed | 0 |
| 180 | IS TRUE | IS FALSE | | | msgDisallowed | 20 |

Displaying Records 1-6 of 6 | First | Prev | 1 | Next | Last | Restore Order

Figure 20: Template 3: Application ID and CC Whitelist for Outbound Roamers

IF A AND B AND C
THEN Set internal variable

Displaying Records 1-5 of 5 | [First](#) | [Prev](#) | 1 | [Next](#) | [Last](#) | [Restore Order](#)

| Rule Id | A | B | C | Set internal variable | |
|---------|--------------------------------|-------------------------|----------------------------|-----------------------|-----------|
| | Check for Foreign Ingress Peer | Check for msgDisallowed | Check for Origin Realm AVP | Internal variable | Set Value |
| 183 | IS TRUE | IS FALSE | fwsss1.com | msgDisallowed | 0 |
| 184 | IS TRUE | IS FALSE | fwsss2.com | msgDisallowed | 0 |
| 181 | IS TRUE | IS FALSE | fwmme1.com | msgDisallowed | 0 |
| 182 | IS TRUE | IS FALSE | fwmme2.com | msgDisallowed | 0 |
| 185 | IS TRUE | IS FALSE | | msgDisallowed | 30 |

Displaying Records 1-5 of 5 | [First](#) | [Prev](#) | 1 | [Next](#) | [Last](#) | [Restore Order](#)

Figure 21: Template 4: OR Whitelist

IF A AND B AND C
THEN Set internal variable

Displaying Records 1-5 of 5 | [First](#) | [Prev](#) | 1 | [Next](#) | [Last](#) | [Restore Order](#)

| Rule Id | A | B | C | Set internal variable | |
|---------|--------------------------------|-------------------------|---------------------------------|-----------------------|-----------|
| | Check for Foreign Ingress Peer | Check for msgDisallowed | Check for Destination-Realm AVP | Internal variable | Set Value |
| 188 | IS TRUE | IS FALSE | hohss1.com | msgDisallowed | 0 |
| 189 | IS TRUE | IS FALSE | hohss2.com | msgDisallowed | 0 |
| 186 | IS TRUE | IS FALSE | homme1.com | msgDisallowed | 0 |
| 187 | IS TRUE | IS FALSE | homme2.com | msgDisallowed | 0 |
| 190 | IS TRUE | IS FALSE | | msgDisallowed | 40 |

Displaying Records 1-5 of 5 | [First](#) | [Prev](#) | 1 | [Next](#) | [Last](#) | [Restore Order](#)

Figure 22: Template 5: DR Whitelist

THEN Set internal variable

Displaying Records 1-1 of 1 | [First](#) | [Prev](#) | 1 | [Next](#) | [Last](#) | [Restore Order](#)

| Rule Id | A | B | C | Set internal variable | |
|---------|--------------------------------|-------------------------|--------------------------------|-----------------------|-----------|
| | Check for Foreign Ingress Peer | Check for msgDisallowed | Check for Origin-Host AVP | Internal variable | Set Value |
| 211 | IS TRUE | IS FALSE | ".* + @msg.avp["Origin-Realm"] | msgDisallowed | 50 |

Displaying Records 1-1 of 1 | [First](#) | [Prev](#) | 1 | [Next](#) | [Last](#) | [Restore Order](#)

Figure 23: Template 6: OH Ends with OR

THEN Set internal variable

Displaying Records 1-2 of 2 | [First](#) | [Prev](#) | 1 | [Next](#) | [Last](#) | [Restore Order](#)

| Rule Id | Move the rule | A | B | C | Set internal variable | | Move the rule |
|---------|---|--------------------------------|-------------------------|---------------------------|-----------------------|-----------|---|
| | | Check for Foreign Ingress Peer | Check for msgDisallowed | Check for RouteRecord AVP | Internal variable | Set Value | |
| 148 | Down | IS TRUE | IS FALSE | blistmme2.com | msgDisallowed | 60 | Down |
| 147 | Up Down | IS TRUE | IS FALSE | blistmme1.com | msgDisallowed | 60 | Up Down |

Displaying Records 1-2 of 2 | [First](#) | [Prev](#) | 1 | [Next](#) | [Last](#) | [Restore Order](#)

Figure 24: Template 7: Handle RouteRecord AVP

IF A
THEN Assert Alarm/Event, Peg Counter, Abandon Message, Exit from Execution Trigger

Displaying Records 1-7 of 7 | First | Prev | 1 | Next | Last | Restore Order

| Rule Id | A | Assert Alarm/Event | Measurement |
|---------|-------------------------|--|----------------------------------|
| | Check for msgDisallowed | Alarm/Event | |
| 213 | 10 | Mediation Generic Alarm -- Major [" + "Error Code :-" + String(\$msgDisallowed) + ":" + "Error Description :-" + " Application Id and CC white list for inbound roamers check failed. Abandoned the message" | measurement_inbound_10 |
| 219 | 100 | Mediation Generic Alarm -- Major [" + "Error Code :-" + String(\$msgDisallowed) + ":" + "Error Description :-" + " Destination-Realm whitelist check failed. Abandoned the message" | measurement_DestRealm_ER_100 |
| 214 | 20 | Mediation Generic Alarm -- Major [" + "Error Code :-" + String(\$msgDisallowed) + ":" + "Error Description :-" + " Application Id and CC white list for outbound roamers check failed. Abandoned the message" | measurement_outbound_20 |
| 215 | 30 | Mediation Generic Alarm -- Major [" + "Error Code :-" + String(\$msgDisallowed) + ":" + "Error Description :-" + " OR whitelist check failed. Abandoned the message" | measurement_ORWhitelist_30 |
| 216 | 40 | Mediation Generic Alarm -- Major [" + "Error Code :-" + String(\$msgDisallowed) + ":" + "Error Description :-" + " DR whitelist check failed. Abandoned the message" | measurement_DRWhitelist_40 |
| 217 | 50 | Mediation Generic Alarm -- Major [" + "Error Code :-" + String(\$msgDisallowed) + ":" + "Error Description :-" + " OH ends with OR check failed. Abandoned the message" | measurement_OH_ends_with_OR_50 |
| 218 | 60 | Mediation Generic Alarm -- Major [" + "Error Code :-" + String(\$msgDisallowed) + ":" + "Error Description :-" + " Handle RouteRecord AVP check failed. Abandoned the message" | measurement_Handle_RRecordAVP_60 |

Displaying Records 1-7 of 7 | First | Prev | 1 | Next | Last | Restore Order

Insert Import Delete All Rules Edit Delete Export Show Counters >> Pause Updates

Figure 25: Template 8: Handle Disallowed Requests

Displaying Records 1-1 of 1 | First | Prev | 1 | Next | Last | Restore Order

| Rule Id | Move the rule | A | B | C | Delete AVP | Delete AVP | Move the rule |
|---------|---------------|------------------------------|-------------------------------------|----------------------|--------------------------------|-----------------|---------------|
| | | Check for foreignIngressPeer | Check for AVP OC-Supported-Features | Check for OC-OLR AVP | OC-Supported-Features[\$index] | OC-OLR[\$index] | |
| 192 | | IS TRUE | EXISTS | EXISTS | | | |

Displaying Records 1-1 of 1 | First | Prev | 1 | Next | Last | Restore Order

Figure 26: Template 9a: Remove DOIC AVP

THEN Delete AVP

Displaying Records 1-1 of 1 | First | Prev | 1 | Next | Last | Restore Order

| Rule Id | A | B | Delete AVP | Rule Counters |
|---------|--------------------------------|--------------------|------------|---------------|
| | Check for Foreign Ingress Peer | Check for DRMP AVP | DRMP[0] | Total Pegs |
| 193 | IS TRUE | EXISTS | DRMP[0] | 0 |

Displaying Records 1-1 of 1 | First | Prev | 1 | Next | Last | Restore Order

Figure 27: Template 9b: Remove DRMP AVP

THEN Set internal variable

Displaying Records 1-4 of 4 | First | Prev | 1 | Next | Last | Restore Order

| Rule Id | A | B | C | Set internal variable | Rule Counters |
|---------|-----------------------------|--------------------------|------------------------|-----------------------|---------------|
| | Identifying the Egress peer | Check for Application ID | Check for Command code | Internal variable | Set Value |
| 74 | FN_HSS1 | 16777251 | 316 | foreignEgressPeer | 1 |
| 76 | FN_HSS1 | 16777251 | 318 | foreignEgressPeer | 1 |
| 77 | FN_HSS2 | 16777251 | 316 | foreignEgressPeer | 1 |
| 75 | FN_HSS2 | 16777251 | 318 | foreignEgressPeer | 1 |

Displaying Records 1-4 of 4 | First | Prev | 1 | Next | Last | Restore Order

All Rules Edit Delete Export << Hide Counters Expand Counters Pause Updates

Figure 28: Template 10. Roaming Scenario Identification

IF A AND B AND C
THEN Set internal variable

Displaying Records 1-3 of 3 | First | Prev | 1 | Next | Last | Restore Order

| Rule Id | A | B | C | Set internal variable | |
|---------|-------------------------------|-------------------------|---------------------------------|-----------------------|-----------|
| | Check for Foreign Egress Peer | Check for msgDisallowed | Check for Destination-Realm AVP | Internal variable | Set Value |
| 195 | IS TRUE | IS FALSE | fwsss1.com | msgDisallowed | 0 |
| 196 | IS TRUE | IS FALSE | fwsss2.com | msgDisallowed | 0 |
| 197 | IS TRUE | IS FALSE | | msgDisallowed | 100 |

Displaying Records 1-3 of 3 | First | Prev | 1 | Next | Last | Restore Order

Figure 29: Template 11. Destination-Realm Whitelist

IF A AND (B OR C)
THEN Delete AVP, Delete AVP

Displaying Records 1-1 of 1 | First | Prev | 1 | Next | Last | Restore Order

| Rule Id | Move the rule | A | B | C | Delete AVP | Delete AVP | Move the rule |
|---------|---------------|-------------------------------|------------------------------------|----------------------|--------------------------------|-----------------|---------------|
| | | Check for Foreign Egress Peer | Match for OC-Supported-Feature AVP | Match for OC-OLR AVP | OC-Supported-Features[\$index] | OC-OLR[\$index] | |
| 194 | | IS TRUE | EXISTS | EXISTS | OC-Supported-Features[\$index] | OC-OLR[\$index] | |

Displaying Records 1-1 of 1 | First | Prev | 1 | Next | Last | Restore Order

Figure 30: Template 12a. Remove DOIC AVP

IF A AND B
THEN Delete AVP

Displaying Records 1-1 of 1 | First | Prev | 1 | Next | Last | Restore Order

| Rule Id | A | B | Delete AVP |
|---------|-------------------------------|--------------------|------------|
| | Check for Foreign Egress Peer | Check for DRMP AVP | |
| 198 | IS TRUE | EXISTS | DRMP[0] |

Displaying Records 1-1 of 1 | First | Prev | 1 | Next | Last | Restore Order

Figure 31: Template 12b. Remove DRMP AVP

2.6 State and Properties of Ruleset

After injecting rules within a rule set, change the state of the template to Active.

1. Navigate to Main Menu -> Diameter -> Mediation -> State & Properties.
2. Select a template and click Edit.
3. Change the State to Active.
4. You can change the Action Error Handling: Ignore the error depending on your requirements.
5. You can change the Status of Rule Counters: Checked. If checked, then you can see the peg counter for each rule.

Main Menu: Diameter -> Mediation -> State & Properties

Display Filter: =

Displaying Records 1-20 of 35 | [First](#) | [Prev](#) | [1](#) | [2](#) | [Next](#) | [Last](#)

| Rule Template Name | State | Action Error Handling | Status of Rule Counters |
|--|-------------|-----------------------|-------------------------|
| Application Id and CC white list for inbound roamers-RTP1 | Test | Ignore the error | Stopped |
| Application Id and CC white list for inbound roamers-RTP1-First Ver | Active | Ignore the error | Active |
| Application Id and CC white list for outbound roamers-RTP1 | Test | Ignore the error | Stopped |
| Application Id and CC white list for outbound roamers-RTP1-First Ver | Active | Ignore the error | Active |
| DR whitelist-RTP1 | Test | Ignore the error | Stopped |
| DR whitelist-RTP1-First Ver | Active | Ignore the error | Active |
| Destination-Realm whitelist-RTP10 | Test | Ignore the error | Stopped |
| Destination-Realm whitelist-RTP10-First Ver | Active | Ignore the error | Active |
| Handle RouteRecord AVP | Test | Ignore the error | Stopped |
| Handle RouteRecord AVP-First Ver | Active | Ignore the error | Active |
| Handle disallowed requests | Test | Ignore the error | Stopped |
| Handle disallowed requests-First Ver | Active | Ignore the error | Active |
| Handle disallowed requests-RTP1-copy | Test | Ignore the error | Active |
| MiklosTest1 | Development | Ignore the error | Stopped |
| MiklosTest1-copy | Development | Ignore the error | Stopped |
| MiklosTest11 | Development | Ignore the error | Stopped |
| OH ends with OR-RTP1 | Test | Ignore the error | Stopped |
| OH ends with OR-RTP1-First Ver | Active | Ignore the error | Active |
| OR whitelist-RTP1 | Test | Ignore the error | Stopped |
| OR whitelist-RTP1-First Ver | Active | Ignore the error | Active |

| Rule Template Name | State | Action Error Handling | Status of Rule Counters |
|---|--------|-----------------------|-------------------------|
| Remove DOIC AVP-RTP1 | Test | Ignore the error | Stopped |
| Remove DOIC AVP-RTP1-First Ver | Active | Ignore the error | Active |
| Remove DOIC AVP-RTP10 | Test | Ignore the error | Stopped |
| Remove DOIC AVP-RTP10-First Ver | Active | Ignore the error | Active |
| Remove DRMP AVP-RTP1 | Test | Ignore the error | Stopped |
| Remove DRMP AVP-RTP1-First Ver | Active | Ignore the error | Active |
| Remove DRMP AVP-RTP10 | Test | Ignore the error | Stopped |
| Remove DRMP AVP-RTP10-First Ver | Active | Ignore the error | Active |
| Roaming scenario identification-RTP1 | Test | Ignore the error | Stopped |
| Roaming scenario identification-RTP1-First Ver | Active | Ignore the error | Active |
| Roaming scenario identification-RTP10 | Test | Ignore the error | Stopped |
| Roaming scenario identification-RTP10-First Ver | Active | Ignore the error | Active |
| set extra logs | Test | Ignore the error | Stopped |
| testGC | Test | Ignore the error | Stopped |
| try4 | Test | Ignore the error | Stopped |

Displaying Records 21-35 of 35 | [First](#) | [Prev](#) | [1](#) | [2](#) | [Next](#) | [Last](#)

Figure 32: Active Templates Used as Reference

2.7 Association of Ruleset to a Trigger Point

This procedure associates the templates to a trigger point.

Associate Template 1 to Template 9b on trigger point RTP1 in increasing order. Associate Template 10, Template 11, Template 8, Template 12a, and Template 12b on trigger point RTP 10 in given sequence.

Associate Template 12a and 12b for the answer message on trigger point ATP10.

Main Menu: Diameter -> Mediation -> Triggers

Display Filter: - None - = Reset OK

| Rule Set Name | Live | DSR Application | Request | Scope |
|---|------|-----------------|----------------|-----------|
| Trigger: Diameter request message received from connection | | | | |
| Roaming scenario identification-RTP1-First Ver | ✓ | | Normal Request | -- All -- |
| Application Id and CC white list for inbound roamers-RTP1-First Ver | ✓ | | Normal Request | -- All -- |
| Application Id and CC white list for outbound roamers-RTP1-First Ver | ✓ | | Normal Request | -- All -- |
| OR whitelist-RTP1-First Ver | ✓ | | Normal Request | -- All -- |
| DR whitelist-RTP1-First Ver | ✓ | | Normal Request | -- All -- |
| OH ends with OR-RTP1-First Ver | ✓ | | Normal Request | -- All -- |
| Handle RouteRecord AVP-First Ver | ✓ | | Normal Request | -- All -- |
| Handle disallowed requests-First Ver | ✓ | | Normal Request | -- All -- |
| Remove DOIC AVP-RTP1-First Ver | ✓ | | Normal Request | -- All -- |
| Remove DRMP AVP-RTP1-First Ver | ✓ | | Normal Request | -- All -- |
| <input type="button" value="Insert"/> <input type="button" value="Remove"/> <input type="button" value="Up"/> <input type="button" value="Down"/> | | | | |
| Trigger: Diameter request message prior to be forwarded to connection | | | | |
| Roaming scenario identification-RTP10-First Ver | ✓ | | Normal Request | -- All -- |
| Destination-Realm whitelist-RTP10-First Ver | ✓ | | Normal Request | -- All -- |
| Handle disallowed requests-First Ver | ✓ | | Normal Request | -- All -- |
| Remove DOIC AVP-RTP10-First Ver | ✓ | | Normal Request | -- All -- |
| Remove DRMP AVP-RTP10-First Ver | ✓ | | Normal Request | -- All -- |
| <input type="button" value="Insert"/> <input type="button" value="Remove"/> <input type="button" value="Up"/> <input type="button" value="Down"/> | | | | |
| Trigger: Diameter request message attempted for reroute | | | | |
| <input type="button" value="Insert"/> <input type="button" value="Remove"/> <input type="button" value="Up"/> <input type="button" value="Down"/> | | | | |
| Trigger: Diameter answer message received from connection | | | | |
| <input type="button" value="Insert"/> <input type="button" value="Remove"/> <input type="button" value="Up"/> <input type="button" value="Down"/> | | | | |
| Trigger: Diameter answer message prior to be forwarded to connection | | | | |
| Remove DOIC AVP-RTP10-First Ver | ✓ | | | -- All -- |
| Remove DRMP AVP-RTP10-First Ver | ✓ | | | -- All -- |

Figure 33: Screenshot of Rule Set Attached to its Trigger Points

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1. Select 3 for Hardware, Networking and Solaris Operating System Support.
2. Select one of the following options:

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- 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

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