Oracle® Communications Diameter Signaling Router

DSR Security App Using Mediation Example Procedure Release 9.0.0.0.0

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Oracle Communications DSR Security Application Using Mediation Example Procedure User's Guide, Release 9.0.0.0.0

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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.

Variable Name	Description	Туре	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

Table 1: Internal Variables

Main Menu: Diameter -> Mediation -> Internal Variables

Filter* 🔻

Table Description: Internal Variables Table

Variable Name	Туре	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 fron 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

Filter* 🔻

Table Description: Measurements Table

Measurement Name	Description	
measurement_DestR ealm_ER_100	Destination Realm Egress Request	*
measurement_DRW hitelist_40	DR whitelist	
measurement_Handl e_RRecordAVP_60	Handle Route Record AVP	
measurement_inbou nd_10	Application Id and CC white list for inbound roamers	
measurement_OH_e nds_with_OR_50	OH ends with OR	
measurement_ORW hitelist_30	OR whitelist	
measurement_outbo und_20	Application Id and CC white list for outbound roamers	

Figure 2: Sreenshot 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	м	Р	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.

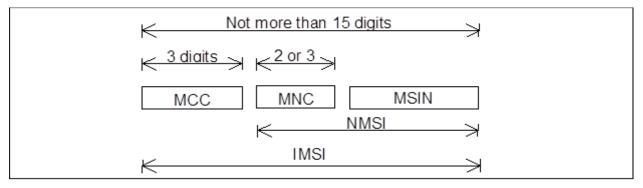
If the peer is in the whitelist then, check IMSI (International Mobile Subscriber Identity) from User-Name AVP to find out the home network of this user.

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

If the MCCMC (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 IM

Table 4: Sample IMSIs

SIs:

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.

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	Set internal varia	sble	inboundRoaming 💌 Set Value		~~×	The action allows setting the value for an internal variable that is valid for the entire duration of a transaction.				

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 r \$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.

			Setungs					
Rule Template I		lame	Application Id and CC white I	list for i	nbound	roamers-RTP1	*	Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid ch
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Default value	ue						[wizard]	When the condition set matches on the message, the
Factors	b	Optional	Fixed				- 14	<pre><pre><coperator> <right-hand operand=""> triple where <right-h< pre=""></right-h<></right-hand></coperator></pre></pre>
Fast seard Name		Check for A	nplicationId				. 0X	from the message being processed. In the former cas
Description		Check for A					v.	"default value". "Optional" makes the condition option:
		-	pplicationId				* [wizard]	
Left value		@msg.appli					• [wizard]	
Operator		==	 Case sensitive 					
Rightvalue		Integer32						
Default valu	ue	16777251					[wizard]	
Feeteen		Optional						
Fast seard Name	an -	Charle fam. C	CommandCode				. <u>C</u> ~	
Description							÷	
			CommandCode				 Environment 1 	
Left value		@msg.com					* [wizard]	
Operator		==	Case sensitive					
Right value		Integer32						
Default valu	ue	360					[wizard]	
Fast search		Optional	Fixed B		~X			
		for msgDisallow			\sim			
Description Left value		t for msgDisallow Disallowed	ved	<u> </u>	[wizard]			
Operator	is fal		se sensitive					
Rightvalue	Integ	er32		Y				
Default value	Ontio	nal 🗌 Fixed			[wizard]	When the condition set i	matches on the	message, the selected actions are applied in the order they are shown. Eacl
Fast search	1		C		^X	<operator> <right-hand from the message being</right-hand </operator>	operand> triple v g processed. In f	where <right-hand operand=""> is either a value provisioned by the Rule Set Ad the former case, "name" is shown on the provisioning screen instead of <lef< td=""></lef<></right-hand>
Name Description		for ApplicationI		'	~	"default value". "Optiona	I" makes the cor	ndition optional, and "Fast search" results in fast database lookups.
Left value	<u> </u>	application_id	-		[wizard]			
Operator	==		se sensitive					
Right value Default value	Integ			v	[wizard]			
		nal 🗹 Fixed 🗌						
Fast search Name	Check	for CommandCo	D		~×			
Description	<u> </u>	for CommandCo						
Left value	-	g.command.code			[wizard]			
Operator Right value	Integ		se sensitive	-				
	360				[wizard]			
[Add]	Optio	nal 🗹 Fixed 🗌						
		ANDed	1			Or setting to the state		
Condition Set		ORed				Specify whether the con the condition set that co	ditions are logic ntains both AND	ally ANDed, ORed or they form a complex logical expression like: (A OR B) Al and OR. Try to optimize the complex expression to achieve the fast-search I
		Comp	lex Expression: A AND B AND C AND D Actions					Description
Action		Default Val	lues	Optional				
		Internal va msgDisal				-		
Set internal varia	able	Set Value			~~X	rne action allows settin	g the value for a	n internal variable that is valid for the entire duration of a transaction.
New action			[wizard] iameter 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	App	ly 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 = \$msgDisallowed =	0 for all the rules except the default rule: 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]

		Settings			Description
Rule Template I	Name	Application Id and CC white list for outbound roam	ers-RTP1	*	Name used to label this Rule Template in the system
Wessage type s		Request 🖌 Answer: 🖌			[Default = n/a. Range = A 255 character string. Valid characters are [a-2], [A-2], [0-9], space, dash (-), period (.), @, and unders: Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The message to depends on the selected conditions and actions.
		Conditions			Description
Fast search	1	Α		~X	
Name	Check for	Outbound Romers	*	\sim	
Description	Check for	Outbound Romers			
Left value	\$outbound	Roaming	*	[wizard]	
Operator	is true	Case sensitive			
Right value	Integer32		Ŧ		
Default value				[wizard]	
-		Fixed			
Fast search Name		B		^×	
	-	msgDisallowed	^	~	
Description		msgDisallowed			
Left value	\$msgDisal		*	[wizard]	
Operator	is false	Case sensitive			
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. Each condition
Fast search	Optional	Fixed C		AY	
Name	-	ApplicationId	*	~	provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" makes the con</left-hand>
Description	-	ApplicationId			"Fast search" results in fast database lookups.
Left value	@msg.app			[wizard]	
Operator	==	Case sensitive			
Right value	Integer32				
Default value	16777251			[wizard]	
	I	✓ Fixed □			
Name	-	msgDisallowed	*	~	
Description		msqDisallowed			
Left value	\$msqDisal		*	[wizard]	
Operator	is false	Case sensitive			
Right value	Integer32				
Default value	1 Integer 52	·		[wizard]	
Dondant Fallab	Ontional	Fixed		1	When the condition set matches on the message, the selected actions are applied in the order they are shown. Each condi-
Fast search		C		~×	<left-hand operand=""> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provisioned by th Administrator or a fixed value that comes for example from the message being processed. In the former case, "name" is sh</right-hand></right-hand></operator></left-hand>
Name	Check for	ApplicationId	*	\sim	provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" makes the co</left-hand>
Description	Check for	ApplicationId			"Fast search" results in fast database lookups.
Left value	@msg.app	olication_id	*	[wizard]	
Operator	==	 Case sensitive 			
Right value	Integer32		*		
Default value	16777251			[wizard]	
		Fixed			
Fast search	1	D		^X	
Name		Commandcode	*	\sim	
Description	-	Commandcode			
Left value		nmand.code	*	[wizard]	
Operator	==	 Case sensitive 			
Right value	Integer32		Ŧ		
Default value	316			[wizard]	
	Optional	Fixed			
[Add]		@ WB-1			
Condition Set		ANDed Dead			Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C A Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve th
contaition set		ORed Complex Expression: A AND B AND C AND D			lookups.
		Actions			Description
Action		Default Values	Optional		Descriptori
		Internal variable			
Set internal vari	able	msgDisallowed		AVV	The action allows setting the value for an internal variable that is valid for the entire duration of a transaction.
oor memai van	able	Set Value		AVX.	The dealer allows seeing the value for an internal variable tracits variation the entire duration of a tradisability.
		0 [wizard]			

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

Fri Jan 06 12

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 whiltelist" 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]

Hel; Fri Jan 06 12:52:24 2017 ES

Ok	Apply	Cancel		
		Settings		Description
Rule Template N	lame	OR whiltelist-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 su		Request 🗸		Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The message type support
		Answer: Conditions		depends on the selected conditions and actions. Description
Fast search	1	A	^X	
1		oreign Ingress Peer	<u> </u>	
i	í	oreign Ingress Peer		
i	\$foreignIng		* [wizard]	1
Operator Right value	is true Integer32	Case sensitive		
Default value	j integersz		[wizard]	1
,	Optional	Fixed		,
Fast search	1	В	^X	
		sgDisallowed	<u> </u>	
	,	sgDisallowed	* [wizard]	, 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 value Operator	\$msgDisallo is false	Case sensitive	• [WIZal U]	¹ «left-hand operand» <operator» <right-hand="" a="" by="" either="" is="" operand»="" provisioned="" rule="" set<br="" the="" triple="" value="" where="">Administrator or a fixed value that comes for example from the message being processed. In the former case, "name" is shown on the</operator»>
Right value	Integer32	Case sensitive	_	provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" makes the condition optional, a</left-hand>
Default value	Integersz		[wizard]	"Fast search" results in fast database lookups.
,	Optional	Fixed		
Fast search	1	C	^X	<
i	í	rigin Realm AVP	* ~	
i	<u></u>	rigin Realm AVP	* [wizard]	
Left value Operator	@msg.avp['	'Origin-Realm"][1].data Case sensitive	• [wizard]	1
Right value	DiameterId		v	
	fwmme1.co		[wizard]	1
,	Optional 🗵			
[Add]				
Name	Check for	Foreign Ingress Peer	*	• •
Description	i	Foreign Ingress Peer		
Leftvalue	i	ngressPeer		* [wizard]
Operator	is true	Case sensitive		
Rightvalue	Integer3			
Default value				[wizard]
	Optional	Fixed		
Fast search	1	В		^X
Name	Check for	msgDisallowed		• •
Description	Check for	msgDisallowed		When the condition set matches on the message, the selected actions are applied in the order they are shown. Eac
Left value	\$msgDisa	llowed	2	* [wizard] when the condition set matches on the message, the selected actions are applied in the order they are shown. Each {left-hand operand> coperator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provisione</right-hand></right-hand>
Operator	is false	 Case sensitive 		Administrator or a fixed value that comes for example from the message being processed. In the former case, "nam provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value", "Optional" make:</left-hand>
Rightvalue	Integer3	2	v	"Fast search" results in fast database lookups.
Default value				[wizard]
	Optional	Fixed		
Fast search Name		C C		
		Origin Realm AVP		
Description		Origin Realm AVP		• [usinged]
Left value	<u> </u>	p["Origin-Realm"][1].data		* [wizard]
Operator	==	Case sensitive		
Rightvalue	Diameter		T	
Defaultvalue	fwmme1.			[wizard]
[Add]	Optional	Fixed		
		ANDed		
Condition Set		ORed		Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) Al Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to ach
		Complex Expression: A AND B AND	G	lookups.
		Actions		Description
Action		Default Values	Optional	al
		Internal variable		
Set internal vari	iable	msgDisallowed Set Value		AVX The action allows setting the value for an internal variable that is valid for the entire duration of a transaction.
		0 [wizard]		
New action		Modify Diameter Header Parts 👻 [Ad	dl	Add a new action to the action list that is applied when the conditions of the Rule Template match on the message.
Haw action		Additional and the second seco	u1	nav a new action to the action nationaria appred when the conditions of the rule remplate match on the message.
Ok	Apply	Cancel		

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 whiltelist" 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 Jar
Ok	Apply Cancel			
	Settings			Description
Rule Template				[Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @, and ur
Message type s	upport Request: ✓ Answer: ✓			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	А А		_ ^	×
Name	Check for Foreign Ingress Peer		_* ~	
Description	Check for Foreign Ingress Peer		_	
Left value	\$foreignIngressPeer		* [wiza	o]
Operator Right value	is true Case sensitive		_	
Default value	Integer32		 [wiza	d 1
Default value	Optional Fixed		[WIZG	u1
Fast search	B			X
Name	Check for msgDisallowed		* ~	
Description	Check for msgDisallowed		_	, When the condition set matches on the message, the selected actions are applied in the order they are shown. Each co
Leftvalue	\$msgDisallowed		* [wiza	I <left-hand operand=""> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provisioned t</right-hand></right-hand></operator></left-hand>
Operator	is false Case sensitive		_	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 th</left-hand>
Right value	Integer32		<u>*</u>	"Fast search" results in fast database lookups.
Default value			[wiza	a]
Fast search	Optional Fixed C		~	X
Name	Check for Destination-Realm AVP		* ~	
Description	Check for Destination-Realm AVP		_	
Left value	@msg.avp["Destination-Realm"][1].data		* (wiza	d]
Operator	== Case sensitive		_	
Right value	DiameterIdentity		*	
Default value	homme1.com		[wiza	d]
[Add]	Optional 🗹 Fixed 🗌			
	Check for Foreign Ingress Peer			
	Check for Foreign Ingress Peer			
Leftvalue	\$foreignIngressPeer		• [wizard]	
Operator	is true Case sensitive			
Right value	Integer32	Ψ.		
Default value			[wizard]	
Fastant	Optional Fixed		. V	
Fast search Name	B Check for msgDisallowed		· ~×	
	Check for msgDisallowed			
Left value	\$msgDisallowed		• [wizard]	When the condition set matches on the message, the selected actions are applied in the order they are shown. Each condition (<left-hand operand=""> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provisioned by the Ru</right-hand></right-hand></operator></left-hand>
Operator	is false Case sensitive			Administrator or a fixed value that comes for example from the message being processed. In the former case, "name" is shown
Right value	Integer32	_		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.</left-hand>
Default value			[wizard]	
Fast search	Optional Fixed C		~×	
	Check for Destination-Realm AVP		• ~	
Description	Check for Destination-Realm AVP			
Left value	@msg.avp["Destination-Realm"][1].data		• [wizard]	
Operator	== Case sensitive			
Right value	DiameterIdentity	T		
Default value	homme1.com		[wizard]	
[Add]	Optional V Fixed			
	ANDed			Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C AND (I
Condition Set	ORed			Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fas
	Complex Expression: A AND B AND C			lookups.
Action	Actions Default Values	Optional		Description
, todon	Internal variable	optional		
Set internal varia	msgDisallowed		~~×	The action allows setting the value for an internal variable that is valid for the entire duration of a transaction.
	Set Value 0 [wizard]			
New action	Modify Diameter Header Parts v [Add]			Add a new action to the action list that is applied when the conditions of the Rule Template match on the message.
New action	moully biameter neader Parts T [Add]			Aut a new action to the action hat that is applied when the contritions of the rule remplate match of 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
.			D "

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

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

Ok	Ар	ply Cancel				
		Settings				Description
Rule Templa	te 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 typ	e suppoi	t Request: 🗸 Answer: 🗸				Indicates what type of message processing is supported by the Rule Template, i.e. F depends on the selected conditions and actions.
		Conditions				Description
Fast search		A			^X	
Name		k for Foreign Ingress Peer			* ~	
Description		k for Foreign Ingress Peer				
Left value		eignIngressPeer			* [wizard]	
Operator Right value	is tr					
Default value		ger32		Ľ	[wizard]	
Delaun valu		onal 🔲 Fixed 🗌			[wizaru]	
Fast search		B			~X	
Name	Che	k for msgDisallowed			• 🗸	
Description	Che	k for msgDisallowed				
Leftvalue	\$ms	gDisallowed			* [wizard]	When the condition set matches on the message, the selected actions are applied i <left-hand operand=""> <operator> <right-hand operand=""> triple where <right-hand oper<="" td=""></right-hand></right-hand></operator></left-hand>
Operator	is fa	Ise Case sensitive				Administrator or a fixed value that comes for example from the message being proce provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the</left-hand>
Right value	Inte	ger32		.		"Fast search" results in fast database lookups.
Default valu	e				[wizard]	
E		onal 🗌 Fixed 🗌				
Fast search Name		C C			. 0×	
Description		in-Host AVP Value does not ends with Origi	n-Realm AVP V	alue	*	
Leftvalue		sg.avp["Origin-Host"][1].data			* [wizard]	
Operator	!=\$	Case sensitive				
Right value	xl-v					
Default valu		@msg.avp["Origin-Realm"]			[wizard]	
	,	onal E Fixed Z			• •	
		Foreign Ingress Peer	* ~			
Description Left value	Check for \$foreignIn	Foreign Ingress Peer	* [wizard]			
Operator	is true	Case sensitive	- [wizaru]			
Right value	Integer32		~			
Default value	Ontinent	Fixed	[wizard]			
	1	В	^×			
		msgDisallowed	* ~			
Description Left value	\$msqDisal	msgDisallowed	* [wizard]	When the co	ndition set mat	ches on the message, the selected actions are applied in the order they are shown. Each condition consist tor⊳ ∝right-hand operand> triple where <right-hand operand=""> is either a value provisioned by the Kulle Set a bit of each of a worder is for the message is being accessed in the forecase. The set of the set of the</right-hand>
Operator	is false	Case sensitive		Aurhinistrate	or or a lixed valu	e that comes for example from the message being processed. In the former case, "name" is shown on the of <left-hand "default="" "optional"="" and="" by="" condition="" is="" makes="" operand-="" opti<="" pre-filled="" td="" the="" value="" value".=""></left-hand>
Right value	Integer32			Fast search		database lookups.
Default value	Optional	Fixed	[wizard]			
Fast search Name	1	C Origin-Host AVP	^X			
Description		Origin-Host AVP t AVP Value does not ends with Origin-Realm AVP Val	ue			
Left value		["Origin-Host"][1].data	* [wizard]			
Operator	!=\$	Case sensitive				
Right value Default value	xl-value	g.avp["Origin-Realm"]	[wizard]			
	,	Fixed V				
[Add]		ANDed ANDED				
Condition Set		ORed Complex Expression: A AND B AND C		Specify whe Use parenth lookups.	ther the condition leses for the co	ins are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C AND (D OR E ndition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-searc
A - 11		Actions	Orfered			Description
Action		Default Values Internal variable	Optional			
Set internal varia	ble	msgDisallowed Set Value 50 [wizard]	□ ^~×	The action a	llows setting th	e 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 a	ction to the acti	on 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:	\$msgDisallov	wed = 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]

Ok	Apply	Cancel					
		Settings			Description		
Rule Template N	lame	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, dash (-), period (.), @, a		
Message type su		Request: 🗸 Answer: 🗸			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	1	A	^	~×			
	Check for Fo	preign Ingress Peer	* ~	/			
Description	Check for Fo	preign Ingress Peer	_				
Left value	\$foreignIngr		* [wiza	ard]			
Operator	is true	 Case sensitive 					
Right value	Integer32		-				
Default value) • • • • □		(wiza	ard]			
Fast search	Optional 🗌	Fixed B	~	^X			
		sgDisallowed	* ~	1			
Description	í	sgDisallowed	_				
Leftvalue	\$msgDisallo		* (wiza	ard]	When the condition set matches on the message, the selected actions are applied in the order they are shown. Ea <left-hand operand=""> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provisio</right-hand></right-hand></operator></left-hand>		
Operator	is false	Case sensitive			Administrator or a fixed value that comes for example from the message being processed. In the former case, "nai		
Right value	Integer32		-		provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" ma "Fast search" results in fast database lookups.</left-hand>		
Default value			[wiza	ard]			
,	Optional						
1	0	C	_ ^	~X			
		buteRecord AVP	`				
Description	í	d AVP, if any Route-Record AVP is ending with blacklisted	* [wiza	ord 1			
Left value	@msg.avp[" =\$	Route-Record"][any],data	- [W12a	aru			
Operator Right value		Case sensitive					
-	xl-value blistmme1.c	om	[wiza	ard 1			
	Optional V		[10120				
Add]	opaonar						
Name	Check for Fo	oreign Ingress Peer	* ~				
Description	Check for Fo	oreign Ingress Peer					
Left value	\$foreignIng	ressPeer	* [wizard	rd]			
Operator	is true	Case sensitive	_				
Right value	Integer32		-				
Default value			[wizard	rd]			
Fast search	Optional 🗸	Fixed B	~>	×			
Name		sgDisallowed	• 🗸				
Description	Check for m	sgDisallowed	_				
Left value	\$msgDisallo	wed	• (wizard	rd] 🎖	Vhen the condition set matches on the message, the selected actions are applied in the order they are shown. Each c :left-hand operand> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provisioned</right-hand></right-hand></operator>		
Operator	is false	Case sensitive		A	dministrator or a fixed value that comes for example from the message being processed. In the former case, "name"		
Right value	Integer32		~		rovisioning screen instead of ≺left-hand operand> and the value is pre-filled by the "default value". "Optional" makes ti Fast search" results in fast database lookups.		
Default value			[wizard				
Fast search	Optional	Fixed C	~>	\sim			
Name	Check for R	outeRecord AVP	0				
Description		d AVP, if any Route-Record AVP is ending with blacklisted	rea				
Left value	<u> </u>	'Route-Record"][any].data	* [wizard	rd]			
Operator	=\$	✓ Case sensitive					
Right value	xl-value		-				
Default value	blistmme1.c		[wizard	rd]			
[Add]	Optional 🔽	Fixed					
[Add]		ANDed					
Condition Set		ORed			specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) ANE Jse parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achie		
		Complex Expression: A AND B AND C			pokups.		
		Actions			Description		
Action		Default Values Opti	onal				
		Internal variable					
Set internal varia	able	Set Value		×T	he action allows setting the value for an internal variable that is valid for the entire duration of a transaction.		
		60 [wizard]					
New action		Modify Diameter Header Parts 👻 [Add]		A	dd 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 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 s	support	Request: 🗸 Answer: 🗸			Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The r on the selected conditions and actions.		
		Conditions			Description		
Fast search	1	A		~X			
Name	Check for r	nsgDisallowed	*	\sim			
Description	Check for r	nsgDisallowed					
Left value	\$msgDisall	owed	*	[wizard]	When the condition set matches on the message, the selected actions are applied in the order they are shown. Eac <left-hand operand=""> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provisior</right-hand></right-hand></operator></left-hand>		
Operator	==	Case sensitive			Administrator or a fixed value that comes for example from the message being processed. In the former case, "nam		
Right value	Integer32	Terrend	-		screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" makes the conditi results in fast database lookups.</left-hand>		
Default value	0			[wizard]	esuits in fast datavase fookups.		
	Optional Fixed						
[Add]							
		ANDed					
Condition Set		ORed			Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) / Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to ac		
		Complex Expression: A			Ose parenareses for the container sectinal contains bour rand and ork. Hy to optimize the complex expression to a		
		Actions			Description		
Action		Default Values	Optional				
		Alarm/Event					
Assert Alarm/E	vent	Mediation Generic Alarm Major		~~×	This action allows raising an alarm if the conditions for the rule match.		
		Additional info					
		"[" + "Error Code :-" + 5 [wizard]					
Peg Counter		Measurement	•	~~X	Peg selected measurement		
		mesurement_1012	-				
Abandon Mess Exit from Execu				~~X	Silently drop the message. The action is supported by Requests and Answers. Exit from the Execution Trigger bypassing any subsequent Rule Template in it		
	non ngger			XVX			
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.

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

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

Ok	Apply	Cancel		
		Settings		Description
Rule Template N	Name	Remove DOIC AVP-RTP1		Name used to label this Rule Template in the system
		Request: 🗸		[Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), (Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. T
Message type s	upport	Answer: 🗸		depends on the selected conditions and actions.
		Conditions		Description
Fast search Name	Check for f	A oreignIngressPeer	- 0	×X
Description	í	oreignIngressPeer	-	
Leftvalue	\$foreignIng	· ·	• [wiza	rd1
Operator	is true	Case sensitive		
Right value	Integer32	· · · · · · · · · · · · · · · · · · ·	Ī	
- Default value			[wiza	rd]
	Optional	Fixed		
Fast search	<u> </u>	В	- ^	×
Name	í	AVP OC-Supported-Features	- ~	
Description		AVP OC-Supported-Features	-	When the condition set matches on the message, the selected actions are applied in the order they are shown.
Left value Operator		["OC-Supported-Features"][1].data	* [wiza	I <left-hand operand=""> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provi</right-hand></right-hand></operator></left-hand>
Operator Right value	exists	Case sensitive	T	Administrator or a fixed value that comes for example from the message being processed. In the former case, " provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" n</left-hand>
Default value	Integer32	v	wiza	"Fast search" results in fast database lookups. rd]
Serauryalue	Optional	Fixed	1 112.8	
Fast search	Optional □	C	~	X
Name	Check for C	DC-OLR AVP	* ~	
Description	Check for C	DC-OLR AVP		
Leftvalue	@msg.avp[["OC-OLR"][1].data	* [wiza	rd]
Operator	exists	Case sensitive	-	
Right value	Integer32	v		
Defaultvalue			[wiza	rd]
[Add]	Optional	Fixed		
[Aud]		O ANDed		
Condition Set		ORed		Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression t
		Complex Expression: A AND (B OR C)		lookups.
Name		/P OC-Supported-Features *	\sim	
Description	í	/P OC-Supported-Features		When the condition set matches on the message, the selected actions are applied in the order they are shown. Each condi
Left value			wizard]	
Operator Right value	exists Integer32	Case sensitive		provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" makes the co</left-hand>
Default value	Integeroz		wizard 1	'Fast search'' results in fast database lookups.
	Optional	Fixed		
	0	C	^X	
Name Description	Check for O		\sim	
Left value	Check for O		wizard 1	
Operator	exists	Case sensitive	,	
Right value	Integer32			
Default value		[wizard]	
	Optional 🗌	Fixed		
[Add]				
Condition Set		ORed	:	Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C A Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve th
Condition Oct		Complex Expression: A AND (B OR C)		lookups.
		Actions		Description
Action		Default Values Optional		
		Delete parent AVP if it is empty: Instance		
		OC-Supported-Features \$index		
Delete AVP		OC-Feature-Vector	~~X	The action allows deleting a specified AVP in the message.
		With the value:		
		[wizard]		
		Delete parent AVP if it is empty: Instance		
		OC-OLR \$index		
Delete AVP		OC-Reduction-Percentage	~~X	The action allows deleting a specified AVP in the message.
		With the value:		
		[wizard]		
New action		Modify Diameter Header Parts 💌 [Add]	1	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.

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

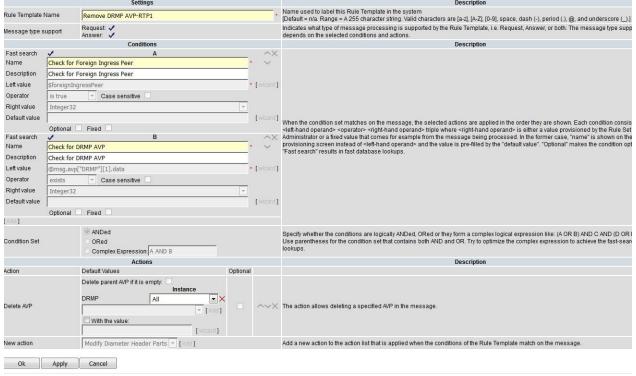


Figure 13: Screenshot of Remove DRMP AVP Configured Template

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.

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:	\$foreignEgressPee	er = 1	

		Settings				Description
Rulo Tompiato	Namo					Name used to label this Rule Template in the system
Rule Template	Name	Roaming scenario identification-RTP10				[Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @
Message type s	support	Request 🖌 Answer: 🖌				Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. Ti depends on the selected conditions and actions.
		Conditions				Description
Fast search	4	А			ΛX	
Name	Identifying	the Egress peer		*	\sim	
Description	Check Pee	r for Roaming scenario identification		_		
Left value	@dsr.eqre	ss. peer		* [W	izard]	
Operator	==	Case sensitive				
Rightvalue	Peer			-		
Default value	FN HSS1			• [w	izard]	
Delautevalue	, -	Z Fixed		<u> </u>	izara j	
Fast search	Optional	Fixed B			××	
Name	Check for	Application ID		*	\sim	
Description		Application ID		_		
Left value		lication id		* [W	izard]	When the condition set matches on the message, the selected actions are applied in the order they are shown.
Operator	==	Case sensitive				left-hand operand> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provi: Administrator or a fixed value that comes for example from the message being processed. In the former case, "</right-hand></right-hand></operator>
Rightvalue						provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" m</left-hand>
	Integer32					"Fast search" results in fast database lookups.
Default value	16777251			I W	izard]	
Fast search	Optional	Fixed C			~~	
Name		Command code	_	*	\sim	
Description		Command code		_		
Left value				* 1	izard]	
		nmand.code				
Operator	==	Case sensitive				
Rightvalue	Integer32			<u> </u>		
Default value	316			[W	izard]	
[A dd]	Optional	Fixed				
[Add]		() AND - 4				
Condition Set		ANDed ORed				Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to
Condition Set		Complex Expression: A AND B AND C	_			lookups.
		Actions				Description
Action		Default Voluee		ntional		boothpion
		e Egress peer		* ~		
Description	Check Peer f	or Roaming scenario identification				
Left value	@dsr.egress	peer		* [wizard]		
Operator	==	Case sensitive				
Right value	Peer		_			
Default value	FN_HSS1		•	[wizard]		
Fast search	Optional 🗹	Fixed B		~×		
Name	Check for Ap			• 😳		
	Check for Ap	•				
Left value	@msg.applic			* [wizard]		the condition set matches on the message, the selected actions are applied in the order they are shown. Each condition
Operator	==	Case sensitive				nand operand> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provisioned by the nistrator or a fixed value that comes for example from the message being processed. In the former case, "name" is sho</right-hand></right-hand></operator>
Right value	Integer32		-		provis	sioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" makes the con</left-hand>
	16777251			[wizard]	Fast	search" results in fast database lookups.
	Optional 🗹	Fixed				
Fast search	1	C		^×		
Name	Check for Co	mmand code		* ~		
Description	Check for Co	mmand code				
Left value	@msg.comn	nand.code		* [wizard]		
Operator	==	Case sensitive				
Right value	Integer32		~			
Default value	316			[wizard]		
	Optional 🗹	Fixed				
Add						
Condition Pot		ANDed Open				fy whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C AN
Condition Set		ORed Complex Expression: A AND B AND C			looku	varentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the ps.
		Actions				Description
Action		Default Values	Optional	1		Description
		nternal variable				
Set internal varia		foreignEgressPeer		AVY	The a	ction allows setting the value for an internal variable that is valid for the entire duration of a transaction.
oocinternar valla		Set Value			ine a	even energe county are value for an internal value of all to value for the churc duration of a transaction.
		1 [wizard]				
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 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.

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

		Settings				Description	
Dula Tanalaha	Mana					Name used to label this Rule Template in the system	
Rule Template	Name	Destination-Realm whitelist-RTP10			*	[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 🗸				Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The r	
		Answer: Conditions				depends on the selected conditions and actions. Description	
Fast search	÷	A			AX	Description	
Name	Check for	Foreign Egress Peer		_	• 🗸		
Description		Foreign Egress Peer		_			
Leftvalue	\$foreignE				* [wizard]		
Operator	is true	Case sensitive			[man of]		
Rightvalue							
	Integer32	2			1		
Default value					(wizard)		
Fast search	Optional	Fixed B			AX		
Name		msgDisallowed			. 00		
Description		msqDisallowed		-	Ť		
Leftvalue				_	• [wizard]	When the condition set matches on the message, the selected actions are applied in the order they are shown. Ea	
	\$msgDisal				- [wizaru]	left-hand operand> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provision</right-hand></right-hand></operator> 	
Operator	is false	Case sensitive				Administrator or a fixed value that comes for example from the message being processed. In the former case, "nan provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" make</left-hand>	
Rightvalue	Integer32	2				"Fast search" results in fast database lookups.	
Default value					[wizard]		
	Optional	Fixed			- 5.4		
Fast search		C		_	X		
Name		Destination-Realm AVP		_	· · ·		
Description		Destination-Realm AVP		_			
Leftvalue	@msg.avp	p["Destination-Realm"][1].data			* [wizard]		
Operator	==	Case sensitive					
Rightvalue	Diameter	Identity		Ŧ			
Default value	fwhss1.co	ım			[wizard]		
	Optional	Fixed					
[Add]							
		ANDed				Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) /	
Condition Set		ORed				Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to ac lookups.	
		Complex Expression: A AND B AND C					
		Actions				Description	
Name	Check for Fo	Actions		~			
Name Description		Actions reign Egress Peer		~			
		Actions reign Egress Peer reign Egress Peer	•	vizard]			
Description	Check for Fo	Actions reign Egress Peer reign Egress Peer	* [vizard]			
Description Left value	Check for Fo \$foreignEgre	Actions reign Egress Peer reign Egress Peer reissPeer	* [wizard]			
Description Left value Operator	Check for Fo \$foreignEgre is true	Actions reign Egress Peer reign Egress Peer reissPeer		wizard]			
Description Left value Operator Right value Default value	Check for Fo \$foreignEgre is true	Actions reign Egress Peer reign Egress Peer ussPeer v Case sensitive Fixed		wizard]			
Description Left value Operator Right value Default value Fast search	Check for Fo \$foreignEgre is true Integer32 Optional	Actions reign Egress Peer reign Egress Peer ssPeer Case sensitive Fixed B					
Description Left value Operator Right value Default value Fast search Name	Check for Fo \$foreignEgre is true Integer32 Optional Check for ms	Actions reign Egress Peer reign Egress Peer ssPeer Case sensitive Fixad B sgDisallowed		wizard]			
Description Left value Operator Right value Default value Fast search Name Description	Check for Fo \$foreignEgre is true Integer32 Optional Check for ms Check for ms	Actions reign Egress Peer reign Egress Peer sesPeer Case sensitive Fixed B sgDisallowed sgDisallowed	<pre> [</pre>	wizard]	When the co	Description	
Description Left value Operator Right value Default value Fast search Name Description Left value	Check for Fo \$foreignEgre is true Integer32 Optional Check for ms \$msgDisallov	Actions reign Egress Peer reign Egress Peer ssPeer v Case sensitive Fixed B sgDisallowed wed	<pre> [</pre>	wizard]	<left-hand o<="" td=""><td>Description</td></left-hand>	Description	
Description Left value Operator Right value Default value Fast search Name Description Left value Operator	Check for Fo \$foreignEgre is true Integer32 Optional Check for ms \$msgDisallov is false	Actions reign Egress Peer reign Egress Peer sesPeer Case sensitive Fixed B sgDisallowed sgDisallowed	<pre> [</pre>	wizard]	left-hand o Administrate provisioning	Description Indition set matches on the message, the selected actions are applied in the order they are shown. Each condition consists of a perandcoperatorright-hand operand>- tiple where <right-hand operand="">- is either a value provisioned by the Rule Set or or a fixed value that comes for example from the message being processed. In the former case, "name" is shown on the screen instead of</right-hand>	
Description Left value Operator Right value Default value Fast search Name Description Left value	Check for Fo \$foreignEgre is true Integer32 Optional Check for ms \$msgDisallov	Actions reign Egress Peer reign Egress Peer ssPeer v Case sensitive Fixed B sgDisallowed wed	× (1) * * (1)	wizard]	left-hand o Administrate provisioning "Fast search	Description ondition set matches on the message, the selected actions are applied in the order they are shown. Each condition consists of a perandr- <a fast="" href="https://www.each.com/distributions</td></tr><tr><td>Description
Left value
Operator
Right value
Default value
Fast search
Name
Description
Left value
Operator
Right value</td><td>Check for Fo
\$foreignEgre
is true
Integer32
Optional
Check for ms
\$msgDisallov
is false</td><td>Actions reign Egress Peer reign Egress Peer sesPeer Case sensitive Fixed B sgDisallowed sgDisallowed ved Case sensitive</td><td>×
(1)
*
* (1)</td><td>wizard]</td><td>left-hand o
Administrate
provisioning
" search<="" td=""><td>Description Indition set matches on the message, the selected actions are applied in the order they are shown. Each condition consists of a perandcoperatorright-hand operand>- tiple where <right-hand operand="">- is either a value provisioned by the Rule Set or or a fixed value that comes for example from the message being processed. In the former case, "name" is shown on the screen instead of</right-hand></td>	Description Indition set matches on the message, the selected actions are applied in the order they are shown. Each condition consists of a perandcoperatorright-hand operand>- tiple where <right-hand operand="">- is either a value provisioned by the Rule Set or or a fixed value that comes for example from the message being processed. In the former case, "name" is shown on the screen instead of</right-hand>
Description Left value Operator Right value Default value Fast search Name Description Left value Operator Right value Default value Fast search	Check for Fo \$foreignEgre Is true Integer32 Optional Check for ms \$msgDisallov Is false Integer32 Optional	Actions reign Egress Peer reign Egress Peer ssPeer Case sensitive Fixed B sgDisallowed wed Case sensitive Fixed Case sensitive Case sensitive Case sensitive Case Sensi	× (1) * * (1)	wizard]	left-hand o Administrate provisioning "Fast search	Description Indition set matches on the message, the selected actions are applied in the order they are shown. Each condition consists of a perandcoperatorright-hand operand>- tiple where <right-hand operand="">- is either a value provisioned by the Rule Set or or a fixed value that comes for example from the message being processed. In the former case, "name" is shown on the screen instead of</right-hand>	
Description Left value Operator Right value Default value Fast search Name Description Left value Operator Right value Default value Fast search Name	Check for Fo \$foreignEgre is true Integer32 Optional Check for ms \$msgDisallov is false Integer32 Optional \$	Actions reign Egress Peer reign Egress Peer sePeer Case sensitive Fixed B sgDisallowed sgDisallowed Ved Case sensitive Fixed Case sensitive Case sensitive Case sensitive	× (1) * * (1)	wizard]	left-hand o Administrate provisioning "Fast search	Description Indition set matches on the message, the selected actions are applied in the order they are shown. Each condition consists of a perandcoperatorright-hand operand>- tiple where <right-hand operand="">- is either a value provisioned by the Rule Set or or a fixed value that comes for example from the message being processed. In the former case, "name" is shown on the screen instead of</right-hand>	
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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.

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

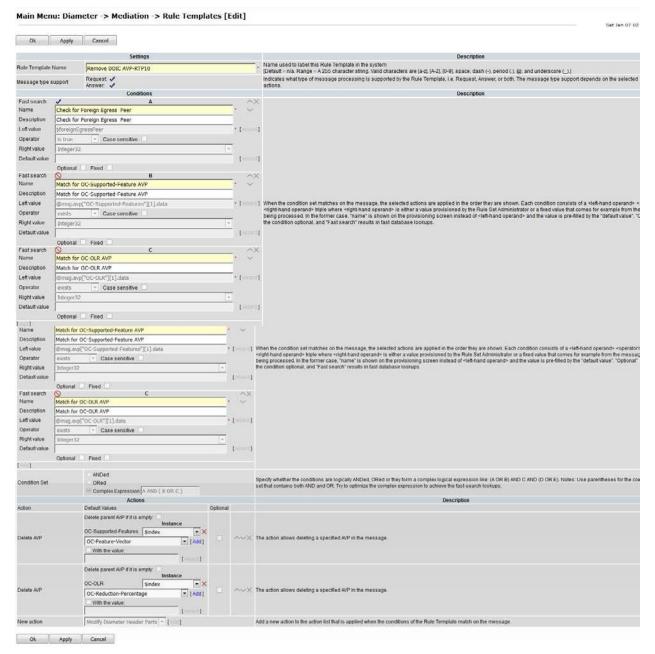


Figure 16: Screenshot of Remove DOIC AVP Configured Template

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	9	SforeignEgressPeer		is	true
AND	(@msg.avp["DRMP"]		exists	
THEN	[Delete AVP		DRMP	
		Settings			Description
Rule Template	Name	Remove DRMP AVP-RTP10		Name used to label this Rule Template in the syste [Default = n/a. Range = A 255 character string. Valid	m characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @, and underscore (_).]
Message type :	support	Request: 🗸 Answer: 🗸		Indicates what type of message processing is supp actions.	orted by the Rule Template, i.e. Request, Answer, or both. The message type support depends on the sele
		Conditions			Description
Fast search	1	A	^×		
Name	Check for	r Foreign Egress Peer	* ~		
Description	Check for	r Foreign Egress Peer			

Left value	\$foreignEgressPeer	*	[wizard]	
Operator	is true Case sensitive			
Right value	Integer32			
Default value			[wizard]	
	Optional Fixed			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-<="" td=""></left-hand>
Fast search	✓ B		~X	<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 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". "C</left-hand></right-hand></right-hand>
Name	Check for DRMP AVP		\sim	being processes in the online last, have been built on the provide strategies of the trade of the determined of the dete
Description	Check for DRMP AVP			
Left value	@msg.avp["DRMP"][1].data	*	[wizard]	
Operator	exists Case sensitive			
Right value	Integer32	-		
Default value			[wizard]	
	Optional Fixed			
[Add]				
Condition Set	ANDed ORed 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). Notes: Use parentheses I 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 is empty: Instance DRMP All V (ndc) With the value: [vccard]		~~X	The action allows deleting a specified A/P 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 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

	et internal variable, Set internal							
	ring Records 1-4 of 4 First Pr A			Set internal variabl	et internal variable		Set internal variable	
Rule Id	Identifying the Ingress peer	Internal variable	Set Value	Internal variable	Set Value	Internal variable	Set Value	
48	FN HSS1	foreignIngressPeer	1	outboundRoaming	(@msg.avp["User-Name"][1].imsi.mccmnc==40417)	inboundRoaming	(\$outboundRoaming==0	
40	TH_HOUT							
49	FN_HSS2	foreignIngressPeer	1	outboundRoaming	(@msg.avp["User-Name"][1].imsi.mccmnc==40417)	inboundRoaming	(\$outboundRoaming==0	
		foreignIngressPeer foreignIngressPeer			(@msg.avp["User-Name"][1].imsi.mccmnc==40417) (@msg.avp["User-Name"][1].imsi.mccmnc==40417)			

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



	B AND C AND D et internal variable									
Displayi	Displaying Records 1-6 of 6 First Prev 1 Next Last Restore Order									
Rule Id	Α	В	С	D	Set internal varia	ble				
Rule lu	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				
Dienlovi	na Records 1-6 of 6 First Pre	av 1 Nevt Last Restore (rder							

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

Displayi	Displaying Records 1-6 of 6 First Prev 1 Next Last Restore Order								
Rule Id	Α	В	С	D	Set internal varia	ble			
Nule lu	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

S

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	Α	В	С	Set internal variable		
Rule lu	Check for Foreign Ingress Peer	Check for msgDisallowed	Check for Origin Realm AVP	Internal variable	Set Value	
183	IS TRUE	IS FALSE	fwhss1.com	msgDisallowed	0	
184	IS TRUE	IS FALSE	fwhss2.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	Α	В	С	Set internal variable	
		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

Displayir	ng Records 1-1 of 1 First Prev	1 Next Last Restore Orde	r		
Rule Id	A	В	С	Set internal varia	ble
Rule lu	Check for Foreign Ingress Peer	Check for msgDisallowed	Check for Origin-Host AVP	Internal variable	Set
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

Pulo Id	Rule Id Move	o tho rulo	Α	В	С	Set internal varia	et internal variable		Move the rule	
Rule lu	move the rule		Check for Foreign Ingress Peer	Check for msgDisallowed	Check for RouteRecord AVP	Internal variable			ine rule	
148	Up	Down	IS TRUE	IS FALSE	blistmme2.com	msgDisallowed	60	Up	Down	
147	Up	Down	IS TRUE	IS FALSE	blistmme1.com	msgDisallowed	60	Up	Down	
Displayi		aarda 4 0	of Q First Draw 4 Navt Lost F	Jantara Ordar						

Displaying Records 1-2 of 2 | First | Prev | 1 | Next | Last | Restore Order

Figure 24: Template 7: Handle RouteRecord AVP

Set Value

Dula	A	Assert Alarm/Event	Assert Alarm/Event					
Rule Id	Check for msgDisallowed	Alarm/Event	Additional info	Measurement				
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 whiltelist check failed. Abandoned the message"	measurement_ORWhitelist_30				
216	40	Mediation Generic Alarm — Major	"[* * "Error Code :-" + String(\$msgDisallowed) + "," + "Error Description :-" + " DR whiltelist 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(SmsgDisallowed) + "." + "Error Description :-" + " Handle RouteRecord AVP check failed. Abandoned the message"	measurement_Handle_RRecordAVP_6				

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 Orde

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

Pulo Id	Rule Id Move the rule	o the rule	Α	В	С	Delete AVP	Delete AVP	Move the rule
Kule lu		Check for foreignIngressPeer	Check for AVP OC-Supported-Features			Delete AVP	move the rule	
192	Up	Down	IS TRUE	EXISTS	EXISTS	OC-Supported-Features[\$index]	OC-OLR[\$index]	Up Down
Displavi	na Re	ecords 1-1	of 1 First Prev 1 Next Last	Restore Order				

Figure 26: Template 9a: Remove DOIC AVP

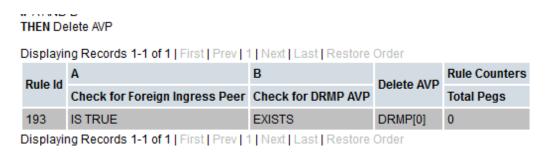


Figure 27: Template 9b: Remove DRMP AVP

THEN Set internal variable

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

Rule Id	Α	В	C Set internal var		е	Rule Counters
Kule lu	Identifying the Egress peer	Check for Application ID	Check for Command code	Internal variable	Set Value	Total Pegs
74	FN_HSS1	16777251	316	foreignEgressPeer	1	0
76	FN_HSS1	16777251	318	foreignEgressPeer	1	0
77	FN_HSS2	16777251	316	foreignEgressPeer	1	0
75	FN_HSS2	16777251	318	foreignEgressPeer	1	0

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

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

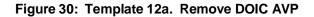
Figure 28: Template 10. Roaming Scenario Identification

B AND C t internal variable				
ng Records 1-3 of 3 First Prev	1 Next Last Restore Orde	91		
Α	В	С	Set internal variable	
Check for Foreign Egress Peer	Check for msgDisallowed	Check for Destination-Realm AVP	Internal variable	Set Value
IS TRUE	IS FALSE	fwhss1.com	msgDisallowed	0
IS TRUE	IS FALSE	fwhss2.com	msgDisallowed	0
IS TRUE	IS FALSE		msgDisallowed	100
	t internal variable ng Records 1-3 of 3 First Prev A Check for Foreign Egress Peer IS TRUE IS TRUE	t internal variable g Records 1-3 of 3 First Prev 1 Next Last Restore Order A B Check for Foreign Egress Peer IS TRUE IS FALSE IS TRUE IS FALSE	t internal variable ag Records 1-3 of 3 First Prev 1 Next Last Restore Order A B C Check for Foreign Egress Peer Check for msgDisallowed Check for Destination-Realm AVP IS TRUE IS FALSE fwhss1.com IS TRUE IS FALSE fwhss2.com	t internal variable ag Records 1-3 of 3 First Prev Next Last Restore Order A B C Set internal variable Check for Foreign Egress Peer Check for msgDisallowed IS TRUE IS FALSE fwhss1.com msgDisallowed IS TRUE IS FALSE fwhss2.com msgDisallowed

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



IF A AND Then De		R C) VP, Delete	AVP						
Displayi	ng Re	cords 1-1	of 1 First Prev 1 Next Last	Restore Order					
Dulo Id	Move	love the rule	Α	В	С	Delete AVP	Delete AVP	Move the rule	
Rule lu			Check for Foreign Egress Peer	Match for OC-Supported-Feature AVP		Delete AVP	Delete AVP		
194	Up	Down	IS TRUE	EXISTS	EXISTS	OC-Supported-Features[\$index]	OC-OLR[\$index]	Up Down	
Displavi	na Re	cords 1-1	of 1 First Prev 1 Next Last	Restore Order					



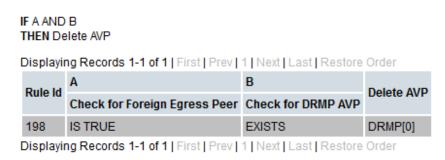


Figure 31: Template 12b. Remove DRMP AVP

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

Filter: - None -	▼ =	Reset Go				
		Displaying Records 1-20 of 35 First Prev 1 2 Next Last				
		Rule Template Name		State	Action Error Hand	ing Status of Rule Counter
		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-Fi	irst 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 whiltelist-RTP1		Test	Ignore the error	Stopped
		DR whiltelist-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			Ignore the error	Stopped
		MiklosTest1-copy			Ignore the error	Stopped
		MiklosTest11			Ignore the error	Stopped
		OH ends with OR-RTP1 OH ends with OR-RTP1-First Ver		Test Active	Ignore the error Ignore the error	Stopped
		OR whiltelist-RTP1		Test	-	Stopped
		OR whiltelist-RTP1-First Ver		Active	Ignore the error Ignore the error	Active
		Rule Template Name	State		-	tatus of Rule Counters
					-	
		Remove DOIC AVP-RTP1	Test	Ignore the	e error S	topped
		Remove DOIC AVP-RTP1-First Ver	Active	e Ignore the	e error A	ctive
		Remove DOIC AVP-RTP10	Test	Ignore the	e error S	topped
		Remove DOIC AVP-RTP10-First Ver	Active	e Ignore the	e error A	ctive
		Remove DRMP AVP-RTP1	Test	Ignore the	e error S	topped
		Remove DRMP AVP-RTP1-First Ver	Active	e Ignore the	e error A	ctive
		Remove DRMP AVP-RTP10	Test	Ignore the	e error S	topped
		Remove DRMP AVP-RTP10-First Ver	Active	e Ignore the	e error A	ctive
		Roaming scenario identification-RTP1	Test	Ignore the	e error S	topped
		Roaming scenario identification-RTP1-First Ver	Active	e Ignore the	e error A	ctive
		Roaming scenario identification-RTP10	Test	Ignore the	e error S	topped
		Roaming scenario identification-RTP10-First Ver	Active	e Ignore the	e error A	ctive
		set extra logs	Test	Ignore the	e error S	topped
		testGC	Test	Ignore the	e error S	topped
		try4	Test	Ignore the	e error S	topped
		Displaying Deserve 21.25 of 25 First Dray 1 2	N. I. N. Laura	11 and		

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

Rule Set Name	Live DSR Application	Request	Scope
Trigger: Diameter request message received from connection			
Roaming scenario identification-RTP1-First Ver	4	Normal Request	All -
Application Id and CC white list for inbound roamers-RTP1-First Ver	4	Normal Request	All -
Application Id and CC white list for outbound roamers-RTP1-First Ver	4	Normal Request	All
OR whiltelist-RTP1-First Ver	4	Normal Request	All
DR whiltelist-RTP1-First Ver	4	Normal Request	All
OH ends with OR-RTP1-First Ver	4	Normal Request	All
Handle RouteRecord AVP-First Ver	1	Normal Request	All
Handle disallowed requests-First Ver	4	Normal Request	All
Remove DOIC AVP-RTP1-First Ver	4	Normal Request	All
Remove DRMP AVP-RTP1-First Ver	4	Normal Request	All
Roaming scenario identification-RTP10-First Ver	4	Normal Request	
Trigger: Diameter request message prior to be forwarded to conne		Normal Deguast	All
Destination-Realm whitelist-RTP10-First Ver	1	Normal Request	
Handle disallowed requests-First Ver	4	Normal Request	All
Remove DOIC AVP-RTP10-First Ver	4	Normal Request	_
Remove DRMP AVP-RTP10-First Ver	1	Normal Request	Al
Insert Remove Up Down			
Trigger: Diameter request message attempted for reroute			
Insert Remove Up Down			
Trigger: Diameter answer message received from connection			
Insert Remove Up Down			
Trigger: Diameter answer message prior to be forwarded to conne	ction		
			All
Remove DOIC AVP-RTP10-First Ver	1		All

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

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

Call the CAS main number at **1-800-223-1711** (toll-free in the US), or call the Oracle Support hotline for your local country from the list at <u>http://www.oracle.com/us/support/contact/index.html</u>. When calling, make the selections in the sequence shown on the Support telephone menu:

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

For technical issues such as creating a new Service Request (SR), select 1.

For non-technical issues such as registration or assistance with MOS, select 2.

You are connected to a live agent who can assist you with MOS registration and opening a support ticket. MOS is available 24 hours a day, 7 days a week, 365 days a year.

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A critical situation is defined as a problem with the installed equipment that severely affects service, traffic, or maintenance capabilities, and requires immediate corrective action. Critical situations affect service and/or system operation resulting in one or several of these situations:

- A total system failure that results in loss of all transaction processing capability
- · Significant reduction in system capacity or traffic handling capability
- Loss of the system's ability to perform automatic system reconfiguration
- Inability to restart a processor or the system
- Corruption of system databases that requires service affecting corrective actions
- Loss of access for maintenance or recovery operations
- Loss of the system ability to provide any required critical or major trouble notification

Any other problem severely affecting service, capacity/traffic, billing, and maintenance capabilities may be defined as critical by prior discussion and agreement with Oracle.

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- 1. Access the **Oracle Help Center** site at http://docs.oracle.com.
- 2. Click Industries.
- 3. Under the Oracle Communications subheading, click the Oracle Communications documentation link. The Communications Documentation page appears. Most products covered by these documentation sets display under the headings Network Session Delivery and Control Infrastructure or "Platforms."

4. Click on your Product and then the Release Number. A list of the entire documentation set for the selected product and release displays. To download a file to your location, right-click the PDF link, select Save target as (or similar command based on your browser), and save to a local folder.