Oracle® Communications Diameter Signaling Router

DSR Security App Using Mediation Example Procedure Release 8.6.0.0.0 F56023-01 April 2022



Oracle Communications DSR Security Application Using Mediation Example Procedure User's Guide, Release 8.6.0.0.0

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

Table of Contents

1.	Intro	ductio	n	5
	1.1	Purpo	se and Scope	5
	1.2	Overv	iew of Security Application	5
2.	Exar	nple P	rocedure	6
	2.1	Define	Internal Variables	6
	2.2	Define	Measurements	7
	2.3	Add A	VP to DSR Custom Dictionary	7
		2.3.1	OC-Supported-Features AVP	7
		2.3.2	OC-OLR AVP	8
		2.3.3	DRMP AVP	8
	2.4	Rulese	et Configuration	8
		2.4.1	Template 1: Roaming Scenario Identification	9
		2.4.2	Template 2: Application ID and CC WhiteList for Inbound Roamers	10
		2.4.3	Template 3: Application ID and CC Whitelist for Outbound Roamers	12
		2.4.4	Template 4: OR Whitelist	14
		2.4.5	Template 5: DR Whitelist	16
		2.4.6	Template 6: OH Ends with OR	18
		2.4.7	Template 7: Handle Route Record AVP	20
		2.4.8	Template 8: Handle Disallowed Requests	22
		2.4.9	Template 9a: Remove DOIC AVP	23
		2.4.10	Template 9b: Remove DRMP AVP	25
		2.4.11	Template 10: Roaming Scenario Identification	26
		2.4.12	Template 11: Destination-Realm Whitelist	28
		2.4.13	Template 12a: Remove DOIC AVP	30
		2.4.14	Template 12b: Remove DRMP AVP	32
	2.5	Insert	Rules within a Rule Set	32
	2.6	State	and Properties of Ruleset	
	2.7	Assoc	iation of Ruleset to a Trigger Point	
Му	Orac	le Sup	port (MOS)	39

List of Tables

Table 1:	Internal Variables	6
Table 2:	Measurements	7
Table 3:	Mediation Templates	8
Table 4:	Sample IMSIs	9

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.

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	



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	г4	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.

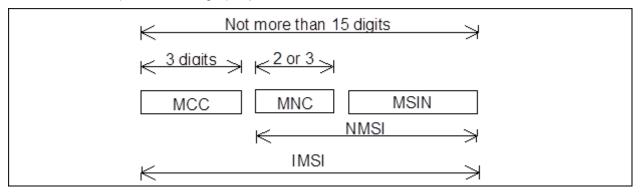
If the peer is in the whitelist then, check IMSI (International Mobile Subscriber Identity) from User-Name AVP to find out the home network of this user.

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 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.

Main Ment	u. Dian	eter -> Mediation -> Rule Tem	nates [Eu	it.]	Fri Jan 06 10:49:25 2017 5				
Ok	Apply	Cancel							
		Settings			Description				
Rule Template N	1000				Name used to label this Rule Template in the system				
cute temptate N	vame	Roaming scenario identification-RTP1		8	[Default = n/a, Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (-), @; and underscore (_).]				
lessage type su	noddn	Request 🖌 Answer 🖌			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	1	A		~×					
Name	Identifying	the Ingress peer		~					
Description	Check Pee	r for Roaming scenario identification							
Leftvalue	@dsr.ingr	ess,peer		1 1	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>				
Operator		- Case sensitive			soperator> sright-hand operand> triple where sright-hand operand> is either a value provisioned by the Rule Set Administrator or a fixed value that comes for exam from the message being processed in the former case. "name" is shown on the provisioning screen instead of <leth-hand operand=""> and the value is pre-filled by the screen instead of <leth-hand operand=""> triple where screen instead of <leth-hand operand=""> and the value is pre-filled by the screen instead of <leth-hand operand=""> triple where screen instead of <leth-hand operand=""> and the value is pre-filled by the screen instead of <leth-hand operand=""> triple where screen instead of <leth-hand operand=""> and the value is pre-filled by the screen instead of <leth-hand operand=""> triple where screen instead of </leth-hand> and the value is pre-filled by the screen instead of </leth-hand> triple where screen instead of </leth-hand> and the value is pre-filled by the screen instead of </leth-hand></leth-hand></leth-hand></leth-hand></leth-hand>				
Right value	Peer		1.0		nom are message being processed in are romer case, name, is snown on me provisioning screen insead or see namo operand> and me value is pre-med i (default value). "Optional" makes the condition optional, and "Fast search" results in fast database lookups.				
Default value	FN_MME1	1		[
	And the second se	Fixed		1 1					
3401	Opuonar	L. Hited L							
		ANDed							
Condition Set		ORed			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				
		© Complex Expression A			the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-search lookups.				
		Actions			Description				
ction		Default Values	Optional						
		Internal variable							
		Print and a second s		foreigningressPeer 💌					
Set internal varia	able	Set Value		~~×	The action allows setting the value for an internal variable that is valid for the entire duration of a transaction.				
		1 [wizard]							
		Internal variable							
Set internal varia	della	outboundRoaming 💌			The action allows setting the value for an internal variable that is valid for the entire duration of a transaction.				
Set internal varia	3046	Set Value		~~~	The action allows seeing the value for an internal valuable that is value for the entire duration of a transaction.				
		(@msg.avp["User-Name [wizard]							
		Internal variable	ariable						
Set internal variable		Servaiue		200	The website efforts will be a first to be an independent of the Bod in which for the webby developes of a beam orders				
				10000	The action allows setting the value for an internal variable that is valid for the entire duration of a transaction.				
		(\$outboundRoaming==([wizard]							

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 = \$msgDisallowed =	0 for all the rules except the default rule: 10

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

			Setungs					
Rule Templa	ate Nai	me	Application Id and CC white	list for i	nbound	Name used to label this Rule Template in the system [Default = n/a. Range = A 255 character string. Valid cl		
Message typ	pe sup	port	Request 🗸 Answer: 🏑					Indicates what type of message processing is suppor conditions and actions.
			Conditions					
Fast search	i př	• •	A				. ^×	
Name	- i-		boundRoamers				•	
Description	i in		nboundRoamers					
Left value	\$	inboundRo	aming				* [wizard]	
Operator	i	s true	 Case sensitive 					
Rightvalue	: I	integer32				T		
Default valu	ue						[wizard]	
		Optional 🗌	Fixed					
Fast search	- ř		B				~×	
Name	i i i		nsgDisallowed				* ~	
Description	םן י	heck for m	nsgDisallowed					
Left value	\$	msgDisallo	wed				 [wizard] 	
Operator	i	s false	 Case sensitive 					
Right value	1	integer32				Ŧ		
Default valu	ue						[wizard]	
		Optional	Fixed					When the condition set matches on the message, the <operator> <right-hand operand=""> triple where <right-f< td=""></right-f<></right-hand></operator>
Fast search	- i		С				~×	from the message being processed. In the former case
Name	- i-		pplicationId				* 🗡	"default value". "Optional" makes the condition option:
Description	ם ו	heck for A	pplicationId					
Left value	0	م¢msg.appli	ication_id				* [wizard]	
Operator	=		 Case sensitive 					
Right value	1	nteger32				T		
Default valu	ue 1	6777251					[wizard]	
	Ċ	Optional 🛛	Fixed					
Fast search	h 👱	/	D				~×	
Name	c	heck for C	ommandCode				* 🗸	
Description	ר י	heck for C	ommandCode					
Left value	C	omsg.com	mand.code				* [wizard]	
Operator	=		 Case sensitive 					
Rightvalue	. 1	nteger32				-		
Default valu	i –	60					[wizard]	
		Dotional 🛛	Fixed					
Fast search Name	1		В		^X			
	<u> </u>	or msgDisallow or msgDisallow			· · ·			
	\$msgDis	-			• [wizard]			
Operator	is false		se sensitive					
Right value Default value	Integer:	32			[wizard]			
	Optional	I Fixed						message, the selected actions are applied in the order they are shown. Eacl vhere ≺right-hand operand> is either a value provisioned by the Rule Set Ad
Fast search Name	Check for	or ApplicationId	c .	,	· ^×	from the message being	g processed. In t	where «infini-mand operand» is either a value provisioned by the Rule Ser Ad he former case, "name" is shown on the provisioning screen instead of «lef didtion optional, and "Fast search" results in fast database lookups.
1	<u> </u>	or ApplicationIc				conductivence : Optiona	maxes ure cor	annon opuonal, and i aotocaron roouito in last udiauase luurups.
Left value	<u> </u>	pplication_id			• [wizard]			
Operator Right value	== Integer:		se sensitive					
-	1677725				[wizard]			
		I 🗹 Fixed						
Fast search Name	Check fo	or CommandCo	D	,	•			
Description	<u> </u>	or CommandCo						
Left value	<u> </u>	ommand.code		-	• [wizard]			
Operator Right value	== Integer3		se sensitive					
	360	-			[wizard]			
[Add]	Optional	I 🗹 Fixed						
Huu		ANDec	1					
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
		Compl	lex Expression: A AND B AND C AND D Actions					Description
Action		Default Val	lues	Optional				coordination and a second s
		Internal va msgDisal						
Set internal varia	able	Set Value			~~×	The action allows settin	g the value for a	n internal variable that is valid for the entire duration of a transaction.
New action		0 Modify Di	[wizard]			Add a new action to the	action list that in	applied when the conditions of the Dule Template match on the man-
New action		I MODITY DI	iameter Header Parts 💌 [Add]			Aud 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 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
Bit and the standard an	Rule Template N	lame		orc-PTP1	*	Name used to label this Rule Template in the system
			Request 🗸			Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The message t
Faile set of the set o						
	Fast search	1			~X	
	Name	Check for C	Outbound Romers	*	\sim	
Operative protection Impact Production Impact Production Impact Production Fails and protection Impact Production Impact Production Impact Production Fails and protection Impact Production Impact Production Impact Production Construction Construction Impact Production Impact Production Impact Production Construction Fails and Production Impact Production Impact Production Impact Production Construction Fails and Production Impact P	Description	Check for C	Outbound Romers			
Roy Mutual to provide a set of the set of th	Left value	\$outboundF	Roaming	*	[wizard]	
Druktuvka Find : excl Image: Provide in the find in the condition is a stand in the condit the condition is a stand in the condition is a sta	Operator	is true	Case sensitive			
	Right value	Integer32		-		
Fale scale Fale scale Fale	Default value				[wizard]	
Name Ref for mightalowed Image: Section of the sectin of the sectin of the secti		Optional				
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Lativiae in factor and provide a data and provide a	(Antonio and Antonio and		-	^	\sim	
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Set Value in elaction allows setting the value for an internal variable that is valid for the entire duration of a transaction.						
	Set internal varia	able			~~X	X The action allows setting the value for an internal variable that is valid for the entire duration of a transaction.
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	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

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 = \$msgDisallowed =	0 for all the rules except the default rule: 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	Name	OR whiltelist-RTP1	*		d to label this Rule Template in the system v/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @, and underscore (_).]
Message type su	upport	Request: 🗸 Answer: 🖌		Indicates v	what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The message type support In the selected conditions and actions.
		Conditions		depends o	Description
Fast search	1	А	^X		
		oreign Ingress Peer	_* ×		
	<u></u>	oreign Ingress Peer	-		
Left value Operator	\$foreignIng	ressPeer □	* [wizard]		
Right value	Integer32		T		
Default value	Integerse	L	[wizard]		
	Optional	Fixed			
Fast search	1	В	^X		
		nsgDisallowed	_* ~		
	\$msqDisallo		* [wizard]		condition set matches on the message, the selected actions are applied in the order they are shown. Each condition consists of a
Operator	is false	Case sensitive		Sielicitatiu	operand> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provisioned by the Rule Set tor or a fixed value that comes for example from the message being processed. In the former case, "name" is shown on the</right-hand></right-hand></operator>
Right value	Integer32		-	provisionin	g screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" makes the condition optional, and ch" results in fast database lookups.</left-hand>
Default value			[wizard]	1 ast sear	
	Optional				
Fast search	Charly fan C	C C	^×		
	í	rrigin Realm AVP			
Left value	<u></u>	"Origin-Realm"][1].data	* [wizard]		
Operator	==	Case sensitive			
Right value	DiameterId		-		
Default value	fwmme1.co	m	[wizard]		
	Optional	Fixed			
[Add]		a . .			
Name	Check fo	r Foreign Ingress Peer		\sim	
Description	Check fo	r Foreign Ingress Peer			
Left value	\$foreign]	ingressPeer		• [wizard]	
Operator	is true	 Case sensitive 			
Rightvalue	Integer3	2	-		
Default value				[wizard]	
	Optional				
Fast search Name	Charle Fo	B		<u> </u>	
Description		r msgDisallowed		. v	
	i	r msgDisallowed		Fusiment 1	When the condition set matches on the message, the selected actions are applied in the order they are shown. Each
Left value Operator	\$msgDis			<pre>* [wizard]</pre>	<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"</right-hand></right-hand></operator></left-hand>
	is false				provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" makes</left-hand>
Right value Default value	Integer3	2		[wizard]	"Fast search" results in fast database lookups.
Delautivalue	Optional	Fixed		wizaru	
Fast search	 Optional 	C		~×	
Name		r Origin Realm AVP		• ~	
Description	Check fo	r Origin Realm AVP			
Left value	@msg.av	/p["Origin-Realm"][1].data	1	• [wizard]	
Operator	==	Case sensitive			
Rightvalue	Diamete	rIdentity	*		
Defaultvalue	fwmme1	.com		[wizard]	
	Optional	Fixed			
Add					
Opendition Cot		ANDed Anded			Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) ANI Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achie
Condition Set		Complex Expression: A AND B AND C			Use parentneses for the condition set that contains both AND and UR. I ry to optimize the complex expression to achie lookups.
		Actions			Description
Action		Default Values	Optional		Description
		Internal variable			
Set internal vari	iable	msgDisallowed 💌		AVY	The action allows setting the value for an internal variable that is valid for the entire duration of a transaction.
- , t inter ven		Set Value			
		0 [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.
		Consel			
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.

Templat	Template Definition							
IF	\$foreignIngressPeer	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: 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		[WIZO	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	ite 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 suppor	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		<u> </u>	X	
Name		k for Foreign Ingress Peer		*	\sim	
Description		k for Foreign Ingress Peer				
Leftvalue		eignIngressPeer			[wizard]	
Operator	is tr					
Right value		ger32				
Default valu	1	onal 🔲 Fixed 🗌			[wizard]	
Fast search		B			~×	
Name		k for msgDisallowed		*	\sim	
Description	Cheo	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
Right value	Inte	ger32		-		provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the "Fast search" results in fast database lookups.</left-hand>
Default valu	e				[wizard]	
	Opti					
Fast search		С			~×	
Name		k for Origin-Host AVP		*	\sim	
Description		n-Host AVP Value does not ends with Orig	in-Realm AVP Va			
Left value	(sg.avp["Origin-Host"][1].data			[wizard]	
Operator	!=\$	Case sensitive				
Right value	xl-vi					
Default valu	,	@msg.avp["Origin-Realm"]			[wizard]	
Name	· · ·	Foreign Ingress Peer	• ~			
Description		Foreign Ingress Peer				
Left value	\$foreignIn		* [wizard]			
Operator Right value	is true Integer32	Case sensitive	T			
Default value	Integeroz		[wizard]			
Fasterath		Fixed B				
Fast search Name	Check for	msgDisallowed	• ~×			
Description		nsgDisallowed		When the con-	dition opt mot	ches on the message, the selected actions are applied in the order they are shown. Each condition consist
Left value	\$msgDisal		* [wizard]	<left-hand ope<="" td=""><td>erand> <opera< td=""><td>ches on the message, the selected actions are applied in the order they are shown. Lach condition consist itor> ≺right-hand operand> triple where ≺right-hand operand> is either a value provisioned by the Rule Set le that comes for example from the message being processed. In the former case, "name" is shown on the</td></opera<></td></left-hand>	erand> <opera< td=""><td>ches on the message, the selected actions are applied in the order they are shown. Lach condition consist itor> ≺right-hand operand> triple where ≺right-hand operand> is either a value provisioned by the Rule Set le that comes for example from the message being processed. In the former case, "name" is shown on the</td></opera<>	ches on the message, the selected actions are applied in the order they are shown. Lach condition consist itor> ≺right-hand operand> triple where ≺right-hand operand> is either a value provisioned by the Rule Set le that comes for example from the message being processed. In the former case, "name" is shown on the
Operator Right value	is false Integer32	Case sensitive	_	provisioning s	creen instead	l of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" makes the condition opti</left-hand>
Default value			(wizard)	FastSearch	results in lasi	database lookups.
Fast search	Optional	Fixed C	~~			
Name	Check for	Drigin-Host AVP	* ~			
Description		t AVP Value does not ends with Origin-Realm AVP Va				
Left value Operator	@msg.avp !=\$	["Origin-Host"][1].data	* [wizard]			
Right value	xl-value		v			
Default value	,	g.avp["Origin-Realm"]	[wizard]			
[Add]	Optional	Fixed 🗸				
Condition Set		ORed		Use parenthes	er the conditions are the conditions for the co	ns 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
		Complex Expression: A AND B AND C		lookups.		Description
Action		Default Values	Optional			Description
Set internal varia	ible	Internal variable msgDisallowed Set Value 50 [wizard]	□ ^~×	The action allo	ows 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 acti	ion 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	ved = 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
vlessage type su	upport	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		A		X	
Name Description	í	preign Ingress Peer		· · ·	
Left value	\$foreignIng	preign Ingress Peer		* wizard	1
Operator	is true	Case sensitive		L	
Right value	Integer32		-		
Default value				[wizard	1
	Optional	Fixed			
	V	В		X	
Name	i	IsgDisallowed		• ×	
Description Left value	í	isgDisallowed		• Eusineerd	, When the condition set matches on the message, the selected actions are applied in the order they are shown. Ea
Operator	\$msgDisallo is false	Case sensitive		 [wizard 	I <left-hand operand=""> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provisio Administrator or a fixed value that comes for example from the message being processed. In the former case, "nai</right-hand></right-hand></operator></left-hand>
Right value	Integer32		-		provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" make</left-hand>
Default value	Integersz			[wizard	"Fast search" results in fast database lookups.
	Optional	Fixed			
	<u>o</u>	с		. ^×	
Name		outeRecord AVP		* ~	
Description	i	d AVP, if any Route-Record AVP is ending with blackli	sted rea		
Left value		"Route-Record"][any].data		* [wizard	I
Operator Right value	=\$ xl-value	Case sensitive	-		
	blistmme1.0	om.		[wizard	1
Dendan falde	Optional 🗵			1	
Add]					
Name	Check for F	oreign Ingress Peer	*	\sim	
Description	-	oreign Ingress Peer	_		
Left value	\$foreignIng			[wizard]	
Operator Right value	is true	Case sensitive			
Default value	Integer32			[wizard]	
	Optional	Fixed			
Fast search	1	В		^×	
Name	i	nsgDisallowed		\sim	
Description	<u> </u>	nsgDisallowed	-	fundamental 1	When the condition set matches on the message, the selected actions are applied in the order they are shown. Each c
Left value Operator	\$msgDisallo is false	Case sensitive		[wizard]	
Right value	Integer32		-		provisioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" makes t</left-hand>
Default value				[wizard]	"Fast search" results in fast database lookups.
	Optional	Fixed			
		C		^X	
Name Description		outeRecord AVP	tod rea	~	
Left value	<u> </u>	d AVP, if any Route-Record AVP is ending with blacklis "Route-Record"][any].data		[wizard]	
Operator	=\$	Case sensitive			
Right value	xl-value		-		
Default value	blistmme1.	com		[wizard]	
	Optional 🛛	Fixed			
[Add]					
Condition Set		ANDed ORed			Specify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) ANE Use 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			lookups.
		Actions			Description
Action		Default Values Internal variable	Optional		
Set internal varia	able	mgDisallowed Set Value		~~×	The 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]			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 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

THENPeg counterCount the number of disallowed ingress requestsRaise alarmInclude 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	Α		~×			
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		-		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]	results in fast database reekaps.		
	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			bac parentineses to the condition sectinal contains bolt and one. Hy to optimize the complex expression to ac		
		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	7				Silently drop the message. The action is supported by Requests and Answers.		
Exit from Execu	luon mgger			~~X	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-Supporte	d-Features
	Delete AVP	OC-OLR	

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

Ok	Apply	Cancel			
		Settings			Description
Rule Template N	Vame	Remove DOIC AVP-RTP1			e used to label this Rule Template in the system with a de Ronada – A 255 character string, Valid characters are to at 14 71,10,01, space, dept. (), paried (),
		Request: 🗸			ult = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @ ates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. T
Message type s	uppon	Answer: 🗸			nds on the selected conditions and actions.
Fast search		Conditions A		X	Description
Name	Check for f	oreignIngressPeer	(, ,	
Description	i	oreignIngressPeer	_		
Leftvalue	\$foreignIng		* [wiz	rd]	
Operator	is true	Case sensitive			
Right value	Integer32		-		
Default value			[wiz	rd]	
	Optional	Fixed			
Fast search	0	В	<u> </u>	×	
Name Description	i	VP OC-Supported-Features	_ ` `		
Leftvalue	<u> </u>	VP OC-Supported-Features	• [wir		the condition set matches on the message, the selected actions are applied in the order they are shown.
Operator		"OC-Supported-Features"][1].data	* [wiz	- IGIT	hand operand> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provi nistrator or a fixed value that comes for example from the message being processed. In the former case, "</right-hand></right-hand></operator>
Right value	exists	Case sensitive		provis	sioning screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" n</left-hand>
Default value	Integer32		[wiz	"Fast rd]	search" results in fast database lookups.
Deldalt value	Optional	Fixed	1		
Fast search	Optional ⊆	C	/	×	
Name	Check for C	OC-OLR AVP	* ~	r	
Description	Check for C	DC-OLR AVP	_		
Left value	@msg.avp["OC-OLR"][1].data	* [wiz	rd]	
Operator	exists	✓ Case sensitive			
Rightvalue	Integer32		-		
Default value			[wiz	rd]	
[Add]	Optional	Fixed			
[· · · · · · ·]		ANDed		Casa	if whether the conditions are locially Alified. Open or they fame a complex locial supression like: (A Op
Condition Set		ORed			ify whether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR 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)		looku	ps.
		/P OC-Supported-Features	· ~		
		/P OC-Supported-Features	. Indexed 1	When the co	ondition set matches on the message, the selected actions are applied in the order they are shown. Each condi
Left value Operator	@msg.avp[" exists	OC-Supported-Features"][1].data	• [wizard]		operand> <operator> <right-hand operand=""> triple where <right-hand operand=""> is either a value provisioned by th or 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>
Right value	Integer32			provisioning	g screen instead of <left-hand operand=""> and the value is pre-filled by the "default value". "Optional" makes the co</left-hand>
Default value	, integerer		[wizard]	Fast searc	h" results in fast database lookups.
	Optional 🗌	Fixed			
	\otimes	C	^×		
	Check for O		~		
Left value			• [wizard]		
Operator	exists	Case sensitive			
Right value	Integer32	 ▼			
Default value			[wizard]		
	Optional	Fixed			
[Add]		~ ··· - ·			
Condition Set		ORed			ether the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C A heses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve th
		Complex Expression: A AND (B OR C)		ookups.	· · · · · · · · · · · · · · · · · · ·
		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 a	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	ine action a	allows deleting a specified AVP in the message.
		With the value:			
		[wizard]			
New action		Modify Diameter Header Parts 💌 [Add]		add a new a	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	s true
AND	@msg.avp["DRMP"]	e	xists
THEN	Delete AVP	C	RMP
	Settings		Description
Rule Template N	Name Remove DRMP AVP-RTP1		Name used to label this Rule Template in the system
Message type s	Poquest d		[Default = n/a. Range = A 255 character string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @, and underscore (_)] Indicates what type of message processing is supported by the Rule Template, i.e. Request, Answer, or both. The message type supp depends on the selected conditions and actions.
	Conditions		Description
Fast search Name Description	A Check for Foreign Ingress Peer Check for Foreign Ingress Peer	<u> </u>	
Left value Operator	\$foreignIngressPeer is true	• [wizar	1
Right value	Integer32	*	
Default value	Optional Fixed	[wizar	I When the condition set matches on the message, the selected actions are applied in the order they are shown. Each condition consis ⊲left-hand operand⇒-operator>- <ight-hand operand="">-triple where <ight-hand operand="">- is either a value provisioned by the Rule Set</ight-hand></ight-hand>
Fast search	В		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
Name	Check for DRMP AVP	* ~	"Fast search" results in fast database lookups.
Description Left value	Check for DRMP AVP		,
Operator	@msg.avp["DRMP"][1].data exists Case sensitive	* [wizar(1
Right value	Integer32	-	
Default value	Integerse	[wizard	1
	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 I Use parentheses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-sear lookups.
201200	Actions		Description
Action	Default Values	Optional	
Delete AVP	Delete parent AVP if it is empty: Instance DRMP All CMWP If the value:	- A.	The action allows deleting a specified A/P in the message.

Figure 13: Screenshot of Remove DRMP AVP Configured Template

Add a new action to the action list that is applied when the conditions of the Rule Template match on the message

[wizard]

Modify Diameter Header Parts 💌 [Add]

New action

Ok Apply Cancel

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:	\$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 variable and to valid for the chare 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.

Template Definition

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			- 57		
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	
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Name Description		Actions reign Egress Peer		~			
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Description	Check for Fo	Actions reign Egress Peer reign Egress Peer	* [vizard]			
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Description Left value Operator Right value Default value Tast search Name Description Left value Operator Right value Default value Fast search Name Description Left value Operator Right value Default value Default value Default value Default value	Check for Fo \$foreignEgre Integer32 Optional Check for ms \$msg0isallov Is false Integer32 Optional Check for De Check	Actions reign Egress Peer reign Egress Peer reign Egress Peer sePer Case sensitive Fixed B sgDisallowed sgDisallowed ved Case sensitive Fixed C returnation-Realm AVP Destination-Realm T[1].data C returnation-Realm T[1].data C returnation-Realm AVP Destination-Realm AVP Destination-Realm AVP Destination-Realm AVP Destination-Realm AVP Fixed C Return C C C C C C C C C C C C C C C C C C C	× • • • • • • • • • • • • •	wizard]	eleft-hand of Administration provisioning "Fast search Specify whe Use parent	Description Indition set matches on the message, the selected actions are applied in the order they are shown. Each condition consists of a perand+-coperatorcright-hand operand triple whereright-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 is createn instead of -deft-hand operand and the value is pre-filled by the "default value". "Optional" makes the condition optional, a " results in fast database lookups. ther the conditions are logically ANDed, ORed or they form a complex logical expression like; (A OR B) AND C AND (D OR E). Note	
Description Left value Operator Right value Default value Description Left value Operator Right value Default value Default value Default value Operator Right value Description Left value Operator Right value Default value Default value	Check for Fo \$foreignEgre is true Integer32 Optional Check for ms \$msgDisallov is false Integer32 Optional Check for De Check for D	Actions reign Egress Peer reign Egress Peer issPeer v Case sensitive Fixed B SegDisallowed Wed Case sensitive Fixed Case sensitive Fixed C SetInation-Realm*][1].data Case sensitive Fixed Case Sensitive	· (· (· (· (wizard]	eleft-hand of Administration provisioning "Fast search Specify whe Use parent	Description andition set matches on the message, the selected actions are applied in the order they are shown. Each condition consists of a perand>coperatorsright-hand operand>- tiple where sright-hand operand>- is either a value provisioned by the Rule Set or or a field value that comes for example from the message being processed. In the former case, "name" is shown on the isoreen instead of 1-efth-and operand>- and the value is pre-filled by the "default value". "Optional" makes the condition optional, ai "results in fast database lookups. there the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C AND (D OR E). Note leases for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-search	
Description Left value Operator Right value Default value Description Left value Operator Right value Default value Default value Operator Right value Operator Right value Default value Default value Default value Default value Default value Default value Default value	Check for Fo \$foreignEgre is true Integer32 Optional Check for ms \$msgDisallov is false Integer32 Optional Check for De Check for D	Actions reign Egress Peer reign Egress Peer reign Egress Peer sePer Case sensitive Fixed B sgDisallowed sgDisallowed ved Case sensitive Fixed C returnation-Realm AVP Destination-Realm T[1].data C returnation-Realm T[1].data C returnation-Realm AVP Destination-Realm AVP Destination-Realm AVP Destination-Realm AVP Destination-Realm AVP Fixed C Return C C C C C C C C C C C C C C C C C C C	× • • • • • • • • • • • • •	wizard]	eleft-hand o Administrat provisioning "Fast searcl Specify whe Use parent lookups.	Indition set matches on the message, the selected actions are applied in the order they are shown. Each condition consists of a perand- coperator- «right-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 iscreen instead of referend operand- and the value is pre-filled by the "default value". "Optional" makes the condition optional, a "results in fast database lookups. ther the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C AND (D OR E). Note leases for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-search Description	
Description Left value Operator Right value Default value Tast search Name Description Left value Operator Right value Default value Fast search Name Description Left value Operator Right value Default value Default value Default value Default value	Check for Fo \$foreignEgre Integer32 Optional □ Check for ms \$msgDisallov is false Integer32 Optional □ Check for De @msg.avp[*] == DiameterIde fwhss1.com Optional □	Actions reign Egress Peer reign Egress Peer issPeer Fixed B ggDisallowed wed Case sensitive Fixed Case sensitive Fixed Fixed	× • • • • • • • • • • • • •	wizard]	eleft-hand o Administrat provisioning "Fast searcl Specify whe Use parent lookups.	Description andition set matches on the message, the selected actions are applied in the order they are shown. Each condition consists of a perand>coperatorsright-hand operand>- tiple where sright-hand operand>- is either a value provisioned by the Rule Set or or a field value that comes for example from the message being processed. In the former case, "name" is shown on the isoreen instead of 1-efth-and operand>- and the value is pre-filled by the "default value". "Optional" makes the condition optional, ai "results in fast database lookups. there the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C AND (D OR E). Note leases for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-search	
Description Left value Operator Right value Default value Description Left value Operator Right value Default value Description Left value Default value Description Left value Operator Right value Default value Default value Default value Default value Default value Default value Set internal varia	Check for Fo \$foreignEgre Is true Integer32 Optional ✓ Check for ms SmsgDisallov Is false Integer32 Optional ✓ Check for De @msg.avp["1 == Diameter1de fwhssl.com Optional Ø	Actions reign Egress Peer reign Egress Peer reign Egress Peer sspPeer	× • • • • • • • • • • • • •	wizard]	eleft-hand of Administration administration of the administrati	Description ondition 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 field value that comes for example from the message being processed. In the former case, "name" is shown on the iscreen instead of -feth-and operand and the value is pre-filed by the "default value". "Optional" makes the condition optional, a 'r results in fast database lookups. ther the conditions are logically ANDed, ORed or they form a complex logical expression like: (A OR B) AND C AND (D OR E). Note lesses for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-search Description	
Description Left value Operator Right value Default value Description Left value Operator Right value Default value Default value Operator Right value Operator Right value Default value Default value Default value Default value Default value Default value Default value	Check for Fo \$foreignEgre Is true Integer32 Optional □ Check for ms SmsgDisallov Is false Integer32 Optional □ Check for De @msg.avp["1 == Diameter1de fwhssl.com Optional □	Actions reign Egress Peer reign Egress Peer issPeer Fixed B ggDisallowed wed Case sensitive Fixed Case sensitive Fixed Fixed	× • • • • • • • • • • • • •	wizard]	eleft-hand of Administration administration of the administrati	Indition set matches on the message, the selected actions are applied in the order they are shown. Each condition consists of a perandcoperatorcright-hand operandtripter set of the set of the 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 -deft-hand operand and the value is pre-filled by the "default value". "Optional" makes the condition optional, a "results in fast database lookups. ther the conditions are logically ANDed. ORed or they form a complex logical expression like: (A OR B) AND C AND (D OR E). Note tesees for the condition set that contains both AND and OR. Try to optimize the complex expression to achieve the fast-search Description	

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-Supporte	d-Features
	Delete AVP	OC-OLR	

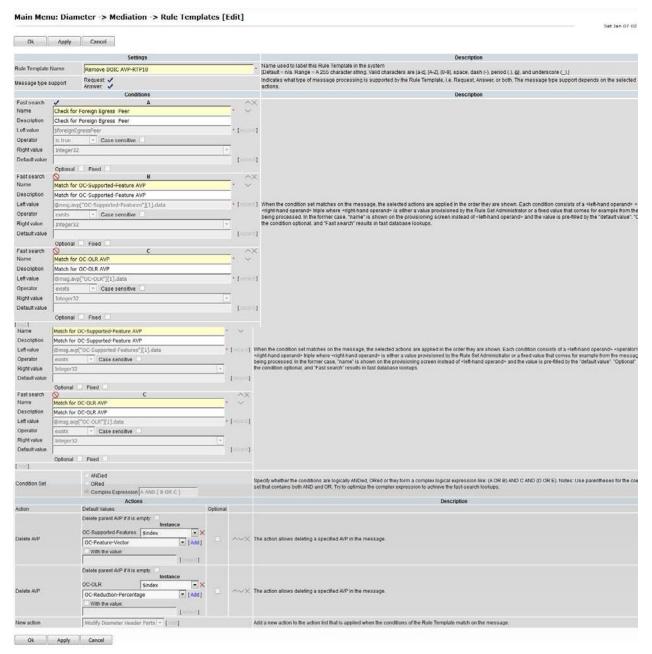


Figure 16: Screenshot of Remove DOIC AVP Configured Template

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	\$foreignEgressPeer	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 Templ [Default = n/a. Range = A 255 charactering] 	te in the system er string. Valid characters are [a-z], [A-Z], [0-9], space, dash (-), period (.), @, and underscore ().]	
Message type support	Request: 🗸 Answer: 🗸	Indicates what type of message pro- actions.	essing is supported by the Rule Template, i.e. Request, Answer, or both. The message type suppo	ort depends on the select
	Conditions		Deparintion	

Message type su	upport	Request: 🗸 Answer: 🗸				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
	Check for F	oreign Egress Peer		,	~×	
Description	Check for F	oreign Egress Peer				
Left value	\$foreignEg	ressPeer		*	[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=""></left-hand>
Fast search	1	В			~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".</left-hand></right-hand></right-hand>
Name	Check for I	ORMP AVP			\sim	the condition optional, and "Fast search" results in fast database lookups.
Description	Check for DRMP AVP @msg.avp["DRMP"][1].data					
Left value					[wizard]	
Operator	exists					
Right value	Integer32					
Default value					[wizard]	
	Optional	Fixed				
[Add]						
		ANDed				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 parenthese
Condition Set		ORed Complex Expression: A AND B				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: In: DRMP All	stance		A	The action allows deleting a specified AVP in the message.
		With the value:				n e duon alona deleting a apeulieu An III ale neasage.
New action		Modify Diameter Header Parts 👻	Land L			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:

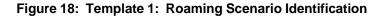
- 1. Navigate to Main Menu -> Diameter -> Mediation -> Rule Sets.
- 2. Select a rule set and click Insert.

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							
	ng Records 1-4 of 4 First Pr A	ev 1 Next Last Re Set internal variable		Set 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									
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

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	B C		Set internal variable		
Rule lu		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

Displayi	ng Records 1-1 of 1 First Prev 1	1 Next Last Restore Orde	r		
Rule Id	Α	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

IHEN Set internal variable

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

Pulo Id	e ld Move the rule		Α	В	С	Set internal varia	Move the rule		
Rule lu			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
Dianlaui		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

Value

Dula	A	Assert Alarm/Event		
Rule Id	Check for msgDisallowed	Alarm/Event	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(\$msgDisallowed) + "." + "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 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

Pulo Id	Move 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	Displaying Records 1-1 of 1 Eirst Prev 1 Nevi Last Restore Order								

/ 1 |

Figure 26: Template 9a: Remove DOIC AVP

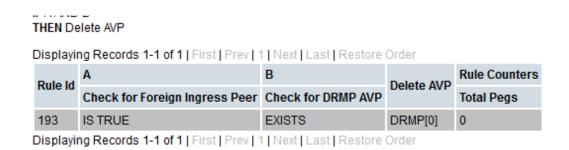


Figure 27: Template 9b: Remove DRMP AVP

THEN Set internal variable

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

Rule Id	Α	В	C Set internal variab		е	Rule Counters
	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
-----------	------	--------	--------	------------------	--	-----------------	---------------

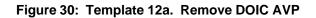
Figure 28: Template 10. Roaming Scenario Identification

A AND B AND C HEN Set internal variable								
Displaying Records 1-3 of 3 First Prev 1 Next Last Restore Order								
A	В	С	Set internal varia	ble				
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 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

Figure 29: Template 11. Destination-Realm Whitelist

IF A AND Then De		RC) VP, Delete	AVP					
Displayi	ng Re	cords 1-1	of 1 First Prev 1 Next Last	Restore Order				
Dulo Id	Move	Nove the rule	Α	В	С	Delete AVP	Delete AVP	Move the rule
Rule lu				Match for OC-Supported-Feature AVP	Match for OC-OLR AVP		Delete AVP	move the rule
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				



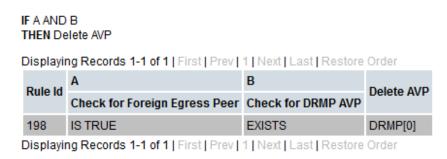


Figure 31: Template 12b. Remove DRMP AVP

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

ay Filter: - None -	 Reset Go				
	Displaying Records 1-20 of 35 First Prev 1 2 Next Last				
	Rule Template Name		State	Action Error Hand	ling 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-Fit	rst 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-F	irst 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 OH ends with OR-RTP1			Ignore the error	Stopped Stopped
	OH ends with OR-RTP1-First Ver		Test Active	Ignore the error 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	ACUON ET	ror Handling S	tatus of Rule Counter
	Remove DOIC AVP-RTP1	Test	Ignore the	e error S	stopped
	Remove DOIC AVP-RTP1-First Ver	Active	Ignore the	e error A	ctive
	Remove DOIC AVP-RTP10	Test	Ignore the	e error S	topped
	Remove DOIC AVP-RTP10-First Ver	Active	Ignore the	e error A	ctive
	Remove DRMP AVP-RTP1	Test	Ignore the	e error S	stopped
	Remove DRMP AVP-RTP1-First Ver	Active	Ignore the	e error A	ctive
	Remove DRMP AVP-RTP10	Test	Ignore the	e error S	stopped
	Remove DRMP AVP-RTP10-First Ver	Active	Ignore the	e error A	ctive
	Roaming scenario identification-RTP1	Test	Ignore the	e error S	stopped
	Roaming scenario identification-RTP1-First Ver	Active	Ignore the	e error A	ctive
	Roaming scenario identification-RTP10	Test	Ignore the	e error S	stopped
	Roaming scenario identification-RTP10-First Ver	Active	Ignore the	e error A	ctive
	set extra logs	Test	Ignore the	e error S	stopped
	testGC	Test	Ignore the	e error S	stopped
	try4	Test	Ignore the	e error S	topped
	Displaying Records 21-35 of 35 First Prev 1 2	Nevt	Laet		

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 Applicatio	n Request	Scop
Trigger: Diameter request message received from connection			
Roaming scenario identification-RTP1-First Ver	1	Normal Request	All -
Application Id and CC white list for inbound roamers-RTP1-First Ve	r 🖌	Normal Request	All
Application Id and CC white list for outbound roamers-RTP1-First \	er 🗸	Normal Request	All
OR whiltelist-RTP1-First Ver	1	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	4	Normal Request	All
Handle disallowed requests-First Ver	1	Normal Request	All
Remove DOIC AVP-RTP1-First Ver	1	Normal Request	All
Remove DRMP AVP-RTP1-First Ver	1	Normal Request	Al
Roaming scenario identification-RTP10-First Ver	✓	Normal Request	
Trigger: Diameter request message prior to be forwarded to con			
Destination-Realm whitelist-RTP10-First Ver	1	Normal Request	Al
Handle disallowed requests-First Ver	1	Normal Request	Al
Remove DOIC AVP-RTP10-First Ver	1	Normal Request	Al
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 con	nection		
Remove DOIC AVP-RTP10-First Ver	1		All

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

My Oracle Support (MOS)

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.

Emergency Response

In the event of a critical service situation, emergency response is offered by the CAS main number at 1-800-223-1711 (toll-free in the US), or by calling the Oracle Support hotline for your local country from the list at http://www.oracle.com/us/support/contact/index.html. The emergency response provides immediate coverage, automatic escalation, and other features to ensure that the critical situation is resolved as rapidly as possible.

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

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

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

Locate Product Documentation on the Oracle Help Center

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

- 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.