# Oracle® Communications Policy Management

Network Impact Report Release 12.2 E82607-01

December 2016



Oracle Communications Policy Management Network Impact Report, Release 12.2

#### E82607-01

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## **1.0 INTRODUCTION**

## 1.1 PURPOSE AND SCOPE

This document highlights the change(s) in this Release 12.2 of the product that may have impact on the customer network, and should be considered by the customer during planning for this release.

#### 1.2 DISCLAIMERS

This document summarizes Oracle Communication Policy Management Release 12.2 new and enhancement features as compared to previous release of 9.9.2/11.5.x/12.1.x and the operations impacts of these features, at a high level. The Feature Requirements (FRS) documents remain the defining source for the expected behavior of these features.

Note that feature implementations may change slightly during product test.

# 1.3 GLOSSARY

This section lists terms and acronyms specific to this document.

## Table 1: Acronyms

AAAAuthorize-Authenticate-AnswerAARAuthorize-Authenticate-RequestADCApplication Detection and ControlAFApplication FunctionAMBRAggregate Maximum Bit RateARPAllocation Retention PriorityAVPAttribute Value PairBBERFBearer Binding and Event Reporting FunctionBoD-AMBandwidth On Demand Application ManagerBSSBusiness Support SystemCALEACommunications Assistance for Law Enforcement Act.CCACredit-Control-Answer (CC-Answer)CCRCredit-Control-Request (CC-Request)CMPConfiguration Management PlatformCMSCable Modem Termination SystemCSCFCall Session Control FunctionDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDPRDisconnect-Peer-RequestDRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	3GPP	Third-Generation Partnership Project
ADCApplication Detection and ControlAFApplication FunctionAMBRAggregate Maximum Bit RateARPAllocation Retention PriorityAVPAttribute Value PairBBERFBearer Binding and Event Reporting FunctionBoD-AMBandwidth On Demand Application ManagerBSSBusiness Support SystemCALEACommunications Assistance for Law Enforcement Act.CCACredit-Control-Answer (CC-Answer)CCRCredit-Control-Request (CC-Request)CMPConfiguration Management PlatformCMTSCable Modem Termination SystemCSCFCall Session Control FunctionDCCDiameter Credit ControlDPIDeep Packet InspectionDPRDisconnect-Peer-AnswerDPRDiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDiameter Signaling RouterDTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	AAA	Authorize-Authenticate-Answer
AFApplication FunctionAMBRAggregate Maximum Bit RateARPAllocation Retention PriorityAVPAttribute Value PairBBERFBearer Binding and Event Reporting FunctionBoD-AMBandwidth On Demand Application ManagerBSSBusiness Support SystemCALEACommunications Assistance for Law Enforcement Act.CCACredit-Control-Answer (CC-Answer)CCRCredit-Control-Request (CC-Request)CMPConfiguration Management PlatformCMTSCable Modem Termination SystemCSCFCall Session Control FunctionDCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDPRDisconnect-Peer-RequestDRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDiameter Signaling RouterDTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	AAR	Authorize-Authenticate-Request
AMBRAggregate Maximum Bit RateARPAllocation Retention PriorityAVPAttribute Value PairBBERFBearer Binding and Event Reporting FunctionBoD-AMBandwidth On Demand Application ManagerBSSBusiness Support SystemCALEACommunications Assistance for Law Enforcement Act.CCACredit-Control-Answer (CC-Answer)CCRCredit-Control-Request (CC-Request)CMPConfiguration Management PlatformCMSCable Modem Termination SystemCSCFCall Session Control FunctionDCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDRADiameter Routing AgentDRADiameter Routing Message PriorityDSRDiameter Signaling RouterDTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	ADC	Application Detection and Control
ARPAllocation Retention PriorityAVPAttribute Value PairBBERFBearer Binding and Event Reporting FunctionBoD-AMBandwidth On Demand Application ManagerBSSBusiness Support SystemCALEACommunications Assistance for Law Enforcement Act.CCACredit-Control-Answer (CC-Answer)CCRCredit-Control-Request (CC-Request)CMPConfiguration Management PlatformCMTSCable Modem Termination SystemCSCFCall Session Control FunctionDCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDRADiameter Routing AgentDRAPDiameter Routing Message PriorityDSRDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	AF	Application Function
AVPAttribute Value PairBBERFBearer Binding and Event Reporting FunctionBoD-AMBandwidth On Demand Application ManagerBSSBusiness Support SystemCALEACommunications Assistance for Law Enforcement Act.CCACredit-Control-Answer (CC-Answer)CCRCredit-Control-Request (CC-Request)CMPConfiguration Management PlatformCMTSCable Modem Termination SystemCSCFCall Session Control FunctionDCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	AMBR	Aggregate Maximum Bit Rate
BBERFBearer Binding and Event Reporting FunctionBoD-AMBandwidth On Demand Application ManagerBSSBusiness Support SystemCALEACommunications Assistance for Law Enforcement Act.CCACredit-Control-Answer (CC-Answer)CCRCredit-Control-Request (CC-Request)CMPConfiguration Management PlatformCSCFCall Session Control FunctionDCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDiameter Signaling RouterDTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	ARP	Allocation Retention Priority
BoD-AMBandwidth On Demand Application ManagerBSSBusiness Support SystemCALEACommunications Assistance for Law Enforcement Act.CCACredit-Control-Answer (CC-Answer)CCRCredit-Control-Request (CC-Request)CMPConfiguration Management PlatformCMTSCable Modem Termination SystemCSCFCall Session Control FunctionDCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDRADiameter Routing AgentDRADiameter Routing Message PriorityDSRDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	AVP	Attribute Value Pair
BSSBusiness Support SystemCALEACommunications Assistance for Law Enforcement Act.CCACredit-Control-Answer (CC-Answer)CCRCredit-Control-Request (CC-Request)CMPConfiguration Management PlatformCMTSCable Modem Termination SystemCSCFCall Session Control FunctionDCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	BBERF	Bearer Binding and Event Reporting Function
CALEACommunications Assistance for Law Enforcement Act.CCACredit-Control-Answer (CC-Answer)CCRCredit-Control-Request (CC-Request)CMPConfiguration Management PlatformCMTSCable Modem Termination SystemCSCFCall Session Control FunctionDCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDiameter Signaling RouterDTMFEnhanced Multimedia Priority Service	BoD-AM	Bandwidth On Demand Application Manager
CCACredit-Control-Answer (CC-Answer)CCRCredit-Control-Request (CC-Request)CMPConfiguration Management PlatformCMTSCable Modem Termination SystemCSCFCall Session Control FunctionDCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	BSS	Business Support System
CCRCredit-Control-Request (CC-Request)CMPConfiguration Management PlatformCMTSCable Modem Termination SystemCSCFCall Session Control FunctionDCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDRADiameter Routing AgentDRMPDiameter Signaling RouterDSRDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	CALEA	Communications Assistance for Law Enforcement Act.
CMPConfiguration Management PlatformCMTSCable Modem Termination SystemCSCFCall Session Control FunctionDCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDPRDisconnect-Peer-RequestDRADiameter Routing AgentDRMPDiameter Signaling RouterDTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	CCA	Credit-Control-Answer (CC-Answer)
CMTSCable Modem Termination SystemCSCFCall Session Control FunctionDCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDPRDisconnect-Peer-RequestDRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	CCR	Credit-Control-Request (CC-Request)
CSCFCall Session Control FunctionDCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDPRDisconnect-Peer-RequestDRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDiameter Signaling RouterDTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	СМР	Configuration Management Platform
DCCDiameter Credit ControlDPADisconnect-Peer-AnswerDPIDeep Packet InspectionDPRDisconnect-Peer-RequestDRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDiameter Signaling RouterDTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	CMTS	Cable Modem Termination System
DPADisconnect-Peer-AnswerDPIDeep Packet InspectionDPRDisconnect-Peer-RequestDRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDiameter Signaling RouterDTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	CSCF	Call Session Control Function
DPIDeep Packet InspectionDPRDisconnect-Peer-RequestDRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDiameter Signaling RouterDTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	DCC	Diameter Credit Control
DPRDisconnect-Peer-RequestDRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDiameter Signaling RouterDTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	DPA	Disconnect-Peer-Answer
DRADiameter Routing AgentDRMPDiameter Routing Message PriorityDSRDiameter Signaling RouterDTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	DPI	Deep Packet Inspection
DRMPDiameter Routing Message PriorityDSRDiameter Signaling RouterDTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	DPR	Disconnect-Peer-Request
DSRDiameter Signaling RouterDTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	DRA	Diameter Routing Agent
DTMFDual Tone Multi FrequencyeMPSEnhanced Multimedia Priority Service	DRMP	Diameter Routing Message Priority
eMPS Enhanced Multimedia Priority Service	DSR	Diameter Signaling Router
	DTMF	Dual Tone Multi Frequency
EVS Enhanced Voice Services	eMPS	Enhanced Multimedia Priority Service
	EVS	Enhanced Voice Services

FRS	Feature Requirements Specification
GBR	Guaranteed Bit Rate
Gen-6, Gen-7, Gen-8	Refers to the generation of HP server hardware.
GUI	Graphical User Interface
НА	High Availability
H-PCRF	Home PCRF or Home MPE
HSS	Home Subscriber Server
HTTP	Hypertext Transfer Protocol
HW	Hardware
IE	Internet Explorer
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
JSON	JavaScript Object Notation
КРІ	Key Performance Indicator
LAN	Local Area Network
LDAP	Lightweight Directory Access Protocol
LI	Lawful Intercept
LIMF	Lawful Intercept Mediation Function
LVM	Logical Volume Manager
MA	Management Agent
MCD	Media Component Description
MC-PTT	Mission Critical Push-To-Talk
MDF	Message Distribution Function
MP	Message Processor
MPE	Oracle Multimedia Policy Engine
MPE-R	Oracle Multimedia Policy Engine – Routing Mode
MPE-S	Oracle Multimedia Policy Engine – Serving Mode
MRA	Oracle Multiprotocol Routing Agent
MS	Mediation Server
NFVO	Network Functions Virtualization Orchestrator
NOAM	Network OAM

NW-CMP	Network-Level Configuration Management Platform
OAM	Operations Administration Maintenance
OCS	Online Charging Service
ОМ	Operational Measurement
OSSI	Operation Support System Interface
PCC	Policy and Charging Control
PCD	Policy Connection Director
PCEF	Policy and Charging Enforcement Function (GGSN, PGW, DPI)
РСММ	Packet Cable Multimedia
PCRF	Policy Control Resource Function (Oracle MPE)
P-CSCF	Proxy CSCF
PDN	Packet Data Network
PGW	Packet Data Network Gateway
PNR	Push-Notification-Request
PS_TO_CS_HANDOVER	Packet Switched to Circuit Switched Handover
PTT	Push-To-Talk
PUR	Profile-Update-Request
QCI	QoS Class Identifier
QoS	Quality of Service
RAR	Re-Auth-Request (RA-Request)SUPL
REST	Representational State Transfer
ROB	Release of Bearer
S-CMP	Site-Level Configuration Management Platform
S-CSCF	Serving CSCF
SGW	Serving Gateway
Sh	Diameter Sh Interface
SMPP	Short Message Peer-to-Peer
SMS	Short Message Service
SNR	Subscribe-Notification-Request
SPR	Subscriber Profile Repository
STA	Session-Termination-Answer
STR	Session-Termination-Request
SRA	Successful Resource Allocation
TDF	Traffic Detection Function

TPS	Transactions Per Second
UD	Upgrade Director
UDR	User Data Repository
UE	User Equipment
UM	Upgrade Manager
UMCH	Usage Monitoring Congestion Handling
VIM	Virtual Infrastructure Manager
VM	Virtual Machine
VNF	Virtual Network Function
VO	Verification Office
XML	Extensible Markup Language

# 2.0 OVERVIEW OF ORACLE COMMUNICATIONS POLICY MANAGEMENT RELEASE 12.2 FEATURES

This section provides an overview list of the Oracle Communications Policy Management Release 12.2 new features.

## 2.1 POLICY MANAGEMENT RELEASE 12.2 NEW FEATURES SUPPORT

Feature PR#	Feature Name
19720700	3GPP ENHANCEMENT: USAGE MONITORING CONGESTION HANDLING (UPDATED TIME-TARIFF SPEC)
20224100	3GPP ENHANCEMENT: SUPPORT 3GPP TIME-BASED USAGE MANAGEMENT/TIMEBASED UPGRADE MANAGER
21322637	3GPP ENHANCEMENT: APPLICATION BASED CHARGING
21322663	3GPP ENHANCEMENT: GROUP COMMUNICATION – QCI RELATED
19720429	3GPP ENHANCEMENT: SUPPORT OF QCI VALUES OUTSIDE OF 1-9
21322590	3GPP ENHANCEMENT: MISSION CRITICAL QCIs
19113866	TRACK MAXIMUM TPS IN KPI INTERVAL
20319847	ADD AUDIT LOG TO CMP SAVELOG
20325595	EXPOSE ENGINEERING LOG LEVEL CONFIGURATION IN CMP
22536198	SUPPORT FOR SECURING PCRF NETWORK INTERFACES (FIREWALL ENABLED SUPPORT)
24304274	GX PENDING TRANSACTION RACE CONDITION
20632502	SELECTIVE TRIGGERING OF POLICY EVALUATION ON STR AND CCR-T
20632554	SETTING GX SESSION LEVEL PARAMETERS VIA POLICY ACTION ON RX REQUEST
19482300	VIRTUALIZED POLICY TABLES
22315457	MRA SENDS SDR THROUGH DRA
22121678	7.105: ENHANCED MULTIMEDIA PRIORITY SERVICE PHASE 1

22135682	7.404: EVS CODEC SUPPORT
19720429	7.119: OPERATOR SPECIFIC QCI
22264564	7.104: INCLUSION OF MSISDN IN SUBSCRIPTION ID AVP OF GX:CCR-I INTERFACE
21322590	7.122: QCI FOR NON-CRITICAL PUSH TO TALK+ USER PLANE (QCI - 66)
19646305	CONFIGURATION TEMPLATES FOR CABLE FEATURES
20162894	PCMM PER MPE SUMMARY AND PER CMTS STATISTICS THROUGH OSSI/XML
20286860	DISCOVER CMTS SUBNETS WHEN SAVING A NEWLY CREATED NETWORK ELEMENT
21153115	GENERIC POLICY NOTIFICATION INTERFACE - CONVERT FOR CABLE MODE
21348748	UNIFIED EXPORT/IMPORT FEATURE SUPPORT FOR CABLE MODE
22186376	IPV6 SUPPORT FOR OAM AND REPLICATION NETWORKS FOR CABLE
20162817	PROVIDE THE NUMBER OF ACTIVE GATES PER AMID PER MPE THROUGH OSSI/XML
20287350	EXPORT BOD SESSION DATABASE
22114178	INCLUDE MORE OPTIONS FOR RESET FREQUENCY FOR PLANS
22258207	NOTIFICATION TRIGGERS FOR AGGREGATE QUOTA
19358129	CABLE POLICY VMWARE SUPPORT ON MULTIPLE HW PLATFORMS
22293420	POLICY CONNECTION DIRECTOR ( PCD )
19359794	ENTRY LEVEL POLICY SOLUTION ON RACK MOUNT SERVERS (RMS)
20837199	POLICY MANAGEMENT VNF MANAGEMENT
20271401/224376	SUPPORT TO CONFIGURE BEARER LEVEL ARP IN POLICY ACTION
20271416 /224391	RESULT CODE 5143 RETURNED IF REQUESTED QOS CONFLICTS WITH AUTHORIZED QOS

20271430 /224512	NOTIFICATION DURING THE CONFIGURED INTERVAL
20271438 /225037	UE SUBSCRIPTION REASON RETURNED IN SESSION RELEASE CAUSE AVP
20271448 /224443	MPE CANNOT SEND DPR MESSAGE TO DISCONNECT DIAMETER CONNECTION ACTIVELY
238974	ADD SIGC ADDRESS SUPPORT
240023	ADC RULE SUPPORT FOR PCC RULE LEVEL
239241	ADD THE POLICY SUPPORT TO DO THE JUDGMENT ACCORDING TO PCEF'S DOMAIN
21305529	POLICY MANAGEMENT SUPPORT FOR ORACLE NETRA SERVER X5-2
19488243	SPECIFY GX AND RX RESULT CODE WHILE NO BINDING INFO

#### 2.1.1 Policy Releases Software Merge into Policy 12.2

This Policy release 12.2 includes features of Policy 9.9.2, 11.5.x, and 12.1.x

#### 2.2 POLICY MANAGEMENT HARDWARE REQUIREMENTS

#### 2.2.1 Supported Hardware

The Policy Management Policy Release 12.2 software can be applied on the following list of hardware that previously supported under Release 9.9.2 / 11.5.x / 12.1.x

- Oracle NETRA Server X5-2.
- Oracle Server X5-2 on Rack Mount Server (RMS).
- Compatible with HP Gen-6, Gen-8 and Gen-9 Rack Mount Server (RMS) and C-class Servers
- HP 6120XG and HP 6125XLG enclosure switches.

#### **NOTE:** *PP-5160 server is NOT supported*

#### 2.2.2 Policy Management Support for Oracle NETRA Server X5-2 (PR# 21305529)

It will be initially implemented in Tekelec Platform Distribution Release 7.0.3 which is part Release 12.2. The Netra X5-2 can be AC or DC powered. Other than processor and memory changes, here is a brief listing of the hardware changes for the Netra X5-2 from the Oracle Server X5-2.

- The server is NEBS certified.
- To meet NEBS requirements, the CPU Power Limit option is used to effectively lower the Thermal Design Power (TDP) such that the CPU will always run just below the 55°C (131°F) throttle point. This function reduces the CPU power to 120 watts from the maximum 145 watts to prevent CPU throttling. In this mode, performance at lower ambient temperature is reduced, however, the CPU cores will not throttle at or below 55°C (131°F). When disabled, the system will operate normally and the default TDP of 145 watts will be maintained. In this mode, the CPU cores should throttle as needed when ambient temperatures and load cause the die temperature to exceed maximum.
- The server is 2-U in height.
- The server has six PCI slots, one of which is dedicated to the disk controller.
- Six USB ports: two on front panel (USB 2.0), two on rear panel (USB 3.0) and two internal on motherboard (USB 2.0).

#### 2.2.3 Entry level Policy Solution on Rack Mount Servers (RMS) (PR# 19359794)

Policy in a box Solution for OVM/KVM on RMS system with benchmarked only on OVM/Enterprise Manager X5-2 (CMP, MPE, MRA/PFE)

This feature is intended to meet several goals:

- Provide a product deployment architecture in support of small fixed/wireless customers
- Provide small scale fixed/wireless Policy system that could be used for trials in a customer's lab
- Provide small scale Cable Policy system (outside the scope of this document) that could be used for trials in a customer's lab

The proposed deployment would result in installing an entire Policy system i.e. one CMP cluster, one MRA cluster, and two MPE clusters, on a single physical RMS server with another set of Policy system running on the second physical RMS server as a Standby system. Thus, the minimum basic Policy system configuration requires only a single physical RMS server and a High Availability (HA) Policy system would require two RMS servers.

# 2.3 POLICY MANAGEMENT SOFTWARE CHANGES

#### 2.3.1 Software Components

Components	Releases
TPD 64 Bit	7.0.3
COMCOL	6.4
PM&C	6.0.3
TVoE	3.0.3
HP Firmware FUP	2.2.9 (Minimum)
Oracle Firmware	3.1.5 (Minimum)

#### 2.3.2 UDR & SPR Product Compatibility

Products	Releases	Compatibility
Oracle SDM SPR	9.3.1	Profile V2, Profile V3 and
		Profile V4 schemas
Oracle Communication UDR	10.2	
	12.1	Profile V2, Profile V3 and
	12.2	Profile V4 schemas

## 2.4 POLICY MANAGEMENT SOFTWARE UPGRADE/BACKOUT OVERVIEW (PR# 233969)

During the execution of Policy software upgrade/rollback (backout) procedures, it is expected that the CMP clusters, MRA clusters and MPE clusters will be running in different software releases.

In Release 11.5.x, both Cable and Fixed/Wireline deployments are using the same software release for the first time in distinct "modes". As with this Release 12.2, Fixed/Wireline mode is no longer supported, so it is expected that upgrade will result in Cable mode only.

#### 2.4.1 Supported Software Upgrade/Rollback (Backout) Paths for Release 12.2

Policy Releases of 9.9.2 / 11.5.x / 12.1.x Rollback Policy Release 12.2

The Figure below shows the supported upgrade Path for Release 12.2

As with the past releases, both Geo-Redundancy and non Geo-Redundancy Policy system deployment will need separate Policy software upgrade/rollback (backout) procedures.

#### 2.4.2 Supported Software Releases Upgrade Sequence

#### 2.4.2.1 Upgrade Sequence

The CMP clusters ( CMP/NW-CMP and DR-CMP/NW-CMP ) shall be upgraded first from Release N to Release N+1 prior to executing upgrade on any other server clusters ( MPE, MRA/PFE, MA, and BoD ) of the system.

In the case that cluster-level upgrades are backed out due to an issue with the Release N+1 software, the reverse of the above order must be applied.

**NOTE:** This sequence may be spread through multiple maintenance windows over an extended time period, with periods of steady state operation in mixed-mode between windows.

The upgrade of Policy Management system from Release N to Release N+1 shall generally be executed in the following sequence:

**NOTE:** *Refer to the separately available related upgrade/rollback upgrade paths for more detail procedures.* 

#### Release 12.1.x to Release 12.2 (Wireless mode)

- 1. If multi-level OAM is deployed, Primary NW-CMP primary cluster and Disaster Recovery (DR) NW-CMP cluster.
- 2. Standalone Primary CMP/S-CMP and Disaster Recovery (DR) CMP/S-CMP clusters.
- 3. MPE clusters, including spare server if geo-redundancy is deployed.
- 4. MRA clusters, including spare server if geo-redundancy is deployed.

#### Release 11.5.x to Release 12.2 (Wireless mode)

- 1. If multi-level OAM is deployed, Primary NW-CMP primary cluster and Disaster Recovery (DR) NW-CMP cluster.
- 2. Standalone Primary CMP/S-CMP and Disaster Recovery (DR) CMP/S-CMP clusters.
- 3. MPE clusters, including spare server if geo-redundancy is deployed.
- 4. MRA clusters, including spare server if geo-redundancy is deployed.

#### Release 11.5.x to Release 12.2 (Cable mode)

- 1. Standalone Primary CMP cluster and Disaster Recovery (DR) CMP cluster.
- 2. MA.
- 3. MPE-R clusters
- 4. MPE-S clusters, including spare server if geo-redundancy is deployed.
- 5. BoD-AM clusters, including spare server if geo-redundancy is deployed.

#### Release 9.9.2 to Release 12.2 (Wireless mode)

- 1. Standalone Primary CMP cluster and Disaster Recovery (DR) CMP cluster
- 2. MPE clusters, including spare server if geo-redundancy is deployed.
- 3. MRA clusters, including spare server if geo-redundancy is deployed
- 4. Oracle Communications UDR (UDR) server(s)
- 5. MDF/MS server(s)

#### 2.4.3 Mixed Version Policy Management system expectations

The system that is running Release 9.9.2 / 11.5.x / 12.1.x mixed configuration supports the performance and capacity of Release 9.9.2 / 11.5.x / 12.1.x respectively. The mixed version Policy Management configuration supports Release 9.9.2 / 11.5.x / 12.1.x features respectively.

In the mixed version Policy Management configuration Release 12.2 CMP has the following general limitations -

- New features must not be enabled until the upgrades of all servers managed by that CMP are completed. This also applies to using policy rules that include new conditions and actions introduced in the release.
- As a general guideline, policy rules should not be changed while running in a mixed version environment. If it is necessary to make changes to the policy rules while running in a mixed version environment changes that do not utilize new conditions and actions for the release could be installed, but should be jointly reviewed by the customer and Oracle before deployment to verify that these policies indeed do not use new conditions or actions.
- The support for configuration of MPE and MRA servers is limited to parameters that are available in the previous version. Specifically -
  - (a) Network Elements can be added.
  - (b) Advanced Configuration settings that were valid for 9.9.2 / 11.5.x / 12.1.x may be changed.

**NOTE:** Replication between CMP and DR-CMP is automatically disabled during upgrade of CMP and DR-CMP from Release 9.9.2 / 11.5.x / 12.1.x to Release 12.2. The replication is automatically enabled once both active CMP and DR-CMP are upgraded to Release 12.2.

Policy Management Components	CMP Release 12.2	MRA Release 12.2	MPE Release 12.2
CMP release 12.1.x	No	No	No
MRA release 12.1.x	Yes	Yes	Yes
MPE release 12.1.x	Yes	Yes	N/A

#### Mixed-version Configurations Supported between Release 12.1.x and Release 12.2 (Wireless mode)

Mixed-version Configurations Supported between Release 11.5.x and Release 12.2 (Wireless & Cable modes)

Policy Management Components	CMP Release 12.2	MPE/MPE-R Release 12.2	MPE-S Release 12.2	BoD Release 12.2	MRA/MA Release 12.2
CMP release 11.5.x	No	No	No	N/A	Yes
MPE/MPE-R release 11.5.x	Yes	N/A	Yes	N/A	Yes
MPE-S release 11.5.x	Yes	Yes	N/A	N/A	Yes
BoD release 11.5.x	Yes	Yes	Yes	N/A	N/A
MRA/MA release 11.5.x	Yes	Yes	Yes	N/A	N/A

Policy Management Components	CMP Release 12.2	MRA Release 12.2	MPE Release 12.2	MDF/MS Release 12.2
CMP release 9.9.2	No	No	No	Yes
MRA release 9.9.2	Yes	Yes	Yes	Yes
MPE release 9.9.2	Yes	Yes	N/A	Yes
MDF/MS release 9.9.2	Yes	Yes	Yes	N/A

Mixed-version Configurations Supported between Release 9.9.2 and Release 12.2 (Wireless mode)

## 2.4.4 Supported Software Releases Rollback (Backout) Support & Limitation

- Once the whole Policy Management system is upgraded to Release 12.2, customer(s) may decide that a backout to the previous release is required. In that case, each individual server/cluster has to be backed out.
- If it is necessary to backout multiple servers, it is required that the systems be rolled back in the reverse order in which they were upgraded. This implies that all the related component servers are rolled back first before the active CMP/NW-CMP and DR-CMP/NW-CMP can be rolled back to the previous version.
- Once all the servers in the system are backed out to the previous release, the servers could be upgraded to another supported minor or major release for example, if all of the servers in the Policy Management system were backed out from Release 12.2 to Release 9.9.2 / 11.5.x / 12.1.x, these servers could subsequently be upgraded to Release 12.2-Build\_A etc.

Backout may be performed at any time after the upgrade, with the following general limitations:

- If any new features have been enabled, they must be disabled prior to any backout.
- If there is an unexpected problem that requires backout after a feature has been enabled, it is possible that transient subscriber data, which is changed by the new feature, may be impacted by the unexpected problem. In this situation those sessions cannot be guaranteed to be unaffected for any subsequent actions (this includes any activity after the feature is disabled). This may prevent data restoration by the SSDP feature during the backout. The impact of any unexpected problem must be analyzed when it occurs to determine the best path forward (or backward) for the customer.

**NOTE:** Although backout after new feature activation is allowed, due to the number of possible permutations under which new features may be activated, the only testing that will be performed will be based on backout without new feature activation.

• One additional restriction of backout is that it can only be used to go back one release. This restriction applies to all types of releases including any major, minor, maintenance or incremental release including minor release(s) of Release 12.2.

#### 2.4.4.1 Rollback ( Backout) Sequence

The Rollback of Policy Management system from Release N+1 to Release N shall generally be executed in the following sequence (reverse of the Upgrade sequence):

**NOTE:** *Refer to the separately available related upgrade/rollback upgrade paths for more detail procedures.* 

#### Release 12.2 to Release 12.1.x (Wireless mode)

- 1. MRA clusters, including spare server if geo-redundancy is deployed.
- 2. MPE clusters, including spare server if geo-redundancy is deployed.
- 3. Standalone Primary CMP/S-CMP and Disaster Recovery (DR) CMP/S-CMP clusters.
- 4. If multi-level OAM is deployed, Primary NW-CMP primary cluster and Disaster Recovery (DR) NW-CMP cluster.

#### Release 12.2 to Release 11.5.x (Wireless mode)

- 1. MRA clusters, including spare server if geo-redundancy is deployed.
- 2. MPE clusters, including spare server if geo-redundancy is deployed.
- 3. Standalone Primary CMP/S-CMP and Disaster Recovery (DR) CMP/S-CMP clusters.
- 4. If multi-level OAM is deployed, Primary NW-CMP primary cluster and Disaster Recovery (DR) NW-CMP cluster.

#### Release 12.2 to Release 11.5.x (Cable mode)

- 1. BoD-AM clusters, including spare server if geo-redundancy is deployed
- 2. MPE-S clusters, including spare server if geo-redundancy is deployed
- 3. MPE-R clusters
- 4. MA.
- 5. Standalone Primary CMP cluster and Disaster Recovery (DR) CMP cluster.

#### Release 12.2 to Release 9.9.2 (Wireless mode)

- 1. MDF/MS server(s)
- 2. UDR server(s)
- 3. MRA clusters, including spare server if geo-redundancy is deployed
- 4. MPE clusters, including spare server if geo-redundancy is deployed.
- 5. Standalone Primary CMP cluster and Disaster Recovery (DR) CMP cluster

#### 2.4.5 Upgrade Director (UD)

For upgrade paths from Release 9.9.2/11.5.x to Release 12.2, there will be an initial upgrade procedure of the pre-Release 12.2 CMP using pre-Upgrade Director methods, and thereafter, the upgrade of all other components will be using the Upgrade Director from just upgraded Release 12.2 CMP.

As for upgrade path from Release 12.1.x to Release 12.2, the Upgrade Director functionality already existed in both releases, so just strictly follow the relevant Upgrade/Rollback procedures.

## 2.5 MIGRATION OF POLICIES AND SUPPORTING POLICY DATA

As with prior releases, the existing Policies configuration and Subscriber Session information will be conserved during the upgrade.

## **3.0 CHANGES BY FEATURE**

# 3.1 MRA ROUTING SDR THROUGH DRA (PR# 22315457)

## 3.1.1 Pre-Requisite

Oracle currently implements a proprietary Session Recovery feature (PR# 229630 & PR# 232952), which allows the network to recover lost Gx session(s) on MPE, or Binding(s) previously created on either Primary or Backup MRA. This functionality is implemented in conjunction support from specific PCEF (PGW). This Session Recovery feature has to be enabled/implemented first prior to applying the following new feature enhancement.

## 3.1.2 Introduction

This feature enhancement allows MRA sent SDR message to be routed over DRA. It does not impact the current implementation of SDR message sent from MPE.

## 3.1.3 Detailed Description

In the current Session Recovery implementation, the MRA initiates a proprietary SDR message to directly connected PCEF (PGW) as shown below in Figure 1. if it receives Rx:AAR-I from the P-CSCF, and does not find the associated binding.

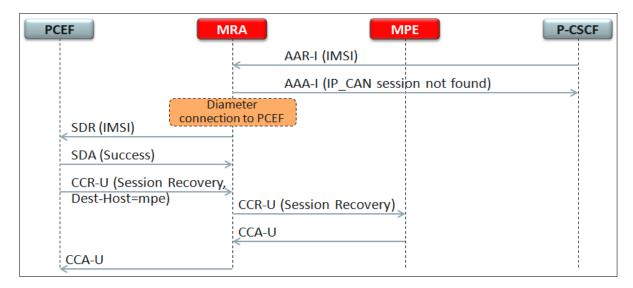


Figure 1: Current Session Recovery Implementation with direct Diameter connection between MRA and PCEF (PGW).

This implementation has it's limit i.e if there is a DRA or any Diameter Peer device between the MRA and PCEF (PGW), then the MRA will interpret as the direct Diameter connection to the PCEF is down, thus no SDR message is sent out, as shown below in Figure 2.

PCEF DR/		RA M	PE P-CSCF
		AAR-I (IMSI)	
		AAA-I (IP_CAN sess	on not found)
SDR (IMSI)	No Dia connectio	meter n to PCEF	, i i i i i i i i i i i i i i i i i i i
SDA (Success)			
CCR-U (Session Recovery, D	est-Host=mpe)		
		CCR-U (Session Recovery)	
		CCA-U	
CCA-U			

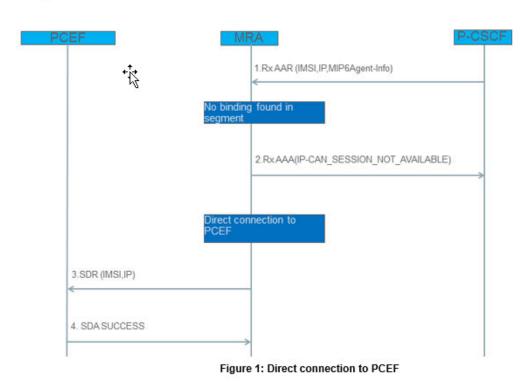
Figure 2: Session Recovery Fails due to DRA installed between MRA and PCEF ( PGW)

The high level solution is to have known MRA Diameter Peers routing configured for the PCEF (PGW) with DRA as it's peer.

**NOTE:** Diameter error message of "IP-CAN session not found" is now changed to "IP-CAN\_SESSION\_NOT\_AVAILABLE"

There are three setup scenarios that this feature enhancement can be implemented -

## a) DIRECT CONNECTION TO PCEF ON MRA

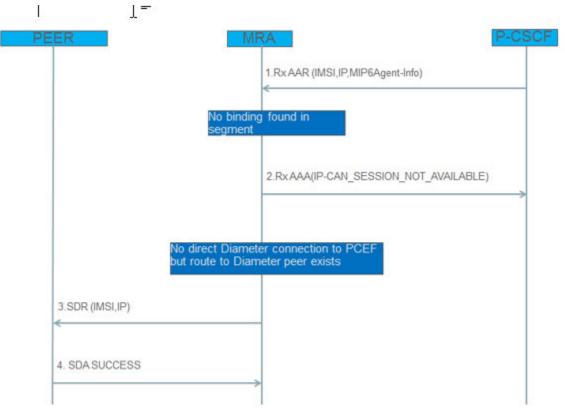


1. When an AAR message is coming to MRA in which there is no MRA binding info found by the indexed user id.

2. MRA rejects Rx:AAR message when session is not found with diameter error message of "IP-CAN\_SESSION\_NOT\_AVAILABLE"

3. An identity of PCEF with connection to MRA will be selected by MIP6AgentInfo in Rx message in a round robin balanced way when the connection for this PCEF identity is found in the current PCEF connections in MRA. A SDR message will be created according to the AAR message and sent to the destination peer by this selected destination identity.

4. PCEF replied with successful SDA message.



## b) ROUTE TO PCEF ON MRA WHEN THERE IS NO DIRECT CONNECTION TO PCEF

Figure 2: Diameter peer to PCEF on MRA when there is no direct connection to PCEF

1. When an AAR message is coming to MRA in which there is no MRA binding info found by the indexed user id.

2. MRA rejects Rx:AAR message when session is not found with diameter error message of "IP-CAN\_SESSION\_NOT\_AVAILABLE"

3. The PCEF Diameter identity is chosen in a round robin way and there are no direct connections to PGW but a matching route exists to the diameter peer. A SDR message will be created according to the AAR message and forwarded to this diameter peer.

- 4. The peer replied with successful SDA message.
- c) CONNECTION TO BACKUP MRA WHEN THERE ARE NO DIRECT CONNECTIONS TO PCEF AND DIAMETER PEER

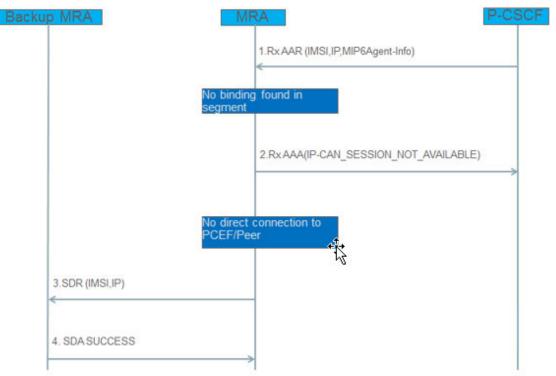


Figure 3: Connection to Backup MRA when there are no direct connections to PCEF and Peer

1. When an AAR message is coming to MRA in which there is no MRA binding info found by the indexed user id.

2. MRA rejects Rx:AAR message when session is not found with diameter error message of "IP-CAN\_SESSION\_NOT\_AVAILABLE"

3. The PCEF Diameter identity is chosen in a round robin way but all direct connections to PGW is down. There are no connections to peer. A backup MRA which is the associated as backup MRA in the MRA association configuration is connected to this MRA. A SDR message is created according to the AAR message and sent to this backup MRA only once. In the backup MRA, a diameter error message of "DIAMETER\_UNABLE\_TO\_DELIVER " will happen if the Backup MRA cannot find the direction connection with PCEF or matched peer in the routing table.

4. Backup MRA replied with successful SDA message.

#### 3.1.4 User Interface Changes

Additional "**Vzr**" Application ID included under the Host and Realm Based Route configuration as shown in the CMP screenshot below – it's only available on the MRA for this feature enhancement.

The SDR message will be forwarded if the "Vzr" and a Next Hop server is connected to this MRA.

**CMP GUI:**  $MRA \rightarrow Configuration \rightarrow (Select MRA cluster name) \rightarrow Diameter Routing \rightarrow Modify Routes \rightarrow (Add Realm Based Route, or Add Host Based Route option menu)$ 

() ALL ) Irigumon ) slak-mra-1	Multi-protocol Routing	Edit Diameter Route           Name         Realm_1           Diameter Realm         tokeloc.com	MRA Administration
	Modify the Diameter Route	Filter	•
	Add * Cione D Edit Name Type Realm_1 Realm	Application ID All User Filter User ID Type Gx Gy Gx Gy Gx Gy Gx Gy Gx Gy Gx Gy Gx Gy Gx Gy Gx Gy Gx Gy Gy Gy Gy Gy Gy Gy Gy Gy Gy Gy Gy Gy	Server ID Lisk-mra- Lorade.com
	Default Route Action Server ID LOCAL	Next Hop Action PROXY V Server ID Slakenya-1.oracle.com http://mpe-1.oracle.com btbg-mpe-2.oracle.com	• •
	Save Cancel	Save Cancel	

# 3.2 3GPP QCI AND GROUP COMMUNICATION ENHANCEMENTS (PR# 19720429, 21322590, 20271401 & 21322633)

#### 3.2.1 Introduction

These feature enhancements describe the functions and requirements as specified in the following -

**PR# 19720429** – Support of QCI values 1 to 254

PR# 21322590 – Mission Critical QCI

PR# 20271401 – Support to configure bearer level ARP in policy action

**PR# 21322633** – Group Communications Services

#### 3.2.2 Detailed Description

**PR# 19720429** – Support of 3GPP for QCI values from 1 to 254 set via policy configuration. This includes allowing QCI values up to 254 specified in the Traffic Profiles and Roaming Profiles.

Currently, Policy Management supports QCI values range only from 1 to 9.

**PR# 21322590** – Support of 3GGP Mission Critical QCI values of 65, 66, 69 and 70 with 'MissionCriticalQCI' indicator set in the received Gx:CCR-I message –

bit	Feature name	M/O	Vendor-Id
25	MissionCriticalQCIs	0	3GPP
			(10415)

Those QCI values could be used for Mission Critical Services as specified in the following -

- QCI-65 (GBR) for Mission Critical PTT (user plane voice)
- QCI-66 (GBR) for non-Mission Critical PTT (user plane voice)
- QCI-69 (non-GBR) for Mission Critical PTT (signaling plan)
- QCI-70 (non-GBR) for Mission Critical Data

PR# 20271401 - Override default eMPS/GCS ARP value

**PR# 21322633** - Support to recognize new 3GPP of Group Communication Service Application Server (GCS AS) as negotiated between Policy Management and PCEF in the received Gx:CCR-I message,

bit	Feature name	M/O	Vendor-Id
10	GroupComService	0	3GPP
	(GCS)		(10415)

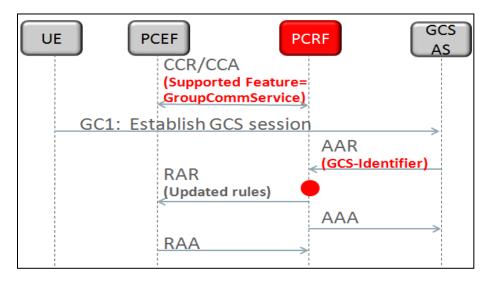
and specified in the "Supported Features" Identifier AVP of received Rx:AAR message.

Attribute Name	AVP Code
GCS-Identifier	538

<AA-Request> ::= < Diameter Header: 265, REQ, PXY >

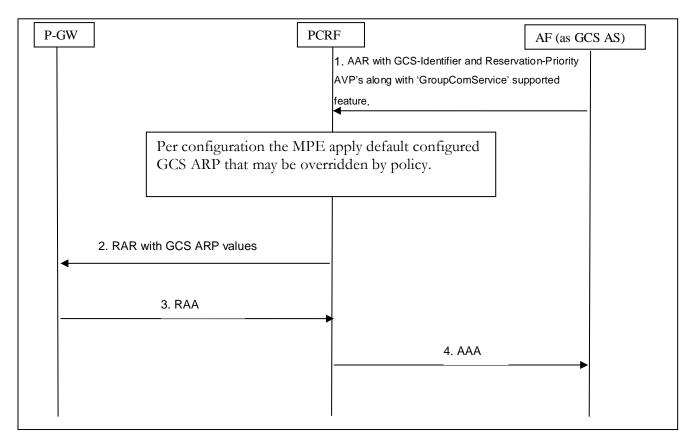
< Session-Id >{ Auth-Application-Id } { Origin-Host } { Origin-Realm } { Destination-Realm } [Destination-Host] [IP-Domain-Id] [AF-Application-Identifier] \*[ Media-Component-Description ] [Service-Info-Status] [AF-Charging-Identifier] [SIP-Forking-Indication] \*[ Specific-Action ] \*[ Subscription-Id ] [OC-Supported-Features] \*[ Supported-Features ] [Reservation-Priority] [Framed-IP-Address] [Framed-Ipv6-Prefix] [Called-Station-Id] [Service-URN] [Sponsored-Connectivity-Data] [MPS-Identifier] [GCS-Identifier] [Rx-Request-Type] \*[Required-Access-Info] [Origin-State-Id] \*[ Proxy-Info ] \*[Route-Record] \*[ AVP ]

 Support to setting up QoS (QCI and ARP) values via configured policy, for both Uplink and Downlink UE unicast resources. This could result in sending a new or updating the PCC rule to PCEF (PGW) as typical call flow described in the following –



One important application of GCS session is emergency services. It is useful to create policies which take different actions based upon whether the PCEF supports Mission critical QCIs.

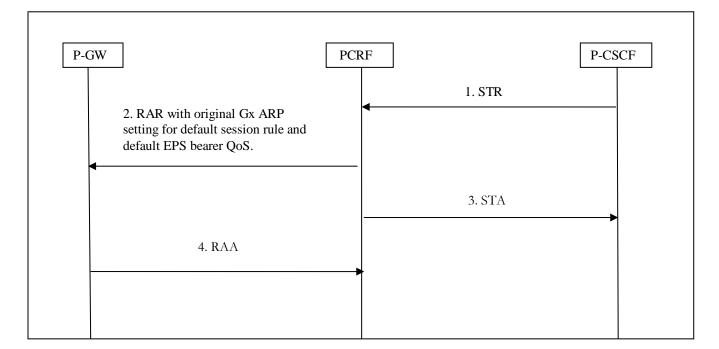
• Group Communication Service – Rx session Establishment



**Pre-requisite** - There is an existing Gx session for a specific PDN connection.

- 1. The AF sends an AAR-I to the PCRF with GCS-Identifier AVP and Reservation-Priority AVP's along with 'GroupComService' supported feature.
- 2. In case the Reservation-Priority AVP is received within the command(session) level, the PCRF applies the configured GCS ARP values to the session default rule, to all session application rules as well as to the default-eps-bearer-QoS. In case the Reservation-Priority AVP is received within particular media, the PCRF applies the configured GCS ARP values to the application rules corresponding to that media only.
- 3. MPE evaluates the received GCS-Identifier value and may set new ARP values.
- 4. MPE sends Gx:RAR to the P-GW for the new Rx session being established.
- 5. The PGW responds with a RAA over Gx to the PCRF.
- 6. The PCRF sends AAA successful back to the AF.

**NOTE:** For the MPE to apply the default configured GCS ARP, AAR must include both GCS-Identifier and Reservation-Priority AVP's.



#### • Group Communication Service – Rx session Termination

**Pre-requisite** - There are existing Gx and Rx sessions for a specific PDN connection.

1. The P-CSCF sends an STR to the PCRF to terminate the Rx session.

- 2. MPE deletes the Rx session. MPE sends RAR to GW to remove application rules. RAR includes Charging-Rule-Install with the default session rule and default-EPS-Bearer-QoS contain the original ARP values that were installed at the time when Gx session was established.
- 3. MPE sends STA to P-CSCF.
- 4. MPE receives RAA back from the P-GW.

#### 3.2.3 User Interface Changes

Additional QCI values supported up to 254 in the following traffic profiles: Diameter QoS, PCC Profile and PCC Rule.

	Traffic Profile Administration
New Traffic Profile	
Name	HH_TrafficProfile_1
Traffic Profile Type	PCC Rule
Enable Dynamic Override	
<b>Configuration Parameter</b>	Value
Rule Name	HH_TrafficProfile_1
QoS Class Identifier	21
Uplink Max Authorized Rate (bps)	N/A 1 = Conversational speech
Downlink Max Authorized Rate (bps)	2 = Conversational 3 = Streaming speech
Uplink Min Guaranteed Rate (bps)	4 = Streaming 5 = Interactive with priority 1 signalling
Downlink Min Guaranteed Rate (bps)	6 = Interactive with priority 1
ARP Priority Level	7 = Interactive with priority 2 8 = Interactive with priority 3
ARP Preemption Capability	9 = Background 65 = MC-PTT Voice
ARP Preemption Vulnerability	66 = PTT Voice
Service Identifier	69 = MC-PTT Signaling 70 = MC Data

**CMP GUI:** Policy Server  $\rightarrow$  Traffic Profiles

**NOTE:** Either QCI values from 1 through 254 can be entered in "QoS Class Identifier" parameter, or the pre-defined QCI dropdown values as shown above.

#### **CMP GUI:** *Policy Server* → *Roaming Profiles*

•	Roaming Profile	
g Profile Configuration		
QoS Validation Parameters		
Downlink Aggregated Maximum Bitrate (bps) for Guara Bitrate Bearers	anteed	
Uplink APN Aggregate Maximum Bitrate (bps)		
Downlink APN Aggregate Maximum Bitrate (bps)		
Acceptable Default EPS Bearer QoS		
QoS Class Identifier(s) Others	1 (Conversation Speech)         2 (Conversational)         3 (Streaming Speech)         4 (Streaming)         5 (Interactive with priority 1 signalling)         6 (Interactive with priority 1)         7 (Interactive with priority 2)         8 (Interactive with priority 3)         9 (Background)         65 (MC-PTT Voice)         Ø 69 (MC-PTT Voice)         Ø 70 (MC Data)	
ARP Priority Level (Comma Separated Values) Associated MCC-MNC Lists	21 254 Delete	

A new "GCS ARP Global Settings" is added and will be applied by default to PCC rules as well as to the default bearer per receiving of GCS-Identifier and Reservation-priority AVP's.

**CMP GUI:** Global Configuration  $\rightarrow$  Global Configuration Settings  $\rightarrow$  GCS ARP Settings

Oracle Com	Oracle Communications Policy Management		
<ul> <li>Global Configuration Settings</li> <li>Precedence Range</li> <li>UE-Initiated Procedures</li> <li>Stats Settings</li> <li>Quota Settings</li> <li>eMPS ARP Settings</li> <li>GCS ARP Settings</li> <li>S9 Settings</li> <li>PDN APN Suffixes</li> <li>Activity Log Configuration</li> <li>Custom APNs Configuration</li> <li>Emergency APNs Settings</li> </ul>	Priority Value Preemption Capability Preemption Vulnerability Save Cancel	\} <b>⊠</b>	GCS ARP Settings

**Priority Level** 

Valid values: *1 through 15* Default value: *1* 

#### **Preemption Capability**

Valid values: *Preemption\_Capability\_Enabled*; *Preemption\_capability\_Disabled* Default value: *Preemption\_Capability\_Enabled* 

#### **Preemption Vulnerability**

Valid values: *Preemption\_Vulnerabilty\_Enabled*; *Preemption\_Vulnerabilty\_Disabled* Default value: *Preemption\_Vulnerabilty\_Disabled* 

When the Reservation-priority AVP is received within the command level, GCS ARP is applied to the default session rule, the application rules as well as to the DEBQ.

When the Reservation-priority ls received within the media, the GCS ARP will be applied only to the application rules that corresponding to this media.

Policy Condition Group	Policy Condition or Action	Description
"Request" Conditions	Where the requested GCS Identifier <u>matches one of value(s)</u>	Checks the value of the received Rx GCS- Identifier AVP.
"Request" Conditions	Where the corresponding enforcement session supports feature <u>name</u>	Evaluates the supported feature name taken from the enforcement session that correlates to this application (Rx )request.
"Request" Conditions	Where the requested QCI is one of specified	Allows QCI values to be within the range of 1-9 or 65, 66, 69 70.
"Request" Conditions	Where the <u>select type</u> is contained in Match List(s) <u>select list(s)</u>	Adding new Match List Type 'Requested QCI'.
"Action"	Set specified ARP to value	Override default eMPS/GCS ARP value

#### Policy Changes Table

#### 3.2.3.1 Where the requested GCS Identifier matches one of value(s)

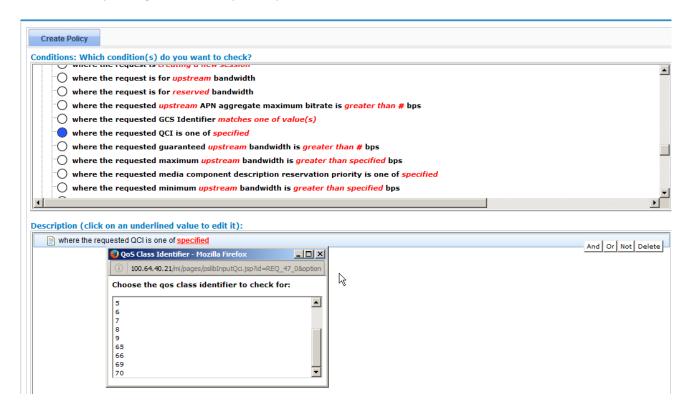
Create Policy			
Conditions: Which condition	(s) do you want to check?		
where the reques	t is creating a new flow		-
where the reques	t is creating a new session		
- where the reques	t is for <i>upstream</i> bandwidth		
where the reques	t is for reserved bandwidth		
where the reques	ted upstream APN aggregate maximum bitrate is greater than # bps	$\mathbf{k}$	
where the reques	ted GCS Identifier <i>matches one of value(s)</i>	°	
where the reques	ted QCI is one of <i>specified</i>		
where the reques	ted guaranteed upstream bandwidth is greater than # bps		
where the reques	ted maximum upstream bandwidth is greater than specified bps		
where the reques	ted media component description reservation priority is one of specified		
where the reques	ted minimum upstream bandwidth is greater than specified bps		
1			
Description (click on an und			
where the requested GCS	3 Identifier matches one of value(s)	A	And Or Not Delete
	Input a Value - Mozilla Firefox	_	
	(i) 100.64.40.21/mi/pages/pslibInputText.jsp?id=REQ_BROOKLYN		
	Enter value:		
	Note: Expected format: a comma-delimited list of values		
	OK Cancel Use Policy Table		
	OK Cancel Use Policy Table		

## 3.2.3.2 Where the corresponding enforcement session supports feature name

Create Policy	
Conditions: Which condition(s) do you want to check?	
• where the Sponsor-Identity matches one of specified Sponsor Identity(s)	-
• where the TDF-Application-Identifier matches one of <i>specified TDF application id(s)</i>	
• where the application session type is <i>Rx</i> session	
• where the bearer usage is General	_
where the codec name for the flow <i>matches one of specified codec name(s)</i>	
where the corresponding enforcement session <i>supports</i> feature <i>name</i>	
• where the enforcement session is an IP-CAN session	
where the event trigger is one of specified trigger(s)	
• where the flow is an application flow	
Description (click on an underlined value to edit it):	
where the corresponding enforcement session supports feature name	And Or Not Delete
😡 Accessibility - Mozilla Firefox 🔨 📃 🗆 🗙	
(i) 100.64.40.21/mi/pages/pslibInputSupportDoesNotSupportChoic	
Choose accessibility:	
supports	
does not support	
OK Cancel	

#### 3.2.3.3 Where the requested QCI is one of specified

**CMP GUI:** Policy Management  $\rightarrow$  Policy Library  $\rightarrow$  Policies



#### 3.2.3.4 Where the select type is contained in Match List(s) select list(s)

Create Policy		
Conditions: Whic	h condition(s) do you want to check?	
where	Filter-ID AVP does not exist	
where	Final-Unit-Indication AVP does not exist	
where	at least one Filter-ID AVP exists	
where	at least one Final-Unit-Action matches Final-Unit-Action to match	
• where	at least one Final-Unit-Indication AVP exists	
i i i	at least one flow has media type that matches <i>specified type(s)</i>	
i i i i i i i i i i i i i i i i i i i	at least one flow with media type <i>specified type</i> has one of statuses <i>specified status(s)</i>	
	the <i>select type</i> is contained in Match List(s) <i>select list(s)</i>	
	the <u>select type</u> is not contained in Match List(s) <u>select list(s)</u>	<b>•</b>
1 where	the &F-Annlication-TD is available	
Description (slic)	k on an underlined value to edit it):	
	elect type is contained in Match List(s) select list(s)	
	elect type is contained in Match List(s) select list(s)	And Or Not Delete
	Match Field Type - Mozilla Firefox	And Or Not Delete
	Match Field Type - Mozilla Firefox    X       100.64.40.21/mi/pages/pslibInputTokenListType.jsp?id=RE	And Or Not Delete
	Match Field Type - Mozilla Firefox  Match Field Type - Mozilla Fi	And Or Not Delete
	Match Field Type - Mozilla Firefox    X       100.64.40.21/mi/pages/pslibInputTokenListType.jsp?id=RE	And Or Not Delete
	Match Field Type - Mozilla Firefox     Imi/pages/psilipputTokenListType.jsp?id=RE     Choose the field to check for:     Serving Gateway Address     Requested QCI     APN	And Or Not Delete
	Match Field Type - Mozilla Firefox	And Or Not Delete
	Match Field Type - Mozilla Firefox	And Or Not Delete
	Match Field Type - Mozilla Firefox	And Or Not Delete
	Match Field Type - Mozilla Firefox	And Or Not Delete

#### 3.2.3.5 Set specified ARP to value

The GCS ARP value can also be overridden via the new policy action to be applied by default to PCC rules as well as to the default bearer per received GCS-Identifier and Reservation-priority AVP's

Create Policy Actions: What do you want to	do with the message?	
Set external field to `value`	o the user property name and save <u>always</u>	
<ul> <li>set policy context property <i>n</i></li> <li>set session revalidation time</li> <li>set session revalidation time</li> </ul>	Choose the field - Mozilla Firefox     Choose the field - Mozilla Firefox     100.64.40.21/mi/pages/pslbInputSelectorSingle.jsp?id=	
<ul> <li>set session revalidation time</li> <li>set specified ARP to value</li> <li>set the scope state variable n</li> </ul>	Choose the field : GCS eMPS	
<ul> <li>set the scope state variable n</li> </ul>	OK Cancel Use Policy Table	ng <i>cont</i> h <i>same</i>
Description (click on an unde		
set <u>GCS</u> ARP to Prior accept message	rity:4,Capability:enable,Vulnerability:enable	

# 3.3 OPTIONS TO RESET PLAN FREQUENCY (PR# 22114178)

#### 3.3.1 Introduction

Currently, when defining a plan, the Policy Management Quota Profile Plan only provides daily/weekly/monthly options to reset the plan. Operators cannot specify 'n' number of days/weeks/months for which a plan can be reset.

#### 3.3.2 Detailed Description

This new feature enhancement adding more flexibility with more granular for the period of time options. For example, it can be reset for every 'n' number of days, weeks or months such as every 4 days, 2 weeks, or 3 months etc.

As in the example shown below, the Billing Date is set at every  $10^{\text{th}}$  day of the month, and with the current date of 02/05/2016, therefore the Next Reset time will be of 04/10/2016. It's the third of  $10^{\text{th}}$  from the current date i.e.

 $\begin{array}{l} 1^{st} - 02/10/2016 \\ 2^{nd} - 03/10/2016 \\ 3^{rd} - 04/10/2016 \end{array}$ 

	Gx - CCR-I	
Current date = 2/5/2016		Quota Usage Lookup
Initial limit = 1000 units Reset every = 3 months billing date =10.	Gx - CCA-I	Total Quota Usage/Initial Limit : 500/1000
	Gx - CCR-U Used = 100	sh PUR
	Gx - CCA-U	Sh PUA (Total Quota Usage/Initial Limit : 600/1000, Next Reset Time =4/10/201
	Gx - CCR-T	
	Gx - CCA-T	

### 3.3.3 User Interface Changes

A new Expert Setting Configuration Key of "**DB.USER.EnableBillingDate**" needs to be added in order to enable/disable this feature enhancement. It is set to "**true**" by default. This will result of that the 'Billing Date Effective Name' entered in the Subscriber's profile, will be used as a Plan Start Date to calculate the next reset time.

**CMP GUI:** Policy Server  $\rightarrow$  Configuration  $\rightarrow$  (*MPE cluster name*)  $\rightarrow$  Policy Server  $\rightarrow$  Advanced  $\rightarrow$  Modify  $\rightarrow$  Expert Settings

dify Cancel				
xpert Settings				
				4
Category	Configuration Key	Туре	Value	Default Value
pomm	PCMM.Cleanup.PcmmSessionValidityTime	int	86400	86400
Diameter	DIAMETER.Cleanup.MaxSySessionValidityTime	int	172800	172800
Diameter	DIAMETER.Cleanup.AuditSySendEmptyPolicyCounterList	boolean	true	true
Diameter	DIAMETER. Cleanup. SessionCleanupInterval	int	21600	21600
Diameter	DIAMETER.SessionUniquenessControlWaitTime	boolean	false	false
Diameter	DIAMETER.Cleanup.MaxDurationForSessionIteration	int	7200	7200
Diameter	DIAMETER.AF.EnableGracePeriodForSubscriptionExpiry	boolean	false	false
Database	DB.USER.EnableBillingDate	boolean	true	true

It is recommended to enter a valid date for Billing Date Effective Name, so it can be used as Plan Start Date. If valid date is not entered, or the new Expert Setting Configuration key of **'DB.USER.EnableBillingDate**' is not set to **"true"**, the time at which CCR-I is sent will be used to calculate as a basis for the next reset time.

In addition, the 'Reset Frequency' field label under Quota Profile Plan configuration is changed to 'Reset Every', and a new input field is added where value input will indicate the 'number' of days/weeks/months that the plan will be reset. As for the yearly plan reset, multiple of '12' value for this new field of 'Months' can be entered accordingly. This new field is available for both Pool and Subscriber Quota Profile Type.

The new '**Reset Every**' parameter is initially set to value of "1" upon Policy Management system upgraded to Release 12.2.

**CMP GUI:** Policy Server  $\rightarrow$  Quota Profiles  $\rightarrow$  Plans  $\rightarrow$  ( *plan name* )  $\rightarrow$  Modify

As shown in the following examples –

1. Reset Every - Months

Name Description / Location		
Quota Profile Type Enable Dynamic Grant Max Leakage Threshold (MB or seconds) Max Sessions Used For Dynamic Grant Minimum Grant Size	Pool 0 10 0	•
Reset Every Reset Time Variable Report Offset Limit (minutes)	1 Months	•
Billing Date Effective Name		
Initial Total Volume Limit (bytes) Initial Upstream Volume Limit (bytes) Initial Downstream Volume Limit (bytes) Initial Time Limit (seconds) Inactivity Detection Time (seconds) Quota Convention	<ul> <li>None</li> <li>None</li> <li>None</li> <li>None</li> <li>None</li> <li>None</li> </ul>	×

# 2. Reset Every – Weeks

Name Description / Location		
Quota Profile Type Enable Dynamic Grant Max Leakage Threshold (MB or seconds) Max Sessions Used For Dynamic Grant Minimum Grant Size	Subscriber 0 10 0	
Reset Every	1 Weeks	
Choose Day Reset Time Variable Report Offset Limit (minutes)	Sun 0	
Billing Date Effective Name		
Initial Total Volume Limit (bytes) Initial Upstream Volume Limit (bytes) Initial Downstream Volume Limit (bytes) Initial Time Limit (seconds) Inactivity Detection Time (seconds)	<ul> <li>None</li> <li>None</li> <li>None</li> <li>None</li> <li>None</li> <li>None</li> </ul>	
Quota Convention Save Cancel	N/A	

# 3. Reset Every – Day

Name		
Description / Location		
Quota Profile Type	Subscriber	•
Enable Dynamic Grant		
Max Leakage Threshold (MB or seconds)	0	
Max Sessions Used For Dynamic Grant	10	
Minimum Grant Size	0	
Reset Every	1 Days	
Hour : Minute		
Reset Time Variable		
Report Offset Limit (minutes)	0	
Billing Date Effective Name		
Initial Total Volume Limit (bytes)	None	
Initial Upstream Volume Limit (bytes)	None	
Initial Downstream Volume Limit (bytes)	None	
	-	
Initial Time Limit (seconds)	None	
Inactivity Detection Time (seconds)	None	
Quota Convention	N/A	
Save Cancel		

Furthermore, Policy OSSI is updated to support the configuration of "Reset Frequency" parameter as shown below –

<pre><?xml version="1.0" encoding="UTF-8" standalone="yes"?></pre>
<configurationdata version="12.2.0.0.0"></configurationdata>
<quota></quota>
<pre><li><name>QuotaAfterCkpoint</name> <cdescription></cdescription></li></pre>
<description></description>
<dynamicquotatype>0</dynamicquotatype>
<priority>0</priority>
<limittotalvolume>false</limittotalvolume>
<limitupvolume>false</limitupvolume>
<pre>closescription&gt;{Description&gt; closescription&gt;{Description&gt; clinitybe/Priority&gt; clinitybe/une&gt;falsec/LimitTotalVolume&gt; clinitDesrVolume&gt;falsec/LimitDowrVolume&gt; clinitDesrVolume&gt;falsec/LimitDesrVolume&gt;</pre>
<tothlvolumelimit>64/TothlVolumeLimit&gt; <upvolumelimit>64/UpVolumeLimit&gt;</upvolumelimit></tothlvolumelimit>
<upvolumelimit>0</upvolumelimit>
<downwolumelimit>0</downwolumelimit>
<pre><li>imitTime&gt;false</li></pre>
<timelimit>0</timelimit>
<pre><limittimeinactivity>false</limittimeinactivity> <timeinactivity>0</timeinactivity></pre>
<timeinactivity>0</timeinactivity>
<limitevent>false</limitevent>
<pre><eventlimit>@</eventlimit></pre>
<replenishing=requency30< replenishing="requency3&lt;/td"></replenishing=requency30<>
<pre>Climittyeet&gt;faise(/limittyeet&gt;</pre>
< rimeInresholderercentage>0.0 rimeInresholderercentage
<pre><cventimesnoidercentage>0.0</cventimesnoidercentage></pre> /feableTetesiofercentage>
<pre><timethresholdpercentage>0.0</timethresholdpercentage> <eventthresholdpercentage>0.0</eventthresholdpercentage> <enableinterimreporting>false</enableinterimreporting> <interimreportinginterval>0</interimreportinginterval></pre>
Contertameportingintervalion/ intertameportingintervalion
<quotaexhaustionaction>0</quotaexhaustionaction> <redirectservertype>1</redirectservertype>
Philote Restar Technology 17 June 312 (Philote Research Technology Three St.
ChecatFreeMultioliers58c/RecatFreeMultioliers
<pre>Construction construction construction</pre>
<pre><quotaresetdayofweek>@</quotaresetdayofweek> <quotaresettimeofday></quotaresettimeofday> </pre>
<quotaresettimevariable></quotaresettimevariable>
<quotareportoffsetlimit>0</quotareportoffsetlimit>
<billingdateeff></billingdateeff>
<quotatype>8</quotatype>
<pre>AnxLeakageThreshold&gt;8<!--/HaxLeakageThreshold--></pre>
<enabledynamicgrant>false</enabledynamicgrant>
<haxsessionsusedfordynamicgrant>10</haxsessionsusedfordynamicgrant>
<pre><hingrantsize>8</hingrantsize></pre>
<durationunittype>2</durationunittype>
<pre><durationunit>0</durationunit></pre>
<activetimeperiod></activetimeperiod>
<expirationdateextensionmethod>0</expirationdateextensionmethod>
<pre>CQuotaReportOffsetLimit&gt;4CluotaReportOffsetLimit&gt;</pre>

# 3.4 NOTIFICATION TRIGGERS FOR AGGREGATE QUOTA (PR# 22258207)

### 3.4.1 Introduction

Currently, policy conditions such as "where the user is using greater than # percent of select type for selected quota" do NOT take into account of any Top-up or Rollover limit setup in the quota plan. In other words, Subscriber usage percentage calculation only uses the base quota plan limit. Any usage notification triggers setup based on these calculations, may be triggered incorrectly from the Subscriber's point of view

This feature changes the outcome of those policy conditions to include all Top-ups and Rollovers usage and limits for the percentage calculation.. However, it will not alter existing Granting calculation for a subscriber session, thus the Grant values will be the same. Expired/Exhausted top-ups and Subscriber's Passes are not used in the calculation.

<b>Policy Condition Group</b>	Policy Condition or Action
User Conditions	Where the user is using greater than specified percent of select type for selected quota
User Conditions	Where the user is using <u>greater than specified</u> percent and <u>less than specified</u> percent of <u>select type</u> for <u>selected</u> quota
User Conditions	Where the user is using greater than # units of total volume (bytes) for selected quota.
Policy Context Properties	The policy variable for User Quota usage:
	<i>{User.Quota.<quotaname>.Volume}</quotaname></i> looks at the usage for that particular quota. This is now enhanced to specify whether "aggregated quota" is requested or not.
	<i>{User.Quota.<quotaname>.Volume.aggregate}</quotaname></i> - Will fetch the aggregated usage value for that quota (included usage against top-ups and rollover).
	<i>{User.Quota. <quotaname>. Volume.noaggregate} -</quotaname></i> Will fetch only the usage against the basic quota limit and not aggregated i.e. the same behavior as it's existing basic context property and reserve for future usage.
	The above implementation is also applicable for the policy variable of { <i>User.Quota.<quotaname>.Time</quotaname></i> }, so there will be the following enhanced variables:
	{ User.Quota. <quotaname>.<b>Time.aggregate</b> }, and</quotaname>
	{ User.Quota. <quotaname>.<b>Time.noaggregate</b> }</quotaname>
Policy Context Properties	The policy variable for Quota Profile limits:
	<i>Quota.Limit.<quotaname>.Volume</quotaname></i> looks at the quota limit for the quota profile with <quotaname>. This is now enhanced to specify whether "<b>aggregated quota</b>" is requested or not for the subscriber or pool quota.</quotaname>
	<i>Quota.Limit.<quotaname>.Volume.aggregate}</quotaname></i> - Will fetch the aggregated limit for that quota profile and includes limits from top-ups and rollover defined for that Subscriber or Pool.
	<i>Quota.Limit.<quotaname>.Volume.noaggregate}</quotaname></i> - Will fetch only the limit defined in the the basic quota and not aggregated i.e. the same behavior as it's existing basic

The policy conditions and actions which are impacted if this feature is enabled -

context property and reserve for future usage.
The above implementation is also applicable for the policy variable of <i>{ Quota.Limit.<quotaname>.Time }</quotaname></i> , so there will be the following enhanced variables:
{ Quota.Limit. <quotaname>.<b>Time.aggregate</b> }, and</quotaname>
{ Quota.Limit. <quotaname>.<b>Time.noaggregate</b> }</quotaname>

In order to preserve backward compatibility, the current behavior can be preserved with a new checkbox field for "Aggregate Quota" left unchecked or set to false by default. Otherwise, then all Quota plans that use that Quota convention will have the new impelmentation.

The Export/Import of the Policies will include this new field.

The new field is also added to the OSSI output.

#### 3.4.2 Detailed Description

Those above-mentioned policy conditions allow the Operator to specify percentage of usage to limit to be calculated and trigger the policy based on those.

Example of use case-1 with the new feature -

Let's say the policy condition is set as where the user is using greater than 80 percent and less than 90 percent of total volume for PoolQuota1 quota send SMS `80 percent quota reached.` to user. Request delivery receipt `default`.

The *PoolQuota1* is defined as a Quota Plan with Initial Volume Limit 10MB. Now, the Subscriber purchased and activated two 5MB topups.

With existing implementation, it would send SMS when the usage reaches 8MB, which is 80% of the plan limit of 10MB.

With this feature enhancement, it would only send SMS when the usage reaches 16 MB, since the calculation for the 80% based on quota plan which now include the recently purchased topups i.e. (10MB + 5MB + 5MB = 20MB).

Example of use case-2 with the new feature –

Using the same policy conditions as outlined in use case-1. The PoolQuota1 is defined as a Quota Plan with Initial Volume Limit 10MB.

The Subscriber purchased two 5MB top-ups, but one of which is not activated yet and will be in a future date.

The Operator has *roll-over* enabled before top-ups, and has a roll-over of 2MB from the previous cycle.

The Subscriber has used up 10MB of basic plan quota before the next reset time, so is granted the 2MB from the roll-over. The Subscriber then used up 1MB from this rollover, so the total usage (basic plan usage + rollover usage) is 11MB.

The aggregate limit is ( basic plan limit + top-ups limit + roll-over limit) 10MB + 10MB + 2MB = 22MB. So, the usage percentage is calculated as (11MB / 22MB) \* 100 = 50%.

Without "Aggregate quota" being enabled/checked, this would be computed as 100% as the user has used up the basic quota for the cycle.

Example of use case-3 with the new feature –

With the pro-rate is enabled, and user quota was pro-rated by a factor of 0.4. In this case, the Subscriber was not allotted the full quota grant of 10MB but only the pro-rated quota plan limit of 4MB.

The Subscriber has purchased and activated two 5MB top-ups. So, the new limit usage is now total of 14 MB ( the pro-rated quota plan limit of 4MB + top-ups limit of 10 MB )

The Subscriber has used up 2MB. With the feature enabled, the percentage calcualtion is ( 2 MB / 14 MB ) = 14.28571%

**NOTE:** Top-ups and rollovers are not subject to pro-rating factor.

#### 3.4.3 User Interface Changes

A new checkbox field is added to CMP of Quota Conventions menu calls "Aggregate Quota". It is set disabled or unchecked, by default. So, the behavior of the two existing policy conditions is the same as is.

To enable this new feature enhancement, check on the "Aggregate Quota" box as shown in CMP GUI below -

٩		Quota Convention Administration
🔁 Quota Conventions	Modify Quota Convention	
	Configuration	
Rollovertest1_conv	Name	quotacn_all
quotaConvention_defaul	Description / Location	
guotacn1		
🐨 💽 quotacn_aggr		
🛄 quotacn_all	Rollover Usage	Rollover before Top-up
rollover_20150_all	Interval percentage of the limits (%)	
iestcn1	Max percentage of the limits (%)	1200.0
	Rollover Time Units	
	Rollover Total Volume	
	Rollover Input Volume	
	Rollover Output Volume	
	Rollover Service Specific Units	
	Discard Rollover on Calculation	
	Consume Rollover before Quota	
	Enable Top-ups	
1	Aggregate Quota	
	Save Cancel	

# 3.5 POLICY SUPPORT ON NETWORK ELEMENT'S IDENTITY (PR# 20271484)

#### 3.5.1 Introduction

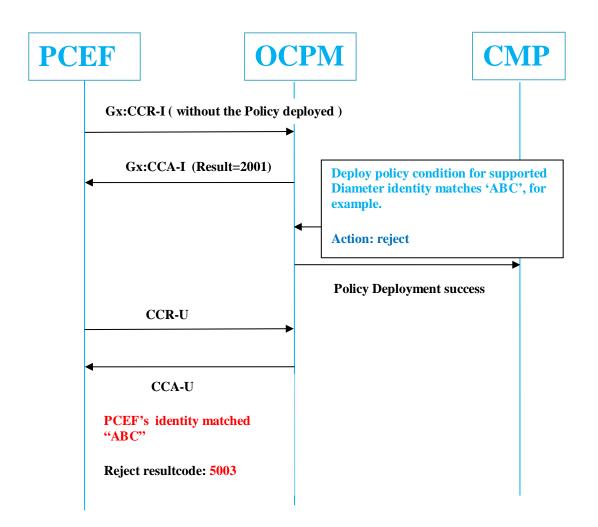
This feature introduces two new policy conditions to check for Diameter identity stated in "Origin Host" AVP of received Gx:CCR, Rx:AAR and Sd:CCR messages. Diameter Notification and Update messages are not supported.

#### 3.5.2 Detailed Description

Here are the new Policy conditions -

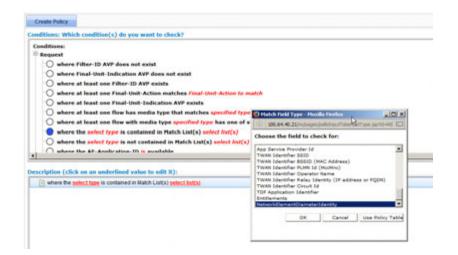
Policy Condition	Description
where the <i>select type</i> is contained in Match List(s) <i>select list(s)</i>	<pre>select type = NE_IDENTITY select list(s) = pre-defined Match List This is to check whether the Network Element's Diameter Identity matches the one in pre-defined Match List.</pre>
where the <i>select type</i> is <i>not</i> contained in Match List(s) <i>select list(s)</i>	select type = NE_IDENTITY select list(s) = pre-defined Match List This is to check whether the Network Element's Diameter Identity <b>doesn't match</b> the one in pre-defined Match List.
where the network element's diameter identity matches one of specified name(s) / does not match any of specified name(s)	This is to check whether the Network Element's Diameter Identity matches or not, to one of specified name(s), which can be comma separated string containing wildcards such as " * ", or " ? "

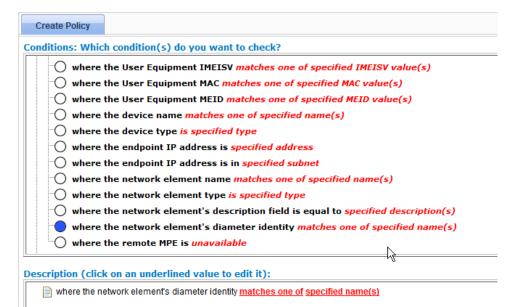
This can be illustrated in the following Call Flow -



### 3.5.3 User Interface Changes

As can be seen in the Figure below, a new option named "NetworkElementDiameterIdentity" is added to the *select type* in the Policy Condition.





# 3.6 SPECIFY GX AND RX RESULT CODES FOR MRA WHILE NO BINDING INFO ( PR# 19488243 & 20271501 )

### 3.6.1 Introduction

This feature allows MRA to return as configured Result-Codes (could be different from the default values ) when the MRA receives the supported Gx:CCR-U/CCR-T; Rx:AAR-I/AAR-U/STR messages but can't find corresponded DRA binding information.

### 3.6.2 Detailed Description

Currently without the DRA binding information, the MRA is returning the following default Result-Codes –

Gx:CCA: Result-Code 0:5002 DIAMETER\_UNKNOWN\_SESSION\_ID Gx:CCA: Result-Code 0:5012 DIAMETER\_UNABLE\_TO\_COMPLY Gx:CCA:Result-Code 0:3002\_DIAMETER\_UNABLE TO DELIVER Rx:AAA: Result-Code 10415:5065 IP\_CAN SESSION\_NOT\_AVAILABLE Rx:STA: Result-Code 0:5012 DIAMETER\_UNABLE\_TO\_COMPLY

Furthermore, use **Reference** [10] and [11] for valid applicable configured Result Codes and CC/Rx-Request-Type respectively.

The following MRA Configuration keys should first set to enable the feature -

- (1) DIAMETERDRA.TopologyHiding.Enabled should be set to "true",
- **NOTE:** This configuration key doesn't affect Rx:AAR-I message
- (2) And, **DIAMETERDRA.TopologyHiding.Apps** could contain values of "**Gx**,**Rx**", OR either "**Gx**" or "**Rx**", OR "\*" for all

Next, in order to override the above-mentioned default returned Result-Codes, configure the following MRA Configuration Keys:

- (1) **DIAMETERDRA.NoBindingInfo.ResultCodeRuleIndexLimit** default value is 10. The value of this configuration is to limit the maximum number of Rules' index as shown in the next Configuration Key in (2) below. Any Rule index number exceeds the RuleIndexLimit value, will NOT be executed. In other words, if the default limit value of 10 is configured, the RuleIndexNumber of 11 and beyond, won't have any effect.
- (2) **DIAMETERDRA.NoBindingInfo.ResultCodeRulePrefix** applicable for all received Gx and Rx:STR messages. The value of this is the prefix of configuration's key which is used to specify the Result Code rules containing one **Filter** prefix and one **Action** prefix with the following formats –

- [Prefix][IndexNumber].filter=App/MessageType/AVPList. Use Reference [11] and [12], Section 8.3 and Section 5.6.5 respectively.

- [Prefix][IndexNumber].action=VendorId:DiameterResultCode.. Use Reference [10], Section 7.1

As shown in the following configuration example -

DIAMETERDRA.NoBindingInfo.**ResultCodeRule1.Filter**=Gx/CCR/CC-Request-Type=2 DIAMETERDRA.NoBindingInfo.**ResultCodeRule1.Action**=0:5007 DIAMETERDRA.NoBindingInfo.**ResultCodeRule2.Filter**=Gx/CCR/CC-Request-Type=3 DIAMETERDRA.NoBindingInfo.**ResultCodeRule2.Action**=10415:5141 DIAMETERDRA.NoBindingInfo.**ResultCodeRule3.Filter**=Rx/AAR/Rx-Request-Type=0 DIAMETERDRA.NoBindingInfo.**ResultCodeRule3.Action**=10415:5064 DIAMETERDRA.NoBindingInfo.**ResultCodeRule4.Filter**=Rx/AAR/Rx-Request-Type=1 DIAMETERDRA.NoBindingInfo.**ResultCodeRule4.Filter**=Rx/AAR/Rx-Request-Type=1 DIAMETERDRA.NoBindingInfo.**ResultCodeRule4.Action**=99999:9999 DIAMETERDRA.NoBindingInfo.**ResultCodeRule5.Filter**=Rx/STR<sup>1</sup> DIAMETERDRA.NoBindingInfo.**ResultCodeRule5.Action**=98765:1234

<sup>1</sup>Exception for App/MessageType format. Refer RFC-4006, Section 8.3 for CC-Request-Types AVP Refer ETSI TS 129.214 V11.6.0, Section 5.3.31 for Rx-Request-Types AVP

- (3) **DIAMETERDRA.NoBindingInfo.ResultCodeForRxAARWithDestinationHost** *applicable for received Rx:AAR with Destination-Host AVP from AF ( P-CSCF) without Rx-Request-Type AVP.*
- (4) **DIAMETERDRA.NoBindingInfo.ResultCodeForRxAARWithoutDestinationHost** *applicable for received Rx:AAR without Destination-Host AVP from AF ( P-CSCF) and without Rx-Request-Type AVP.*

## 3.6.3 User Interface Changes

**CMP GUI:**  $MRA \rightarrow Configuration \rightarrow (Select MRA cluster name) \rightarrow MRA \rightarrow Advanced \rightarrow Modify \rightarrow Service Overrides \rightarrow Add$ 

As shown in the example below -

•	Service Overrides				
					<b>V</b>
	Category	Configuration Key	Туре	Value	Default Value
	DIAMETERDRA.NoBin	International Contemporary C	int	5	10
	DIAMETERDRA.Topolo	DIAMETERDRA.TopologyHiding.Apps	String	Gx,Rx	Gx,Rx
	DIAMETERDRA.Topolo	DIAMETERDRA.TopologyHiding.Enabled	boolean	true	false

#### • Service Overrides

Category	Configuration Key	Туре	Value	Default Value
	International Content of Conte		0:5012	Undefined
	IAMETERDRA.NoBindingInfo.ResultCodeRule2.Filter		Rx/AAR/Rx-Request- Type=0	Undefined
	IAMETERDRA.NoBindingInfo.ResultCodeRule1.Actio		0:5002	Undefined
	DIAMETERDRA.NoBindingInfo.ResultCodeRule1.Filter		Gx/CCR /CC-Request- Type=1	This is Undefined

# 3.7 INCLUSION OF MSISDN IN SUBSCRIPTION-ID AVP OF GX:CCR-I INTERFACE FOR OCS LOOKUP ( PR# 22264564 )

#### 3.7.1 Introduction

This feature enhancement allows Policy Management to use the MSISDN value received in Gx:CCR-I message to query the OCS for Policy Counter information, when the Policy Management does NOT receive an MSISDN value from the following scenarios either –

- 1. UDA/SNA response from HSS/SPR.; or
- 2. HSS/SPR does not send UDA/SNA response, and Sy Data Source is defined as "on-demand" and "Validate User" set to false .

#### 3.7.2 Detailed Description

Currently, when Policy Management retrieves Policy Counter information from an OCS based of the MSISDN value received from the SPR/HSS, as shown below in Figure 3 with the following assumption of either -

- The OCS is provisioned as a secondary data source using MSISDN as the Subscriber key; or
- OCS lookup is triggered by policy execution.

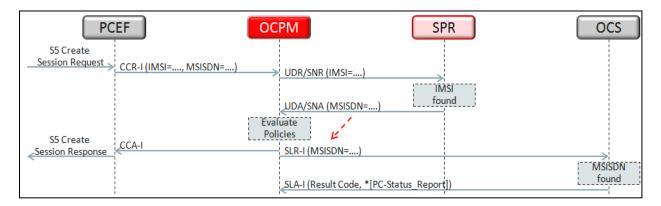


Figure 3: OCS Query Based on MSISDN Received in Sh:UDA/SNA (SPR Response)

Otherwise, the Policy Management will not attempt to retrieve Policy Counter information from the OCS.

So, this feature enhancement allows Policy Management to use the MSISDN in the received Gx:CCR-I message to query the OCS as shown below in Figure 4.

In a typical Gx:CCR-I message, the IMSI and MSISDN values can be included via separate instances of the Subscription-ID AVP as described in RFC-4006.

```
Subscription-Id ::= < AVP Header: 443 >
{ Subscription-Id-Type }
{ Subscription-Id-Data }
```

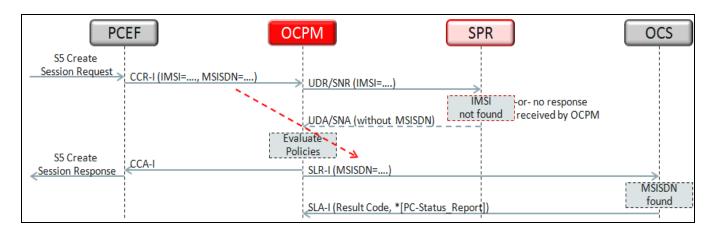


Figure 4: OCS Query Based on MSISDN Received in Gx:CCR-I

If the MSISDN value does not exist in the OCS from either case, then the Subscriber session must be established without the Policy Counter information, as shown below. This is the same behaviour as current implementation.

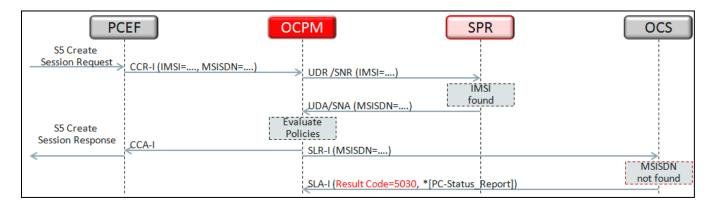


Figure 5: OCS Query ( in this example is based on HSS/SPR response) with Unknown MSISDN. The SLA-I response from OCS will be the same as with MSISDN value retrieved from Gx:CCR-I message.

#### 3.7.3 User Interface Changes

NONE

## 3.8 PCMM MESSAGES PER MPE AND PER CMTS STATISTICS VIA OSSI/XML (PR# 20162894)

#### 3.8.1 Introduction

Currently, there are multiple PCMM sessions related statistics displayed in CMP GUI like Gate set/info/delete messages counts and errors counters. These counters are presented on configured MPE level as well as CMTS level.

This new feature further provides the capability of extracting these statistics fed through OSSI/XML.

#### 3.8.2 Detailed Description

A new OSSI interface "**PcmmCmtsGateStats**" is created as part of this feature release to collect the messages count for each of the following messages kinds per CMTS:

- 1) Gate set
- 2) Gate info
- 3) Gate delete

The "OssiXmlOm.xsd" XML schema definition file used by OSSI is modified to cater for these statistics collection.

An example request for PCMM Gates stats for 'CMTS-12-2' network element as shown -

<?xml version="1.0" encoding="UTF-8"?> <XmlInterfaceRequest> <QueryOmStats> <StartTime>2015-08-03T00:01:00</StartTime> <EndTime>2015-08-08T23:59:00</EndTime> <PcmmCmtsGateStats > <PolicyServer>MPE1</PolicyServer> <Name>CMTS-12-2</Name> </ PcmmCmtsGateStats > </QueryOmStats> </XmlInterfaceRequest>

#### 3.8.3 User Interface Changes

The data provided will be equivalent to what is presented in the following GUI:

**CMP GUI:** Policy Server  $\rightarrow$  Configuration  $\rightarrow$  <Configured MPE>  $\rightarrow$  Reports  $\rightarrow$  PCMM CMTS Statistics  $\rightarrow$  PCMM CMTS

UAUTER .	Ca Ality Servers	<ul> <li>Policy Server, MPL 5.</li> </ul>		Pulicy Server Advantatration	
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		(hate only and / arrow stanssigns processed	4/4		
mpart / Expert		Bala debite messages (sate debite eds./ error messages processed)	8 6/6	POHL OFTE Studious Model: Active / Absolute	
		Sata report massages Messages directed	1	Shouther Paule Control Marine (201) Chitte-MAINE	
adigandian belian Milaya Milaya		Currently active gates Highest number of active gates seen so fer	1	Tytel messages in / sut. Stats start time Last stats time	0/0 4× Mar 11 (0-10-11 807 2016 4× Mar 11 10-45-00 807 2016
		Look statu react time PCHM CHTS	Pri Her 11 10-45-00 887 2016	Connect Time Discontect Time	An Har 11 10-31-30 697 2016 N/R
		Name (02) Total cleat messages in / out CH12:05:0	Correctly active gates	Connections 27 Address	1 25.245.225.245
				Sate set messages Gate set ock / error messages processed	8 878
				Gata lefts reasonages Gata lefts ask / arms manages processed	a 4/0
				Bala debits messages (tata debits add / actor messages processed)	8
				Sate report messages	1
				Convently active geter Highwat novitar of active gater sean or for	

These statistical data are collected as part of all Operational and measure statistics collected by "OM **Statistics**" scheduled task under the following GUI:

**CMP GUI:** System Administration → Scheduled Tasks

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User Management					

The reports data counters are collected throughout an interval of time as configured in the following GUI:

**CMP GUI:** global configuration  $\rightarrow$  global configuration settings  $\rightarrow$  stats settings

• default value is 15 minutes



# 3.9 PROVIDE NUMBER OF ACTIVE GATES PER AMID AND PER MPE VIA OSSI/XML (PR# 20162817)

#### 3.9.1 Introduction

Currently, the MP GUI displays statistics on PCMM active gates per AMID, these counters are presented on configured MPE level.

This feature extends the capability of extracting these statistics to be fed through OSSI/XML.

#### 3.9.1 Detailed Description

A new OSSI interface "**PcmmAmGateStats**" is created as part of this feature release to collect the messages count for each of the following messages kinds per CMTS:

- 1) Gate set
- 2) Gate info
- 3) Gate delete

The "OssiXmlOm.xsd" XML schema definition file used by OSSI is modified to cater for these statistics collection.

An example request for PCMM AM Gates stats for 'Atlanta105' policy Server as shown -

<?xml version="1.0" encoding="UTF-8"?> <XmlInterfaceRequest> <QueryOmStats> <StartTime>2015-08-03T00:01:00</StartTime> <EndTime>2015-08-08T23:59:00</EndTime> <PommAmGateStats > <PolicyServer>Atlanta105</PolicyServer> <Name>1</Name> </ PcmmAmGateStats > </QueryOmStats> </XmlInterfaceRequest>

#### 3.9.2 User Interface Changes

The data provided will be equivalent to what is presented in the following GUI:

**CMP GUI:** Policy Server  $\rightarrow$  Configuration  $\rightarrow$  <Configured MPE>  $\rightarrow$  Reports  $\rightarrow$  PCMM AM Statistics  $\rightarrow$  PCMM AM

ORACLE	Oracle Con	nmunications Policy	y Management	
PRI FAVORITES     POLICY SERVER     Configuration Template     Network Elements     Applications     Traffic Profiles     Redia Profiles	C Anlay Servers	Policy Server: HPE-S Policy Server: HPE-S PCHH AM Statistics Mode: Active / Absolute Show Detail   Pause   Cancel Connections Total messages (n / out) Gate set ack / error messages processed Gate set ack / error messages processed Gate side wessages Gate side ack / error messages processed Gate side ack / error messages / error messages processed Gate side ack / error messages / error messages processed Gate side ack / error messages / error messag	EM         Rewring         Policies         Data Sources         Debug           1         6/6         2         3         3         <	Policy Server Administration
		and a construction of the		

These statistical data are collected as part of all Operational and Measure (OM) statistics collected by "OM Statistics" scheduled task in CMP GUI: *System Administration*  $\rightarrow$  *Scheduled Tasks* 

ORACLE	Oracle Communications	Policy Management			4421.14
IN CANCELLES		•	cheduled Task Advanistration		
POLICY MAYIN	Tank	Land Start Time	Sister	Nexel Base Time	Bun Internal
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Very Management					

The reports data counters are collected throughout an interval of time configured in the following -

**CMP GUI:** Global Configuration  $\rightarrow$  Global Configuration Settings  $\rightarrow$  Stats Settings

Default value is 15 minutes.

ORACLE	Oracle Communications Policy Management						
NY FAVORITES     NOLICY SERVER     POLICY SERVER     DISCY MANAGEMENT     BAD     SYSTEM WIDE REPORTS     PLATFORM SETTING     UNIGRADE     GLOBAL CONFIGURATION     Global Configuration Settinger	Clubal Configuration Settings  Precedence Range  UE-Initiated Precedures  Stats Collection Period  Stats Settings  NOS ARP Settings  SS ARP Settings  SS Relates	15 minutes	Stats Settings				

# 3.10 DISCOVER CMTS SUBNETS WHEN SAVING A NEWLY CREATED NETWORK ELEMENT (PR# 20286860)

#### 3.10.1 Introduction

This feature enhance the functionality of creating new CMTS network elements via OSSI/XML to additionally discover the subnets associated to this new CMTS and push the new and modified subnets to the relevant MPE(s).

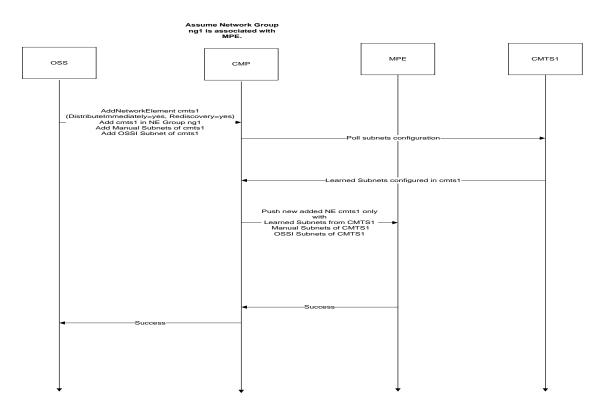
When provisioning a new CMTS via OSSI/XML interface command, CMP will learn CMTS's subnet configuration via SNMP service and push them to associated MPE cluster(s).

#### 3.10.2 Detailed Description

To support OSSI trigger re-discovery CMTS subnet via SNMP, The new attributes 'Rediscovery' and 'DistributeImmediately' will be supported in QueryNetworkElement, AddNetworkElement and UpdateNetworkElement OSSI requests.

If Rediscovery attribute value is set to 'yes', AddNetworkElement and UpdateNetworkElement request will also trigger CMP re-discovery after CMP create or modify CMTS requests.

After the re-discovery of the subnets associated with the new CMTS, CMP trigger subnet information push to MPE via SNMP interface and return back CMTS subnets information in OSSI response. Following an illustrative flow showing the process of discovering the subnets associated with a newly added CMTS (CMTS1) and CMP pushing only the new learned subnets to MPE:



# 3.10.3 User Interface Changes

NONE

## 3.11 STATISTICS RESET MODE UNIFICATION (PR# 22534128)

#### 3.11.1 Introduction

Previously Oracle Communications Policy Manager used to provide 2 reset modes for statistics and counters displayed in CMP GUI:

- 1. Manual Reset
- 2. Interval Reset

This feature phase out the manual reset technique for statistics and counters leaving only the interval reset technique.

This applies to both modes Cable and Wireless

### 3.11.2 Detailed Description

With manual reset technique, all the statistics and counters were reset only by customer manually or with system restart or upgrade.

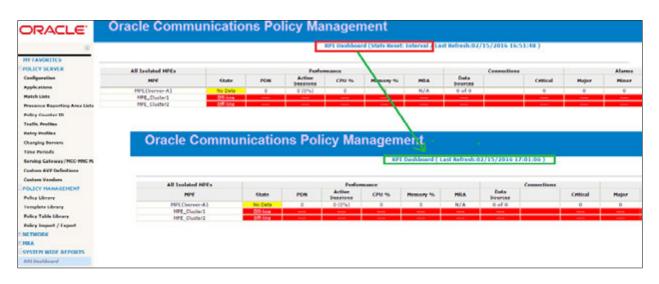
CMP GUI is updated by removing "Reset Counts" and "Reset All Counts" buttons of multiple reports and statistics pages so as to enable statistics reset by interval only.

At the beginning of each interval, all counters and statistics will reset automatically to Zero and start counting thereafter. In the mean time, all previous/historical interval data will be stored in COMCOL database.

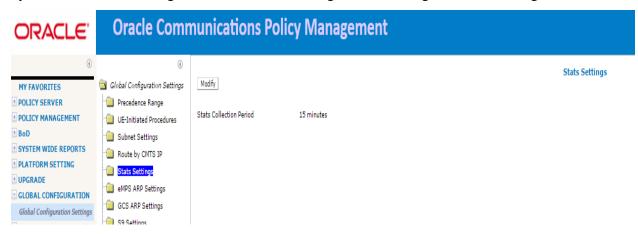
CMP will then retrieve these historical interval date from COMCOL and store it in MySql database table. These historical data is kept for 24 hours.

#### 3.11.3 User Interface Changes

As a reason of this feature, CMP screens headings will not include statistics reset mode used any more:



Statistics settings is also removed from global configuration to enable only interval statistics collection by default: Global Configuration -> Global Configuration Settings -> Stats Settings



## 3.12 BOD ENHANCEMENTS ( PR# 20287350)

#### 3.12.1 Introduction

This feature provides the ability of extracting multiple BOD related counters and statistics that are displayed in CMP GUI via OSSI/XML interface.

In addittion, BOD will introduce new statistics counting PCMM error messages categorized by error code that is displayed in the reports tab of configured BOD cluster in CMp GUI.

Also, as part of BOD enhancements in this release, BOD notification is enhanced in case of session early termination to send more details as part of the notification message sent out, early termination applies to sessions which expires before its entire assigned duration at session creation.

### 3.12.2 Detailed Description

As part of this feature, a set of existing BOD reports that are in CMP GUI will be available to be exported and fed into other customer's reporting or management systems via OSSI/XML including:

- 1. BOD PCMM gates stats
- 2. BOD PCMM gates stats by AMID
- 3. BOD PCMM sessions stats by AMID
- 4. BOD failed sessions stats by failure reason
- 5. BOD PCMM gates report stats
- 6. BOD HTTP requests and responses stats
- 7. BOD SOAP requests and responses stats

A BoD session may encounter several errors during its life cycle. In such cases, BoD uses its state machine mechanism to determine if the error can be recovered. Sessions that CANNOT be recovered are counted in "Failed Sessions". And the error which brings the session into an unrecoverable state is the "Failed Reason" of the session.

If a session involves both upstream and downstream Gates, and the two Gates fail on different reasons, the failed reason of the session is summarized by following priorities:

- The un-recoverable error takes the highest priority, if the two errors has the same priority
- The error of upstream Gate takes higher priority

A BoD session may encounter several errors during its life cycle. In such cases, BoD uses its state machine mechanism to determine if the error can be recovered. Sessions that CANNOT be recovered are counted in "Failed Sessions". And the error which brings the session into an unrecoverable state is the "Failed Reason" of the session.

Early Termination occurs when BoD receives a GateReport from CMTS and decides to terminate the session before the actual time assigned to this session is exhausted.

The details of GateReport message that triggers early terminations are valid Session ID and valid Gate ID and either one of the following conditions:

- State=4 "Committed" and reason=7 "Gate state unchanged, but volume limit reached"
- State=1 "idle/closed" and reason!=5 "Inactivity timer expired"

Following the details appended to the notification messages as part of this feature enhancement:

- SUBIP the SUBIP of the BoD session
- AMID the AMID of the BoD session
- DUR the duration configured of the BoD session
- ACTUALDUR the actual duration of the BoD session

#### 3.12.3 User Interface Changes

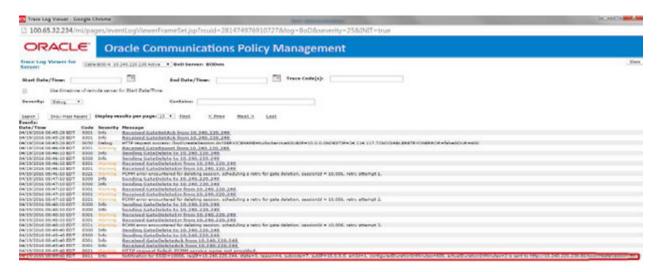
All BOD reports statistics data will be available through OSSI/XML: BOD -> Configuration -> <Configured BOD> -> Reports

Bandwidth on Demand Server:bod									
System	Reports	Logs	BoDServer	Session	Viewer	Debug	1		
				-					
Cluster Information Report									
Mode: Active									
Reset All Counters Rediscover Cluster Pause									
Cluster: bod									
Cluster Status On-line									
Blades									
					State		Blade Failures		
jshao-13-132	-bod (Serve	er-A)		-0-	Active	•	2		
Protocol Statistics									
Name			Total client	messages	sin / out	t			
	Http Interface Stat 2/2								
	Policy Server Stat (PCMM) 2/2								
Soap	.c. start			272					
Interface	Stat			0/0					
Policy Ser	ver Stat (	PCMM)		0/0					
Gate Report	Stat (PCM	M)							
РСММ			Total error	s receive	d / sent				
Errors By	Code								

New statistics data provides the number of PCMM error messages is presented in the GUI under: BOD - > Configuration -> <Configured BOD> -> Reports -> PCMM -> Errors by code

1 A-0	<ul> <li>Bandwidth on Demand Server 800</li> </ul>	But Administration										
18	Autors Reports Logs Sull Barner B	Autora Reserved Copy   Roth Second   Second Warner   Second Warner   Second										
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						NUMBER OF STREET, STRE		AT TO 10.08.08 BOT 10	114 1/4			

Sample trace log entry showing the notification sent with the new details



# 3.13 UNIFIED EXPORT/IMPORT ENHANCEMENTS FOR CABLE MODE( PR# 21348748)

## 3.13.1 Introduction

This feature enables customers to export several CMP GUI objects into one file and in one export request instead of the previous export support technique of exporting one object at a time. In addition, export added more granularity to choose specific configurations under certain object to export rather than the whole configurations under that object..

Bulk export also added the ability to include dependency objects in the export process by setting a flag in the CMP GUI export screen.

While importing or exporting, user will have the ability to choose what to do with conflicts between existing and imported objects either by deleting or overwriting existing objects or reject importing objects that already exists or stop the import in case of conflicts or just run a validation without actual import.

## 3.13.2 Detailed Description

In the export screen, when an object type is selected from the horizontal tree list, the configured items in that type are displayed to support the granularity to choose the configured items to be exported. The results of the export is produced in the form of a zip file incuding an MD5 checksum file that is used afterwards when this file is imported as a verification mechanism to check if it has been modified/altered.

The objects to be exported can be selected and added to shopping cart then the shopping cart objects can be exported at the end.

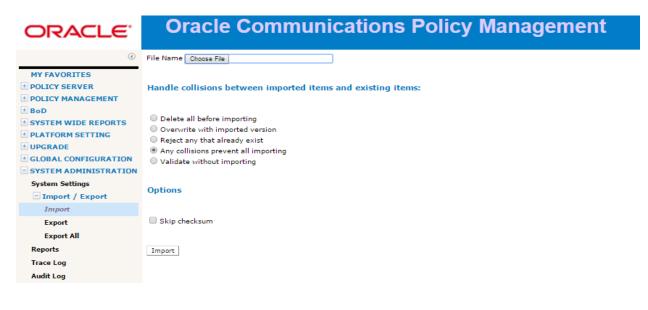
If an account has dependency on Network Element or Tier, then it will be exported or imported with that object in case the option of exporting dependencies is chosen before the export process. This dependency will be included automatically with all items dependent with any object selected for export.

### 3.13.3 User Interface Changes

Bulk export main screen:

ent	estatis de la Ala   educia   Legan
Rit trajut	vuorian 🕅

## Bulk Import main screen:



Include dependencies option while exporting:

MY FAVORITES	Accounts Applications		Bulk Expo	rt	View Cart
POLICY MANAGEMENT     SUBSCRIBER     BoD	MPE Configuration Templates Network Element Groups Network Elements	[First/Prev]1[Next/Last] Total 1 Pages, 2 items.	Description	Last Modified Time	Input key word Search
L SYSTEM WIDE REPORTS PLATFORM SETTING UPGRADE CLOBAL CONFIGURATION SYSTEM ADMINISTRATION System Settings Import / Export Import Export Reports Trace Log	Policies Policy Groups Policy Tables Policy Tampletes Record Keeping Serviers Roles Scopes Trefic Portile Groups Trefic Portile Groups Users	☐ 1000 ☐ 12000 <sup>®</sup> Include Dependencies <u>Add selected items</u> <u>Add</u>	m m	2016-09-24 14:09:58 2016-09-24 14:07:54	Add Add

## 3.14 GENERIC POLICY NOTIFICATION INTERFACE - CONVERT FOR CABLE ( PR# 21153115 )

## 3.14.1 Introduction

The intent of this feature is to provide generic, highly configurable external event notification functions beyond the previously existing SMS, Email, and logging functions.

The existing methods in the current product to send either end-user notifications (SMS, Email) or operator notifications (logging, Syslog, LDAP Write) are specific to the interface on which they work and not flexible enough to provide generic notifications.

The eventual usage of these messages could be either end-user notifications (after processing by an external gateway), or event-specific messages as triggers to other operator systems (B/OSS).

The 'Generic Notifications from Policy System' feature provides necessary framework based on HTTP/web services interface to provide highly configurable/flexible notifications. The methods, destinations, and contents of the messages are flexible at the time of message generation by Policy Actions.

## 3.14.2 Detailed Description

Policy Condition Group	Policy Condition or Action	Description
Action	Send http "POST" notification to url "URL" with headers "headers" and content "content"	Send a HTTP request to specified destination. The fields 'destination', 'headers', 'content' are all free-flowing text fields to be configured by operator.
Action	Send http "POST" notification to "select notification destination" with headers "headers" and content "content"	Send a HTTP request to pre-defined destination. The fields 'headers', 'content' are all free-flowing text fields to be configured by operator.

The 'URL' field is free flowing text field – user can define the 'destination' URL directly into the policy. This allows for cases where the URL itself may be dynamic, based on policy variable substitution. For example: <u>http://10.15.20.190:80/rs/quota/notify/{User.MSISDN}.</u>

The '**POST**' is the default notification delivery technique, this field is a 'drop-down' having values 'GET', 'PUT', 'POST', 'DELETE'. Operator shall be able to choose one of the values in the action field.

The 'headers' field is a pop-up box with 2 fields: 'Header' and 'Value'. Both fields shall be free-flowing text fields. There is no validation whether particular header type is a valid HTTP header. Similarly, there is no validation whether the 'value' corresponds to 'header type'. Operator shall be able to add up to 20 such rows of 'header' and 'value' in a single policy. Once the user clicks OK, header and value will be separated by a colon and multiple headers will come as a comma separated list of values. The content shown on the policy screen will display the escape characters as well, / in this case.

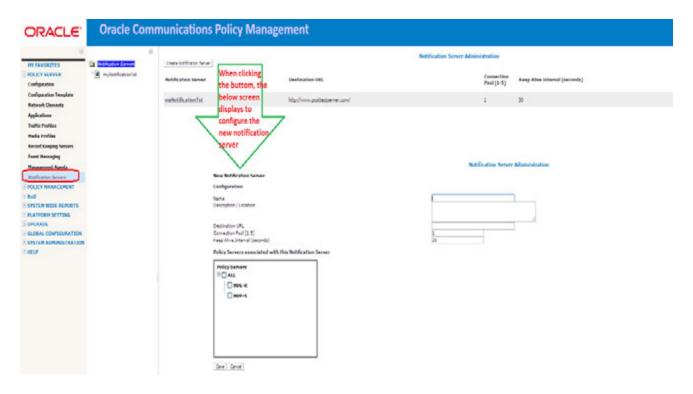
**NOTE:** In order for MPE to read the headers correctly if there are colons and/or commas in the header or value they will be escaped with forward slash (/). Also, Forward slash is not allowed as the last character in either the header or value and header name cannot be empty.

The 'content' field is also 'free-flowing' text field which allows for any type of notification like JSON/ XML/ Text message in the body of HTTP request. 'Content' field also allow for policy variable substitution. MPE shall not validate whether the 'header' value corresponds to particular 'content'.

For pre-defined destinations, the 'select notification destination field is a pop-up that will list the predefined static-destination servers already configured by operator and operator shall select one of them.

## 3.14.3 User Interface Changes

New menu item "**Notification Server**" is added under "Policy Server" to configure static based Notification servers:



#### New Logs

A new log called "**HTTP log**" is introduced to track the HTTP notification messages sent from Oracle Communications Policy Management to external Notification servers. Log level can be set from CMP GUI as follows:

ORACLE Oracle Co	mmunications Policy Management	
Analysis of the second of the	Pulky Server HPE-S       System     Reports       Mody       Trace Log Configuration       Trace Log Configuration       Trace Log Forwarding Settings       Insile Trace Log Forwarding Mellow       View Trace Log Forwarding     Relation       View Trace Log     Pelloy Server       Weak Trace Log Forwarding Settings       Insile Trace Log Forwarding Mellow       View Trace Log     Relation       View Trace Log     Relation       View Trace Log     WAMI       Policy Log Level     WAMI       Policy System Forwarding Configuration     WAMI       Stel Log Forwarding IP Addresses     WAMI       SHTP Log Configuration     WAMI       IntTP Log Level     WAMI       HTTP Log Level     WAMI	Policy Server Administration

The actual log file is located on MPE servers under /var/camiant/log:

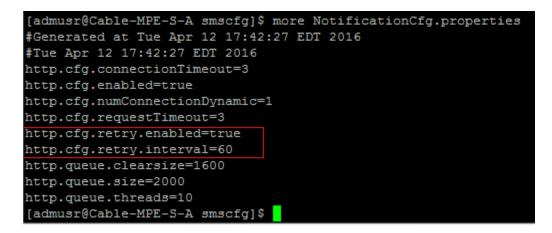
[root@Cable-MPE-S-A log]#	cd /var/camiant/log
[root@Cable-MPE-S-A log]#	ls -ltr
total 1114468	
drwx 2 root root	16384 Mar 9 18:56 lost+found
drwxr-x 2 root root	4096 Mar 9 19:11 firewall
-rw-r 1 root root	0 Mar 9 19:11 rc.stats.daily
-rw-r 1 root root	0 Mar 9 19:11 policy.log
-rw-r 1 root root	0 Mar 9 19:11 dynamic_quota.log
-rw-r 1 root root	0 Mar 9 19:11 quota_rollover.log
-rw-rr 1 root root	0 Mar 9 19:12 huge_core.log
-rw-r 1 root root	0 Mar 9 19:12 smsr.log
-rw-r 1 root root	0 Mar 9 19:12 smsclient.log
-rw-r 1 root root	0 Mar 9 19:12 SMPP.log
-rw-r 1 root root	0 Mar 9 19:12 SMTP.log
-rw-r 1 root root	0 Mar 9 19:12 HTTP.log
-rw-r 1 root root	990 Mar 9 19:16 qpLayout.log

#### Persistent Notification servers Connection Configurations

A new configuration file "**NotificationCfg.properties**" is introduced to handle the settings of establishing persistent connection to the configured Notification Servers in CMP GUI.

The file would be in MPE server under the following path: /opt/camiant/smsr/smscfg/

Should a connection attempt fail Oracle Communications Policy Management will continuously retry at constant intervals as per the configured connection retry value in this properties file till the connection is restored.



At the time of policy execution if a policy notification is triggered with a target destination for which a connection does not exist, the notification message shall be dropped generating a **Warning** Trace Log.

04/13/2016 19:54:04 EDT 2567 Warning SMTP:Error attempting to establish a new connection to . Error: Could not connect to SMTP host: localhost, port: 25 04/13/2016 19:54:06 EDT 2565 Warning SMTP:Connection to MTA was closed.

## 3.15 MPE SENDS DPR TO DISCONNECT DIAMETER CONNECTION ( PR# 224443 & 20271448 )

## 3.15.1 Introduction

When a Diameter peer needs to disconnect due to some internal reasons, Policy Management can actively send the DPR (Disconnect-Peer-Request) to the Diameter peers.

## 3.15.2 Detailed Description

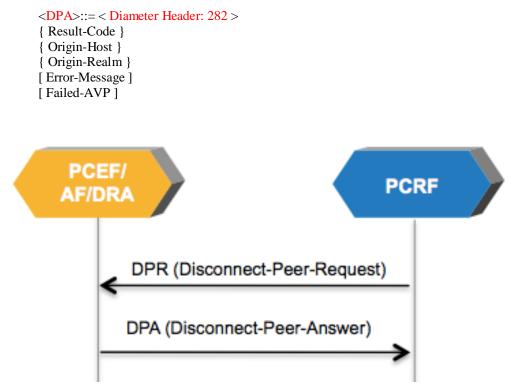
The **Disconnect-Peer-Request (DPR)**, indicated by the **Command-Code set to 282** and the Command Flags' **'R' bit ( Request)** is cleared. The AVP flag **'M' bit** is set for all 3 AVPs in the message, is sent to a peer to inform its intentions to shut down the transport connection.

Message syntax:

<DPR>::= < Diameter Header: 282, REQ > { Origin-Host } { Origin-Realm } { Disconnect-Cause }

The **Disconnect-Peer-Answer (DPA)**, indicated by the **Command-Code set to 282** and the Command Flags' **'R'** (Request) is cleared. The AVP flag **'M' bit** is set for all 3 AVPs in the message, is sent as a response to the Disconnect-Peer-Request message.

Message syntax:



#### **DPR**(**PCRF** $\rightarrow$ **PCEF**)

Origin-Host AVP	М	PCRF host name
Origin-Realm AVP	M	PCRF domain name
Disconnect-Cause AVP	М	Cause value
DPA(PCEF→PCRF)	I	I
Result-Code AVP	М	Result
Origin-Host AVP	М	PCRF host name
Origin-Realm AVP	М	PCRF domain name

Here is the list of '**Disconnect-Cause'** as defined in RFC6733, to disconnect diameter peers (Policy Management/AF/DRA) -

- REBOOTING (0)
- BUSY (1)
- DO\_NOT\_WANT\_TO\_TALK\_TO\_YOU (2)

#### 3.15.3 User Interface Changes

There are two new Advance Setting of Configuration keys, as shown below, applicable to both MPE and MRA in the Policy Management Service Overrides which need to be enabled for the feature -

- DIAMETER.SendDPRtoPeersWhileReconfigure (MPE) and DIAMETERDRA.SendDPRtoPeersWhileReconfigure (MRA). Default value is "false". If it's set to "true" and there is a change in Realm/Identity/Port (not case sensitive) configuration, DPR will be sent to every diameter peer before disconnecting the peer(s).
- 2) **DIAMETER.DisconnectCause** (**MPE**) and **DIAMETERDRA.DisconnectCause** (**MRA**). Default value is "0". The DPR sent to every diameter peers with specified Disconnect-Cause which can be one of the following -
  - REBOOTING (0)
  - BUSY (1)
  - DO\_NOT\_WANT\_TO\_TALK\_TO\_YOU (2)

**CMP GUI:** Policy Server  $\rightarrow$  Configuration  $\rightarrow$  All  $\rightarrow$  (*MPE cluster name*)  $\rightarrow$  Policy Server  $\rightarrow$  Advanced  $\rightarrow$  Modify  $\rightarrow$  Service Overrides

**CMP GUI:** MRA  $\rightarrow$  Configuration  $\rightarrow$  All  $\rightarrow$  (*MRA cluster name*)  $\rightarrow$  MRA  $\rightarrow$  Advanced  $\rightarrow$  Modify  $\rightarrow$  Service Overrides

© Expert Setti	nga					
2 inte				👒 Set to	Default 🛛 🖓 Filters *	
Category	Configuration Key	Туре	Value	Default Value	Comments	
Diameter	DIAMETER, Cleanup, MaxDurationForSessionIterat	ion int	7200	7200	1	
Diameter	DIAMETER, AF, AuditForAuthLifetime	boolean	false	false		
51	SY.Reconciliation.MaxSessionReconcileRate	int	50	50		
Diameter	DIAMETER.AppsToEvaluateOnTermination	String	Undefined	Undefined		
Diameter	DIAMETER, Cleanup. Sepsion CleanupInterval	int	21600	21600		
Diameter	DIAMETER, AF, AuthLifetime	et	86400	86400		
SH	SH.Retry.EnabledOnTimeout	boolean	faloe	false		
Piamatar 7	PUAMETED Classion Audidu/Carelone	horlase	Falsa	Falra		
@Service Ove	rides					
DbA 🐻	Close 🔯 Edit   🗙 Delete   🛧 Up 👵 📖				V Filters *	
	Configuration Key	Type	Value	Default Value	Comments	
DIAMETER	1 DIAMETER Disconnect/Cause	int	0	0	A CONTRACTOR OF THE OWNER OWNER OF THE OWNER OWNE	
DIAMETER	O DIAMETER.SendDPRtoPeersWhileReconfigure	boolean	True	false	Configuration Key Value	
					guration Key DLAMETER.Se	endDPRtoP
				Value	ments	

		Configu Value Comme	true	PeersWhileReconfigure	Configuration Value		
	DIAMETERDRA	DIAMETERDRA, SendDPRtoPeersWhileReconfigure	boolean	alue	false		
	Category	Configuration Key	Туре	Value	Default Value	Comments	
		📴 Edit   🗙 Delete   👚 Op 🐥 Down	1			😵 Filter	5 *
	Service Overrides						
	Püamatar 4	PIAMETERNEA StatisticstineMedaEcoldad	honlaan	falea	Falme		
	Diameter	DIAMETERDRA.ConnectionTimeOut	int	3	3		
	Diameter	DIAMETERDRA-Cleanup.MaxSessionvalidityTime	int	864000	864000		
slak-mra-1	KPI	KPIMRA, Capacity, TPS	int	1	1		
ALL .	Diameter	DIAMETERDRA. Cleanup. BindingCleanupInterval DIAMETERDRA. Cleanup. CheckForSuspectBindings	int boolean	86400 true	86400 true		
MRA E	Diameter	DIAMETERDRA.Cleanup.CheckForStaleBindings	boolean	faise	false		
8	Litelitevel	UTAVIE I ENDICAL LIEBIIU PLUTECKI UT STREDESSIUTSTIC	n ooorean	uiue	una		

## 3.16 NOTIFICATIONS DURING THE CONFIGURED INTERVAL (PR# 224512 & 20271430)

## 3.16.1 Introduction

This feature allows Policy Management (MPE) to send SMS notification, via policy action, to the end user only during the configured interval in SMPP. This enable Operator to limit the end user notification frequency and to avoid the potential "notification storm" in some special cases like location based notification policy control.

## 3.16.2 Detailed Description

The Policy Management (MPE) writes the current SMS notification sent date into the State filed in subscription profile in SPR when the first SMS notification is sent if the subs is located in the Cell ID match list which is configured In the CMP.

## Example:

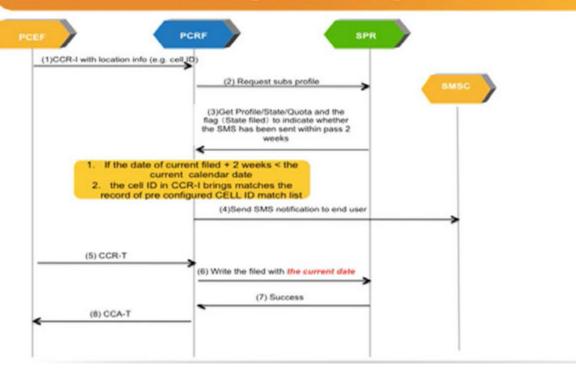
The Policy Management (MPE) would compare the result of recorded date in State field + 2 weeks (*a configuration example*) with the Current Calendar Date

If Recorded date+ 2 weeks > Current Calendar Date Action: Continue (*Do Not send the SMS*)

If Recorded date+ 2 weeks < Current Calendar Date and If use location info is in the Cell ID match list Action: Send the SMS notification (*Write the State filed with current Calendar date*)

The location string in the SMS content should be able to linked with the hit Cell ID

## Notification during the configured interval



#### 3.16.3 User Interface Changes

Here is the Policy changes with the feature:

• CMP Mode settings set to "Wireless Quote Gx" and 'SMS:SMPP'

Hode Settinge	
Change Mode	
Mode	Wireless:Diameter 3GPP, Wireless:Diameter 3GPP2, Wireless:Quotas Gx, Wireless:Quotas Gy, Wireless:Gx-Lite, SMS:SMPP
Manage Policy Servers	live .
Manage HA Servers	forum failse
Manage Policies	true .
Hanage Hilda	5rx8
Manage BoDs	Talse
Manage SPR Subscriber Data	true .
Manage Geo-Kedundarit MPL/MKA/DoO	Talse
Manager is NA (divstered)	true .
Manage Analytic Data	Take
Manage Direct Link	false
Manager is NW-CNP	false false
Manager is S-GMP	false

• MPE Policy Server Tab configured for SMS Relay and SMPP configuration

SMS Relay Configuration	
SMS Enabled	Enabled
Relay Host	127.0.0.1
Relay Port	8080
Throttle Value	0
SMPP Configuration	
SMPP Enabled	Enabled
Validate Message Length	Enabled
SMPP Long Message Support	Enabled
Delivery Method for Long Messag	e Segmentation and Reassembly (SAR)
Primary	
SMSC Host	10.240.166.27
SMSC Port	2775
ESME System ID	smppclient1
ESME Password	*******

Policy Condition Group	Policy Condition or Action	Description
"Optional" actions	send SMS <b>`specified`</b> to user from <b>`default`</b> source address if exceed <b>`number` `days`</b> for <b>`Identity`</b> . Request delivery receipt <b>`default`</b> .	This policy action can send notification to end user, and only once during the configured interval.

<ul> <li>send SMS `specified` to user. Request delivery receipt `default`.</li> <li>send SMS `specified` to user on their Billing Day. Request delivery receipt `default`.</li> <li>send SMS `specified` to `default` destination address, `default` TON and `default` NPI from `default` source address, `default` TON and `default` NPI. Request delivery receipt `default`.</li> <li>send SMS `specified` to `default` destination address, `default` TON and `default` NPI from `default` source address, `default` TON and `default` NPI. Request delivery receipt `default`.</li> <li>send SMS `specified` to `default` destination address, `default` TON and `default` NPI from `default` source address, `default` TON and `default` NPI on user billing day. Request delivery receipt `default`.</li> <li>send SMS `specified` to user from `default` source address if exceed `number` `days` for `Identity`. Request delivery receipt `default`.</li> </ul>				
Choose the field - Mozilla Firefox 100.64.40.25/mi/pages/psiroInputSelectorSingle.jsp?id=OA Choose the field : days hours OK Cancel Use Policy Table	<ul> <li>Choose the field - Mozilla Firefox</li> <li>100.64.40.25/mi/pages pslibInputSelectorSingle.jsp?</li> <li>Choose the field :</li> <li>default</li> <li>No Delivery Receipt</li> <li>Delivery Receipt on success and failure</li> <li>Delivery Receipt on failure</li> </ul>			
	OK Cancel Use Policy Table			

• SMS 'specified'

SMS message content.

• destination address

Dest\_terminal\_Id(The destination phone number) in SMS SUBMIT message, if 'default' it will be replaced by User.MSISDN. It supports multi destination addresses, each address separated by comma. Note the multi destination addresses will cause to generate multi SMS messages including one destination address.

#### • source address

Src\_Id(The source phone number) in SMS SUBMIT message, if 'default' it will be replaced by smpp.protocol.srcId configured in SMPP.properties.

#### • delivery receipt

The policy variable 'default' can be replaced with a user specified value which choices are default, No Delivery Receipt, or Delivery Receipt. When choosing the 'default' field, it will be replaced by "Registered Delivery" which configured in SMS profile configuration under the Policy Server tab. If choose 'Delivery Receipt' field will ask for delivery receipt while submitting SMS, and choose 'No Delivery Receipt' field will not request it.

#### • if exceed `number` `days` for `Identity`

We use "Identity" to identify different kinds of SMS, "number days" means a time period, This policy action will control to send this kind SMS only once during specific time period. We have two units for interval: days and hours, default value is day.

#### Service Overrides -

- 1) SMPP.NotifyDuringIntervalUserStateKey
- 2) SMPP.NotifyDuringIntervalDelimiter
- 3) SMPP.NotifyDuringIntervalDetailDelimiter

The Notification Interval configuration is as of the following -

٢						Subscribe	r Profile
MY FAVORITES	Subscriber Profile						
* POLICY SERVER	Profile Quota State Dy	namic Quota	Pool Profile	Pool Quota	Pool State	Pool Dynamic Quota	
<b>POLICY MANAGEMENT</b>		-		_			
Policy Library	Back to Search Page						
Template Library	State Properties						
Policy Table Library	-						
SPR	Subscriber Key Fields						
Profile Data	NAI						
Configuration	E.164 (MSISDN)	9139915732					
	IMSI	012345678901	234				
* NETWORK	Create Delete						
± MRA							
* SYSTEM WIDE REPORTS	Select: All , None						
PLATFORM SETTING	Name			Value			
* UPGRADE	LastDeliveryTime		V	VLAN 20160419	13:44,		
GLOBAL CONFIGURATION	,						
Global Configuration Settings							
<b>SYSTEM ADMINISTRATION</b>							
HELP							

- The "LastDeliveryTime" string contains all information for every identity which defined in policy action. The format is as: Identity01|LastDeliveryTime01,Identity02|LastDeliveryTime02,... The symbol to separate every item here is ",".
- The Entity state "LastDeliveryTime" is saved to SPR/UDR with correct identity eg. "WLAN" and correct delivery time information.

## 3.17 RESULT-CODE 5143 RETURNED IF REQUESTED QoS CONFLICTS WITH AUTHORIZED QoS ( PR# 224391 & 20271416 )

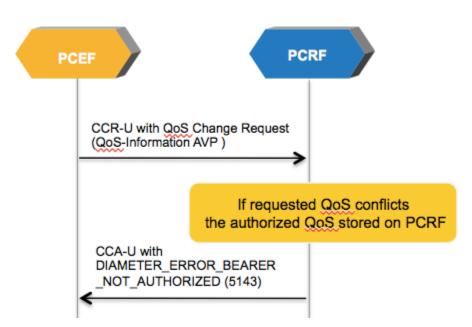
## 3.17.1 Introduction

This feature allows Policy Management to provide Experimental-Result-Code AVP of "DIAMETER\_ERROR\_BEARER\_NOT\_AUTHORIZED (5143)" together with the bearer-identifier AVP in the CCA as an indication to PCEF that the authorized QoS exceeds the subscribed QoS.

Besides support for Gx interface, the Sd and Gxx interfaces are also supported. The support for Rx interface already supported in the pre-Release 12.2.

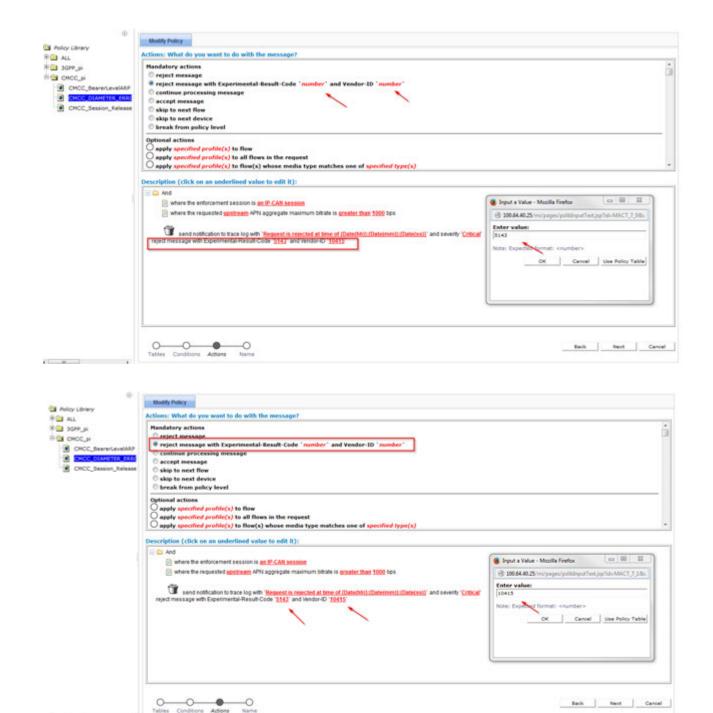
## 3.17.2 Detailed Description

This error shall be used when the Policy Management cannot authorize an IP-CAN bearer (e.g. the authorized QoS would exceed the subscribed QoS) upon the reception of an IP-CAN bearer authorization request coming from the PCEF. The affected IP-CAN bearer is the one that triggered the corresponding CCR. The PCEF shall reject the attempt to initiate or modify the bearer indicated in the related CCR command



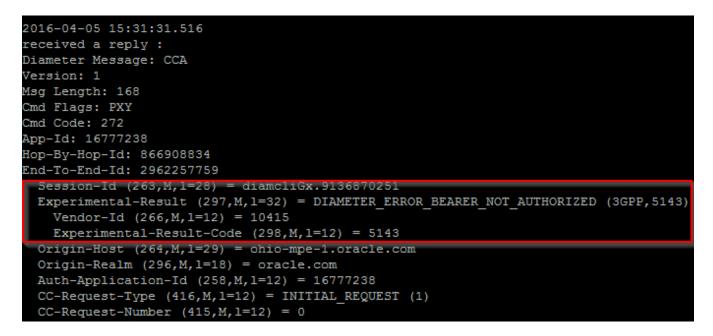
#### 3.17.3 User Interface Changes

Policy Condition Group	Policy Condition or Action	Description
"Mandatory" actions	Reject message with Experimental-Result- code 'number' and Vendor-ID 'number'	Configure the Experimental-Result-code, the Diameter_Error_Bearer_Not_Authorized( <b>5143</b> ) and Vendor-Id <b>10415</b>



· · · · · · · ·

Sample usecase screenshot: Reject with Experimental-Result and Vendor-Id (PCRF respond with Gx CCA-U)



## 3.18 UE SUBSCRIPTION REASON RETURNED IN SESSION-RELEASE-CAUSE AVP ( PR# 225037 & 20271438 )

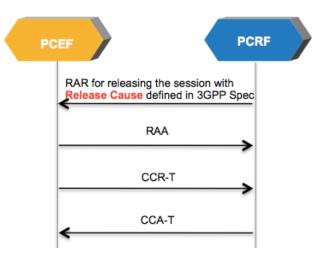
## 3.18.1 Introduction

Currently Policy Management can only fill "UNSPECIFIED\_REASON(0)" in Session-Release-Cause AVP ( code: 1045) when using the policy condition "Release the session". This feature only supports Gx, Gxx, s9 and sd Interfaces

This feature enables Policy Management to send RAR containing the following Session-Release-Cause AVPs to the PCEF -

- 1) UNSPECIFIED\_REASON:0
- 2) UE\_SUBSCRIPTION\_REASON:1
- 3) INSUFFICIENT\_SERVER\_RESOURCES:2
- 4) IP\_CAN\_SESSION\_TERMINATION:3
- 5) UE IP ADDRESS RELEASE: 4

#### 3.18.2 Detailed Description

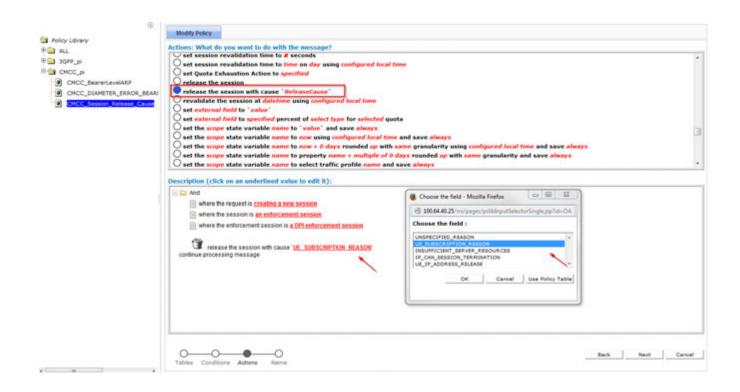


PCRF able to send RAR (per 3GPP Techical Spec 29.212 c70, Section:5.3.44) containing Session-Release-Cause AVP to the PCEF.

#### 3.18.3 User Interface Changes

Policy Condition Group	<b>Policy Condition or Action</b>	Description
"Optional" actions	release the session with cause 'Release Cause'	Configure by choosing the Release Cause: UNSPECIFIED_REASON(0), UE_SUBSCRIPTION_REASON(1), INSUFFICIENT_SERVER_RESOURCES(2), IP_CAN_SESSION_TERMINATION(3), UE_IP_ADDRESS_RELEASE(4)

	Session-Release-Cause AVP
Name	Description
UNSPECIFIED_REASON	This value is used for unspecified reasons.
UE_SUBSCRIPTION_REASON	This value is used to indicate that the subscription of UE has
	changed (e.g. removed) and the session needs to be terminated.
INSUFFICIENT_SERVER_RESOURCES	This value is used to indicate that the server is overloaded and
	needs to abort the session.
IP_CAN_SESSION_TERMINATION	This value is used to indicate that the corresponding IP-CAN
	session is terminated. The IP_CAN_SESSION_TERMINATION
	value is introduced in order to be used by Sd only, when PCRF
	initiates the TDF session termination within IP-CAN session
	termination.
UE_IP_ADDRESS_RELEASE	This value is used to indicate that the IPv4 address of a dual stack
	IP-CAN session is released. The UE_IP_ADDRESS_RELEASE
	value is introduced in order to be used by Sd only, when PCRF
	initiates the TDF session termination if the IPv4 address of a dual
	stack IP-CAN session is released and if there is an active IPv4
	address related TDF session for that IP-CAN session.



# 3.19 SUPPORT TO CONFIGURE BEARER LEVEL ARP IN POLICY ACTION ( PR# 224376 & 20271401 )

## 3.19.1 Introduction

This feature extends the capability of Policy Management Policy Action to set 'bearer level ARP Preemption Capability " and " bearer level ARP Preemption Vulnerability", in addition to the current of " priority level of bearer level ARP"

## 3.19.2 Detailed Description

These two parameters in CCA message will be set as the values brought by CCR message from PCEF. To optimize the current system limitation and support the policy parameters setting in a flexible way, these two parameters are required to be set by CMP and send to PCEF via the Gx interface.

If these parameters are NOT configured, the system should be able to use the default value in CCA message.

The Allocation-Retention-Priority AVP (AVP code 1034) is of type Grouped, and it is used to indicate the priority of allocation and retention, the pre-emption capability and pre-emption vulnerability for the SDF if provided within the QoS-Information-AVP or for the EPS default bearer if provided within the Default-EPS-Bearer-QoS AVP.

The **Priority-Level AVP** of the default bearer should be set to a sufficiently high level of priority and the ARP pre-emption vulnerability of the default bearer should be set appropriately to minimize the risk for unexpected PDN disconnection or UE detach from the network according to operator specific policies.

#### **AVP Format:**

Allocation-Retention-Priority ::= < AVP Header: 1034 > { Priority-Level } [ Pre-emption-Capability ] [ Pre-emption-Vulnerability ]

The description of the "bearer level ARP Preemption Capability" and "bearer level ARP Preemption Vulnerability" as follow table:

Name	description
PREEMPTION_CAPABILITY_ENABLED	This value indicates that the service data flow or bearer is allowed to get
	resources that were already assigned to another service data flow or
	bearer with a lower priority level.
PREEMPTION_CAPABILITY_DISABLED	This value indicates that the service data flow or bearer is not allowed to
	get resources that were already assigned to another service data flow or
	bearer with a lower priority level. This is the default value applicable if
	this AVP is not supplied.
PREEMPTION_VULNERABILITY_ENABLED	This value indicates that the resources assigned to the service data flow
	or bearer can be pre-empted and allocated to a service data flow or
	bearer with a higher priority level. This is the default value applicable if
	this AVP is not supplied.
PREEMPTION_VULNERABILITY_DISABLED	This value indicates that the resources assigned to the service data flow

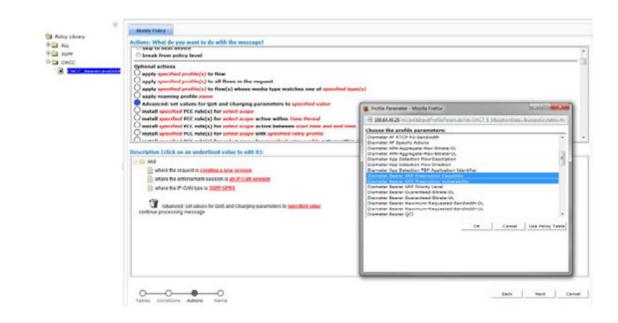
or bearer shall not be pre-empted and allocated to a service data flow or
bearer with a higher priority level.

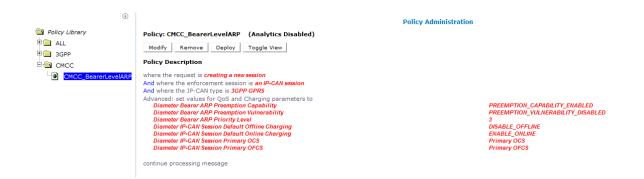
Sample use case: Bearer Level ARP in Policy action with Policy Management responds with Gx:CCA-I

QoS-Information (1016,VM,v=10415,1=152) =
QoS-Class-Identifier (1028,VM,v=10415,l=16) = 3
Guaranteed-Bitrate-UL (1026,VM, v=10415, 1=16) = 10000
Guaranteed-Bitrate-DL (1025,VM,v=10415,1=16) = 30000
Max-Requested-Bandwidth-UL (516,VM, v=10415, 1=16) = 20000
Max-Requested-Bandwidth-DL (515,VM,v=10415,1=16) = 50000
Allocation-Retention-Priority (1034,V,v=10415,1=60) =
Priority-Level (1046,V,v=10415,1=16) = 15
Preemption-Capability (1047,V,v=10415,1=16) = PREEMPTION_CAPABILITY_DISABLED (1)
Preemption-Vulnerability (1048,V,v=10415,1=16) = PREEMPTION_VULNERABILITY_ENABLED (0)
Precedence (1010,VM,v=10415,1=16) = 1999
Bearer-Identifier (1020,VM,v=10415,1=15) = 102

## 3.19.3 User Interface Changes

<b>Policy Condition Group</b>	Policy Condition or Action	Description
"Optional" actions	Advanced: set values for QoS and Charging parameters to 'specified value'	Configure "bearer level ARP Preemption Capability" and "bearer level ARP Preemption Vulnerability" in
		the action.





## 3.20 3GPP USAGE MONITORING CONGESTION HANDLING (UPDATED TIME-TARIFF SPEC) ( PR# 19720700 )

## 3.20.1 Introduction

This feature introduces support for Usage Monitoring Congestion Handling (UMCH) as defined by 3GPP 29.212 [5]. V12.9. It allows usage reporting at end of billing cycles to be further distributed to prevent message storm and usage leakage.

## 3.20.2 Detailed Description

The PCRF will support this functionality when the PCEF provides the UMCH supported feature upon session establishment. This only applies to quota plans for both subscribers and pools, since they occur on a set cycle such as daily, weekly, and monthly.

Dynamic quota such as passes, top-ups, and roll-over will behave as they currently do prior to UMCH.

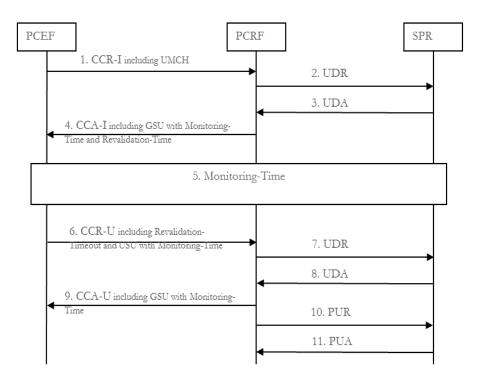
The PCRF, upon receiving a CCR-I with the UMCH supported feature, will have the capability to send 2 Granted-Service-Units, with one of them containing a Monitoring-Time AVP in the CCA.

Upon receiving a CCR-u after the Monitoring-Time, that contains 2 Used-Service-Units, and one of them also has the Monitoring-Time AVP, will record this usage to the SPR.

The octets in the Granted-Service-Unit along with the Monitoring-Time AVP, will be calculated by prorating the units based off of this formula.

(Max-Possible-Grant-From-Policy) \* ((Revalidation-Time – Monitoring-Time)/Plan Cycle)

where the Max-Possible-Grant-From-Policy = Percentage in policy \* Volume Limit defined in quota profile



The call flow explains scenario of Revalidation Timeout with usage report included in the same message.

1. The PCEF sends a CCR-initial to the PCRF which includes the UMCH supported feature.

2. The PCRF sends a UDR to the SPR to lookup the user's profile and quota records.

3. The SPR sends a UDA containing the user's profile and quota records.

4. The PCRF sends a CCA-initial to the PCEF containing the computed Revalidation-Time and 2 Granted-Service-Unit AVPs, where 1 of them contains the Monitoring-Time AVP.

5. The user continues to use usage as the monitoring time is passed.

6. The PCEF sends a CCR-update to the PCRF upon the Revalidation-Time occurring. This message includes the Revalidation-Timeout event trigger and 2 Used-Service-Unit AVPs, where 1 of them contains the Monitoring-Time AVP.

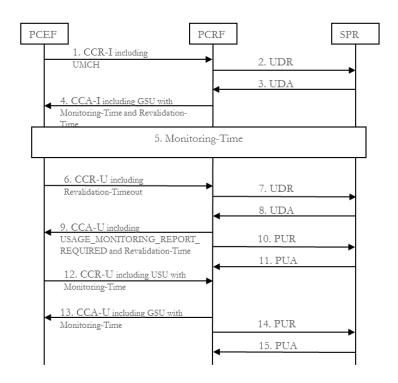
7. The PCRF sends a UDR to the SPR to lookup the user's quota records.

8. The SPR sends a UDA containing the user's quota records.

9. The PCRF calculates a new grant based off of a new cycle beginning and sends a CCA-update to the PCEF containing a newly computed Revalidation-Time and 2 Granted-Service-Unit AVPs, where 1 of them contains the Monitoring-Time AVP.

10. This step occurs asynchronously along with the previous step. The PCRF updates the quota records of the user from the Used-Service-Unit AVP that contained the Monitoring-Time and reports this to the SPR in a PUR.

11. The SPR responds with a PUA.



The call flow explains scenario of Revalidation Timeout with usage report included in the separate message(s).

1. The PCEF sends a CCR-initial to the PCRF which includes the UMCH supported feature.

2. The PCRF sends a UDR to the SPR to lookup the user's profile and quota records.

3. The SPR sends a UDA containing the user's profile and quota records.

4. The PCRF sends a CCA-initial to the PCEF containing the computed Revalidation-Time and 2

Granted-Service-Unit AVPs, where 1 of them contains the Monitoring-Time AVP.

5. The user continues to use usage as the monitoring time is passed.

6. The PCEF sends a CCR-update to the PCRF upon the Revalidation-Time occurring. This message includes the Revalidation-Timeout event trigger and does not contain any usage reports.

7. The PCRF sends a UDR to the SPR to lookup the user's quota records.

8. The SPR sends a UDA containing the user's quota records.

9. The PCRF calculates a new grant based off of a new cycle beginning and sends a CCA-update to the PCEF containing a newly computed Revalidation-Time and 2 Granted-Service-Unit AVPs, where 1 of them contains the Monitoring-Time AVP. The PCRF also includes

USAGE\_MONITORING\_REPORT\_REQUIRED in a Usage-Monitoring-Information AVP.

10. This step occurs asynchronously along with the previous step. The PCRF updates the quota records of the user indicating the quota has reset by sending a PUR to the SPR.

Name	Default Value	Description	
DB.User.BillingRevalidationTimeInterval	1800	Range in seconds from the end billing date that a	
		random revalidation time will be chosen.	

11. The SPR responds with a PUA.

12. The PCEF sends a CCR-update to the PCRF in response to receiving the USAGE\_MONITORING\_REPORT\_REQUIRED. This message includes 2 Used-Service-Unit AVPs, where 1 of them contains the Monitoring-Time AVP.

13. The PCRF calculates a new grant based off of a new cycle beginning and sends a CCA-update to the PCEF containing 2 Granted-Service-Unit AVPs, where 1 of them contains the Monitoring-Time AVP.

14. This step occurs asynchronously along with the previous step. The PCRF updates the quota records of the user from the Used-Service-Unit AVP that contained the Monitoring-Time and reports this to the SPR in a PUR.

15. The SPR responds with a PUA.

## 3.20.3 User Interface Changes

Functionality related to the proprietary version of Time-Tariff support is being removed. This includes the network capability called "Time-Tariff" for DPI and PGW network elements.

The figure below show the former value "Time-Tariff" for the network capability is being removed

New Network Element	
Name	
Host Name / IP Address	
Backup Host Name	
Description / Location	
Туре	DPI V
Capability	TDF-Solicit
	Lune-Tariff
Capacity	Usage-Report-26
Capacity	

The figure below show the Policy Management R12.2.0 with values only TDF-Solicit and Usage-Report-26

#### **New Network Element**

Name Host Name / IP Address Backup Host Name Description / Location	
Туре	DPI
Protocol Timer Profile	undefined 💌
Capability	TDF-Solicit A Usage-Report-26
Capacity	

Configuration Changes: The below configuration key that are configured as overrides on the Advanced Settings tab in CMP

This service override can be used to increase the range that the PCEF will report usage at the end of a billing cycle. By default this is set to a window of 1800 seconds (half-hour) after the billing cycle ends.

## 3.21 3GPP SUPPORT TIME-BASED USAGE MANAGEMENT/TIMEBASEDUM (PR# 20224100)

## 3.21.1 Introduction

This feature introduces support for Time-Based Usage Management as defined by 3GPP 29.212 [5]. V12.9. The PCRF will support this functionality when the PCEF provides the TimeBasedUM supported feature upon session establishment for Gx or Sd protocol applications.

## 3.21.2 Detailed Description

The PCRF will now support Time-Based Usage Management for both the Gx and Sd protocol applications. For Gx this feature is enabled if the TimeBasedUM and REL9 supported features are included on a CCR-initial message. It is enabled for Sd if the TimeBasedUM supported feature is included in both the TSR and TSA messages. The PCRF will send the TimeBasedUM supported feature on the TSR if it receives this supported feature over the Gx interface.

From the PCRF point of view, the TimeBasedUM supported feature indicates that CC-Time can be used to grant units to the PCEF within the Granted-Services-Unit AVP. In order to support this, a number of policies, as shown in 2.2.1, are updated to support time based grants. The PCEF will then begin usage tracking and report any usage for CC-Time in a Used-Service-Unit AVP. The PCRF will then record this usage to the SPR.

In addition, 29.212 defines a new Quota-Consumption-Time AVP which specifies the Inactivity Detection Time. The inactivity detection time is configurable per quota plan, pass, or top-up as shown in section 2.2.2. If this is configured it would then be included within the Usage-Monitoring-Information AVP anytime a policy to grant time units is applied and sent on the CCA. This value indicates the time interval in seconds after which the time measurement shall stop for the Monitoring Key, if no packets are received belonging to the corresponding Monitoring Key.

The new supported features and AVPs are shown below: TimeBasedUM Feature of Feature-List-ID used in Gx/Sd

.Feature bit	Feature	Mandatory <b>/O</b> ptional	Description
15 (Gx)/ 2 (Sd)	TimeBasedUM	0	This feature indicates support for Time based Usage Monitoring Control. If the PCEF supports this feature, the behaviour shall be as specified in corresponding sub clauses in the 3GPP specification.

Quota-Consumption-Time AVP

AVP Name	AVP Used in Value			Value	AVP Flag rules						
	Code	ACR	ACA	CCR	CCA	Туре	Must	Мау	Should		May
									not	not	Encr.
Quota-Consumption-Time	881	-	-	-	Х	Unsigned32	V,M	Р			Ν

#### **AVP Formats:**

```
Usage-Monitoring-Information::= < AVP Header: 1067 >
        [ Monitoring-Key ]
        0*2[ Granted-Service-Unit ]
        0*2[ Used-Service-Unit ]
        [ Quota-Consumption-Time ]
        [ Usage-Monitoring-Level ]
        [ Usage-Monitoring-Report ]
        [ Usage-Monitoring-Support ]
        *[ AVP ]
        AVP ]
```

```
Granted-Service-Unit ::= < AVP Header: 431 >
[ CC-Time ]
[ CC-Total-Octets ]
[ CC-Input-Octets ]
[ CC-Output-Octets ]
*[ AVP ]
```

#### 3.21.3 User Interface Changes

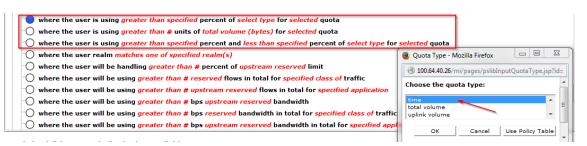
• In order to support the Quota-Consumption-Time AVP, a new configurable field "Inactivity Detection Time" is added. This field only becomes editable when the Initial Time Limit is specified.

<ul> <li>Quota Profiles</li> <li>Plans</li> <li>TimeBasedUMDailyQuot</li> <li>TimeBasedUMDailyQuoti</li> </ul>	Plan: TimeBasedUMDailyQuota Modify Delete Configuration	
TimeBasedUMMonthlyQu     TimeBasedUMPoolDailyC     TimeBasedUMWeeklyQu     TimeBasedUMWeeklyQu     TimeBasedUMWeeklyQu	Name Description / Location	TimeBasedUMDailyQuota
⊕ Passes	Quota Profile Type	Subscriber
	Enable Dynamic Grant Max Leakage Threshold (MB or seconds) Max Sessions Used For Dynamic Grant Minimum Grant Size	false 0 10 0
	Reset Every Hour : Minute Reset Time Variable Report Offset Limit (minutes) Billing Date Effective Name	1 Days 23:20 {User.Custom1} 4 <none></none>
	Initial Total Volume Limit (bytes) Initial Upstream Volume Limit (bytes) Initial Downstream Volume Limit (bytes)	8500000 100000 300000
•	Initial Time Limit (seconds) Inactivity Detection Time (seconds)	3600 360
	Quota Convention	<none></none>

Quota Profiles Plans Passes ALL UMCH_Pass UMCH_Pool_Pass	Pass: UMCH_Pool_Pass Modify Delete Configuration Name Description / Location	UMCH_Pool_Pass			
	Active Time Period Priority Quota Profile Type Enable Dynamic Grant	<none> 0 Pool true 500</none>			
	Max Leakage Threshold (MB or seconds) Max Sessions Used For Dynamic Grant Minimum Grant Size Initial Total Volume Limit (bytes)	10 0 100000000			
<	Initial Upstream Volume Limit (bytes) Initial Downstream Volume Limit (bytes) Initial Time Limit (seconds) Inactivity Detection Time (seconds)	2000000 8000000 3400 2200			
	Duration Group	0 Hours <none></none>			

## **Policy condition/action changes:**

- There are policy conditions that check or specify the type of quota. Previously most of these only included the option for *the volume types: total, uplink, and downlink*. Now this will include the option to pick the *quota type of "time"*.
- The new option Quota Type "*time*" and the policies affected by this are shown in the figure below



- There are many policy actions and conditions that check or specify the type of quota. Previously most of these only included the option for the **volume types**: *total, uplink, and downlink*. Now this will include the option to pick the quota type of *"time"*.
- The new option Quota Type "time" and the policies affected by this are shown in the figure below

grant total volume to specified percent used for select quota	🕘 Volume Type - Mozilla Firefox 🛛 🗆 🛛
grant total volume to specified percent used for BEST OF select quota	🕘 100.64.40.26/mi/pages/pslibInputMonitoringKeyType.jsp
grant # units of total volume (bytes) for select quota	Choose a Ouota Type:
U grant total volume to specified percent used for select quota using monitoring key	
U grant total volume to specified percent used for BEST OF select quota using monitoring key grant # units of total volume (bytes) for select quota using monitoring key	time A final state of the state
O request usage report for <i>monitoring key</i>	uplink volume
O disable <i>monitoring key</i>	
	OK Cancel Use Policy Table

The below policy condition group summarizes policies affected with description •

Policy Condition Group	Policy Condition or Action	Description				
"grant" Actions	grant <u>total volume</u> to <u>#</u> percent <u>used</u> for <u>select</u> <u>quota</u>	<ul> <li>Grant the specified quota type<sup>1</sup> for the selected quota with a percentage</li> </ul>				
	grant <u>total volume</u> to <u>#</u> percent <u>used</u> for BEST OF <u>select quota</u>	<ul> <li>Grant the specified quota type<sup>1</sup> for the selected quota(s) using the best of algorithm from FD007618 with a percentage</li> </ul>				
	grant <u>total volume</u> to <u>#</u> bytes for <u>select quota</u>	<ul> <li>Grant the specified quota type<sup>1</sup> for the selected quota with absolute bytes</li> </ul>				
	grant <u>total volume</u> to <u>#</u> percent <u>used</u> for <u>select</u> <u>quota</u> using <u>monitoring key</u>	Grant the specified quota type <sup>1</sup> for the selected quota using a monitoring key with a percentage				
	grant <u>total volume</u> to <u>#</u> percent <u>used</u> for BEST OF <u>select quota</u> using <u>monitoring key</u>	<ul> <li>Grant the specified quota type<sup>1</sup> for the selected quota(s) using the best of algorithm from FD007618 with a percentage using a monitoring key</li> </ul>				
	grant <u>total volume</u> to <u>#</u> bytes of <u>select</u> <u>quota</u> using <u>monitoring key</u>	<ul> <li>Grant the specified quota type<sup>1</sup> for the selected quota with absolute bytes using a monitoring key</li> </ul>				
	grant $\underline{\#}$ percent of <u>select type</u> for BEST OF <u>select</u> <u>quota</u>	<ul> <li>Grant the specified quota type<sup>1</sup> for the selected quota(s) using the best of algorithm from FD007618 with a percentage</li> </ul>				
Quota Conditions	where the user is using <u>greater than #</u> percent of <u>select type</u> for <u>selected</u> quota	Check to see how much quota the user has consumed based on percentage and quota type <sup>1</sup>				
	where the user is using <u>greater than #</u> bytes in <u>total volume</u> for <u>selected</u> quota	Check to see how much quota the user has consumed based on absolute bytes and quota type <sup>1</sup>				
	where the user is using <u>greater than #</u> percent and <u>less than #</u> percent of <u>select</u> <u>type</u> for <u>selected</u> quota	Check to see how much quota the user has consumed based on percentage and quota type <sup>1</sup> with multiple conditions				

The quota type will now include the following choices: Time, Total Volume, Uplink Volume, and Downlink Volume

## 3.22 3GPP APPLICATION BASED CHARGING (PR# 21322637)

## 3.22.1 Introduction

This feature adds support for the Application-Based Charging functionality to Gx and Sd interfaces as it is described in 3GPP TS 29.212 Rel 12 to PCRF. This functionality includes support of the new and reused related AVPs as well as new "ABC" Supported-Feature for Gx and Sd protocols and procedures accordingly.

## 3.22.2 Detailed Description

To Support the ABC feature, PCRF and TDF have to negotiate a new supported feature

Feature bit	Feature	Mandatory/Optional (M/O)	Description
17 (Gx) / 4 (Sd)	ABC	0	This feature indicates support for Application Based Charging.

#### Gx / Sd AVPs for ABC Support:

New Gx AVP		
Credit-Management-Status AVP		
PCEF Gx interface CCR-I contains D	iamete	r Gx re-used existing AVPs to support ABC feature:
Charging-Characteristics-3GPP	$\rightarrow$	3GPP-Charging-Characteristics as 4 hex digits (e.g. "0800"),
GGSN-Address-3GPP	$\rightarrow$	3GPP GGSN Address, ABC Feature
GGSN-IPv6-Address-3GPP	$\rightarrow$	3GPP GGSN IPv6 Address, ABC Feature
Dynamic-Address-Flag	$\rightarrow$	3GPP, 0- static, 1- dynamic, ABC Feature
Dynamic-Address-Flag-Extension A	$VP \rightarrow$	3GPP, 0- static, 1- dynamic, ABC Feature
Selection-Mode-3GPP AVP	$\rightarrow$	The 3GPP-Selection-Mode, ABC Feature
PDN-Connection-Charging-ID AVP	$\rightarrow$	The PDN-Connection-Charging-ID, ABC Feature
User-CSG-Information Grouped AV	Р	
CSG-Access-Mode avp		
CSG-Membership-Indication avp		
CSG-Id avp		

The above AVPs are propagated to the TDF Sd interface in the TSR message. The only difference is the Supported Feature Bit is set to 16 (bit 4) for Sd interface, and for Gx CCR-I this value is 131072 (bit 17).

User-CSG-Information AVP and Credit-Management-Status AVP are only applicable when ABC feature is supported.

To support ABC feature functionality a new event trigger is added to Gx:

CREDIT\_MANAGEMENT\_SESSION\_FAILURE (46).

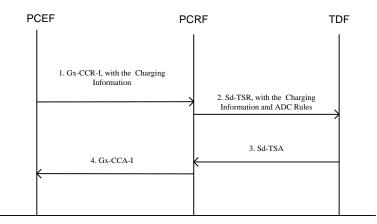
The following event triggers values are applicable when ABC feature is supported:

OUT\_OF\_CREDIT (15), REALLOCATION\_OF\_CREDIT (16), USER\_CSG\_INFORMATION\_CHANGE (30),

## USER\_CSG\_HYBRID\_SUBSCRIBED\_INFORMATION\_CHANGE (35), USER\_CSG\_HYBRID\_UNSUBSCRIBED\_INFORMATION\_CHANGE (36), CREDIT\_MANAGEMENT\_SESSION\_FAILURE (46).

**NOTE:** CREDIT\_MANAGEMENT\_SESSION\_FAILURE(46) - When used in a CCR command, this value indicates that a transient/permanent failure has been detected in the OCS. If the failure does not apply to all PCC Rules, the affected PCC Rules are indicated within the Charging-Rule-Report AVP, with the PCC-Rule-Status set to value ACTIVE and the Rule-Failure-Code AVP set to the corresponding value as reported by the OCS. If the failure applies to the session, the Credit-Management-Status shall be set to the corresponding value as reported by the OCS

Note: For the PCEF, CREDIT\_MANAGEMENT\_SESSION\_FAILURE event trigger only applies to the situation that the IP-CAN session is not terminated by the PCEF due to the credit management session failure.



Call Flow: Propagation of the Charging Information to TDF

## 3.22.3 User Interface Changes

CMP GUI – 'Traffic Profiles' UI changes

• To accommodate the new AVPs the definition of '*ADC Rule*' Traffic Profile Type has been *extended* by this feature to contain the Charging Information used for the Application Based Charging.

ALL	Name		ADC_RULE	
PCCRule_ep	Traffic Profile Type		ADC Rule	
PccRule_1	Enable Dynamic Override		10	
	Configuration Parameter	Value		
	Rule Name	ADC_RULE_1		
	Uplink Max Authorized Rate (bps)	336		
	Downlink Max Authorized Rate (bps)	36000		
	Monitoring Key	N/A 💌		
	Flow Status	ENABLED		
	TDF Application Identifier	1		
	TDF Redirect Support	REDIRECTION_ENABLED		
	TDF Redirect Address Type	N/A 💌		
	TDF Redirect Server Address		1	
	Mute Notification	N/A		
	Service Identifier	2		
	Rating Group	5		
	Reporting Level	RATING_GROUP_LEVEL		
	Online Charging	DISABLE_ONLINE		
	Offline Charging	ENABLE_OFFLINE		
	Metering Method	VOLUME		
	Precedence	1		

## CMP GUI - 'Policy' UI changes

• There is a new policy condition introduced to support ABC feature by a policy server. Two existing conditions and an action that can be applicable to Sd protocol.

Policy Condition Group	Policy Condition or Action	Description
"Request" Conditions(New)	where the request Credit Management Status is one of {1}	Identifies Credit Management status reported by TDF
"Request" Conditions (Extended)	where at least one Final-Unit-Indication AVP exists	This condition can be used in conjunction with the ADC rule report to identify final unit indication state over Sd protocol
"Request" Conditions (Extended)	where the rule report contains one of {0} and the final unit action is one of {1} and the rule status is {2}	This condition can be used in conjunction with the ADC rule report to identify final unit indication state over Sd protocol
Action (Extended)	set charging server(s) for the IP-CAN/Sd session to specified values	This action can be applied to Sd protocol when ABC feature is enabled; For example: set charging server(s) for the IP-CAN/Sd session to Primary Online Server:OCS1, Primary Offline OFCS

	where the request Credit Management Status is one of specified type(s)
- (	where the request MPS Identifier matches one of value(s)
Ó	where at least one Final-Unit-Action matches Final-Unit-Action to match
	where at least one Final-Unit-Indication AVP exists
О	where at least one flow has media type that matches specified type(s)
0	where the rule report contains one of specified rule name(s) and the rule status is active
$\sim$	where the rule report contains one of specified rule name(s) and the final unit action is one of specified values and the rule status is active

set charging server(s) for the IP-CAN/Sd session to specified values

## 3.23 7.404: EVS CODEC SUPPORT (PR# 22135682)

## 3.23.1 Introduction

EVS is a codec which has been adopted by 3GPP, defined in 3GPP TS 26.114. The PCRF NATIVELY supports the EVS (Enhanced Voice Services) Codec. The EVS codec provides the same audio quality with lower capacity requirements or higher audio quality with same capacity requirement as today's AMR-WB codec.

## 3.23.2 Detailed Description

This feature support the bandwidth computation based on the codec data offered in the SDP messages. The EVS codec includes two operational modes:

- EVS Primary mode: Includes 11 bit-rates for fixed-rate or multi-rate operation; 1 average bit-rate for variable bit-rate operation; and 1 bit-rate for SID (3GPP TS 26.441).
- EVS AMR-WB IO mode: Includes 9 codec modes and SID. All are bitstream interoperable with the AMR-WB codec (3GPP TS 26.171).

The mode (EVS Primary mode/ EVS AMR-WB IO mode), br/br-send/br-recv, ptime, channels count, IPv4/IPv6 are the keys to decide the bandwidth of audio flow with EVS codec.

PCRF can give the desired bandwidth according to the Coded parameters.

## 3.23.3 EVS Codec Support Use case Example

This use case is to verify that the PCRF derives the correct bandwidth for Codec "EVS" in diameter message. In this case EVS is "primary mode" and whose *ptime is 20ms, bitrate is 7.2 kbps* 

- From PGW establish a Gx session with IPv4 framed IP and other Required AVPs
- Establish Rx session over IPv4 flow and other Required EVS parameter AVPs
- Check Maximum Bandwidth in RAR sent to PGW
  - Based on below Bandwidth Computation of b=AS for EVS Primary mode (IPv4, ptime=20)

Mode	7.2	8	9.6	13.2	16.4	24.4	32	48	64	96	128	SID
AS (kbps)	25	25	27	30	34	42	49	65	81	113	145	N/A

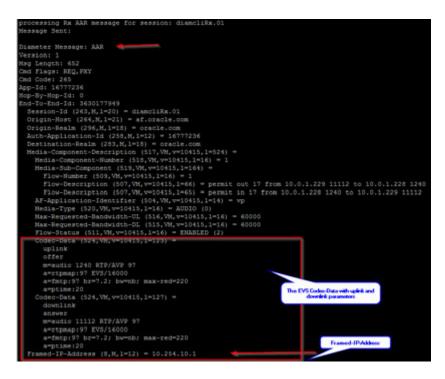
- Maximum Rate bandwidth of Uplink and down link RTP flow of Rx set to 25Kbytes/sec
- Rule installed on Gx session from Rx session has Maximum-Requested bandwidth (UL/DL) of 25Kbytes/sec

#### Screenshots:

• From PGW establish a Gx session with IPv4 framed IP



• Establish Rx session over IPv4 flow



- Rule installed on Gx session from Rx session has Maximum-Requested bandwidth (UL/DL) of 25Kbytes/sec
- Maximum Rate bandwidth of Uplink and down link RTP flow of Rx set to 25Kbytes/sec



## 3.24 TRACK MAXIMUM TPS IN KPI INTERVAL (PR# 19113866)

## 3.24.1 Introduction

Currently, as part of KPI Stats, TPS stats are captured in sum total and do not include TPS per message type. This feature shall add TPS stats per message type for various interface like Gx, Rx, Sh etc. This will help in exactly determining TPS behavior for each interface/each message and will help in solving related issues.

## 3.24.2 Detailed Description

During upgrade from previous release to a release containing these enhancements, the default value of Stats Reset Configuration is changed from 'Manual' to 'Interval'. For other TPS stats, there is no impact as they are not displayed on CMP

Currently TPS is calculated in system as:

Total number of Transaction initiating messages received (since last count)/ Time difference (since last count; in seconds)

As part of this feature, the TPS shall be tracked for each message type on each interface. So, for ex, TPS related to CCR-I messages on Gx interface shall be calculated as: PCEF\_CCRI\_MAX\_TPS = Number of CCR-I received on Gx (since last count) / Time difference (since last count; in seconds)

- All Diameter interfaces are supported and tracked separately
- A timestamp of when the maximum TPS was reached for each message type (for each interface) will be included.
- TPS Stats (per message type) related to the Cable interface (Rx/PCMM) is not part of this feature (Rx in Wireless environment is supported).
- These Stats are stored on both MPE & MRA. None of the these stats are displayed on CMP
- These Stats are available to be queried via the OSSI Interface

#### Maximum TPS Stats for PCEF (Gx) Interface

Reference Name	MPE/MRA Counter Name
PCEF_CCRI_CURRENT_TPS	PcefCCRICurrentTPS
PCEF_CCRI_MAX_TPS	PcefCCRIMaxTPS
PCEF_CCRI_TIME_MAX_TPS	PcefCCRITimeOfMaxTPS
PCEF_CCRU_CURRENT_TPS	PcefCCRUCurrentTPS
PCEF_CCRU_MAX_TPS	PcefCCRUMaxTPS
PCEF_CCRU_TIME_MAX_TPS	PcefCCRUTimeOfMaxTPS
PCEF_CCRT_CURRENT_TPS	PcefCCRTCurrentTPS
PCEF_CCRT_MAX_TPS	PcefCCRTMaxTPS
PCEF_CCRT_TIME_MAX_TPS	PcefCCRTTimeOfMaxTPS
PCEF_RAR_CURRENT_TPS	PcefRARCurrentTPS
PCEF_RAR_MAX_TPS	PcefRARMaxTPS
PCEF_RAR_TIME_MAX_TPS	PcefRARTimeOfMaxTPS

## <u>OSSI</u>

A new query will be added to the existing commands to allow users to request TPS statistics for a specified time range. A query request can contain a number of parameters that allow the user to request a specific set of data and format how that data is returned. Here are example request and response to help demonstrate the changes that will be made to this interface:

```
<?xml version="1.0" encoding="UTF-8"?>
<XmlInterfaceRequest>
 <QueryOmStats DeltaCount="false">
   <StartTime>2010-07-23T18:35:00Z</StartTime>
    <TpsStats>
     <PolicyServer>kiran-anchorage-mpe</PolicyServer>
      <MRA></MRA>
    </TpsStats>
  </QueryOmStats>
</XmlInterfaceRequest>
This is the example response:
<?xml version='1.0' ?>
<Statistics>
  <TpsStats>
    <Sample>
      <StartTime>2015-08-31T19:43:39Z</StartTime>
      <EndTime>2015-08-31T20:21:52Z</EndTime>
      <PolicyServer>kiran-anchorage-mpe</PolicyServer>
      <AfAARICurrentTPS>1306</AfAARICurrentTPS>
      <AfAARIMaxTPS>306</AfAARIMaxTPS>
      <AfAARITimeOfMaxTPS>2015-08-31T20:21:52Z</AfAARITimeOfMaxTPS>
      <AfAARMCurrentTPS>13</AfAARMCurrentTPS>
      <AfAARMMaxTPS>5</AfAARMMaxTPS>
      <AfAARMTimeOfMaxTPS>2015-08-31T20:21:52Z</AfAARMTimeOfMaxTPS>
      <AfASRCurrentTPS>13</AfASRCurrentTPS>
      <AfASRMaxTPS>5</AfASRMaxTPS>
      <AfASRTimeOfMaxTPS>2015-08-31T20:21:52Z</AfASRTimeOfMaxTPS>
      <AfSTRCurrentTPS>13</AfSTRCurrentTPS>
      <AfSTRMaxTPS>5</AfSTRMaxTPS>
      <AfSTRTimeOfMaxTPS>2015-08-31T20:21:52Z</AfSTRTimeOfMaxTPS>
. . .
      <RadiusAccountingOffCurrentTPS >0</RadiusAccountingOffCurrentTPS >
      <RadiusAccountingOffMaxTPS>0</RadiusAccountingOffMaxTPS>
      <RadiusAccountingOffTimeOfMaxTPS>2015-08-31T20:21:52Z</RadiusAccountingOffTimeOfMaxTPS>
      <RadiusAccountingOffCurrentTPS>
    </Sample>
  </TpsStats>
</Statistics>
```

New command (in mramgr and rcmgr) 'show counters tpsstats' will list new TPS stats

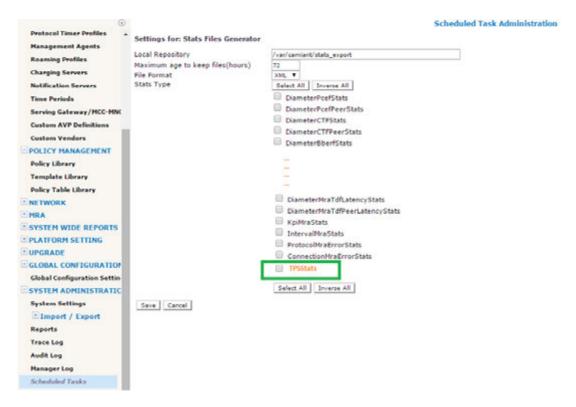
## **Performance Impacts**

Addition of new stats will not have any performance impact on MPE/MRA.

#### 3.24.3 User Interface Changes

A new category of stats named "TPSStats" is created to track TPS per message type under each interface.

The new category is added under Statistics Generator files



# **Default Interval Mode for Stats**

The Stats settings under 'Global Configuration Settings' will now show Stats Collection Period of '15' minutes.

۲	Stats Settings
Global Configuration Settings	
" Precedence Range	
UE-Initiated Procedures	
Stats Settings	
Quota Settings	Collecting data more often than the default increases the amount of data stored to disk. Reduce the OM Statistics value Number of days to keep statistical data accordingly.
eMPS ARP Settings	
GCS ARP Settings	Stats Collection Period 15 💌 minutes
9 Settings	
DDN APN Suffixes	
	Save Cancel
Custom APNs Configuration	
Emergency APNs Settings	

## KPI Interval Stats as default

# 3.25 ADD AUDIT LOG TO CMP SAVELOG (PR# 20319847)

## 3.25.1 Introduction

This enhancement adds the audit logs to the CMP savelog.

#### 3.25.2 Detailed Description

As part of this feature, CMP savelog shall now include CMP Audit logs (as displayed under System Administration -> Audit logs) for last 2 months.

The procedure to take savelog is same as before: from platcfg menu; Policy Configuration -> Save Platform Debug Logs. All other options under this remain as before

There are 2 options to capture auditlog data: either in .xml file OR in .txt file. Sample output of both is captured:

#### Sample output of auditlog.txt:

281474976711135	2015-08-04 05:19:22 admin	10.176.255.9	user	login	MPE Manager	admin	2015-08-04 05:19:22
281474976711136	2015-08-04 05:19:46 admin	10.176.255.9	user	changeP	assword admin		2015-08-04 05:19:46
281474976711137	\N \N 2015-08-04 05:50:49 admin	10.176.255.9	user	logout	admin		2015-08-04 05:50:49
1 281474976810657 1	\N \N 2015-08-05 01:29:49 admin \N \N	10.176.255.9	user	login	MPE Manager	admin	2015-08-05 01:29:49

## Sample output of auditlog.xml:

<?xml version="1.0"?>

<row>

```
<field name="uid">281474976711134</field>
        <field name="timestamp">2015-08-04 05:19:07</field>
        <field name="username"></field>
        <field name="hostname"></field>
        <field name="auditclass">manager</field>
        <field name="auditaction">modify</field>
        <field name="key1"></field>
        <field name="key2"></field>
        <field name="mscname"></field>
        <field name="mschostname"></field>
        <field name="details">Architecture&lt;br&gt;&amp;nbsp;&amp;nbsp;&amp;nbsp; {auditLog.valueOld}
standalone<br&gt;&amp;nbsp;&amp;nbsp;&amp;nbsp; {auditLog.valueNew}
distributed<br&gt;MiMode&lt;br&gt;&amp;nbsp;&amp;nbsp; &auditLog.valueNew}
DiamAF,Diam3gppPCEF,gxquota<br&gt;</field>
        <field name="createtimestamp">2015-08-04 05:19:07</field>
        <field name="createuser" xsi:nil="true" />
```

```
<field name="createuser" xsi:nil="true" />
```

```
<field name="modifytimestamp" xsi:nil="true" />
```

```
<field name="modifyuser" xsi:nil="true" />
```

</row>

# 3.25.3 User Interface Changes

None.

# 3.26 EXPOSE ENGINEERING LOG LEVEL CONFIGURATION IN CMP ( PR# 20325595 )

## 3.26.1 Introduction

Currently, in order to debug customer issues, files logback-tomcat.log, logback-rc.xml, logback-mra.xml, and logback-bod.xml have to be modified at each target MPE/MRA/BoD to enable specific component level logging. This consumes a lot of time. This enhancement allows the operator to easily enable debug-level logging from CMP for the specific component as required.

## 3.26.2 Detailed Description

Currently, the Debug tab on CMP is visible only if 'Debug mode' is enabled. As part of enhancement 'Enable Debug Logging via CMP', debug tab on CMP shall be enabled by default for any mode (Wireless/Cable/ SPC, RADIUS, BoD etc) irrespective of Debug mode – on MPE / MRA/BoD. This includes for any option selected under these modes.

By default, modify in this tab shall be allowed only for Role: 'Administrator'. For all other roles, this tab will by default be 'Read-Only'

	nmunications	Policy Manage	ment	
٩			лісу зегует мантнізна	uon
🔄 Policy Servers ⊡ 🔄 ALL	Policy Server: MPE-Cluster	Policy Server Diameter Routing	Policies Data Source	s Session Viewer Debug
MPE-Cluster	Modify			î
		20 WARN		This Debug Tab sha be visible by defau
	File Appender Configuration	File Name Maximun	n File Size (MB) Maxi	for all modes like Wireless/ RADIUS, Cable etc
		/var/camiant/log/tomcat.log 8	9	
		20 INFO		
	File Appender Configuration			
	RCLog StatsLog1 StatsLog2 StatsLog3 policylog StatsLogKpi	File Name         Maxi           /var/camiant/log/rc.log         8           /var/camiant/log/rc.stats.hourly         8           /var/camiant/log/rc.stats.daily         8           /var/camiant/log/rc.stats.minute         16           /var/camiant/log/policy.log         20           /var/camiant/log/policy.log         8           /var/camiant/log/no.stats.kpi         8	imum File Size (MB)	Maximum File Count 9 9 30 10 9 9

Debug page on CMP

**NOTE**: The debug tab will not be available via Configuration Template.

## Enhancements to Debug page for supporting class log level - MPE

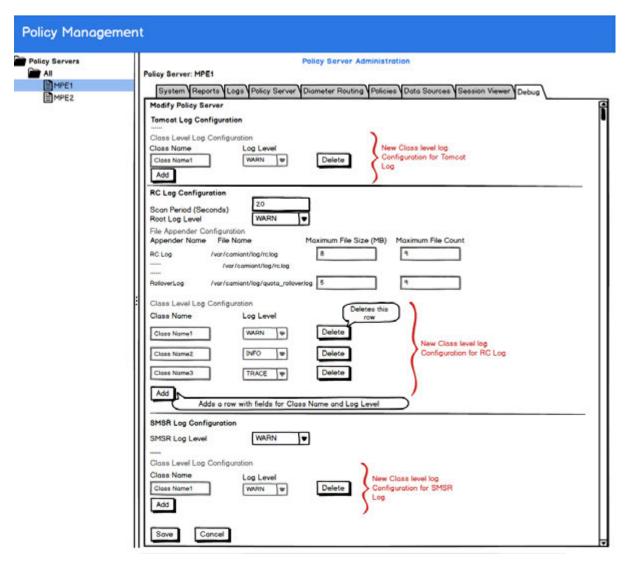
Currently, as shown above, the Debug page on CMP does not support configuring log level per class for any component. For ex, if someone wants to enable DEBUG log level for particular class for RC component, then the same can't be done. This has to be done manually by logging into MPE & changing the corresponding logback-rc.xml file respectively.

As part of enhancement 'Enable Debug Logging via CMP', the Debug page has been enhanced to support class log level for different components in the MPE

The class level log configuration shall be provided for all loggers like Tomcat log, RC log, SMSR log

For these class level log configuration, operator shall be able to specify the exact class name (for which logging is to be enabled) (as a string) & select the particular log level (from dropdown list), the same shall be set in corresponding logger file. For ex, if operator specifies class name as 'msc.rc.PolicyEngine' under RC log class level log configuration & select log level as 'Debug', following will be written in logback-rc.xml file:

```
<logger name="msc.rc.PolicyEngine" level="DEBUG" additivity="false">
<appender-ref ref="RCLog"/>
</logger>
The .xml files corresponding to each logger is specified below:
Tomcat log -> /etc/camiant/logconfig/logback-tomcat.xml
RC log -> /etc/camiant/logconfig/logback-rc.xml
SMSR log -> /etc/camiant/logconfig/logback-tomcat-rc.xml
```



#### Debug Page enhancements for MPE

#### Enhancements to Debug page for supporting class log level - MRA

As part of enhancement 'Enable Debug Logging via CMP', the Debug page shall be enhanced to support class log level for different components in MRA

The class level log configuration shall be provided for all loggers like Tomcat log, RC log

The .xml files corresponding to each logger is specified below:

Tomcat log -> /etc/camiant/logconfig/logback-tomcat.xml RC log -> /etc/camiant/logconfig/logback-mra.xml

ORACLE	Policy Managemen	t
<ul> <li>MY FAVORITES</li> <li>POLICY SERVER</li> <li>POLICY MANAGEMENT</li> <li>MRA</li> <li>Configuration</li> <li>Configuration Templates</li> <li>MRA Associations</li> <li>NETWORK</li> <li>SPR</li> <li>SYSTEM WIDE REPORTS</li> <li>PLATFORM SETTING</li> <li>UPORADE MANAGER</li> <li>SYSTEM ADMINISTRTI</li> <li>HELP</li> </ul>	MRA MRA1 MRA2	MRA Administration         Multi-protocol Routing Agent: MRA1         System Reports Logs MRA Diameter Routing Session Viewer Debug         Modify HRA         Temcot Log Configuration         Scan Period (Seconds)         20         Root Log Level         File Appender Name         Tomcot Log         Appender Name         Tomcot Log         Var/comiant/log/NebServiceCalls/og         9         Class Name         Log Level         New Class level log         Class Name2         INFO         Elevel         New Class level log         Class Name2         INFO         Elevel         Delete         Class Name2         INFO         Elevel         Class Name2         INFO         Elevel         MRA Log Configuration         Root Log Level         Root Log Configuration         Appender Configuration         Appender Configuration         Appender Configuration         Appender Configuration         Appender Name       File Appender Configuration         Class Name       Log Le

Debug Page enhancement for MRA

# Enhancements to Debug page for supporting class log level - BoD

As part of enhancement 'Enable Debug Logging via CMP', the Debug page shall be enhanced to support class log level for different components in BoD

The class level log configuration shall be provided for all loggers like Tomcat log, BoD log

The .xml files corresponding to each logger is specified below:

Tomcat log -> /etc/camiant/logconfig/logback-tomcat.xml BoD log -> /etc/camiant/logconfig/logback-bod.xml

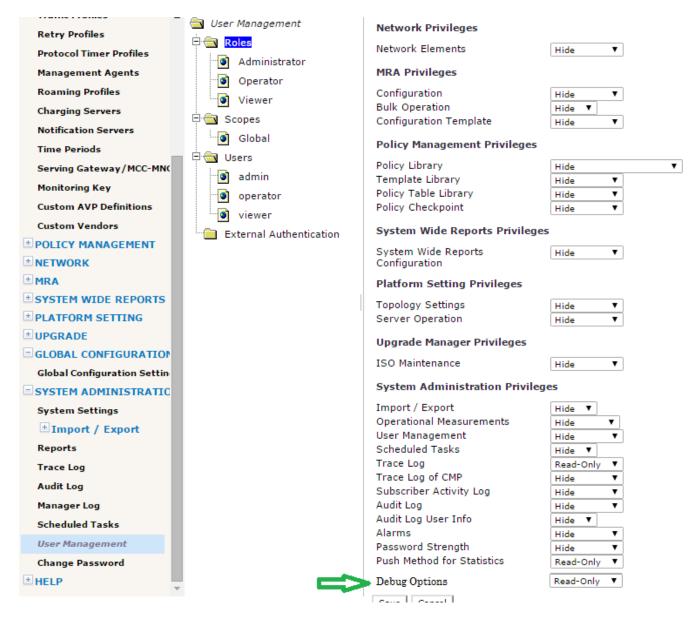
Scan Period (Seconds) Root Log Level File Appender Configurat	20 WARN V		
File Appender Configurat			
	ion		
Appender Name	File Name	Maximum File Size (MB)	Maximum File Count
TomcatLog	/var/camiant/log/tomcat.log	8	9
QPUDLog	/var/camiant /log/qp_upgradedirector.log	2	5
WebserviceCalls	/var/camiant /log/WebServiceCalls.log	2	5
Class Log Configuration			
Class Name	Log Level		
mi.bia.ba.BiaController	INFO 💌 Delete	•	
Add Row			
BoD Log Configuration			
Scan Period (Seconds)	20		
Root Log Level	WARN 👻		
File Appender Configurat	ion		
Appender Name	File Name	Maximum File Size (MB)	Maximum File Count
BODLog	/var/camiant/log/bod.log	8	9
StatsLog1	/var/camiant /log/bod.stats.hourly	8	9
StatsLog2	/var/camiant /log/bod.stats.daily	8	9
StatsLogKpi	/var/camiant/log/bod.stats.kp	i 8	9
Class Log Configuration			
Class Name	Log Level		
camiant.schedule	WARN 💌		
Add Row			
Save Cancel			
save    Cancer			

#### Debug Page enhancement for BoD

# 3.26.3 User Interface Changes

# System Administration

There will be a new row 'Debug Options' under User management -> Roles -> System Administration Privileges. This will have access control for debug tab: Read-Write or Read-only



Role based authorization for Debug Page

# 3.27 ADD SUPPORT FOR ADC ON GX ( PR# 240023 / 20271473 )

## 3.27.1 Introduction

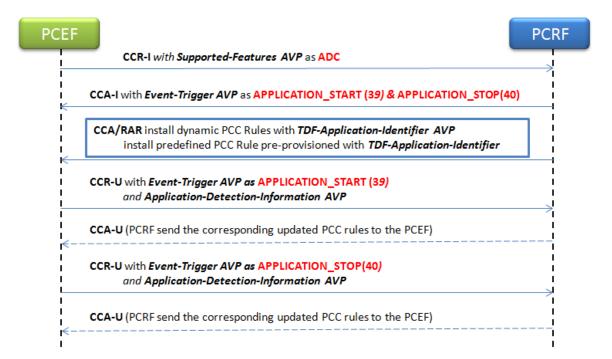
In 3GPP TS 29.212 V12.4.0, PCRF needs to support application detection information and redirect function over the Gx interface. The PCRF may instruct the PCEF to detect application (s) by providing the Charging-Rule-Install AVP (s) with the corresponding parameters and provide the redirect instruction for a dynamic PCC rule to the PCEF enhanced with ADC (Application Detection Control). The MPE and CMP need to enhance the Gx reference point, traffic profiles, and policies to support this feature.

The TDF-Application-Instance-Identifier AVP and Flow-Information AVP is also supported under Application-Detection-Information AVP on the Sd interface.

## **Feature Activation**

For Gx interface, this feature is only applicable if the ADC feature was advertised in Supported-Features AVP by the PCEF or the PCRF will not send TDF-Application-Identifier/ Mute-Notification / Redirect-Information AVP in Charging-Rule-Definition AVP in CCA or RAR to PCEF. If PCEF advertises ADC feature in CCR-I, PCRF shall subscribes to the APPLICATION\_START/APPLICATION\_STOP Event-Triggers in CCA-I.

## 3.27.2 Detailed Description



• Gx interface:

The PCRF shall instruct the PCEF enhanced with ADC to detect application (s) and provide redirect function by dynamic PCC rules or predefined PCC Rule/predefined PCC Rule base in CCA or RAR.

For predefined PCC Rule/ predefined PCC Rule base which pre-provisioned with corresponding ADC information, only Charging-Rule-Name/Charging-Rule-Base-Name need to be provided in Charging-Rule-Install AVP.

For dynamic PCC rule, PCRF shall provide the Charging-Rule-Install AVP (s) in dynamic PCC rules with the corresponding parameters as follows:

Charging-Rule-Definition ::= < AVP Header: 1003 > { Charging-Rule-Name } [Service-Identifier] [Rating-Group] \* [Flow-Information] [TDF-Application-Identifier] [Flow-Status] [QoS-Information] [PS-to-CS-Session-Continuity] [Reporting-Level] [Online] [Offline] [Metering-Method] [Precedence] [AF-Charging-Identifier] \*[Flows] [Monitoring-Key] [Redirect-Information] [Mute-Notification] [AF-Signalling-Protocol] [Sponsor-Identity] [ Application-Service-Provider-Identity ] \*[ Required-Access-Info ] \*[ AVP ] Redirect-Information ::= < AVP Header: 1085 > [Redirect-Support] [Redirect-Address-Type] [Redirect-Server-Address] \*[ AVP ]

The application to be detected is identified by the TDF-Application-Identifier AVP. If the PCRF requires to be reported about when the application start/stop is detected, it shall also subscribe to the APPLICATION\_START and APPLICATION\_STOP Event-Triggers. The PCRF may also mute such a notification about a specific detected application by providing Mute-Notification AVP within the PCC Rule.

The redirect instruction shall be encoded using a Redirect-Information AVP within the Charging-Rule-Definition AVP of the dynamic PCC rule.

## > PCEF report the information regarding the detected application's traffic to PCRF

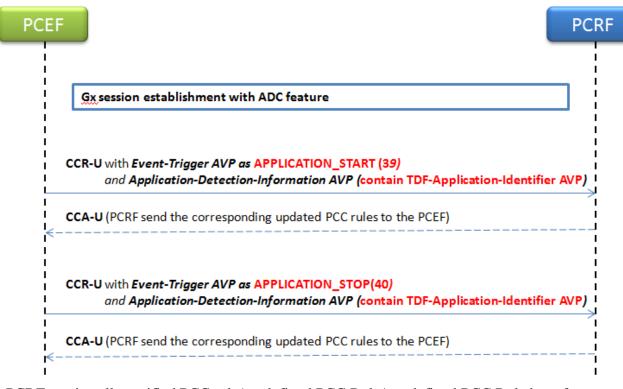
When PCEF reports the information regarding the detected application's traffic to PCRF, PCRF makes policy decisions based on the information received and sends the corresponding updated PCC rules to the PCEF.

The Application-Detection-Information AVP is now supported in PCRF.

Application-Detection-Information ::= < AVP Header: 1098 > { TDF-Application

{ TDF-Application-Identifier } [ TDF-Application-Instance-Identifier ] \*[ Flow-Information ] \*[ AVP ]

## **Use Case-1: PCEF reports for APPLICATION\_START only with TDF-Application-Identifier in Application-Detection-Information**



 PCRF can install specified PCC rule/predefined PCC Rule/ predefined PCC Rule base for different TDF-Application-Identifier by policy engine in CCA-U when PCEF report for APPLICATION\_START.  PCRF can remove specified PCC rule/ predefined PCC Rule/ predefined PCC Rule base for different TDF-Application-Identifier by policy engine in CCA-U when PCEF report for APPLICATION\_STOP.

#### For example:

#### App Start

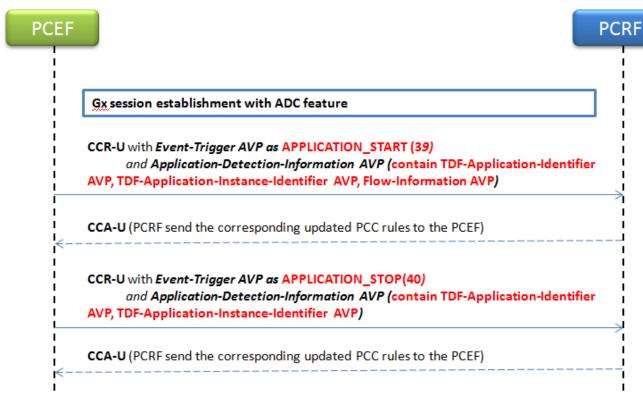
where the request is *modifying an existing session* And where the event trigger is one of *APPLICATION\_START* And where the TDF-Application-Identifier matches one of *TDFID01,TDFID02* install *pcc\_rule1* PCC rule(s) for *session* continue processing message

#### App Stop

where the request is *modifying an existing session* And where the event trigger is one of *APPLICATION\_STOP* And where the TDF-Application-Identifier matches one of *TDFID01,TDFID02* remove *pcc\_rule1* PCC rule(s) continue processing message

## Use Case-2: PCEF reports for APPLICATION\_START with TDF-Application-Instance-Identifier *and* Flow-Information in Application-Detection-Information

When the Event trigger indicates APPLICATION\_START, the Flow-Information AVP for the detected application may be included under Application-Detection-Information AVP, if deducible. The TDF-Application-Instance-Identifier, which is dynamically assigned by the PCEF in order to allow correlation of APPLICATION\_START and APPLICATION\_STOP Event-Triggers to the specific Flow-Information AVP, if service data flow descriptions are deducible, shall also be provided when the Flow-Information AVP is included. Also, the corresponding Event-Trigger (APPLICATION\_START or APPLICATION\_STOP) shall be provided to PCRF. When the TDF-Application-Instance-Identifier is provided along with the APPLICATION\_START, it shall also be provided along with the corresponding APPLICATION\_STOP.



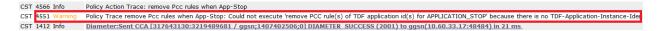
When PCEF reports for APPLICATION\_START with TDF-Application-Identifier and TDF-Application-Instance-Identifier and Flow-Information AVP, PCRF can install specified PCC rule/ predefined PCC Rule/ predefined PCC Rule base for different reported flows by policy engine in CCA-U.

If PCEF report for APPLICATION\_START, TDF-Application-Instance-Identifier AVP and Flow-Information AVPs must be included under Application-Detection-Information AVP at the same time or both not present. If only one of them present, PCRF shall generate a warning level trace log and continue with the session processing.

# New Trace Logs

4551-Policy\_Warning scenario one for policy action: remove default PCC/ADC rule(s) of default TDF application id(s) for APPLICATION\_STOP

**Description:** If PCRF can't find associated PCC/ADC rules(s) with this TDF-Application-Identifier and TDF-Application-Instance-Identifier info, then PCRF shall generate a warning level trace log and continue with the session processing.



**Log: Policy Trace policy name:** Could not execute 'remove PCC rule(s) of TDF application id(s) for APPLICATION\_STOP' because there is no TDF-Application-Instance-Identifier in Application-Detection-Information AVP

4551-Policy\_WARNing scenario two for policy action: remove default PCC/ADC rule(s) of default TDF application id(s) for APPLICATION\_STOP

**Description:** If no TDF-Application-Instance-Identifier is in the Application-Detection-Information AVP, but some installed PCC rule(s) contain binding info for the same TDF-Application-Identifier, then PCRF shall generate a warning level trace log and continue with the session processing.

 CST
 4566
 Info
 Policy Action Trace: remove Pcc rules when App-Stop

 CST
 4551
 Warning
 Policy Trace remove Pcc rules when App-Stop: Could not execute 'remove PCC rule(s) of TDF application id(s) for APPLICATION\_STOP' because can not find related PCC rule to remove

 CST
 1412
 Info
 Diameter:Sent CCA [317643129:3219489680 / ggsn;1407402506;0] DIAMETER\_SUCCESS (2001) to ggsn(10.60.33.17:48484) in 17 ms\_

**Log: Policy Trace policy name:** Could not execute 'remove PCC/ADC rule(s) of TDF application id(s) for APPLICATION\_STOP' because can not find related PCC/ADC rule to remove

## **Policy Changes**

Policy wizard changes of the type "request conditions".

Policy Condition Group	Policy Condition or Action	Description
"request" conditions	where the flow is <u>an application flow</u>	<b>Enhance</b> the existing policy condition by adding a new flow type – <b>an application detection flow</b>
"request" conditions	where the QoS parameters in the flow are equal to <u>specified value</u>	<ul> <li>Enhance the existing policy condition, so that it can support:</li> <li>Diameter App Detection TDF-Application-Identifier</li> <li>Diameter App Detection Flow-Description</li> <li>Diameter App Detection Flow-Direction</li> </ul>
"request" conditions	where the <u>select type</u> is contained in Match List(s) <u>select list(s)</u>	Enhance the existing policy condition, add new select type: TDFApplicationIdentifier
"request" conditions	where the <u>select type</u> is not contained in Match List(s) <u>select list(s)</u>	Enhance the existing policy condition, add new select type: TDFApplicationIdentifier

Policy wizard changes of the type "optional actions".

Policy Condition Group	Policy Condition or Action	Description
"optional" actions "optional" actions	add the APP Detection Flow <u>select</u> <u>scope</u> to <u>specified</u> PCC/ADC rule(s) remove <u>default</u> PCC/ADC rule(s) of <u>default</u> TDF application id(s) for	It can bind TDF-Application-Identifier and TDF- Application-Instance-Identifier info of current application detection flow to PCC/ADC rule(s) It can remove associated PCC/ADC rule(s) while PCEF/TDF is reporting for APLICATION_STOP
"optional" actions	APPLICATION_STOP apply <u>specified profile(s)</u> to request	Enhance the existing policy action, so that it can change "TDF Application Identifier/TDF Redirect Support/TDF Redirect Address Type/TDF Redirect Server Address/Mute Notification"
"optional" actions	apply <u>specified profile(s)</u> to all flows in the request	information in dynamic PCC rule Enhance the existing policy action, so that it can change "TDF Application Identifier/TDF Redirect Support/TDF Redirect Address Type/TDF
"optional"	apply <u>specified profile(s)</u> to flow(s)	Redirect Server Address/Mute Notification" information in dynamic PCC rule Enhance the existing policy action, so that it can
actions	whose media type matches one of <u>specified type(s)</u>	change "TDF Application Identifier/TDF Redirect Support/TDF Redirect Address Type/TDF Redirect Server Address/Mute Notification" information in dynamic PCC
"optional" actions	apply <u>specified profile(s)</u> to selected <u>specified type(s)</u> flows in the request	Enhance the existed policy action, so that it can change "TDF Application Identifier/TDF Redirect Support/TDF Redirect Address Type/TDF Redirect Server Address/Mute Notification" information in dynamic PCC rule

## 3.27.3 User Interface Changes

# PCC profile enhancement

Operator can define PCC Profile on "Traffic Profiles" on CMP. "TDF Application Identifier/TDF Redirect Support/TDF Redirect Address Type/TDF Redirect Server Address/Mute Notification" are added for this feature.

Precedence	
Resource Allocation Notification	N/A
Required Access Info	N/A
TDF Application Identifier	
TDF Redirect Support	N/A
TDF Redirect Address Type	N/A 💌
TDF Redirect Server Address	
Mute Notification	N/A
Sponsor Identity	
Application Service Provider Identity	

Display on Traffic Profiles	AVP in Charging-Rule-Definition AVP
TDF Application Identifier	TDF-Application-Identifier
Mute Notification	Mute-Notification
TDF Redirect Support	Redirect-Support in Redirect-Information AVP
TDF Redirect Address Type	Redirect-Address-Type in Redirect-Information AVP
TDF Redirect Server Address	Redirect-Server-Address in Redirect-Information AVP

# 3.28 [RX COUNTER] ADD SEVERAL RAW COUNTERS FOR RX RELATED MESSAGES SUPPORT FOR ADC ON GX ( PR# 20271492 )

# 3.28.1 Introduction

Currently, on the PCRF, there are existing counters "AAASendSuccessCount / AAASendFailureCount" which represent the successful/failure AAA which is sent from PCRF to AF, responding to an AAR. PCRF will now add finer grain counters to divide the AAA to AAA initial or AAA update ones.

## 3.28.2 Detailed Description

Four new counters will be added as "AAAInitialSendSuccessCount / AAAInitialSendFailureCount", "AAAModificationSendSuccessCount / AAAModificationSendFailureCount" which are respectively for AAA initial response and update response. These counters are only provided on MPE, while not provided on MRA in the current stage. The reason of not supporting these counters on MRA is that the initial or modification of AF session is decided by the existence of AF session in MPE.

Also, there are existing counters "ASRSendCount / ASRTimeoutCount" which represent the send/timeout ASR which is sent from PCRF to AF. There is a need to summarize the number of ASR triggered by handover. The handover scenario is that the ASR included with Abort-Cause as PS\_TO\_CS\_HANDOVER[6]. Then it will need to add the corresponding counters as "ASRHOSendCount / ASRHOTimeoutCount". These counters can be provided both on MPE and MRA.

Prior to 12.2, the PCRF tracks counters for "AAASendSuccessCount /AAASendFailureCount". This feature adds finer grain counters to distinguish between "AAA initial" and "AAA update" Rx interface messages.

# Prior to 12.2

Counter Name
AAA success messages received / sent
AAA failure messages received / sent

# **Introduced in 12.2**

Counter Name
AAA initial success messages received / sent
AAA initial failure messages received / sent
AAA modify success messages received / sent
AAA modify failure messages received / sent

**NOTE:** These counters are only provided on MPE

Prior to 12.2, the PCRF tracks counters on the Rx Interface for "ASRSendCount & ASRTimeoutCount". This feature also adds counters to summarize the number of ASR messages triggered by a handover. The handover scenario is when the ASR includes the Abort-Cause as PS\_TO\_CS\_HANDOVER[6].

# Introduced in 12.2

Counter Name	
ASR HO messages received / sent	
ASR HO timeout	

# 3.28.3 User Interface Changes

Open AF Protocol Statistics on the reports tab of the MPE and confirm the new counters are incrementing that distinguish between AAA "initial" and "update" (or modify) received/sent messages. These messages will equal the total of AAA messages received/sent. In previous releases this level of granularity did not exist.

## For example:

- Policy Servers	AF Protocol Statistics	
E 🔄 ALL	Connections	1
	Currently okay peers	1
	Currently down / suspect / reopened peers	0/0/0
	Total messages in / out	8 / 8
	AAR messages received / sent	8 / 0
	AAR Initial messages received / sent	5/0
	AAR Modification messages received / sent	3/0
	AAA success messages received / sent	0/8
	AAA failure messages received / sent	0/0
	AAR messages timeout	0

#### Total AAA success messages sent

Total AAA success initial and modify (update) messages sent

	Policy Servers	
	E ALL	
	MPE Site1 Cluster	
I		

AAA initial success messages received / sent	0/5
AAA initial failure messages received / sent	0/0
AAA modify success messages received / sent	0/3
AAA modify failure messages received / sent	0/0

# 3.29 ENHANCED PRIORITY FOR EMPS BASED WIRELESS PRIORITY SERVICES (PR# 22121678)

## 3.29.1 Introduction

This feature enhancement allows Policy Management to:

- Recognize that an incoming Rx request is for an emergency service (e.g., 911 in the US)
- Notify the PGW (and any intermediary nodes) that this is a high priority message by setting and sending a new optional AVP called DRMP (Diameter Routing Message Priority) in a RAR
- Ensure that messages associated with priority calls are not shed on either the MPE or the MRA unless absolutely necessary, with new load shedding rules
- When all priority sessions are terminated, instruct the PGW to revert to the behaviors defined before the priority session as established (current functionality)

#### **Feature Activation**

After fresh install or upgrade, the new AVP is defined in Diameter dictionary. But the AVP won't be added to Diameter messages by default unless a Policy action described in section is triggered.

## 3.29.2 Detailed Description

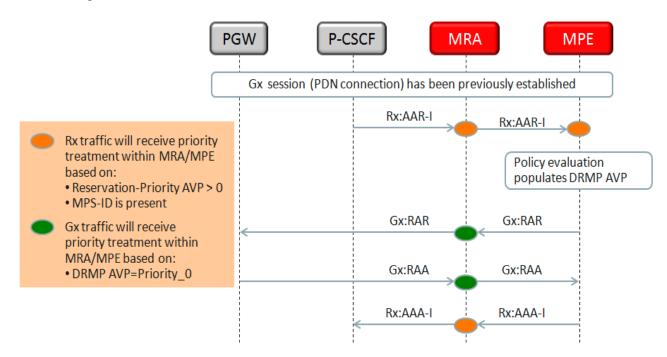
The feature "Enhanced Priority for eMPS Based Wireless Priority Services" enables Oracle PCRF Release 12.2.0.0 products to support Multimedia Priority Support as defined in 3GPP 29.212 and the Diameter message priority mechanism defined in Annex J of 3GPP TS 29.213.

To be specific, PCRF performs the following actions when it receives Rx: AAR requests whose service information including an MPS session indication and the service priority level from P-CSCF:

Grants highest priority to the messages;

May include a DRMP AVP indicating a priority level in the requests to the PCEF and also grants highest priority to them.

The message flow is summarized below:



# **Policy Changes**

New policy actions are defined to set DRMP AVP to specified value. The action is exposed to user when "Diameter 3GPP" mode is enabled.

User can use the existing policy conditions combining with the new policy action to add the DRMP AVP and assign a priority level to messages.

Policy Condition Group	Policy Condition or Action	Description
NA	Optional actions: set DRMP AVP to DRMP Level in Re-Authorized Request	This action is exposed to user when mode "Diameter 3GPP" is enabled. It is used to set the DRMP AVP to specified priority level in Gx: RAR messages. Only one value can be specified. The DRMP Level can be one of: PRIORITY_0 value 0 PRIORITY_1 value 1 PRIORITY_2 value 2 PRIORITY_3 value 3 PRIORITY_4 value 4 PRIORITY_6 value 6 PRIORITY_6 value 6 PRIORITY_7 value 7 PRIORITY_8 value 8 PRIORITY_9 value 9 PRIORITY_10 value 10 PRIORITY_11 value 11 PRIORITY_12 value 12 PRIORITY_13 value 13

	<ul> <li>PRIORITY_14 value 14</li> <li>PRIORITY_15 value 15</li> </ul>
--	--

## **Configuration Changes**

A group of new rules are added into default load shedding configuration, to proceed MPS messages when there is congestion

- For an upgrade of Policy Management from previous releases, the new load shedding rules need to be added manually.
- For a fresh install, no manual operations are needed because these rules are pre-defined automatically on CMP.

ſr		<u> </u>			1 .			Ĩ		i			1	]
Name	level	App	Message	avpName	initial		terminate		apnValue drmpName	drmpValue	mpsIdAndRpName	mpsIdAndRpE	cist Action	n
DefaultRule1	1	Gx	CCR	CC-Request-Type	1	-999	-999	Called-Station-Id	DRMP			false	DIAMETER_TO	O_BUSY
DefaultRule14	1	Gx	CCR	CC-Request-Type	1	-999	-999	Called-Station-Id	DRMP	0	]	false	ACCEPT	
DefaultRule4	1	Gxx	CCR	CC-Request-Type	1	-999	-999	Called-Station-Id	]			false	DIAMETER_TO	O_BUSY
Name	level	App	Message	avpName	initial	upgrade	terminate	apnName	apnValue drmpName	e drmpValue	mpsldAndR	pName	mpsIdAndRpExist	Action
DefaultRule17	2	Rx	AAR	Rx-Request-Type	0	-999	-999	Called-Station-Id			MPS-Identifier_Rese	rvation-Priority	true	ACCEPT
DefaultRule2	2	Gx	CCR	CC-Request-Type	1	-999	-999	Called-Station-Id	DRMP				false	DIAMETER_TOO_BUSY
DefaultRule15	2	Gx	CCR	CC-Request-Type	1	-999	-999	Called-Station-Id	DRMP	0	]		false	ACCEPT
DefaultRule5	2	Gxx	CCR	CC-Request-Type	1	-999	-999	Called-Station-Id	]				false	DIAMETER_TOO_BUSY
DefaultRule7	2	Rx	AAR	Rx-Request-Type	0	-999	-999	Called-Station-Id	]		MPS-Identifier_Rese	rvation-Priority	false	DIAMETER_TOO_BUSY
Name	level	App	Message	avpName	initial	uparade	terminate	apnName	apnValue drmpName	drmpValue	mpsIdAndR	pName	mpsIdAndRpExist	Action
DefaultRule3			CCR	CC-Request-Type		2	-999	Called-Station-Id	DRMP	]			false	DIAMETER_TOO_BUSY
DefaultRule3 DefaultRule16	3		CCR		1	<u> </u>		<u> </u>	DRMP DRMP	]0	]		false false	
	3 3	Gx	CCR CCR	CC-Request-Type	1	2	-999	Called-Station-Id	DRMP	]0	]			DIAMETER_TOO_BUSY
DefaultRule16	3 3 3	Gx Gx Gxx	CCR CCR CCR	CC-Request-Type CC-Request-Type	1	2	-999 -999	Called-Station-Id Called-Station-Id	DRMP	0	MPS-Identifier_Rese	rvation-Priority	false false	DIAMETER_TOO_BUSY ACCEPT
DefaultRule16 DefaultRule6	3 3 3 3	Gx Gx Gxx Rx	CCR CCR CCR	CC-Request-Type CC-Request-Type CC-Request-Type	1 1 1 0	2	-999 -999 -999	Called-Station-Id Called-Station-Id Called-Station-Id	DRMP	0	]	,	false false false	DIAMETER_TOO_BUSY ACCEPT DIAMETER_TOO_BUSY
DefaultRule16 DefaultRule6 DefaultRule8	3 3 3 3 3	Gx Gxx Rx Rx	CCR CCR CCR AAR	CC-Request-Type CC-Request-Type CC-Request-Type Rx-Request-Type	1 1 1 0	2	-999 -999 -999 -999	Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id	DRMP	]0	MPS-Identifier_Rese	,	false false false	DIAMETER_TOO_BUSY ACCEPT DIAMETER_TOO_BUSY DIAMETER_TOO_BUSY
DefaultRule16 DefaultRule6 DefaultRule8 DefaultRule18	3 3 3 3 3 3	Gx Gxx Rx Rx	CCR CCR CCR AAR AAR	CC-Request-Type CC-Request-Type CC-Request-Type Rx-Request-Type	1 1 1 0	2 2 2 1 1	-999 -999 -999 -999 -999	Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id	DRMP	]0	MPS-Identifier_Rese	,	false false false true false	DIAMETER_TOO_BUSY ACCEPT DIAMETER_TOO_BUSY DIAMETER_TOO_BUSY ACCEPT
DefaultRule 1 6 DefaultRule6 DefaultRule8 DefaultRule 1 8 DefaultRule9	3 3 3 3 3 3 3 3	Gx Gxx Rx Rx Sh Sy	CCR CCR CCR AAR AAR PNR SNR	CC-Request-Type CC-Request-Type CC-Request-Type Rx-Request-Type Rx-Request-Type	1 1 0 0 -999 -999	2 2 2 1 -999 -999	-999 -999 -999 -999 -999 -999 -999	Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id	DRMP		MPS-Identifier_Rese	rvation-Priority	false false false true false	DIAMETER_TOO_BUSY ACCEPT DIAMETER_TOO_BUSY DIAMETER_TOO_BUSY ACCEPT DIAMETER_TOO_BUSY
DefaultRule16 DefaultRule6 DefaultRule8 DefaultRule18 DefaultRule10 DefaultRule10	3 3 3 3 3 3 3 1 8 9	Gx Gxx Gxx Rx Rx Sh Sy App	CCR CCR CCR AAR AAR PNR SNR	CC-Request-Type CC-Request-Type CC-Request-Type Rx-Request-Type Rx-Request-Type	1 1 0 -999 -999	2 2 2 1 -999 -999	-999 -999 -999 -999 -999 -999 -999	Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id	DRMP		MPS-Identifier_Rese	rvation-Priority	false false false true false	DIAMETER_TOO_BUSY ACCEPT DIAMETER_TOO_BUSY DIAMETER_TOO_BUSY ACCEPT DIAMETER_TOO_BUSY
DefaultRule16 DefaultRule6 DefaultRule8 DefaultRule18 DefaultRule9 DefaultRule10 Name	3 3 3 3 3 3 <b>Jevel</b> 4	Gx Gxx Gxx Rx Rx Sh Sy App	CCR CCR AAR AAR PNR SNR Message JLNR	CC-Request-Type CC-Request-Type CC-Request-Type Rx-Request-Type Rx-Request-Type Rx-Request-Type	1 1 0 -999 -999 1 <b>upgro</b>	2 2 2 1 -999 -999 -999	-999 -999 -999 -999 -999 -999 -999	Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id Called-Station-Id	DRMP		MPS-Identifier_Rese MPS-Identifier_Rese pName	pExist Action	false false false true false	DIAMETER_TOO_BUSY ACCEPT DIAMETER_TOO_BUSY DIAMETER_TOO_BUSY ACCEPT DIAMETER_TOO_BUSY

#### MPE

MRA
-----

Name	level	App	Message	avpName	initial	upgrade	terminate	apnName	apnValue	drmpName	drmpValue	mpsIdAndRpName	mpsIdAndRpEx	st Action	
DefaultRule1	1	Gx	CCR	CC-Request-Type	1	-999	-999	Called-Station-Id		DRMP			false	DIAMETER_TO	O_BUSY
DefaultRule2	1	Gxx	CCR	CC-Request-Type	1	-999	-999	Called-Station-Id		DRMP		5	false	DIAMETER_TO	O_BUSY
DefaultRule6	1	Gx	CCR	CC-Request-Type	1	-999	-999	Called-Station-Id		DRMP	0		false	ACCEPT	
Name	level	App	Message	avpName	initial	upgrade	terminate	apnName	apnValue	drmpName	drmpValue	mpsIdAndR	Name	npsIdAndRpExist	Action
DefaultRule2	2	Gx	CCR	CC-Request-Type	1	-999	-999	Called-Station-Id		DRMP			f	alse	DIAMETER_UNABLE_TO_COMPLY
DefaultRule5	2	Gxx	CCR	CC-Request-Type	1	-999	-999	Called-Station-Id					f	alse	DIAMETER_UNABLE_TO_COMPLY
DefaultRule7	2	Rx	AAR	Rx-Request-Type	0	-999	-999	Called-Station-Id				MPS-Identifier_Rese	vation-Priority f	alse	DIAMETER_UNABLE_TO_COMPLY
Name	leve	el Ap	Messag	e avpName	initia	Upgrade	eterminate	apnName	apnValue	e drmpNam	e drmpValue	e mpsldAndi	pName	mpsIdAndRpExis	Action
DefaultRule3	3	Gx	CCR	CC-Request-Typ	e 1	2	-999	Called-Station-I	d	DRMP				false	DIAMETER_UNABLE_TO_COMPLY
DefaultRule6	3	Gx	CCR	CC-Request-Typ	e 1	2	-999	Called-Station-I	d					false	DIAMETER_UNABLE_TO_COMPLY
DefaultRule8	3	Rx	AAR	Rx-Request-Type	1	2	-999	Called-Station-I	d			MPS-Identifier_Res	ervation-Priority	false	DIAMETER_UNABLE_TO_COMPLY
DefaultRule9	3	Sh	PNR	7	-999	-999	-999	Called-Station-I	d					false	DIAMETER UNABLE TO COMPLY
DefaultRule1	03	Sy	SNR	j	-999	-999	-999	Called-Station-le	d					false	DIAMETER_UNABLE_TO_COMPLY
DefaultRule1 Name				 ge avpName initi						drmpValue	mpsidAnd	RpName mpsIdAnd	pExist Action	false	
	leve	el Ap				ade term	inate apnt			drmpValue	mpsIdAnd	RpName mpsidAnd	pExist Action	false	
Name	<b>lev</b>	el Ap Drm	p Messa		al upgi	ade term	inate apnt			drmpValue	mpsidAnd			false	

## **Performance Impacts**

The new default group of load shedding rules will allow more messages to be process in MPE and MRA, when system is over loaded. This behavior will cause system more quickly into higher level of busy state.

## 3.29.3 User Interface Changes

The configuration changes are in Diameter 3GPP mode only.

In MPE and MRA Load Shedding Rule edit page, when Application is Gx and Message is CCR, add one parameter: DRMP.

lame	MyRule	
Filter		
Application	Gx	<b>T</b>
Message	CCR	-
-Request Type	5	
<ul> <li>Initial</li> </ul>	Update	Terminate
APNs		(CSV)
DRMP		(CSV,0-15)
Action		
Accept		
Drop		
Answer With		
O Answer With		nd Vendor ID
Code		

# Load Shedding Rule Edit Page: Gx CCR

## **Parameter:**

DRMP: value from 0 to 15, if there is more than one values, use comma separated values. Such as: 1,2,3. The parameter is used to check the DRMP AVP value in messages.

In MPE and MRA Load Shedding Rule edit page, when Application is Rx and Message is AAR add one parameter: Check MPS and Reservation Priority.

lame	MyRule	
Filter		
Application	Rx	*
Message	AAR	*
-Request Type	es	
Initial	Update	Terminate
APNs		(CSV)
Check MPS and Reservation Prio	rity 🕑	
Action		
Accept		
O Drop		
Answer With		*
<ul> <li>Answer With</li> <li>Code</li> </ul>	an	d Vendor ID

#### **Parameter:**

Check MPS and Reservation Priority: Check the existence of AVPs: MPS-Identifier and Reservation-Priority or not.

In MRA Load Shedding Rule edit page, when Application is Gx, RAR message type is added. And parameter [DRMP] is also added.

ame	MyRule	
Filter	1	_
Application	Gx	*
Message	RAR	Ŧ
ORMP		(CSV,0-15)
Action		

# Load Shedding Rule Edit Page: Gx RAR

# **Parameter:**

DRMP: value from 0 to 15, if there is more than one value, use comma separated values such as: 1,2,3. The parameter is used to check the DRMP AVP value in messages.

# 3.30 SELECTIVE TRIGGERING OF POLICY EVALUATION ON STR AND CCR-T (PR# 20632502)

#### 3.30.1 Introduction

This feature allows the operator to select which terminate messages (Rx:STR and/or Gx:CCR-T) will trigger policy evaluation on their reception. Currently the selection applies to both Rx:STR and Gx:CCR-T.

#### 3.30.2 Detailed Description

Two configuration parameters control the behavior of the feature:

- Existing parameter 'DIAMETER.PolicyExecutionOnSessionTermination'. 'True' means that all termination messages trigger policy evaluation; 'false' means only the applications listed in the next parameter will trigger policy evaluation.
- New parameter 'DIAMETER.AppsToEvaluateOnTermination'. Only the applications listed here ('Rx' / 'Gx' / 'Rx,Gx') will trigger policy evaluation.

#### 3.30.3 User Interface Changes

POLICY SERVER > Configuration > [MPE] > Policy Server > Advanced

					The second se
	Category	Configuration Key	Туре	Value	Default Value
]	Diameter	DIAMETER.AppsToEvaluateOnTermination	String	Rx	Undefined
	0				
rvice	e Overrides				To a construction of the second se
rvice	Category	Configuration Key	Туре	Value	Default Value

The settings in the example above mean that not all the termination messages will trigger policy evaluation and that only Rx:STR will.

# 3.31 SETTING GX PARAMETERS VIA POLICY ACTION BASED ON RX REQUEST (PR# 20632554)

#### 3.31.1 Introduction

The feature "Enable Setting Gx Session-Level Parameters on Rx Request" allows Gx session-level parameters to be set during policy execution of an Rx:AAR message.

This allows the AAR to maintain its data and be processed, while simultaneously allowing for Gx parameters to be set without impact on the AAR data.

#### 3.31.2 Detailed Description

The Gx parameters will be set via the policy action:

#### Advanced: set values for QoS and Charging parameters to specified value

That is, a policy can be written containing the above action and, upon reception of an Rx:AAR, the Gx:RAR message will be sent back with the required Gx session-level parameters set as per the policy action.

#### **3.31.3** User Interface Changes

The following policy example will be executed upon reception of an Rx:AAR and the indicated parameters will be sent in a Gx:RAR.

#### Policy Description

where the flow is an application flow Advanced: set values for QoS and Charging parameters to Diameter APN-Aggregate-Max-Bitrate-DL Diameter APN-Aggregate-Max-Bitrate-UL

512000 128000

continue processing message

# 3.32 VIRTUAL POLICY TABLES (PR# 19482300)

#### 3.32.1 Introduction

Virtual policy tables are representations of existing policy tables with no data of their own that can be used to test table changes without affecting existing tables and policies.

#### 3.32.2 Detailed Description

Policies that use virtual policy tables can be made to point to different tables with different values with no changes to the policies themselves.

#### 3.32.3 User Interface Changes

Virtual policy tables are created at POLICY MANAGEMENT > Policy Table Library > Virtual Policy Tables

Virtual Policy Table:	
Name	
Description	
Default Policy Table	TierRules_ep

In the same window while creating a virtual policy table, the virtual policy table can be associated with one or several configuration templates and different policy tables:

🖡 Add 🛛 🖻 Clone 📑 Edit 🛛 🗙 De	elete	
Configuration Template	Policy Table	

# 3.33 SUPPORT FOR CONFIGURATION TEMPLATES FOR CABLE (PR# 19646305)

## 3.33.1 Introduction

A configuration template is an object that contains configuration information common to two or more MPEs.

## 3.33.2 Detailed Description

They can be created and configured to include different kinds of parameters that apply to several MPEs such as:

- Logging level
- Policy server settings
- Event messaging
- Routing
- Diameter AF configuration
- Load-shedding rules

## 3.33.3 User Interface Changes

They are created at POLICY SERVER > Configuration Template

New Configuration Template Configuration	
Name Copy From Description / Location	<none></none>
Save Cancel	

And once created they can be configured with the desired configuration information and associated with an MPE:

Configuration Template: Conf	figTempl1_ep		
Template Logs Policy	Server Diameter Routing	Policies	Data Sources
Modify Delete			
Configuration			
Name Description	ConfigTempl1_ep		
Policy Server			
<u>guam-mpe-1</u>			

Once associated they appear under the corresponding MPE:

Policy Server: guam-mpe-1					
System Reports Logs	Policy Server	Diameter Routing	Policies	Data Sources	Sessio
Modify Delete Reapply C	onfiguration				
Configuration					
Name Status Version Description / Location	guam-mpe-1 On-line 12.2.0.0.0_53.1.0				
Secure Connection Legacy Type System Time	No No Oracle Sep 17, 2016 02:	00 PM EDT			
Associated Templates(lower i	numbered templa	ates take priority ov	er higher n	umbered templa	ates)
Priority Template Name					
1 <u>ConfigTempl1 ep</u>	2				

And indications are added whenever the information locally configured in the MPE differs from that in the template:

Policy Server: guam-mpe-1	-	
System Reports Logs	Policy Server	Diameter Routing
Modify Advanced		
Associations		
Applications	P-CSCF L	
Network Elements	PDN-GW PGW L	
Network Element Groups	<none></none>	
Notification Servers	<none></none>	
Subscriber Indexing		
Defaults		
Index by IPv4:	true L	
Index by IP-Domain-Id:	false	
Index by IPv6:	false	
Index by Username:	false	
Index by NAI:	false	
Index by E.164 (MSISDN):	true L	
Index by IMSI:	true L	
< No Overrides by APN >		
Configuration		
Time Of Day Triggering	disabled T	
Default Local Time Mode	system	

In the example above "L" indicates Local information, i.e., not set by the template and "T" indicates Template information, i.e., information that has overridden the original local settings.

# 3.34 SIG-C ADDRESS SUPPORT (PR# 238974)

## 3.34.1 Introduction

This feature introduces support for a third signaling interface, SIG-C, in addition to SIG-A and SIG-B for both MPEs and MRAs.

## 3.34.2 Detailed Description

SIG-C can be used just like SIG-A/SIG-B and has the same capabilities as those interfaces.

SIG-C support can be observed:

- During platform initial configuration
- During cluster/server configuration in the CMP GUI
- Through the use of the two configuration keys that filter the availability of SIG-A/SIG-B/SIG-C for SCTP in both MPEs and MRAs. The following configuration keys determine which signaling interfaces are allowed to be used with SCTP:
  - For MPEs: *DIAMETER.Sctp.SIGDeviceFilter*. The default value is 'SIGA;SIGB;SIGC' meaning that all three interfaces can be used with SCTP.
  - For MRAs: *DIAMETERDRA.Sctp.SIGDeviceFilter* (notice the different name). The default value is also 'SIGA;SIGB;SIGC' meaning that all three interfaces can be used with SCTP.

#### 3.34.3 User Interface Changes

These are some of the instances where support for SIG-C can be found:

#### 3.34.3.1 SIG-C in VLAN IDs

PLATFORM SETTING > Topology Settings > ... > Add MPE/MRA Cluster

BCluste	r Settings	 
General Settings		 Network Configuration
Name		General Network
Appl Type	MPE	VLAN ID
W Type	C-Class	OAM 3
		SIG-A 5
1		 SIG-B 6
DAM VIP		SIG-C 7

On the right under Network Configuration it can be seen that SIG-C is available for VLAN ID use.

# 3.34.3.2 SIG-C for Signaling VIP

PLATFORM SETTING > Topology Settings > ... > Add MPE/MRA Cluster > Add New VIP

Type Inter OAM 3 HW Type C-Class OAM VIP OAM SIG-A 5 SIG-B 6 SIG-C 7 Signaling VIPs Add New VIP SHI Down Signaling VIP Delete Server-A New Signaling VIP Delete Server-A Signaling VIP Signaling VIP Signal					ology Config	nuuon			
Settings     Network Configur       Name     Appl     General Network       Appl     MPE     VLAN I       OAM     Type     VLAN I       HW Type     C-Class     VLAN I       OAM VIP     Image: Contract of the server of t	Ecluster Sel	tings							
Appl MPE Type MPE HW Type C-Class SIG-A 5 SIG-A 5 SIG-B 6 SIG-C 7 Add New VIP EN Delete Signaling VIP Add New VIP EN Delete Signaling VIP Delete Server-A Signaling VIP Delete Server-A Signaling VIP Mask Interface SIG-C Sig-B Save Cancel IP Signal S								Network	Configuration
Type MPE OAM VIE HW Type C-Class OAM VIE COAM VIE Signaling VIPs Add New VIE SIN Datase Signaling VIE Add New VIE SIN Datase Add New VIE SIN Datase SIG-C 7 Add New VIE SIN Datase SIG-C 7 Signaling VIE New Signaling VIE New Signaling VIE Signaling	ame							Genera	l Network-
HW Type C-Class OAM IB SIG-A S SIG-A S SIG-A S SIG-A S SIG-C 7  Add New VIP SIGNAING VIP Add New VIP SIGNAING VIP Delete Server-A Signaling VIP General Settings IP Signaling VIP IP Signaling VI							*		VLAN ID
CAM VIP	and the second se	155					*	1202	
OAM VIP									
Add New VIP   Signaling   VIPs     Add New VIP     Add	AM VIP							1262.0	
Signaling VIPs Add New VIP Server-A General Settings IP IP Preference IP Preference Forced Standby					Add New VID	Í			-
Add New VIP					Hau new VIP				
Server-A     New Signaling VIP       Delete Server-A     Signaling VIP       General Settings     Mask       IP     Mask       IP     SiG-C       IP     SiG-C       IP Preference     IPv4       IPv6	IPs						*		
Server-A     New Signaling VIP       Delete Server-A     Signaling VIP       General Settings     Mask       IP     Mask       IP     SiG-C       IP     SiG-C       IP Preference     IPv4       IPv6									
Server-A     New Signaling VIP       Delete Server-A     Signaling VIP       General Settings     Mask       IP     Mask       IP     SiG-C       IP     SiG-C       IP Preference     IPv4       IPv6									
Server-A     New Signaling VIP       Delete Server-A     Signaling VIP       General Settings     Mask       IP     Mask       IP     SiG-C       IP     SiG-C       IP Preference     IPv4       IPv6	_						+		
Delete Server-A Signaling VIP   General Settings Mask   IP Interface   SIG-A Save   SIG-B Save   Cancel SIG-C   IP Preference   IP Vef   HostName   Load   Forced Standby					Add New VIP	594			
General Settings     Mask       IP     SIG-C       IP     SIG-A       SIG-B     Save       Cancel     SIG-C	Eserver-A	( <u> </u>	New Signaling	VIP					
General Settings Mask Interface SIG-C  IP Preference O IPv4 O IPv6 HostName Load Forced Standby O	Delete Sen	A A	Signaling VIP						
IP     SIG-A       IP Preference     IPv4       HostName     Load       Forced Standby     IPve	General Se	ttings							
IP     SIG-8     Save     Cancel       IP Preference     IPv4     IPv6       HostName     Load       Forced Standby			Interface	SIG-C					
IP Preference O IPv4 O IPv6 HostName Load Forced Standby O	IP						Save	Cancel	
HostName Load Forced Standby									
HostName Load Forced Standby	IP Preferenc	e () 10-	A (0) 10/6						
Forced Standby									1
Forced Standby	HostName	Load							
Server-8	Forced Stand								
Add County D	Server-B							_	
	Add Server	в							
and the second s									

#### 3.34.3.3 Static IPs can use SIG-C

PLATFORM SETTING > Topology Settings > ... > Add MPE/MRA Cluster

Delete Server-A				
General Settings				nfiguration
IP	<ip1>&lt;10.196.164.9&gt;</ip1>		Static IP	<10.196.164.7/26> <sig-c></sig-c>
P Preference	IPv4 O IPv6	Add New IP Edit Orlate		
lostName				Add N

As can be seen on the right under Path Configuration, the Static IP assigned to this server uses the SIG-C interface.

#### 3.34.3.4 SIG-C in Georedundant Settings

PLATFORM SETTING > Topology Settings > ... > Add MPE/MRA Cluster

		Topology Config	uration							
Cluster Set			DSCP Marking	PHB(Non	e)	¥				
Appl Type	MPE		Replication Stream Count	1		one	OAM.	SIG-A	SIG-B SIG-C	ARE
Site Preference	Normal		Replication & Heartbeat Backup Heartbeat			0	0	0	0 <b>4</b> 0	00

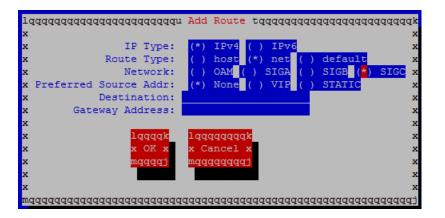
Replication & Heartbeat and Backup Heartbeat can now use SIG-C as well.

## 3.34.3.5 *Platform Configuration*

SIG-C is also available during platform initial configuration:

Jddddddddddddddddddddd	Initial Configuration tqqqqqqqqqqqqqqqqqqqqqqqqqqq
x	x
	guam-mpe-1ax
x OAM Real IPv4 Address:	10.240.152.79/26x
x OAM IPv4 Default Route:	10.240.152.66 x
x OAM Real IPv6 Address:	x
x OAM IPv6 Default Route:	X
x NTP Servers:	10.250.54.75 <u>x</u>
x NTP Servers: x DNS Server A: x DNS Server B: x DNS Search: x OAM Device:	X
x DNS Server B:	X
x DNS Search:	X
	bond0x
x OAM VLAN: x SIGA VLAN: x SIGB VLAN:	85 <u> </u>
x SIGA VLAN:	86 <u> </u>
	87x
x SIGC VLAN: x x	<mark>8</mark> 9 x
x	x
x	lddddr ldddddddr x
x	x OK x x Cancel x x
x	waddaj wdaddaddi x
x	x
x	x
waaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa	<u>aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa</u>

As well as in:



## 3.35 POLICY CONNECTION DIRECTOR (PR# 22293420)

### 3.35.1 Introduction

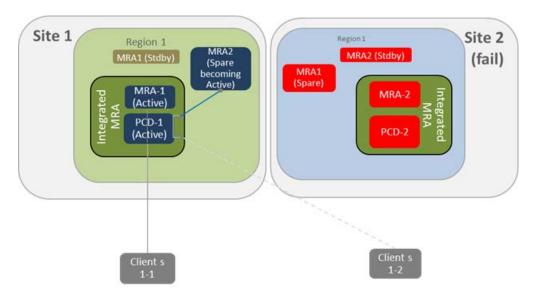
The Policy Connection Director (PCD) feature adds connection-level routing capabilities to an MRA in addition to the existing Diameter-level routing (using realm or hostname) and binding-level routing (using DRA binding information).

### 3.35.2 Detailed Description

PCD allows a specific client (a network element) to specify a primary and a secondary MRA connection.

When the PCD functionality is added to an MRA, inter-MRA connections are established between the designated primary and secondary MRAs for the indicated network element only.

When a site failure occurs with PCD configured, messages from the indicated network element and intended for the failed MRA site are sent instead to the secondary site where the backup MRA will send them directly to the spare MRA site without parsing the messages for Diameter or Binding routing. The impact on processing on the backup MRA is minimal as the redirection is done at the connection level.



3.35.3 User Interface Changes

Under the existing MRA Associations window and **only** when an association has already been created) the new Client Mapping panel now appears:

(	Client Mapping			
	Network Element	Primary MRA	Secondary MRA	
				*

The Client Mapping panel allows for the creation of a PCD connection between the primary and the secondary MRAs and associated with the indicated network element:

Add	Add Client Mapping	
Networ	Network Element Primary MRA Secondary MRA Save Cancel	1400_HH_PGW

Once a client mapping association has been created, the inter-MRA PCD connection between the network element and the MRA can be seen at MRA > Reports > Diameter AF Statistics:

ID	IP Address : F	Port Currently a	ctive connections	Con	nect Time		Disconnect	Time
AF1	10.148.233.88 : 3	34101	1	Tue May 03 0	07:29:22 EDT	2016	N/A	
pcd-mpe-vg.com	10.196.132.155 :	3868	1	Tue May 03 0	06:09:05 EDT	2016	N/A	
pcd mra2.oracle.com	10.148.234.214 :	51636	2	Tue May 03 0	06:09:06 EDT	2016	N/A	
ameter AF PCD Peer								
Diameter AF PCD Peer		P Address : Port	Currently active	connections	Con	nect Ti	me	Disconnect Tim

In the above example the network element AF1 has a PCD connection to the MRA mra2.oracle.com

## 3.36 POLICY VNF MANAGEMENT (PR# 20837199)

## 3.36.1 Introduction

The VNF Management feature introduces into Policy Management a new application called NF Agent.

The NF Agent provides VNF Management services and acts as the integration point for orchestration software (NFVO) and Virtual Infrastructure Manager (VIM) interfaces via APIs.

VNF Management services provide the functionality that allows the virtual instance of an application (a VNF) to be instantiated, managed, and destroyed.

#### 3.36.2 Detailed Description

The NF Agent is a hidden web service application that provides the logical interface and mappings between virtual deployments and Policy Management objects and logic.

It is accessed via the CMP application during MPE/MRA cluster and server configuration.

It keeps mappings between logical MPE/MRA and virtual instances.

It currently supports two VIM connection types called OpenStack API and OpenStack Heat API.

#### 3.36.3 User Interface Changes

Two new interface changes are introduced due to this feature.

#### 3.36.3.1 VIM Connections

A new object is introduced, a VIM Connection:

MY FAVORITES + POLICY SERVER + POLICY MANAGEMENT + SPR + SUBSCRIBER + NETWODY	Create VIM Connection General Configuration Name Description	
<ul> <li>NETWORK</li> <li>MRA</li> <li>SYSTEM WIDE REPORTS</li> <li>PLATFORM SETTING</li> <li>Platform Configuration Setting</li> <li>Topology Settings</li> </ul>	VIM Type Host Port Secure Connection Username Tenant	OpenStack API OpenStack HEAT 5000
NF Management SNMP Settings UPGRADE GLOBAL CONFIGURATION SYSTEM ADMINISTRATION	Password Save Cancel	

Two VIM types are supported, OpenStack API and OpenStack HEAT.

This object allows the establishment of connections to the different Virtual Infrastructure Managers (VIMs) responsible for creating/reading/updating/deleting the necessary virtual instances of MPE/MRA.

#### 3.36.3.2 Topology

A new hardware type option for creating an MPE/MRA cluster:

MY FAVORITES POLICY SERVER POLICY MANAGEMENT SPR SUBSCRIBER NETWORK	Cluster Settings       General       Settings       Name       Appl Type       HW Type       VM(Automated)	<b>v</b>
MRA     SYSTEM WIDE REPORTS     PLATFORM SETTING	OAM VIP	Add New VIP Edit Delete
Platform Configuration Setting	Signaling VIPs	
Topology Settings NF Management		
SNMP Settings   UPGRADE  GLOBAL CONFIGURATION		Add New VIP Edit Delete
SYSTEM ADMINISTRATION HELP	Delete Server-A General Settings	
	VIM Connection Instance Name	×
	Image	
	Affinity Zone	V

The VM (Automated) hardware type allows the creation of MPE/MRA clusters as virtual instances.

When VM (Automated) is selected as hardware type, it prompts the display of a new set of options for the servers making up the new cluster.

The VIM Connection used provides additional instructions (Image, Flavor, etc.) can be passed to the VIM to specify the type of virtual instance needed to be created.

When the Save button is clicked and data has been collected, the CMP does a REST POST to the NF Agent which in turn instructs the VIM to create the new VM with the indicated parameters.

## 3.37 GX PENDING TRANSACTION RACE CONDITION (PR# 24304274)

## 3.37.1 Introduction

This enhancement allows successful Rx session establishment when Policy Management receives a second AAR message within a short time.

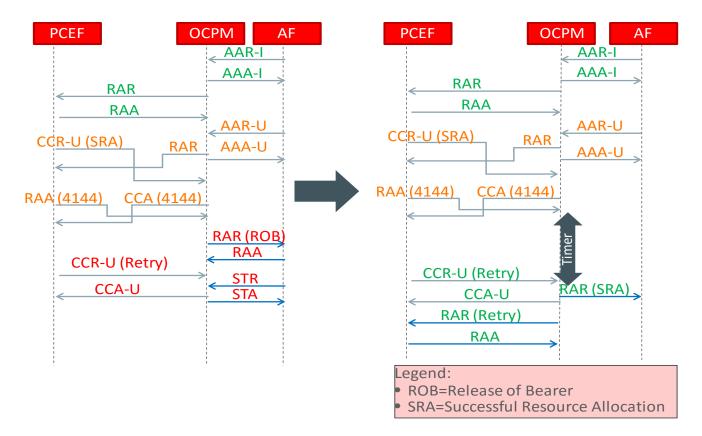
## 3.37.2 Detailed Description

Policy Management will no longer immediately send an Rx:RAR with Release of Bearer. Instead, Policy Management shall initiate a timer, and take the following actions:

• If Policy Management receives a Gx:CCR-U (presumably a retry of the previous failed CCR-U) for this subscriber before the timer expires, it shall respond with a Gx:CCA-U indicating success, and perform subsequent actions as needed to process the CCR-U (including, in the use case discussed, sending an RAR with the Specific-Action AVP indicating Successful Resource Allocation).. This behavior is illustrated on the right side of Figure 1.

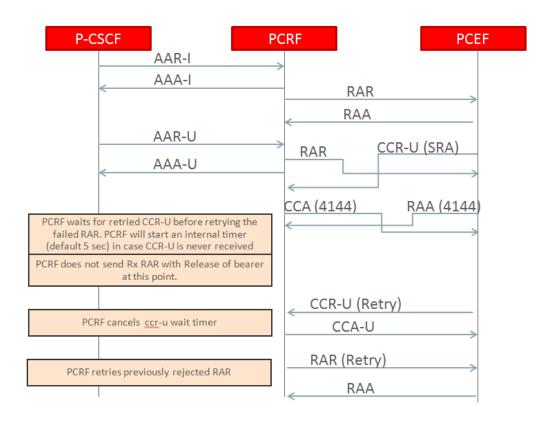
• If the timer expires before a Gx:CCR-U is received, Policy Management shall perform the appropriate failure processing as was previously done.

The message flow is summarized below:



NOTE: Left side of above figure is current behavior. Right side is the behavior enhanced

The detailed message flow is summarized below:



3.37.3 GUI Configuration Changes

The below two new configurations are introduced in conjunction with *DIAMETER.Gx.RaceModeratorEnabled=true* 

Variable Name (Default)	Required/ Optional	Туре	Description
DIAMETER.Gx. RarRetryOnCcrRace (disabled by default)	Required	Boolean	This property controls whether to resend Gx:RAR when the diameter message is not received by the destination host, as still on the way.
DIAMETER.Gx. CcrRetryWaitTime	Optional	Integer	The time in millisecond which PCRF server will wait for client request retry before retry server pending request. This configuration is applied when RarRetryOnCcrRace is true.

## 4.0 PROTOCOL FLOW/PORT CHANGE

Additional 1813/UDP port support for default factory Firewall rules specifically for CMCC deployment.

## 5.0 OSSI XML/ SNMP MIB CHANGE

In the following table, the Added, changed and Deleted MIBs are listed, for the Delta of Policy Releases 9.9.2/11.5.x/12.1.x to 12.2.

#### NOTE:

#### **Policy Management MIBs**

Release 9.9.2  $\rightarrow$  12.2 Release 11.5.x  $\rightarrow$  12.2

Release $11.5.x \rightarrow 12.2$
perfMIBNotificationsTransportClosedNotify
perfMIBNotificationsTransportDisconnectedNotify

**Issue**: Notifications removed from MIB.

**Impact**: If this new MIB is compiled to the central NMS and Release 9.9.2 or 11.5.x system emits these notifications, the operator will not be able to translate these notifications. NO impact to Release 12.1.x system.

Recommendation: No Action, documentation only.

Release $12.1.x \rightarrow 12.2$					
pcrfMIBNotificationsQPFailedToExecuteRecaptureIpv4Notify					
pcrfMIBNotificationsQPFailedToPrepareRecaptureIpv4Notify					
pcrfMIBNotificationsOPFailedToRollbackRecaptureIpv4Notify					

**Issue**: Notifications removed from MIB.

**Impact**: If this new MIB is compiled to the central NMS and Release 9.9.2, 11.5.x, or 12.1.x system emits these notifications, the operator will not be able to translate these notifications.

Recommendation: No Action, documentation only.

## Policy Platform (TPD) Changes from 6.7.0.x and 6.7.2.x to 7.0.3.x

Change Type	MIB Module	Notification Name
Changed	TEKELEC-TPD-ALARMS-MIB	tpdDeviceIfWarn

#### <u>Old</u>

[trapSequenceNumber, alarmLocation, alarmState, alarmId, alarmSeverity, alarmText, alarmTime, bindVarNamesValuesStr, hrDeviceDescr, hrDeviceErrors, alarmNumber, alarmEventType, alarmProbableCause, alarmAdditionalInfoStr] New

[trapSequenceNumber, alarmLocation, alarmState, alarmId, alarmSeverity, alarmText, alarmTime, hrDeviceDescr, hrDeviceErrors, bindVarNamesValuesStr, alarmNumber, alarmEventType, alarmProbableCause, alarmAdditionalInfoStr]

**Issue**: Notification VarBinds have changed order.

**Impact**: Operator will get wrong values in a mixed version environment between Releases of 9.9.2 or 11.5.x with Release 12.2

Recommendation: Contact Oracle Technical Support

## 5.1 DELTA CHANGES FROM POLICY 9.9.2 (TPD 6.7.0.X)

Change Type	MIB Module	OID	Notification Name
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.31301	comcolHaTopologyNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32540	comcolTpdCpuPowerLimitMismatchNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32348	comcolTpdFipsSubsystemProblemNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32537	comcolTpdFipsSubsystemWarningNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32337	comcolTpdFlashProgramFailureNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32347	comcolTpdHWMGMTCLIProblemNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32701	comcolTpdHidsBaselineCreatedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32702	comcolTpdHidsBaselineDeletedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32707	comcolTpdHidsBaselineUpdatedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32704	comcolTpdHidsDisabledNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32703	comcolTpdHidsEnabledNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32349	comcolTpdHidsFileTamperingNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32706	comcolTpdHidsResumedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32705	comcolTpdHidsSuspendedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32346	comcolTpdOEMHardwareProblemNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32350	comcolTpdSecurityProcessDownNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32338	comcolTpdSerialMezzUnseatedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.86306	pcrfMIBNotificationsCMPApplyFailedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70501	pcrfMIBNotificationsClusterMixedVersionNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70502	pcrfMIBNotificationsClusterReplicationInhibitedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71403	pcrfMIBNotificationsConnectivityDegradedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71402	pcrfMIBNotificationsConnectivityLostNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70505	pcrfMIBNotificationsISOMismatchNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.86308	pcrfMIBNotificationsNCMPReferdObjMissNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.86303	pcrfMIBNotificationsNWCMPApplyFailedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.74103	pcrfMIBNotificationsNeWithoutCmtsIpNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71003	pcrfMIBNotificationsOmStatsExceptionErrorNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71002	pcrfMIBNotificationsOmStatsParseErrorNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71005	pcrfMIBNotificationsOmStatsValueExceedErrorNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70045	pcrfMIBNotificationsQPDNSServerIsNotAvailableNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70041	pcrfMIBNotificationsQPFailedToBlockAllIPv4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70040	pcrfMIBNotificationsQPFailedToBlockOAMIPv4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70043	pcrfMIBNotificationsQPFailedToRemoveAllIPv4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70042	pcrfMIBNotificationsQPFailedToRemoveOAMIPv4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70044	pcrfMIBNotificationsQPFailedToRollbackrecaptureIpv4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70039	pcrfMIBNotificationsQPHasBlockedIPv4Notify

Added         PCRF-ALARM-MIB         1.5.6.1.4.1.223.5.3.29.1.270001         pcrfMIRsDiffcationSQPNotyEnProteotholity           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.223.5.3.29.1.270001         pcrfMIRsDiffcationSQPNotyEnProteotholity           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.223.5.3.29.1.270001         pcrfMIRsDiffcationSCMPSINCFALISNOTy           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.223.5.3.29.1.2.86300         pcrfMIRSDiffcationSCMPSINCFALISNOTy           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.223.5.3.29.1.2.86300         pcrfMIRSDiffcationSCMPSINCFALISNOTy           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.323.5.3.29.1.2.86300         pcrfMIRSDiffcationSCMPUNREACHABLINGTY           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.323.5.3.29.1.2.70000         pcrfMIRSDiffcationSEVEPUNREACHABLINGTY           Added         PCRF-ALARM-MIB         1.3.6.1.4.3.23.5.3.29.1.2.70000         pcrfMIRSDiffcationSUpgradeInProgresSIOH7           Added         PCRF-ALARM-MIB         1.3.6.1.4.3.23.5.3.29.1.2.70000         pcrfMIRSDiffcationSUPgradePerionFaileRhoffy           Added         PCRF-ALARM-MIB         1.3.6.1.4.3.23.5.3.29.1.2.70000         pcrfMIRSDiffcationSUPgradePerionFaileRhoffy           Added         PCRF-ALARM-MIB         1.3.6.1.4.3.23.5.3.29.1.2.70000         pcrfMIRSDiffcationSUPgradePerionFaileRhoffy           Added         PCRF-ALARM-MIB </th <th>Added</th> <th>PCRF-ALARM-MIB</th> <th>1.3.6.1.4.1.323.5.3.29.1.2.70038</th> <th>perfNUDNetificationsODUesDlackedOANUDv4Netify</th>	Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70038	perfNUDNetificationsODUesDlackedOANUDv4Netify
Added         PCRF-ALARM-MIB         13.6.1.4.1323.5.3.29.1.27000         pcrfMIBN0tificationSQPResourceNotEseVetWorthy           Added         PCRF-ALARM-MIB         13.6.1.4.1323.5.3.29.1.286307         pcrfMIBN0tificationSQPResourceNotEseVetWorthy           Added         PCRF-ALARM-MIB         1.3.6.1.4.1323.5.3.29.1.286307         pcrfMIBN0tificationSCMP9VRCFAILBN0tify           Added         PCRF-ALARM-MIB         1.3.6.1.4.1323.5.3.29.1.2.86307         pcrfMIBN0tificationSCMP9VRCFAILBN0tify           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.323.5.3.29.1.2.0500         pcrfMIBN0tificationSCMP9VRCFAILBN0tify           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.323.5.3.29.1.2.70500         pcrfMIBN0tificationSCVPFORCeStareNtotify           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.323.5.3.29.1.2.70500         pcrfMIBN0tificationSUpgradeDrogressNotIfy           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.323.5.3.29.1.2.70500         pcrfMIBN0tificationSUpgradeDrogressNotIfy           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.323.5.3.29.1.2.70500         pcrfMIBN0tificationSUCConnectionLostNotify           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.323.5.3.3.1.2.70500         pcrfMIBN0tificationSUCConnectionLostNotify           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.323.5.3.3.1.2.70500         pcrfMIBN0tificationSUCConnectionLostNotify           Added <td< td=""><td></td><td></td><td></td><td></td></td<>				
Added         PCRF-AARM-MB         13.6.14.3223.5.29.1.27000         pcrfMBNDtificationSQPsourceWatRedyNotify           Added         PCRF-AARM-MB         13.6.14.3225.3.29.1.27000         pcrfMBNDtificationSCMPSDteSNbtRotify           Added         PCRF-AARM-MB         13.6.14.1325.3.29.1.28630         pcrfMBNDtificationSCMPSDtESNbtRotify           Added         PCRF-AARM-MB         13.6.14.1325.3.29.1.27068         pcrfMBNDtificationSCMPSDtESNtPSDtESnabWotify           Added         PCRF-AARM-MB         13.6.14.1325.3.29.1.27068         pcrfMBNDtificationSCVPUNREACHAELNOITY           Added         PCRF-AARM-MB         13.6.14.1325.3.29.1.27060         pcrfMBNDtificationSCVPUNREACHAELNOITY           Added         PCRF-AARM-MB         13.6.14.1325.3.29.1.27060         pcrfMBNDtificationSVPUNFCereationActiveVersionNUTY           Added         PCRF-AARM-MB         13.6.14.1325.3.29.1.27090         pcrfMBNDtificationSVLograduProgressNUTY           Added         PCRF-AARM-MB         13.6.14.1325.3.29.1.27990         pcrfMBNDtificationSVLOgraduProgressNUTY           Added         PCRF-AARM-MB         13.6.14.1325.3.29.1.27990         pcrfMBNDtificationSVLOPperationErrorNotify           Added         TEKELECTPD-AARM-MB         13.6.14.1325.3.3.1.29         pdfmBNDtificationSVLOPperationErrorNotify           Added         TEKELECTPD-AARM-MB         13.6.14.1325.3.3.1.29         pdfmBNDtificationSV				
Added         PCFF-LLARM-MIB         13.6.1.4.1.323.5.3.29.1.2 6300         pcr/MIRNUTICationsSCMP2VKCPLSNotify           Added         PCFF-LLARM-MIB         13.6.1.4.1.323.5.3.29.1.2 6830         pcr/MIRNUTICationsSCMP2VKCPLSNotify           Added         PCFF-LLARM-MIB         13.6.1.4.1.323.5.3.29.1.2 70500         pcr/MIRNUTICationsSCMP2VKCPLSNotify           Added         PCFF-LARM-MIB         13.6.1.4.1.323.5.3.29.1.2.70500         pcr/MIRNUTICationsScrPPCINEAChIANSANE/SOMINUTI/           Added         PCFF-LARM-MIB         13.6.1.4.1.323.5.3.29.1.2.70500         pcr/MIRNUTICationsSterveTorceStandup/Notify           Added         PCFF-LARM-MIB         13.6.1.4.1.323.5.3.29.1.2.70500         pcr/MIRNUTICationsSterveTorceStantonIty           Added         PCFF-LARM-MIB         13.6.1.4.1.323.5.3.29.1.2.70500         pcr/MIRNUTICationsSterveTorceStantonIty           Added         PCFF-LARM-MIB         13.6.1.4.1.323.5.3.29.1.2.79500         pcr/MIRNUTICationsSterveTorceStantonIty           Added         PCFF-LARM-MIB         13.6.1.4.1.323.5.3.29.1.2.79500         pcr/MIRNUTICationsSterveTorceStantonIty           Added         PCFF-LARM-MIB         13.6.1.4.1.323.5.3.29.1.2.79500         pcr/MIRNUTICationsSterveTorceStantonIty           Added         PCFF-LARM-MIB         13.6.1.4.1.323.5.3.8.3.1.2.38         tpdfipStabsystemProblem           Added         TEKLEC TPD-LARM-SMIB         13.6.1.4.1				
Added         PCFF-LARM-MIB         13.6.14.1323.5.329.12.68307         pcr/MINNOTICiationsSCMP201R310005XMP201R31005XMP201R3105XMP201R3105000000000000000000000000000000000				· · ·
Added         PCFF-ALARM-MIB         1.3.6.1.4.1323.5.3.9.1.2.86300         pcr/MIBNOtificationsSCMPUREACHABLENDIfy           Added         PCF-ALARM-MIB         1.3.6.1.4.1323.5.3.9.1.2.70500         pcr/MIBNOtificationsServerForcedSandbyNotify           Added         PCR-ALARM-MIB         1.3.6.1.4.1323.5.3.9.1.2.70500         pcr/MIBNOtificationsServerForcedSandbyNotify           Added         PCR-ALARM-MIB         1.3.6.1.4.1323.5.3.2.9.1.2.70507         pcr/MISNOtificationsSystem/MixedVersionNotify           Added         PCRF-ALARM-MIB         1.3.6.1.4.1323.5.3.29.1.2.70507         pcr/MISNOtificationsUpgradeOperationNotify           Added         PCRF-ALARM-MIB         1.3.6.1.4.1323.5.3.29.1.2.79960         pcr/MISNOtificationSUPGradeOperationNotify           Added         PCRF-ALARM-MIB         1.3.6.1.4.1323.5.3.29.1.2.79996         pcr/MISNOtificationSUPGradeOperationEncrorNotify           Added         TEKELC-TPD-ALARM-SMIB         1.3.6.1.4.1323.5.3.1.8.3.1.2.3         tpdfpsSubsystemProblem           Added         TEKELC-TPD-ALARM-SMIB         1.3.6.1.4.1323.5.3.1.8.3.1.2.3         tpdfpsSubsystemProblem           Added         TEKELC-TPD-ALARM-SMIB         1.3.6.1.4.1323.5.3.1.8.3.1.4.2         tpdfHisbSubsystemProblem           Added         TEKELC-TPD-ALARM-SMIB         1.3.6.1.4.1323.5.3.1.8.3.1.4.2         tpdfHisbSubsystemProblem           Added         TEKELC-TPD-ALARM-SMIB				
Added         PCRF-ALARM-MIB         1.3.6.1.4.1323.5.3.29.1.2.7600         pcr/MIRNOTIFicationsScrwerForedStandbyNotify           Added         PCRF-ALARM-MIB         1.3.6.1.4.1323.5.3.29.1.2.70500         pcr/MIRNOTIFicationsServerForedStandbyNotify           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.323.5.3.29.1.2.70500         pcr/MIRNOTIFicationsServerFis2ombieNotify           Added         PCRF-ALARM-MIB         1.3.6.1.4.1.323.5.3.29.1.2.70500         pcr/MIRNOTIFicationsSypradeInProgradeIInProgradeInProgradEn				
Added         PCRF-ALARM-MIB         13.6.1.4.1.323.5.3.29.1.2.70508         pcr/MIBNOIfficationsServerisZombikoutly           Added         PCRF-ALARM-MIB         13.6.1.4.1.323.5.3.29.1.2.70500         pcr/MIBNOIfficationsServerisZombikoutly           Added         PCRF-ALARM-MIB         13.6.1.4.1.323.5.3.29.1.2.70500         pcr/MIBNOIfficationsSystemMixedVersionNotify           Added         PCRF-ALARM-MIB         13.6.1.4.1.323.5.3.29.1.2.70500         pcr/MIBNOIfficationsSystemMixedVersionNotify           Added         PCRF-ALARM-MIB         13.6.1.4.1.323.5.3.29.1.2.7050         pcr/MIBNOIfficationsXLConnectionLostNotify           Added         PCRF-ALARM-MIB         13.6.1.4.1.323.5.3.29.1.2.7095         pcr/MIBNOIfficationsXLConnectionLostNotify           Added         PCRF-ALARM-MIB         13.6.1.4.1.323.5.3.29.1.2.7095         pcr/MIBNOIfficationsXLConnectionLostNotify           Added         TEKELEC-TPD-ALARMS-MIB         13.6.1.4.1.323.5.3.18.3.1.2.40         tpdFipSubsystemVoilem           Added         TEKELEC-TPD-ALARMS-MIB         13.6.1.4.1.323.5.3.18.3.1.2.40         tpdFipSubsystemVoilem           Added         TEKELEC-TPD-ALARMS-MIB         13.6.1.4.1.323.5.3.18.3.1.41         tpdHipSubselinePoleted           Added         TEKELEC-TPD-ALARMS-MIB         13.6.1.4.1.323.5.3.18.3.1.42         tpdHipSubselinePoleted           Added         TEKELEC-TPD-ALARMS-MIB         13.6.1.4.1				
Added         PCRF-ALARM-MIB         13.6.1.4.1.323.5.3.29.1.2.70500         pcr/MIBNotificationsSystemMixedVersionNotify           Added         PCRF-ALARM-MIB         13.6.1.4.1.323.5.3.29.1.2.70500         pcr/MIBNotificationsSystemMixedVersionNotify           Added         PCRF-ALARM-MIB         13.6.1.4.1.323.5.3.29.1.2.70500         pcr/MIBNotificationsSystemMixedVersionNotify           Added         PCRF-ALARM-MIB         13.6.1.4.1.323.5.3.29.1.2.70500         pcr/MIBNotificationsSVNOPperationForNotify           Added         PCRF-ALARM-MIB         13.6.1.4.1.323.5.3.29.1.2.7990         pcr/MIBNotificationsSVConectionLostNotify           Added         PCRF-ALARM-MIB         13.6.1.4.1.323.5.3.29.1.2.7990         pcr/MIBNotificationsSVConectionLostNotify           Added         TEKELECTPD-ALARMS-MIB         13.6.1.4.1.323.5.3.18.3.1.3.41         tpdfipSubsystemProvelm           Added         TEKELECTPD-ALARMS-MIB         13.6.1.4.1.323.5.3.18.3.1.43         tpdfipSubsystemProvelm           Added         TEKELECTPD-ALARMS-MIB         13.6.1.4.1.323.5.3.18.3.1.43         tpdfipSubsystemProvelm           Added         TEKELECTPD-ALARMS-MIB         13.6.1.4.1.323.5.3.18.3.1.43         tpdfipSubsystemProvelm           Added         TEKELECTPD-ALARMS-MIB         13.6.1.4.1.323.5.3.18.3.1.43         tpdfipSubsystemProvelm           Added         TEKELECTPD-ALARMS-MIB         13.6.1.4.1.323.5.3.18.3.				
Added         PCRF-ALARM-MIB         13.61.41.323.5.3.29.1.270500         pcr/MIBNotifications/systemMixed/versionNotify           Added         PCRF-ALARM-MIB         13.6.1.41.323.5.3.29.1.270507         pcr/MIBNotifications/systemMixed/versionNotify           Added         PCRF-ALARM-MIB         13.6.1.41.323.5.3.29.1.270507         pcr/MIBNotifications/Upgrade/progressNotify           Added         PCRF-ALARM-MIB         13.6.1.41.323.5.3.29.1.279590         pcr/MIBNotifications/XIConnectionLostNotify           Added         PCRF-ALARM-MIB         13.6.1.41.323.5.3.29.1.279590         pcr/MIBNotifications/XIConnectionLostNotify           Added         TEKELECTPD-ALARMS-MIB         13.6.1.41.323.5.3.18.3.1.3.40         tpdfipSubsystemProblem           Added         TEKELECTPD-ALARMS-MIB         13.6.1.41.323.5.3.18.3.1.3.41         tpdfipSubsystemProblem           Added         TEKELECTPD-ALARMS-MIB         13.6.1.41.323.5.3.18.3.1.42         tpdfipSubsystemVroblem           Added         TEKELECTPD-ALARMS-MIB         13.6.1.41.323.5.3.18.3.1.42         tpdfipSubsystemVroblem           Added         TEKELECTPD-ALARMS-MIB         13.6.1.41.323.5.3.18.3.1.42         tpdfipSubsystemVroblem           Added         TEKELECTPD-ALARMS-MIB         13.6.1.4.1.323.5.3.18.3.1.42         tpdfipSubsystemVroblem           Added         TEKELECTPD-ALARMS-MIB         13.6.1.4.1.323.5.3.18.3.1.42 <td< td=""><td></td><td></td><td></td><td></td></td<>				
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Added         PCRF-ALARM-MB         13.61.4.1.323.5.3.29.1.279906         pcrfMIBNUTIGATIONS/COnnectionLostNutify           Added         TEKELEC-TPD-ALARMS-MIB         13.61.4.1.323.5.3.18.3.1.3.41         tpdfpipSubsystemProblem           Added         TEKELEC-TPD-ALARMS-MIB         13.61.4.1.323.5.3.18.3.1.3.81         tpdfpipSubsystemProblem           Added         TEKELEC-TPD-ALARMS-MIB         13.61.4.1.323.5.3.18.3.1.3.81         tpdfpipSubsystemProblem           Added         TEKELEC-TPD-ALARMS-MIB         13.61.4.1.323.5.3.18.3.1.3.81         tpdflidsBaselineCreated           Added         TEKELEC-TPD-ALARMS-MIB         13.61.4.1.323.5.3.18.3.1.4.81         tpdflidsBaselineUpdated           Added         TEKELEC-TPD-ALARMS-MIB         13.61.4.1.323.5.3.18.3.1.4.81         tpdflidsBaselineUpdated           Added         TEKELEC-TPD-ALARMS-MIB         13.61.4.1.323.5.3.18.3.1.4.81         tpdflidsBaselineUpdated           Added         TEKELEC-TPD-ALARMS-MIB         13.61.4.1.323.5.3.18.3.1.4.51         tpdflidsBaselineUpdated           Added         TEKELEC-TPD-ALARMS-MIB         13.61.4.1.323.5.3.18.3.1.4.51         tpdflidsBaselineUpdated           Added         TEKELEC-TPD-ALARMS-MIB         13.61.4.1.323.5.3.18.3.1.4.51         tpdflidsBaselineUpdated           Added         TEKELEC-TPD-ALARMS-MIB         13.61.4.1.323.5.3.2.3.12.51         tpdflidsSuspended      <		PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.78850	
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[DESCRIPTION]PCRF-ALARM-MIB1.3.6.1.4.1.323.5.3.29.1.2.32505comcolTpdSwapSpaceShortageWarningNotify[DESCRIPTION]PCRF-ALARM-MIB1.3.6.1.4.1.323.5.3.29.1.2.70015pcrfMIBNotificationsQPAddRouteFailedNotify[DESCRIPTION]1.3.6.1.4.1.323.5.3.29.1.2.70015pcrfMIBNotificationsQPAddRouteFailedNotify[Description]1.3.6.1.4.1.323.5.3.29.1.2.70015pcrfMIBNotificationsQPAddRouteFailedNotify[Description]1.3.6.1.4.1.323.5.3.18.3.1.3.14tpdDevicelfWarn[VarBinds]1.3.6.1.4.1.323.5.3.29.1.2.71402pcrfMIBNotificationsTransportClosedNotify		PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32307	comcolTpdSwapSpaceShortageErrorNotify
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[DESCRIPTION]     PCRF-ALARM-MIB     1.3.6.1.4.1.323.5.3.29.1.2.70015     pcrfMIBNotificationsQPAddRouteFailedNotify       [DESCRIPTION]     TEKELEC-TPD-ALARMS-MIB     1.3.6.1.4.1.323.5.3.18.3.1.3.14     tpdDevicelfWarn       [VarBinds]     1.3.6.1.4.1.323.5.3.29.1.2.71402     pcrfMIBNotificationsTransportClosedNotify		PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32505	comcolTpdSwapSpaceShortageWarningNotify
Changed [DESCRIPTION]PCRF-ALARM-MIB1.3.6.1.4.1.323.5.3.29.1.2.70015pcrfMIBNotificationsQPAddRouteFailedNotify[DESCRIPTION]TEKELEC-TPD-ALARMS-MIB1.3.6.1.4.1.323.5.3.18.3.1.3.14tpdDevicelfWarn[VarBinds]Image: Complexity of the state of the				
[DESCRIPTION]         Image: Constraint of the system		PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70015	pcrfMIBNotificationsQPAddRouteFailedNotify
[VarBinds]         PCRF-ALARM-MIB         1.3.6.1.4.1.323.5.3.29.1.2.71402         pcrfMIBNotificationsTransportClosedNotify				
Deleted PCRF-ALARM-MIB 1.3.6.1.4.1.323.5.3.29.1.2.71402 pcrfMIBNotificationsTransportClosedNotify	Changed	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.3.14	tpdDevicelfWarn
	[VarBinds]			
Deleted DCPE ALADM MID 12614122252201271402 perfMIDNetificationsTrepresentedNetific	Deleted	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71402	pcrfMIBNotificationsTransportClosedNotify
Deleted PCRT-ALARIVI-IVIIB 1.5.0.1.4.1.525.5.3.29.1.2.71403 pcrtwillshotifications transport/DisconnectedNotify	Deleted	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71403	pcrfMIBNotificationsTransportDisconnectedNotify

# 5.2 DELTA CHANGES FROM POLICY 11.5.X (TPD 6.7.2.X)

Change Type	MIB Module	OID	Notification Name
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.31301	comcolHaTopologyNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32540	comcolTpdCpuPowerLimitMismatchNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32348	comcolTpdFipsSubsystemProblemNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32537	comcolTpdFipsSubsystemWarningNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32337	comcolTpdFlashProgramFailureNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32347	comcolTpdHWMGMTCLIProblemNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32701	comcolTpdHidsBaselineCreatedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32702	comcolTpdHidsBaselineDeletedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32707	comcolTpdHidsBaselineUpdatedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32704	comcolTpdHidsDisabledNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32703	comcolTpdHidsEnabledNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32349	comcolTpdHidsFileTamperingNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32706	comcolTpdHidsResumedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32705	comcolTpdHidsSuspendedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32346	comcolTpdOEMHardwareProblemNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32350	comcolTpdSecurityProcessDownNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32338	comcolTpdSerialMezzUnseatedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79120	pcrfMIBNotificationsBatchDiskQuotaExceedsNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.86306	pcrfMIBNotificationsCMPApplyFailedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70501	pcrfMIBNotificationsClusterMixedVersionNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70502	pcrfMIBNotificationsClusterReplicationInhibitedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71403	pcrfMIBNotificationsConnectivityDegradedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71402	pcrfMIBNotificationsConnectivityLostNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79110	pcrfMIBNotificationsFilesUploadingFailureNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70505	pcrfMIBNotificationsISOMismatchNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79108	pcrfMIBNotificationsMSDiskNoSpaceNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79107	pcrfMIBNotificationsMSDiskQuotaExceedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79105	pcrfMIBNotificationsMediationSOAPTooBusyNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.86308	pcrfMIBNotificationsNCMPReferdObjMissNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.86303	pcrfMIBNotificationsNWCMPApplyFailedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.74103	pcrfMIBNotificationsNeWithoutCmtsIpNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71003	pcrfMIBNotificationsOmStatsExceptionErrorNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71002	pcrfMIBNotificationsOmStatsParseErrorNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71005	pcrfMIBNotificationsOmStatsValueExceedErrorNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70045	pcrfMIBNotificationsQPDNSServerIsNotAvailableNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70041	pcrfMIBNotificationsQPFailedToBlockAllIPv4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70040	pcrfMIBNotificationsQPFailedToBlockOAMIPv4Notify
			pcrfMIBNotificationsQPFailedToRemoveAllIPv4Notif
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70043	У

			I
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70042	pcrfMIBNotificationsQPFailedToRemoveOAMIPv4N otify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70044	pcrfMIBNotificationsQPFailedToRollbackrecaptureIp v4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70039	pcrfMIBNotificationsQPHasBlockedIPv4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70038	pcrfMIBNotificationsQPHasBlockedOAMIPv4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70017	pcrfMIBNotificationsQPNoStaticIPForRouteNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70016	pcrfMIBNotificationsQPNoVipForRouteNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70007	pcrfMIBNotificationsQPReaourceNotReadyNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71001	pcrfMIBNotificationsRemoteDiversionNotPossibleNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.86307	pcrfMIBNotificationsSCMPSYNCFAILSNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.86305	pcrfMIBNotificationsSCMPSplitBrainNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.86304	pcrfMIBNotificationsSCMPUNREACHABLENotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.72575	pcrfMIBNotificationsSMSRHTTPConnectionClosedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79106	pcrfMIBNotificationsSPRConnectionFailedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79109	pcrfMIBNotificationsSPRLicenselimitNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70503	pcrfMIBNotificationsServerForcedStandbyNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70508	pcrfMIBNotificationsServerIsZombieNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70500	pcrfMIBNotificationsSystemMixedVersionNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70507	pcrfMIBNotificationsUpgradeInProgressNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70506	pcrfMIBNotificationsUpgradeOperationFailedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.78850	pcrfMIBNotificationsVNFOperationErrorNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79995	pcrfMIBNotificationsX1ConnectionLostNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79996	pcrfMIBNotificationsX2ConnectionLostNotify
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.3.41	tpdCpuPowerLimitMismatch
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.2.49	tpdFipsSubsystemProblem
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.3.38	tpdFipsSubsystemWarning
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.2.38	tpdFlashProgramFailure
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.4.2	tpdHidsBaselineCreated
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.4.3	tpdHidsBaselineDeleted
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.4.8	tpdHidsBaselineUpdated
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.4.5	tpdHidsDisabled
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.4.4	tpdHidsEnabled
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.2.50	tpdHidsFileTampering
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.4.7	tpdHidsResumed
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.4.6	tpdHidsSuspended
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.2.51	tpdSecurityProcessDown
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.2.39	tpdSerialMezzUnseated
Changed [OBSOLETE]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.31223	comcolHaHbTransmitFailureNotify
Changed [OBSOLETE]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.31222	comcolHaNotConfiguredNotify
Changed			
[DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.31287	comcolHaSbrCompleteNotify

Changed			
[DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.31285	comcolHaSbrEntryNotify
	PCRFALARIVEIVIID	1.5.0.1.4.1.525.5.5.29.1.2.51265	
Changed		4 2 6 4 4 2 2 2 5 2 20 4 2 24 20 6	a successful a Charple a Na Ma
[DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.31286	comcolHaSbrPlanNotify
Changed			
[DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.31225	comcolHaSvcStartFailureNotify
Changed			
[DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32300	comcolTpdFanErrorNotify
Changed			
[DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32306	comcolTpdRamShortageErrorNotify
Changed			
[DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32503	comcolTpdRamShortageWarningNotify
Changed			
[DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32307	comcolTpdSwapSpaceShortageErrorNotify
Changed			
[DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32505	comcolTpdSwapSpaceShortageWarningNotify
Changed			
[DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70015	pcrfMIBNotificationsQPAddRouteFailedNotify
Changed			
[VarBinds]	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.3.14	tpdDevicelfWarn
Deleted	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71402	pcrfMIBNotificationsTransportClosedNotify
Deleted	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.71403	pcrfMIBNotificationsTransportDisconnectedNotify

# 5.3 DELTA CHANGES FROM POLICY 12.1.X (TPD 7.0.2.X)

Change Type	MIB Module	OID	Notification Name
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32540	comcolTpdCpuPowerLimitMismatchNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32348	comcolTpdFipsSubsystemProblemNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32537	comcolTpdFipsSubsystemWarningNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32337	comcolTpdFlashProgramFailureNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32701	comcolTpdHidsBaselineCreatedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32702	comcolTpdHidsBaselineDeletedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32707	comcolTpdHidsBaselineUpdatedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32704	comcolTpdHidsDisabledNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32703	comcolTpdHidsEnabledNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32349	comcolTpdHidsFileTamperingNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32706	comcolTpdHidsResumedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32705	comcolTpdHidsSuspendedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32350	comcolTpdSecurityProcessDownNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32338	comcolTpdSerialMezzUnseatedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79120	pcrfMIBNotificationsBatchDiskQuotaExceedsNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79110	pcrfMIBNotificationsFilesUploadingFailureNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79108	pcrfMIBNotificationsMSDiskNoSpaceNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79107	pcrfMIBNotificationsMSDiskQuotaExceedNotify

Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79105	pcrfMIBNotificationsMediationSOAPTooBusyNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.74103	pcrfMIBNotificationsNeWithoutCmtsIpNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70045	pcrfMIBNotificationsQPDNSServerIsNotAvailableNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70041	pcrfMIBNotificationsQPFailedToBlockAllIPv4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70040	pcrfMIBNotificationsQPFailedToBlockOAMIPv4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70043	pcrfMIBNotificationsQPFailedToRemoveAllIPv4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70042	pcrfMIBNotificationsQPFailedToRemoveOAMIPv4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70044	pcrfMIBNotificationsQPFailedToRollbackrecapturelpv 4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70038	pcrfMIBNotificationsQPHasBlockedOAMIPv4Notify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70017	pcrfMIBNotificationsQPNoStaticIPForRouteNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70016	pcrfMIBNotificationsQPNoVipForRouteNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70007	pcrfMIBNotificationsQPReaourceNotReadyNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79106	pcrfMIBNotificationsSPRConnectionFailedNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.79109	pcrfMIBNotificationsSPRLicenselimitNotify
Added	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.78850	pcrfMIBNotificationsVNFOperationErrorNotify
Added	TEKELEC-TPD-ALARMS-MIB	1.3.6.1.4.1.323.5.3.18.3.1.3.41	tpdCpuPowerLimitMismatch
Changed [DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.31287	comcolHaSbrCompleteNotify
Changed			
[DESCRIPTION] Changed	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.31285	comcolHaSbrEntryNotify
[DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.31286	comcolHaSbrPlanNotify
Changed [DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32300	comcolTpdFanErrorNotify
Changed [DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32347	comcolTpdHWMGMTCLIProblemNotify
Changed			
[DESCRIPTION] Changed	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32346	comcolTpdOEMHardwareProblemNotify
[DESCRIPTION] Changed	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32306	comcolTpdRamShortageErrorNotify
[DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32503	comcolTpdRamShortageWarningNotify
Changed [DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.32307	comcolTpdSwapSpaceShortageErrorNotify
Changed	PCRF-ALARM-MIB		
[DESCRIPTION] Changed		1.3.6.1.4.1.323.5.3.29.1.2.32505	comcolTpdSwapSpaceShortageWarningNotify
[DESCRIPTION] Changed	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70015	pcrfMIBNotificationsQPAddRouteFailedNotify
[DESCRIPTION]	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70039	pcrfMIBNotificationsQPHasBlockedIPv4Notify
Deleted	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70041	pcrfMIBNotificationsQPFailedToExecuteRecaptureIpv 4Notify
			pcrfMIBNotificationsQPFailedToPrepareRecaptureIpv
Deleted	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70040	4Notify pcrfMIBNotificationsQPFailedToRollbackRecaptureIp
Deleted	PCRF-ALARM-MIB	1.3.6.1.4.1.323.5.3.29.1.2.70042	v4Notify