Oracle® Communications Policy Management

CMP Wireless User Guide

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Oracle® Communications CMP Wireless User Guide, Release 11.1

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Chapter 1

About This Guide

Topics:

This chapter describes the organization of the document and provides other information that could be useful to the reader.

Introduction

This guide describes how to use the Configuration Management Platform (CMP) product to configure and manage Policy Management devices in a wireless network.

Conventions

The following conventions are used throughout this guide:

- **Bold text** in procedures indicates icons, buttons, links, or menu items that you can click.
- *Italic text* indicates variables.
- `Monospace text` indicates text displayed on screen.
- **`Monospace bold text`** indicates text that you enter exactly as shown.

How This Guide is Organized

The information in this guide is presented in the following order:

- *About This Guide* provides general information about the organization of this guide, related documentation, and how to get technical assistance.
- *The Policy Management Solution* provides an overview of the Multimedia Policy Engine (MPE) device, which manages multiple network-based client sessions; the network in which the MPE device operates; policies; and the Configuration Management Platform (CMP) system, which controls MPE devices and associated applications.
- *Configuring the Policy Management Topology* describes how to set the topology configuration.
- *Managing Multimedia Policy Engine Devices* describes how to use the CMP system to configure and manage the MPE devices in a network.
- *Configuring Protocol Routing* describes how to configure protocol routing.
- *Managing Network Elements* describes how to manage network elements.
- *Managing Application Profiles* describes how to manage application profiles.
- *Managing Match Lists* describes how to manage match lists, which provide whitelist and blacklist functions in the CMP system.
- *Managing Policy Counter Identifiers* describes how to manage policy counter IDs.
- *Managing Quotas* describes how to manage Gx and Gy quotas.
- *Managing Quota Conventions* describes how to manage quota conventions.
- *Managing Services and Rating Groups* describes how to manage Gy services and rating groups.
- *Managing Traffic Profiles* describes how to manage traffic profiles.
- *Managing Retry Profiles* describes defines how to manage retry profiles.
- *Managing Charging Servers* describes how to manage charging servers.
- *Managing Policy Time Periods* describes how to manage time periods.
- *Mapping Serving Gateways to MCCs/MNCs* describes how to map serving gateways to mobile country codes (MCCs) and mobile network codes (MNCs).
- *Managing Monitoring Keys* describes how to manage monitoring keys.
- *Managing Third-Party AVPs* describes how to manage attribute-value pair (AVP) data in Diameter messages issued by third-party vendors.

- *Managing Multi-Protocol Routing Agents* describes the Multi-Protocol Routing Agent (MRA), a standalone entity that supports MPE devices and is manageable by the CMP system.
- *Managing Subscriber Profile Repositories* describes how to manage subscriber profile repositories (SPRs).
- *Understanding and Creating Policy Rules* describes policy rules, which dynamically control how an MPE device processes protocol messages as they pass through it.
- *Managing Policy Rules* describes how to manage your library of policy rules and policy groups.
- *Managing Policy Tables* describes how to manage policy tables.
- *Managing Subscribers* describes how to manage subscriber tiers, entitlements, and quota usage within the CMP system.
- *System-Wide Reports* describes the reports available on the function of Policy Management systems in your network.
- *Upgrade Manager* describes the purpose of the Upgrade Manager GUI page and the elements found on that page.
- *System Administration* describes functions reserved for CMP system administrators.
- The appendix, *CMP Modes*, lists the functions available in the CMP system, as determined by the operating modes and sub-modes selected when the software is installed.

Scope and Audience

This guide is intended for the following trained and qualified service personnel who are responsible for operating Policy Management devices:

- System operators
- System administrators

Documentation Admonishments

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

Table 1: Admonishments

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

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

Customer Care Center

Oracle's Tekelec Customer Care Center is your initial point of contact for all product support needs. A representative takes your call or email, creates a Customer Service Request (CSR) and directs your requests to the Technical Assistance Center (TAC). Each CSR includes an individual tracking number. Together with TAC Engineers, the representative will help you resolve your request.

The Customer Care Center is available 24 hours a day, 7 days a week, 365 days a year, and is linked to TAC Engineers around the globe.

TAC Engineers are available to provide solutions to your technical questions and issues 7 days a week, 24 hours a day. After a CSR is issued, the TAC Engineer determines the classification of the trouble. If a critical problem exists, emergency procedures are initiated. If the problem is not critical, normal support procedures apply. A primary Technical Engineer is assigned to work on the CSR and provide a solution to the problem. The CSR is closed when the problem is resolved.

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

Related - Global

Email (All Regions): support@tekelec.com

- **USA and Canada**

  Phone:

  1-888-367-8552 (toll-free, within continental USA and Canada)

  1-919-460-2150 (outside continental USA and Canada)

  TAC Regional Support Office Hours:

  8:00 a.m. through 5:00 p.m. (GMT minus 5 hours), Monday through Friday, excluding holidays

- **Caribbean and Latin America (CALA)**

  Phone:

  +1-919-460-2150

  TAC Regional Support Office Hours (except Brazil):

  10:00 a.m. through 7:00 p.m. (GMT minus 6 hours), Monday through Friday, excluding holidays

  - **Argentina**

Phone:

0-800-555-5246 (toll-free)

- **Brazil**

  Phone:

  0-800-891-4341 (toll-free)

  TAC Regional Support Office Hours:

  8:00 a.m. through 5:48 p.m. (GMT minus 3 hours), Monday through Friday, excluding holidays

- **Chile**

  Phone:

  1230-020-555-5468

- **Colombia**

  Phone:

  01-800-912-0537

- **Dominican Republic**

  Phone:

  1-888-367-8552

- **Mexico**

  Phone:

  001-888-367-8552

- **Peru**

  Phone:

  0800-53-087

- **Puerto Rico**

  Phone:

  1-888-367-8552

- **Venezuela**

  Phone:

  0800-176-6497

- **Europe, Middle East, and Africa**

  Regional Office Hours:

  8:30 a.m. through 5:00 p.m. (GMT), Monday through Friday, excluding holidays

  - **Signaling**

    Phone:

+44 1784 467 804 (within UK)

- **Software Solutions**

  Phone:

  +33 3 89 33 54 00

- **Asia**
  - **India**

    Phone:

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

    TAC Regional Support Office Hours:

    10:00 a.m. through 7:00 p.m. (GMT plus 5 1/2 hours), Monday through Saturday, excluding holidays

  - **Singapore**

    Phone:

    +65 6796 2288

    TAC Regional Support Office Hours:

    9:00 a.m. through 6:00 p.m. (GMT plus 8 hours), Monday through Friday, excluding holidays

Emergency Response

In the event of a critical service situation, emergency response is offered by Oracle's Tekelec Customer Care Center 24 hours a day, 7 days a week. The emergency response provides immediate coverage, automatic escalation, and other features to ensure that the critical situation is resolved as rapidly as possible.

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

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

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

Related Publications

The Policy Management product set includes the following publications, which provide information for the configuration and use of Policy Management products in the following environments:

Cable

- *Feature Notice*
- *Cable Release Notes*
- *Roadmap to Hardware Documentation*
- *CMP Cable User's Guide*
- *Troubleshooting Reference*
- *SNMP User's Guide*
- *OSSI XML Interface Definitions Reference*
- *Platform Configuration User's Guide*
- *Bandwidth on Demand Application Manager User's Guide*
- *PCMM specification PKT-SP-MM-I06* (third-party document, used as reference material for PCMM)

Wireless

- *Feature Notice*
- *Wireless Release Notes*
- *Roadmap to Hardware Documentation*
- *CMP Wireless User's Guide*
- *Multi-Protocol Routing Agent User's Guide*
- *Troubleshooting Reference*
- *SNMP User's Guide*
- *OSSI XML Interface Definitions Reference*
- *Analytics Data Stream Reference*
- *Platform Configuration User's Guide*
- *Message Distribution Function Reference*

Wireline

- *Feature Notice*
- *Wireline Release Notes*
- *Roadmap to Hardware Documentation*
- *CMP Wireline User's Guide*
- *Troubleshooting Reference*
- *SNMP User's Guide*
- *OSSI XML Interface Definitions Reference*
- *Platform Configuration User's Guide*

Other Publications

The following documents are useful for reference:

- RADIUS RFCs:
  - RFC 2865: "RADIUS"
  - RFC 2866: "RADIUS Accounting"
  - RFC 3576: "Dynamic Authorization Extensions to RADIUS"
- Internet Engineering Task Force (IETF) Diameter-related RFCs:
  - RFC 3539: "Authentication, Authorization and Accounting (AAA) Transport Profile"
  - RFC 3588: "Diameter Base Protocol"
- 3rd Generation Partnership Project (3GPP) technical specifications:
  - 3GPP TS 23.203: "Policy and charging control architecture (Release 8)"
  - 3GPP TS 29.208: "End-to-end Quality of Service (QoS) signalling flows (Release 6)"
  - 3GPP TS 29.209: "Policy control over Gq interface (Release 6)"
  - 3GPP TS 29.211: "Rx Interface and Rx/Gx signalling flows (Release 6)"
  - 3GPP TS 29.212: "Policy and Charging Control over Gx/Sd reference point (Release 11)"
  - 3GPP TS 29.213: "Policy and Charging Control signalling flows and QoS parameter mapping (Release 11.4)"
  - 3GPP TS 29.214: "Policy and Charging Control over Rx reference point (Release 8)"
  - 3GPP TS 29.219: "Policy and Charging Control: Spending limit reporting over Sy reference point (Release 11.3)"
  - 3GPP TS 29.229: "Cx and Dx interfaces based on the Diameter protocol; Protocol details (Release 8)"
  - 3GPP TS 32.240: "Charging architecture and principles (Release 8)"
  - 3GPP TS 32.299: "Telecommunication management; Charging management; Diameter charging applications (Release 8)"
- 3rd Generation Partnership Project 2 (3GPP2) technical specifications:
  - 3GPP2 X.S0013-012-0: "Service Based Bearer Control — Stage 2"
  - 3GPP2 X.S0013-013-0: "Service Based Bearer Control — Tx Interface Stage 3"
  - 3GPP2 X.S0013-014-0: "Service Based Bearer Control — Ty Interface Stage 3"

Locate Product Documentation on the Customer Support Site

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

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

Chapter 2

The Policy Management Solution

Topics:

The Policy Management Solution provides an overview of the Multimedia Policy Engine (MPE) device, which manages multiple network-based client sessions; the network in which MPE devices operate; policies; and the Configuration Management Platform (CMP) system, which controls MPE devices and associated applications.

The Multimedia Policy Engine

The Multimedia Policy Engine (MPE) device provides a policy and charging rules function (PCRF) as defined in the 3rd Generation Partnership Project (3GPP) technical specification "Policy and charging control architecture" (TS 23.203). The MPE device includes a simple, powerful, and flexible policy rules engine. Through the use of policy rules, you can modify the behavior of an MPE device dynamically as it processes protocol messages.

A policy is a set of operator-created business rules. These business rules control how subscribers, applications, and network resources are used. Policies define the conditions and actions used by a carrier network to determine how network resources are allocated and used and how applications and subscribers are treated.

Figure 1: The Policy Management Solution and MPE Devices shows how the Tekelec Policy Management solution fits into a wireless network. The major elements of a Policy Management network are:

- MPE devices — Provide policy control decisions and flow-based charging control. When a request for a policy decision is received for a subscriber session, the MPE device obtains subscriber information, evaluates the applicable policies, and directs the enforcement device to handle the session based on policy rules. MPE devices can communicate with an online charging system (OCS) directly using an Sy interface. MPE devices can send Short Message Service (SMS) or Simple Mail Transfer Protocol (SMTP) notifications to subscribers, and analytics data stream (ADS) information, as a series of policy event records (PERs), to third-party systems for analysis.
- Subscriber Profile Repository (SPR) — Contains subscriber or subscription information. MPE devices can operate with either the Tekelec Subscriber Data Management (SDM) product or a third-party SPR. The communication protocol can be Sh or Lightweight Directory Access Protocol (LDAP). The Tekelec SPR supports a RESTful application programming interface (API) to provisioning and OCS systems.
- Diameter Routing Application — Depending on the size of the Policy Management network, a combination of stateful and dynamic Multi-Protocol Routing Agent (MRA) or Diameter Signaling Router (DSR) systems. MRA systems distribute the load between multiple MPE devices. DSR systems are multi-application Diameter agents that support segmented Policy Management networks.
- Configuration Management Platform (CMP) — Provides the policy console. The CMP system contains a centralized database of policy rules, policy objects, and network objects. Carriers can exchange database information in eXtensible Markup Language (XML) format with office support or back-office support systems (OSS/BSS). A system can communicate Policy Management network management information with network management stations (NMSs) using Simple Network Management Protocol (SNMP).

The Application Function (AF) is a network element offering applications that require dynamic policy or charging control over IP Connectivity Access Network (IP-CAN) user plane behavior. An example of an AF is a Proxy Call Session Control Function (P-CSCF) device. MPE devices communicate with AFs to obtain dynamic session information and send IP-CAN specific information and notifications about bearer-level events.

The Policy and Charging Enforcement Function (PCEF) receives requests to start new sessions for subscribers. Examples of PCEFs include a Gateway GPRS Support Node (GGSN), and a Packet Data Network Gateway (PGW). MPE devices communicate with PCEFs to receive requests for policy decisions and send those policy decisions to the PCEF for implementation.

The Traffic Detection Function (TDF) can permit, gate, shape, or redirect service traffic. An example of a TDF is a deep packet inspection (DPI) device.

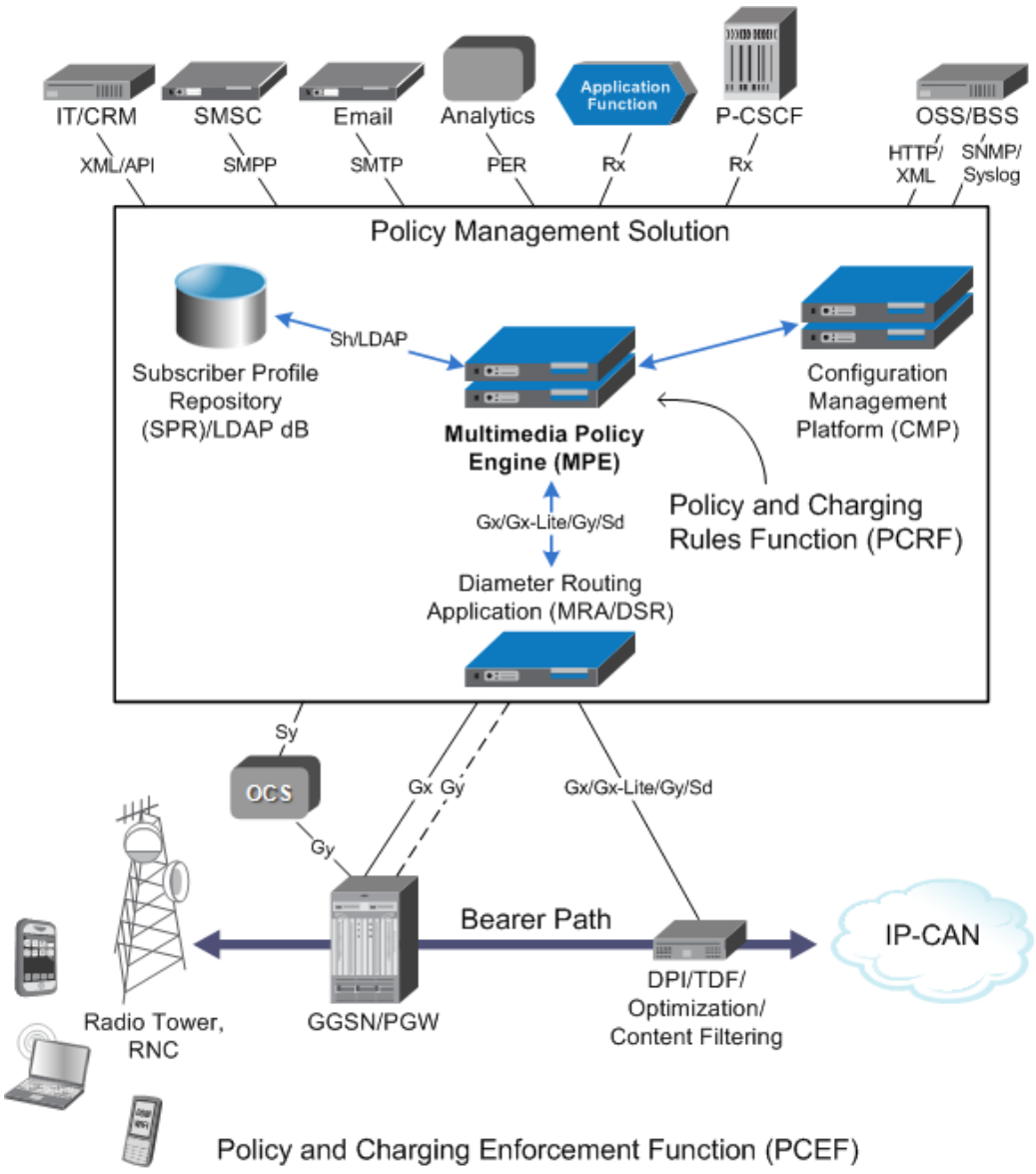


Figure 1: The Policy Management Solution and MPE Devices

Understanding Policy Rules

A policy rule is an if-then statement that has a set of conditions and actions. If the conditions are met, the actions are performed. You create policy rules within the CMP database, using a policy wizard that organizes a large number of conditions and actions to assist you in the construction of policy rules. Once you create policy rules, you manually deploy the rules to MPE devices.

You can combine policy rules to provide additional power and flexibility. When there are multiple policy rules, the order in which the policy rules are evaluated can also influence MPE device behavior, so the order of evaluation is also configurable through the CMP system. You can also organize policy rules into groups to simplify the management of policy rules. You can cause groups of rules to be executed.

The following are sample scenarios for which you might use policy rules:

- You can modify the contents of protocol messages using policy rules. For example, you could use a policy rule to override the requested bandwidth parameters in a request.
- You can create policy rules that track the use of resources for devices in the network and implement limits on how those resources are used.
- Some protocols allow for the provisioning of default QoS parameters for subscribers. With these protocols, policy rules can implement subscriber tiers where different subscribers have different bandwidth available.
- You can configure policy rules to monitor the reservation of bandwidth on network elements and notify operators when an element exceeds certain threshold levels.

The Configuration Management Platform

The Configuration Management Platform (CMP) provides centralized management and administration of policy rules, Policy Management devices, associated applications, and manageable objects, all from a single management console. This management console is web-based and supports the following features and functions:

- Configuration and management of MPE devices
- Configuration and management of MRA devices
- Configuration of connections to subscriber profile repository (SPR) devices
- Definition of network elements
- Creation, modification, deletion, and deployment of policy rules
- Creation, modification, and deletion of objects that can be included in policy rules
- Monitoring of individual product subsystem status
- Administration and management of CMP users
- Upgrading the Policy Management software on devices

Organizing Policy Rules

The CMP system includes features to simplify the management of multiple policy rules.

The order in which rules are evaluated is important. The CMP system lets you configure the evaluation order of policies. See *Structure and Evaluation of Policy Rules*.

The CMP system provides a policy template feature to simplify the creation of multiple policy rules that have similar conditions and actions. Once you create a policy template, you can use it to create additional rules. See *Creating a Policy Template*.

The CMP system also provides a policy rule grouping feature. Policy rules can be organized into groups and the groups can be used to simplify the process of deploying policies to MPE devices. See

Creating a Policy Group. Policy rule groups can be executed with a single action. See *Structure and Evaluation of Policy Rules*.

Policies with similar conditions or actions can be consolidated into tabular form. See *Managing Policy Tables*.

Specifications for Using the GUI

Tekelec recommends the following:

- **Web Browsers** —
  - Mozilla Firefox release 23.0.1 or higher
  - Microsoft Internet Explorer 9.0 or higher
- **Monitor** — 1024 x 768 or higher

  Note: When using the CMP system for the first time, it is recommended that you change the default username and password to a self-assigned value. See *Changing a Password* for information on this procedure.

Logging In

The CMP system supports either HTTP or HTTPS access. Access is controlled by a standard username/password login scheme.

Note: The CMP system also supports carrier-specific network authentication and authorization environments. For information on setting up an alternate login process, see *System Administration*.

Before logging in, you need to know the following:

- The IP address of the CMP system
- Your assigned username
- The account password

Note: As delivered, the profile **`admin`** provides full access privileges, and is the assumed profile used in all procedures described in this document. The default username of this profile is **`admin`** and the default password is **`policies`**. You cannot delete this user profile, but you should immediately change the password. See *Creating a User Profile* for information about user profiles.

To log in:

1. Open a web browser and enter the IP address of the CMP system.
   The login page opens (*Figure 2: CMP Login Page* shows an example).

   Note: The title and text on the login page are configurable. For information on changing this page, see *Configuring System Settings*.

2. Enter the following information in the appropriate fields:
   a) **Username**
   b) **Password**
3. Click **Login**.
   The main page opens.

You are logged in.

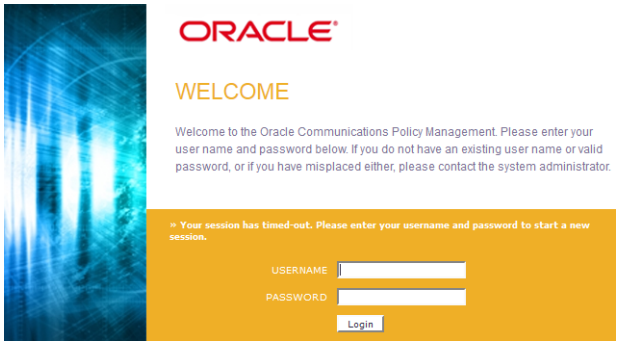


Figure 2: CMP Login Page

Logging In to a Standby or Secondary-Site CMP System

Most of the procedures in this document begin with you logged in to the active server of the primary CMP system. A few procedures require you to log in to the active server of a secondary CMP system, and it is also possible to log in to the standby server of a CMP cluster. The functions available on other servers are limited.

- If you log in to the standby server of a primary CMP cluster, the work area displays the prompt "Warning: This server you signed in is the Primary Standby Server."
- If you log in to the active server of a secondary CMP cluster, the work area displays the prompt "Warning: This server you signed in is the Secondary Active Server."
- If you log in to the standby server of a secondary CMP cluster, the work area displays the prompt "Warning: This server you signed in is the Secondary Standby Server."

In all cases, you are limited to the Platform Setting functions **Platform Configuration Settings** and **Topology Settings**. Status information for all other servers is not available and is displayed as **out-of-service**.

GUI Overview

You interact with the CMP system through an intuitive and highly portable Graphical User Interface (GUI) supporting industry-standard web technologies (SSL, HTTP, HTTPS, IPv4, IPv6, and XML). *Figure 3: Structure of the CMP GUI* shows the structure of the CMP GUI.

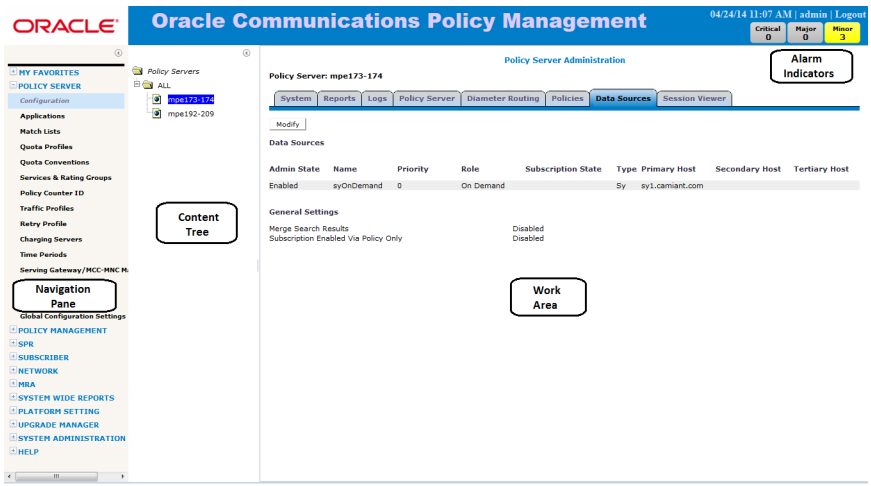


Figure 3: Structure of the CMP GUI

- **Navigation Pane** — Provides access to the various available options configured within the CMP system.

  You can bookmark options in the Navigation pane by right-clicking the option and selecting **Add to Favorite**. Bookmarked options can be accessed from the **My Favorites** folder at the top of the Navigation pane. Within the My Favorites folder, you can arrange or delete options by right-clicking the option and selecting **Move Up**, **Move Down**, or **Delete from Favorite**.

  You can collapse the navigation pane to make more room by clicking the button in the top right corner of the pane. Click the button again to expand the pane.

- **Content Tree** — Contains an expandable/collapsible listing of all the defined items for a given selection. For content trees that contain a group labeled **ALL**, you can create customized groups that display on the tree.

  The content tree section is not visible with all navigation selections.

  You can collapse the content tree to make more room by clicking the button in the top right corner of the pane. Click the button again to expand the tree. You can also resize the content tree relative to the work area.

- **Work Area** — Contains information that relates to choices in both the navigation pane and the content tree. This is the area in which you perform all work.
- **Alarm Indicators** — Provides visual indicators that show the number of active alarms.

GUI Icons

The CMP GUI provides icons for removing, deleting, or changing the sequential order of items displayed in a list:

Calendar icon — Use this to select a date and, in some cases, time.

Delete icon — When visible in the work area, selecting the Delete icon deletes an item, removing it from the MPE device.

Note: Deleting an item from the **ALL** folder also deletes the item from any associated group. A delete verification window opens when this icon is selected.

Move icons — The up/down arrow icons are displayed when it is possible to change the sequential order of items in a list.

Details icon — The binoculars icon displays when it is possible to view more details for an item.

External Connection icon — When visible in the work area, indicates which server currently has the external connection (the active server).

Gear — The gear icon displays when a policy references another policy or policy group.

Hide icon — When visible in the work area, selecting the hide icon removes the item from the current view.

Note: The item is only hidden during the current session. The item will be visible the next time a user logs into the CMP system.

Remove icon — When visible in the work area, selecting the Remove icon removes an item from the group it is associated with. The item is still listed in the ALL group and any other group that it is currently associated with. For example, if you remove MPE device PS_1 from policy server group PS_Group2, PS_1 still displays in the ALL group.

Shortcut Selection Keys

The CMP GUI supports the following standard browser techniques for selecting multiple items from a list:

- **Shift/click** — selects two or more consecutive items. To do this, select the first item, then Shift/click a second item to select both items and all items in between.
- **Control/click** — selects two or more non-consecutive items. To do this, hold down the Ctrl key as you click each item.

Changing a Password

The Change Password option lets users change their password. This system administration function is available to all users.

Note: The **admin** user can change any user's password.

If a system administrator has configured your account for password expiration, you will receive a warning when you log in that you will need to change your password.

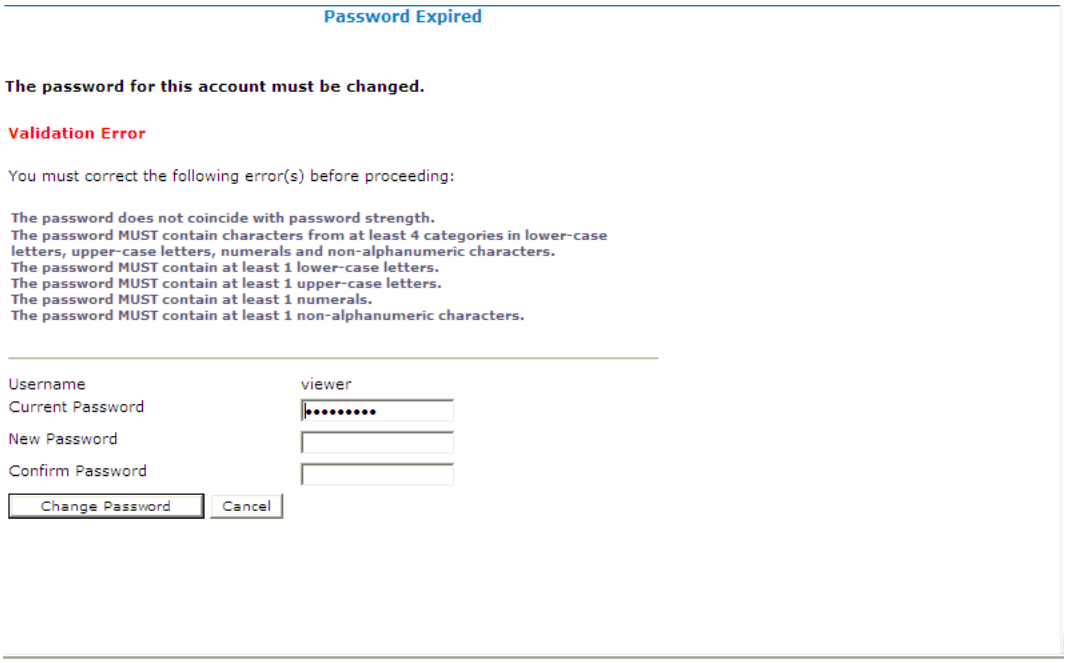
To change your password:

1. From the **System Administration** section of the navigation pane, select **Change Password**. The Change Password page opens. If your account is set up with a password expiration period, the expiration date is displayed.
2. Enter the following information:
   a) **Current Password** — The present value of the password.
   b) **New Password** — The value of the new password.

This value is case sensitive and must conform to the password strength rules. The password cannot contain the user name.

c) **Confirm Password** — Retype the new password.

If your new password does not conform to the password strength rules, a validation error message appears; for example:



Enter and confirm another password that conforms to the rules.

3. When you finish, click **Change Password**.

Your password is changed.

Overview of Main Tasks

The major tasks involved in using MPE devices are configuration, defining profiles, defining manageable elements, creating and deploying policy rules, managing subscribers, and administering the authorized CMP users.

The configuration tasks are a series of required steps that must be completed in the following order:

1. Configure the topology, which defines the addresses of Policy Management clusters in your network. These steps are described in *Configuring the Policy Management Topology*.
2. Configure policy server profiles for MPE devices. This step is described in *Managing Multimedia Policy Engine Devices*.
3. Configure protocol routing, which enables a Policy Management device to forward requests to other Policy Management devices for further processing. This step is described in *Configuring Protocol Routing*.

The element and profile definition tasks you need to perform depend on what exists on your network. They can be defined in any order at any time as needed. Once elements and profiles are defined, you can refer to them in policy rules. The complete set of tasks are as follows:

- Create network element profiles, including protocol options, for each network element with which the MPE or MRA devices interact. This task is described in *Managing Network Elements*.
- Specify which MPE or MRA device will interact with which network element(s). This task is described in *Managing Multimedia Policy Engine Devices* and *Managing Multi-Protocol Routing Agents*.
- Create application profiles, which specify protocol information to associate each request with an application. This task is described in *Managing Application Profiles*.
- Create match lists, which provide whitelist and blacklist functions. This task is described in *Managing Match Lists*.
- Create policy counter identifiers, which are values stored in online charging servers. This task is described in *Managing Policy Counter Identifiers*.
- Create Gx and Gy quotas, which set limits on a subscriber's usage. This task is described in *Managing Quotas*.
- Configure rollover and top-up information. This task is described in *Managing Quota Conventions*.
- Create Gy services, which identify a class of traffic and can be collected into rating groups. This task is described in *Managing Services and Rating Groups*.
- Create traffic profiles, which define default settings for protocol messages. This task is described in *Managing Traffic Profiles*.
- Create retry profiles, which specify the circumstances under which installation of certain rules is retried in the event of a failure. This task is described in *Managing Retry Profiles*.
- Define charging servers, which are applications that calculate billing charges for a wireless subscriber. This task is described in *Managing Charging Servers*.
- Define policy time periods to specify in policy time-of-day conditions. This task is described in *Managing Policy Time Periods*.
- Map serving gateways to mobile country codes (MCCs) and mobile network codes (MNCs). This task is described in *Mapping Serving Gateways to MCCs/MNCs*.
- Define monitoring keys, which are unique strings that identify the quota profile to be used by certain rules for usage tracking. This task is described in *Managing Monitoring Keys*.
- Define how policy rules will process attribute-value pairs (AVPs) used in Diameter messages by third-party vendors. This task is described in *Managing Third-Party AVPs*.
- Configure Multi-Protocol Routing Agent (MRA) devices, which are Policy Management devices that can route requests to MPE or other MRA devices. This task is described in *Managing Multi-Protocol Routing Agents*.
- Configure subscriber profile repositories and manage entity states, quotas, pools, tiers, and entitlements. These tasks are described in *Managing Subscriber Profile Repositories* and *Managing Subscribers*.

Once elements and profiles are defined, you can refer to them in policy rules. The steps to create and deploy policy rules must be done in the following order:

1. Create policy rules in the CMP database. This step is described in *Understanding and Creating Policy Rules*.
2. Deploy the policy rules from the CMP database to MPE or MRA devices. This step is described in *Managing Policy Rules*.
3. You may decide to consolidate policy rules with similar structures using a policy table. This step is described in *Managing Policy Tables*.

The management and administrative tasks, which are optional and performed only as needed, are as follows:

- Manage subscriber profiles and sessions. These tasks are described in *Managing Subscriber Profile Repositories* and *Managing Subscribers*.
- View reports on the function of the Policy Management systems in your network. This task is described in *System-Wide Reports*.
- Manage CMP users, accounts, access, authorization, and operation. These tasks are described in *System Administration*.
- Upgrade software using the Upgrade Manager. These tasks are described in *Upgrade Manager*.

Chapter 3

Configuring the Policy Management Topology

Topics:

Configuring the Policy Management Topology describes how to configure the Policy Management devices into a network, and how to configure the CMP system to manage them.

About the Policy Management Topology

You need to configure a network topology for the Policy Management products (CMP, MPE, and MRA devices). The topology determines the following:

- How clusters are set up
- Which sites are primary and which are secondary
- How configuration data is replicated
- How incidents (events and alarms) get reported to the CMP system that controls the Policy Management network.

Figure 4: Policy Management Topology illustrates a Policy Management topology consisting of a primary (Site 1) and secondary (Site 2) CMP cluster, an MRA cluster, and two MPE clusters.

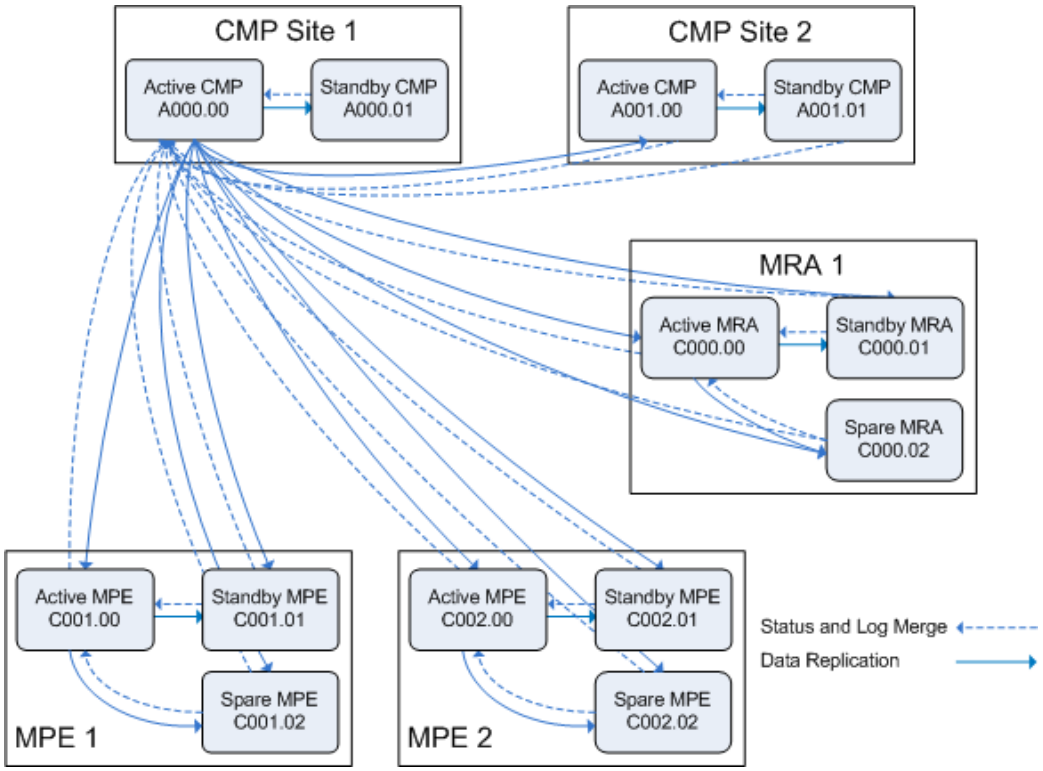


Figure 4: Policy Management Topology

High Availability

High Availability is provided for all Policy Management cluster configurations. High Availability is afforded by using two servers per cluster, an active server and a standby server. As shown in *Figure 5: High Availability*, the active server processes network traffic and is accessible and connected to external devices, clients, gateways, and so forth. Only one server in a cluster can be the active server.

Within the cluster, the servers are connected together, and work collaboratively, as follows:

1. The active and standby servers communicate using a TCP connection over the Operation, Administration, and Management (OAM) network to perform replication, monitor server heartbeats, and merge trace logs and alarms. Separating OAM and signaling traffic allows the ability to shut down one network without affecting the other, and also the opportunity to include separate and redundant signaling (SIG-A and SIG-B) networks.
2. The servers share a virtual IP (VIP) cluster address to support automatic failover.
3. The COMCOL database runtime process constantly monitors the status of both servers in the cluster.
4. If the active server fails, it instructs the standby server to take over and become the active server.

The terms "active" and "standby" denote roles or states that the servers assume, and these roles or states can change based on decisions made by the underlying COMCOL in-memory database, automatically and at any time. If necessary, the standby server can assume control, at which point it becomes the active server. (For example, this would occur if the active server became unresponsive as determined by lack of a heartbeat signal.) When this happens, the server that was previously the active server assumes the role or state of the standby server.

Note: Some Policy Management product clusters can also include a spare server that can be in a physically separate location. The role of the spare server in high availability is described in *MPE and MRA Georedundancy*.

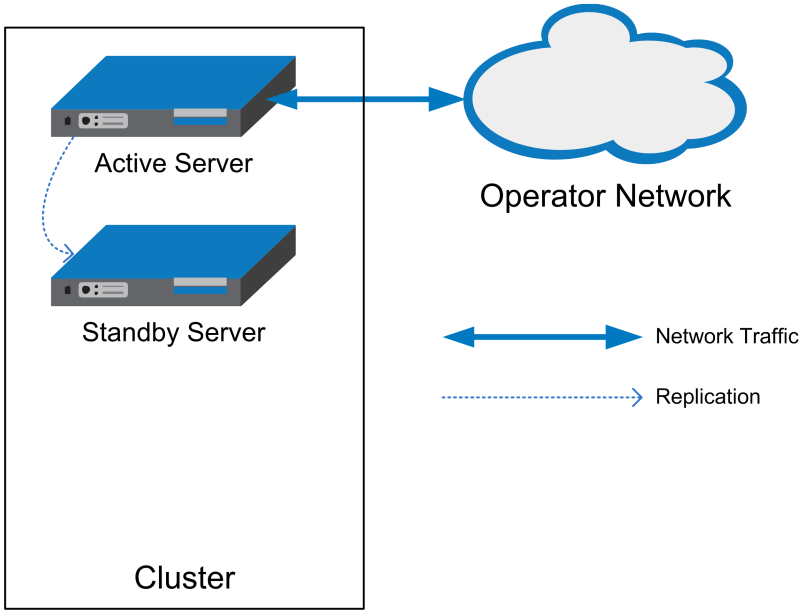


Figure 5: High Availability

MPE and MRA Georedundancy

An MPE or MRA cluster can contain an additional server, called a spare server. The active server will replicate its database to the spare server as well as the standby server. In this configuration, the standby server is first in line to take over from the active server (it is available and preferred), and the spare is second in line (it is available, but not preferred).

Active, standby, and spare servers interoperate as follows:

1. The servers communicate using TCP streams to perform replication, monitor heartbeats, and merge events.
2. The active and standby servers share a common virtual IP (VIP) cluster address to support automatic failover.
3. The spare server has a unique VIP cluster address.
4. The COMCOL state database runtime process constantly monitors the status of all servers in the cluster.
5. If the active server fails, it instructs the standby server to take over and become the active server.

The terms “active,” “standby,” and “spare” denote roles or states that the servers assume, and these roles or states can change, based on decisions made by the underlying COMCOL state database, automatically and at any time. If both the active and standby servers become unavailable, the spare server automatically assumes the role or state of active server and continues to provide service.

The additional (spare) server need not be physically close to the active and standby servers. Georedundancy is an optional configuration provided for MPE and MRA clusters in which the spare server can be located in a separate geographical location, as shown in *Figure 6: MPE or MRA Georedundant Configuration*. If the active and standby servers at one site become unavailable, the spare server, located at another site, automatically continues to provide service.

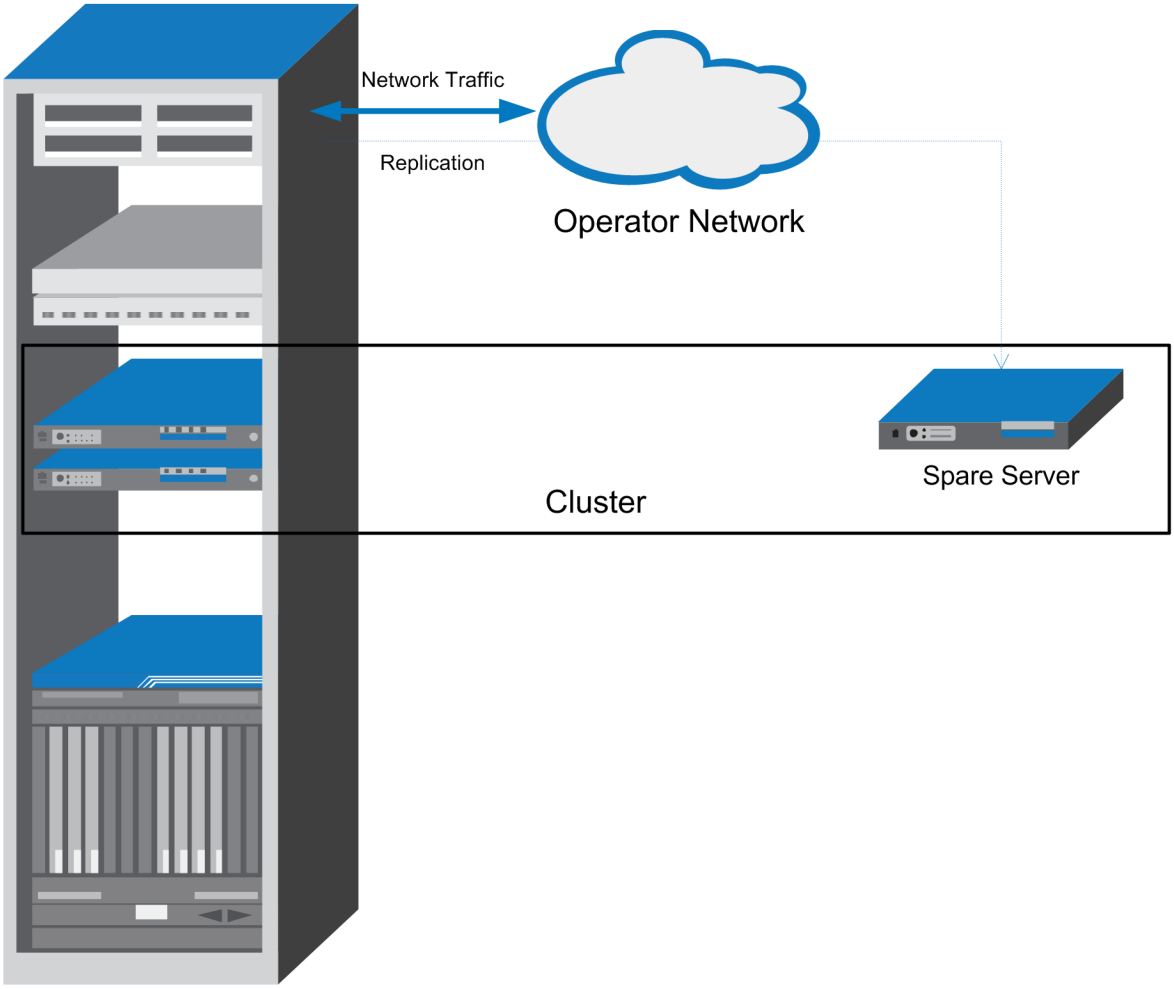


Figure 6: MPE or MRA Georedundant Configuration

Within a georedundant cluster, the active and standby servers are connected through a local area network (LAN), which uses a single TCP/IP socket connection or "stream." The active and spare servers, located at separate sites, are connected through a Wide Area Network (WAN). Since every WAN has distinct bandwidth and packet loss characteristics, the connection can optionally be configured to use up to eight streams to maintain throughput in cases of network congestion or packet loss.

Diameter signaling traffic is carried on a virtual LAN (VLAN) Signaling A (SIG-A) network or, optionally, a SIG-B network. Database replication and high-availability (HA) heartbeat traffic within a site (that is, between the active and standby servers) is sent on an Operation, Administration, and Management (OAM) VLAN network. You can configure the Policy Management topology to send replication and HA heartbeat traffic between sites (that is, between the active and spare servers) using different VLANs. MPE or MRA replication traffic can be sent between sites on the OAM (default), SIG-A, SIG-B, or a dedicated replication (REP) network. (Replication traffic between CMP servers always uses the OAM network.) For information on configuring a REP network, see *Setting Up an MPE or MRA Cluster*.

Replication packets can be marked with a symbolic differentiated services code point (DSCP) value to determine per-hop behavior (PHB). The supported code points are class selector (CS), assured forwarding (AF), and expedited forwarding (EF). The available class selectors are CS1 through CS7. The following AF points are available:

Drop Probability	Class 1	Class 2	Class 3	Class 4
Low	AF11	AF21	AF31	AF41
Medium	AF12	AF22	AF32	AF42
High	AF13	AF23	AF33	AF43

A cluster can be configured to use a secondary HA heartbeat path between georedundant sites in case the primary HA heartbeat network fails. The secondary HA heartbeat path can be configured to use the OAM, SIG-A, SIG-B, or REP network. If the primary HA heartbeat network fails, then the secondary HA heartbeat path continues to send heartbeats between the active and spare servers.

The primary HA heartbeat path is the same as the replication path. For MPE or MRA servers, the default primary HA heartbeat and replication path is the OAM network. If you configure a different network to carry replication traffic, then that network is also used as the primary HA heartbeat network. In this case, the OAM network could be configured as the secondary HA heartbeat network.

Replication traffic, including a threshold of outstanding updates to a standby or spare server (see *Configuring the Upsync Log Alarm Threshold*), is displayed in an MPE/MRA Replication Stats report (see *Viewing the MPE/MRA Replication Statistics Report*).

Primary and Secondary Sites

In the Policy Management topology architecture, "primary" refers to the preferred option for sites, servers, and connections. Under normal conditions, for any cluster, a server at the primary site is the active server that services traffic or manages the Policy Management network. All clients and gateways are connected to this primary site.

"Secondary" refers to the georedundant backup site, server, and connection. MPE and MRA clusters can be dispersed between a primary site and a secondary site. This dispersal mates the primary and secondary sites together. (CMP clusters are paired, not geographically dispersed.)

If for some reason the active server at a primary site can no longer provide service, the cluster fails over to the standby server at the primary site. The server assuming the service becomes the active server.

If and only if no servers are available at an MPE or MRA primary site, the cluster fails over to the secondary site, and a spare server takes over as the active server in the cluster and provides service. When one of the servers at the primary site is once again able to provide service, then the “active” status transitions back to the server at the primary site. (In contrast, CMP failover is manual.)

You configure primary and secondary sites as initial states. Once MPE and MRA clusters are in operation, failover from a primary site to a secondary site, if necessary, is automatic.

It is not meaningful to describe a site as “primary” except in the context of where the active server of a cluster is located. For example, you could establish a topology with two sites and two MPE clusters, with the spare server of each cluster located at the other site. In this topology, the primary site of Cluster A is also the secondary site of Cluster B, and vice versa.

Cluster Preferences

When you configure a georedundant MPE or MRA cluster, you initially set the High Availability site preference to "Normal" to designate that the primary site is preferred. This determines which site contains the active server and initially processes traffic. Once defined, you can reverse this preference, which designates that the secondary site is preferred. Reversing site preference makes the spare server take over as the active server; the former active and standby servers become the standby and spare servers. (Which server assumes which role is not determined.) Reversing site preference is useful in situations where you need to troubleshoot, service, upgrade, or replace the active server.

The Cluster Settings table on the **Cluster Configuration** page lists information on MPE or MRA cluster preferences under the heading “Site Preference.” A cluster preference is either “Normal” or “Reverse” (or “N/A” for CMP clusters, which cannot be reversed).

CMP Georedundancy

As shown in *Figure 7: CMP Georedundancy*, georedundancy is implemented for CMP clusters by pairing a primary site CMP cluster with a secondary site cluster. The active server from the Site 1 CMP cluster will continuously replicate topology and application data to active server of the Site 2 cluster.

The secondary cluster does not have to be physically close to the primary cluster. The terms “primary” and “secondary” denote roles or states that the servers or clusters assume, and you can change these roles or states manually. If the Site 1 CMP cluster goes offline (as in a disaster scenario), you would log in to the active server of the Site 2 CMP cluster and manually promote this cluster to become the primary (Site 1) CMP cluster to manage the Policy Management network.

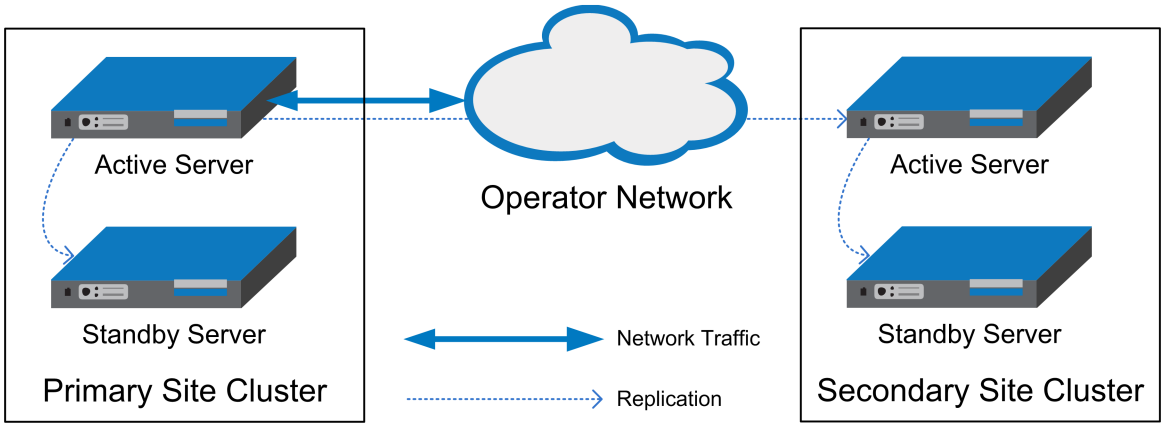


Figure 7: CMP Georedundancy

Note: CMP servers do not use the REP network or DSCP marking.

Server Status

You can display the status of a server in the Cluster Information Report (see *Cluster Information Report*). The display refreshes every 10 seconds.

The status of a server can be thought of as its current role. The status describes what function the server is currently performing in the cluster. Statuses can change from server to server within a cluster, but no two servers in the same cluster should ever have the same status. (Two servers in the same cluster with the same status is an error condition.)

The status values are as follows:

- **Active:** The active server in a cluster is the server that is the externally connected. The active server is the only server that is handling connections and servicing messages and requests. Only the active server writes to the database. An active server at the primary site remains active unless it cannot provide service. An active server at the secondary site will remain active as long as no server is available to provide service at the primary site.
- **Standby:** The standby server in a cluster is the server that is prepared to immediately take over in the event that the current active server is no longer able to provide service. If the standby server takes over, it becomes the active server.
- **Spare:** The spare server in an MPE or MRA cluster is the server that is prepared to take over if no server at the primary site is able to provide service. The spare server has the same replicated data as the servers at the primary site. If there is no server available at the primary site, the spare server becomes active and provides service. As soon as a server in the primary site is available to provide service, that server become the active server and the spare server demotes itself and reverts to its former status of spare or standby (depending on the availability of the other servers in the cluster).
- **Out of Service:** If a server has failed and is unavailable to assume any of the other roles, then its status is out of service. A server is reported as out of service if the CMP system can reach the server, but the software service on the server is down.
- **No Data:** The CMP system cannot reach the server. This status value provides backward compatibility with previous Policy Management releases. It can be observed during the upgrade process.

Policy Management Network Segmentation

A Policy Management network supports a maximum of four MRA clusters operating as two mated pairs. Each cluster can support up to 12 MPE clusters. For larger carrier networks, you can assemble a Policy Management network consisting of multiple independent segments, using Tekelec Diameter Signaling Router (DSR) systems to route traffic, both directly and indirectly, between MRA systems. In addition to supporting larger carrier networks, a segmented Policy Management network also isolates faults within one segment.

Figure 8: Segmented Policy Management Network shows an example of a high-capacity, segmented Policy Management network. Each segment is self-contained, including a mated pair of independent MRA clusters, operating in stateful mode, that direct requests to the appropriate MPE device. Each segment can be made fully georedundant. Each segment is served by a mated pair of independent DSR clusters, operating in stateless (static) mode, that direct requests to the appropriate segment. The mated-pair architecture provides redundancy of both systems and connections in the same way as mated MRA pairs. Redundant connections between paired systems allow for both direct and indirect routing.

In a segmented Policy Management network, MPE clients (such as PGWs, HSGWs, and P-CSCFs) are not directly connected to MRA systems, but to DSR systems instead.

The DSR uses a Subscriber Profile Repository (SPR) system to assign subscribers to a specific segment. The DSR system uses the Full Address Based Resolution (FABR) application to use subscriber identification information in initial requests to look up subscriber information in the SPR database and direct the request to the appropriate segment. The DSR system then directly routes subsequent requests associated with a session to the appropriate segment using the destination host information in the request.

The SPR system stores a logical representation of the segment destination in the subscriber record. This allows for changes in the network configuration without requiring changes to the customer provisioning system.

To configure Policy Management network segmentation, do the following:

1. Define the DSR systems in the CMP database as network elements. For more information, see *DSR*.
2. Configure the DSR database to include Policy Management segments, Diameter connections to MRA clusters, DSR pairs, and the appropriate protocols for the FABR application to support. For more information on the Tekelec DSR product, including configuration and provisioning, refer to the DSR documentation.

For more information on the Tekelec SPR product, including information on configuration and provisioning, refer to the SPR documentation.

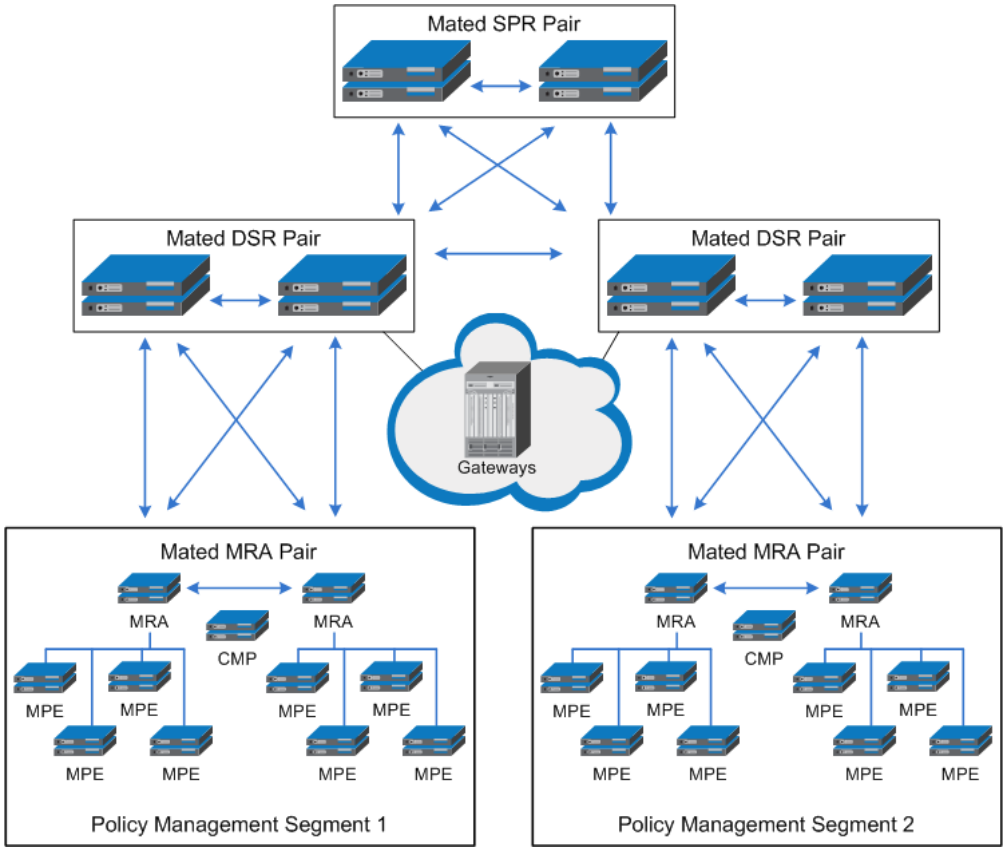


Figure 8: Segmented Policy Management Network

Setting Up the Topology

Topology configuration consists of defining Policy Management sites, clusters, and communication channels, including their addresses and hierarchy. You can add MPE and MRA clusters to the topology before configuring the individual servers themselves. You can define all the servers in a cluster in the same operation.

The recommended sequence of creating the Policy Management topology is as follows:

1. Configure the primary CMP cluster — You start to build a topology by logging in to the active CMP server at the primary site. Configure the CMP cluster settings for the active and standby servers. The settings are replicated (pushed) to the standby CMP server. Together, the two servers form a primary, or Site 1, CMP cluster. This is the primary CMP site for the whole topology network. The primary site cannot be deleted from the topology.
2. Configure the secondary CMP cluster (optional) — Use the primary CMP cluster to configure a secondary, or Site 2, CMP cluster. A secondary CMP cluster can provide georedundancy.
3. For georedundancy (optional), configure additional sites for MPE and MRA clusters.
4. Configure MPE and MRA clusters — Enter MPE and MRA cluster settings on the active CMP server on the primary site. You can define the topology before defining the servers themselves. Once defined, the configuration information is replicated as follows:

a. The CMP system replicates the topology configuration, including the cluster settings, to active, standby, and (if present) spare servers using the OAM network. These servers form an MPE or MRA cluster based on the topology configuration.
b. Active servers communicate with standby servers using LAN connections over the OAM network. Active servers communicate with spare servers using WAN connections over the OAM, SIG-A, SIG-B, or REP network.
c. Active and standby servers share a virtual IP (VIP) cluster address to support automatic failover. (If present, the spare server has a unique VIP address.)
d. The COMCOL database runtime process constantly monitors the status of the servers in each cluster. If an active server in a cluster fails, it instructs the standby server to take over and become the active server. In a georedundant topology, if both the active and standby servers in a cluster fail, it instructs the spare server to take over and become the active server.

Once you define the topology, use the **System** tab of each server to determine if there are any topology mismatches. See *Reapplying the Configuration to Policy Management Devices* for more information.

Setting Up a CMP Cluster

You must define at least one CMP cluster before continuing with the topology. The first site you define will be the primary (Site 1) cluster. You can optionally define a secondary CMP cluster.

Before defining the primary (Site 1) cluster, ensure the following:

- The CMP software is installed on all servers in the cluster
- The servers have been configured with network time protocol (NTP), domain name server (DNS), IP Routing, and OAM IP addresses
- The CMP server IP connection is active
- The CMP application is running on at least one server

To set up the primary CMP cluster:

1. Log in to the CMP server.
2. From the **Platform Setting** section of the navigation pane, select **Topology Settings**.
   The Cluster Configuration page opens. If a primary cluster is not yet defined, you are prompted, "Initial Configuration Detected. Please add CMP Site 1 Cluster."
3. From the content tree, select the **All Clusters** group.
4. Click **Add CMP Site1 Cluster**.
   The Cluster Settings Page opens. The cluster name and application type are fixed.
5. Enter the following information (*Figure 9: Cluster Settings Page for CMP Cluster* shows an example):
   a) **HW Type** — Select **C-Class** (the default), **C-Class(Segregated Traffic)** (for a configuration in which Signaling and OAM networks are separated onto physically separate equipment), or **RMS** (for a rack-mounted server).
   b) **Network VLAN IDs** (appears if you selected **C-Class** or **C-Class(Segregated Traffic)**) — Enter the OAM, SIG-A, and (optionally) SIG-B virtual LAN (VLAN) IDs, in the range 1–4095. The defaults are 3 for the OAM network, 5 for the SIG-A network, and 6 for the SIG-B network.
   c) **OAM VIP** (required) — Enter the IPv4 address and mask of the OAM VIP. The OAM VIP is the IP address the CMP uses to communicate with a Policy Management cluster. Enter the address in the standard dot format, and the subnet mask in CIDR notation from 0–32.

      Note: This address corresponds to the cluster address in Policy Management systems before V7.5.

d) **Signaling VIP 1** through **Signaling VIP 4** (optional) — Enter up to four IPv4 or IPv6 addresses and masks of the signaling virtual IP (VIP) addresses; for each, select **None**, **SIG-A**, or **SIG-B** to indicate whether the cluster will use an external signaling network. You must enter a Signaling VIP value if you specify either SIG-A or SIG-B. If you enter an IPv4 address, use the standard dot format, and enter the subnet mask in CIDR notation from 0–32. If you enter an IPv6 address, use the standard 8-part colon-separated hexadecimal string format, and enter the subnet mask in CIDR notation from 0–128.

6. Select **Server-A** and enter the following information for the first server of the cluster (which will be the initial active server):
   a) **IP** (required) — The IP address of the server. Enter the standard dot-formatted IP address string.
   b) **HostName** (required) — The name of the server. This must exactly match the host name provisioned for this server (that is, the output of the Linux command **`uname -n`**).
   c) **Forced Standby** — Select to force this server into standby mode. The flag is set automatically when a new server is added to a cluster, or if a server setting is modified and another server already exists in the cluster.
7. When you finish, click **Save** (or **Cancel** to discard your changes).
   You are prompted, "The VLAN IDs on the page must match the VLAN IDs configured on the server. A mismatch will cause HA to fail. Please confirm that the VLAN IDs are correct before saving." Click **OK** (or **Cancel** to stop the save operation). You are prompted, "Active server will restart and you will be logged out." The active server restarts.
8. Log back in to the CMP server.
9. From the **Platform Setting** section of the navigation pane, select **Topology Settings**.
   The Cluster Configuration page opens.
10. From the content tree, select the CMP Site 1 cluster.
    The Topology Configuration page opens.
11. Select **Server-B**, and enter the appropriate information for the second server of the cluster.
12. When you finish, click **Save** (or **Cancel** to discard your changes).

The primary CMP cluster topology is defined.

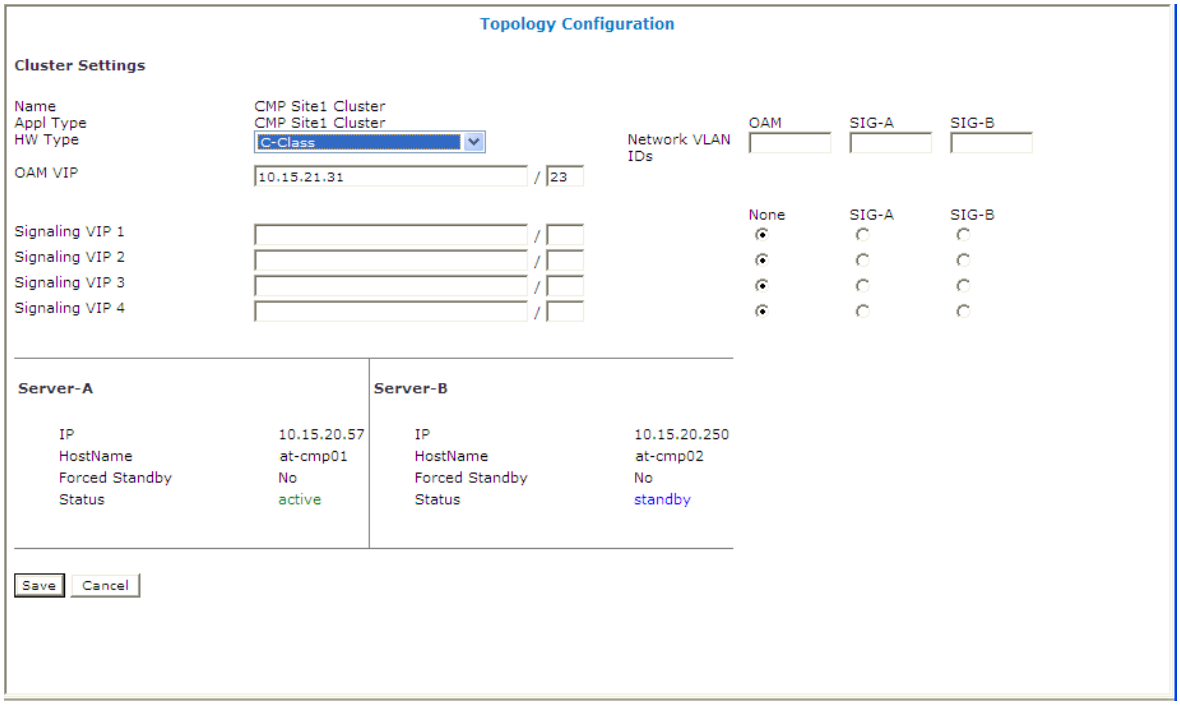


Figure 9: Cluster Settings Page for CMP Cluster

Once you define the primary (Site 1) CMP cluster, you can optionally repeat this procedure to define a secondary (Site 2) CMP cluster.

Setting Up an MPE or MRA Cluster

Before defining an MPE or MRA cluster, ensure the following:

- The MPE or MRA software is installed on all servers in the cluster
- The servers have been configured with network time protocol (NTP), domain name server (DNS), IP Routing, and OAM IP addresses
- The MPE or MRA server IP connection is active
- The MPE or MRA application is running on at least one server

To define an MPE or MRA cluster:

1. From the **Platform Setting** section of the navigation pane, select **Topology Settings**.
   The **Cluster Configuration** page opens.
2. From the content tree, select the **All Clusters** folder.
   The defined clusters are listed.
3. Click **Add MPE/MRA Cluster**.
   The **Topology Configuration** page opens. Define the options. *Table 2: MPE/MRA Cluster Options* lists the available options. Each section of the **Topology Configuration** page can be collapsed or expanded.

Table 2: MPE/MRA Cluster Options

Option	Description
Cluster Settings	
Name (required)	Name of the cluster. Enter up to 250 characters, excluding quotation marks (") and commas (,)
Appl Type	Select **MPE** (default) or **MRA**.
Site Preference	Select **Normal** (default) or **Reverse**. This field only appears if the system supports georedundancy.
DSCP Marking	Select the type of Differentiated Services Code Point (DSCP) marking for MPE or MRA replication traffic. The valid code points are **AF11**, **AF12**, **AF13**, **AF21**, **AF22**, **AF23**, **AF31**, **AF32**, **AF33**, **AF41**, **AF42**, **AF43** (assured forwarding), **CS1**, **CS2**, **CS3**, **CS4**, **CS5**, **CS6**, **CS7** (class selector), **EF** (expedited forwarding), or **PHB(None)** (the default, for no marking). For information on DSCP marking, see *MPE and MRA Georedundancy*.
Replication Stream Count	Select the number of redundant TCP/IP socket connections (streams) to carry replication traffic between sites. Up to 8 streams can be configured. The default value is **1**.
Replication & Heartbeat	Select a network to carry inter-site replication and heartbeat traffic. You can select **None** (the default), **OAM**, **SIG-A**, **SIG-B**, or **REP**.
Backup Heartbeat	Select a network to carry inter-site backup heartbeat traffic. You can select **None** (the default), **OAM** (default), **SIG-A**, **SIG-B**, or **REP**.
Primary Site Settings	
Site Name	Select **Unspecified** (default) or the name of a previously defined site. If you select **Unspecified**, you create a non-georedundant site, and cannot add a secondary site. You can assign multiple clusters to the same site.
HW Type	Select **C-Class** (default), **C-Class(Segregated Traffic)** (for a configuration where Signaling and other networks are separated onto physically separate equipment), or **RMS** (for a rack-mounted server).
OAM VIP (optional)	Enter the IPv4 address and mask of the OAM virtual IP (VIP) address. The OAM VIP is the address the CMP cluster uses to communicate with the MPE or MRA cluster. Enter the address in the standard dot format, and the subnet mask in CIDR notation from 0–32. **Note:** This address corresponds to the cluster address in Policy Management systems before V7.5.
Signaling VIPs	The signaling VIP is the IP address a PCEF device uses to communicate with an MPE or MRA cluster. To support redundant

Option	Description
	communication channels, an MPE or MRA cluster uses both SIG-A and SIG-B. At least one signaling VIP is required. Click **Add New VIP** to add a VIP to the system. You can enter up to four IPv4 or IPv6 addresses and masks of the signaling VIP addresses. For each new VIP, enter the address and mask in the New Signaling VIP dialog. Select **SIG-A** or **SIG-B** to indicate whether the cluster will use an external signaling network. For an IPv4 address, use the standard dot format, and enter the subnet mask in CIDR notation from 0–32. For an IPv6 address, use the standard 8-part colon-separated hexadecimal string format, and enter the subnet mask in CIDR notation from 0–128.
General Network VLAN ID	This field appears if you selected **C-Class** or **C-Class(Segregated Traffic)**. Enter the **OAM**, **SIG-A**, and **SIG-B** VLAN IDs, in the range 1–4095. The defaults are 3 for the OAM network and server IP, 5 for the SIG-A network, and 6 for the SIG-B network.
User Defined Network	This field appears if the system supports georedundancy and if you selected **C-Class** or **C-Class(Segregated Traffic)**. Enter the REP network VLAN ID, in the range 1–4095.
Server A	
IP (required)	The IPv4 address of the server. Enter the standard IP dot-formatted IPv4 address string.
HostName	The name of the server. This must exactly match the host name provisioned for this server (the output of the Linux command `uname -n`).
Forced Standby	Select to put Server A into forced standby. (By default, Server A will be the initial active server of the cluster.)
Static IP	If an alternate replication path and secondary HA heartbeat path is used, then a server address must be entered in this field. Click **Add New**. In the New Path dialog, enter an IP address and mask, and select the SIG-A, SIG-B, or REP network.
Server B	After adding Server A, you can optionally click **Add Server-B** and enter the appropriate information for the standby server of the MPE or MRA cluster.
Secondary Site Settings	This section only appears if the system supports georedundancy. Select the site name (which must be different from the primary site name).

Option	Description
	Select the hardware type: **C-Class** (the default), **C-Class(Segregated Traffic)**, or **RMS**. Enter the OAM VIP address and mask. Enter the signaling VIP addresses.
Server-C	This section only appears if the system supports georedundancy. If you define a secondary site, you must define a spare server. Click **Add Server-C** and define the spare server static IP address (optional) and host name. Select **Forced Standby** to ensure that the server is in standby mode.

4. When you finish, click **Save** (or **Cancel** to discard your changes).
   You are prompted, "The VLAN IDs on the page must match the VLAN IDs configured on the server. A mismatch will cause HA to fail. Please confirm that the VLAN IDs are correct before saving." Click **OK** (or **Cancel** to stop the save operation).
5. If you are setting up multiple MPE or MRA clusters, repeat the above steps as often as necessary.

The MPE or MRA cluster is defined.

Figure 10: Sample MPE Cluster Topology Configuration shows the configuration for a georedundant (two-site) MPE cluster, using SIG-B for a replication network and OAM for the backup heartbeat network, with eight WAN replication streams.

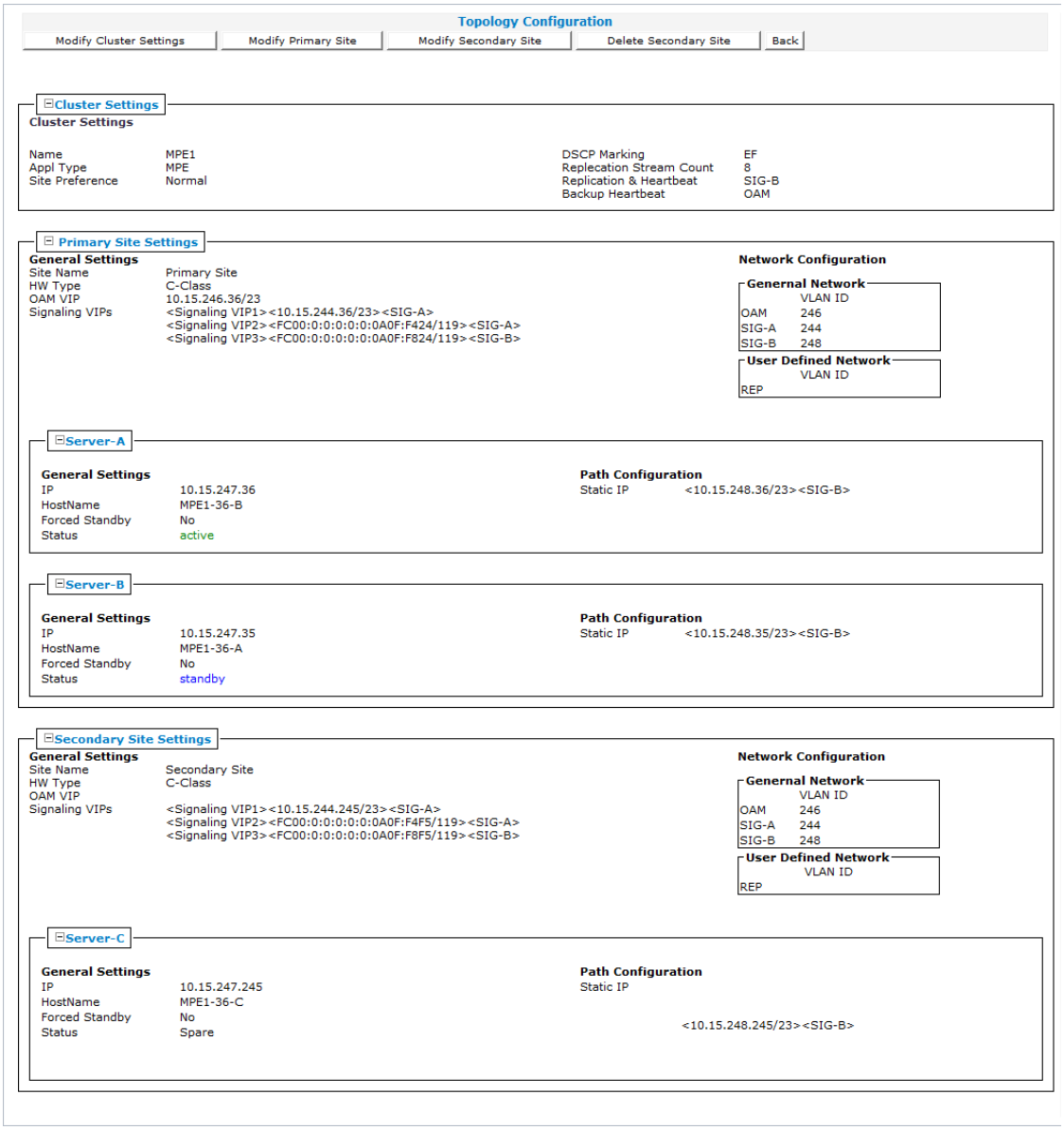


Figure 10: Sample MPE Cluster Topology Configuration

Modifying the Topology

Once the topology is configured, you can change it as necessary, to correct errors, add a server to a cluster, define new clusters, add clusters to an existing site, define new sites, change which cluster is primary and which secondary, or put an active server into standby status.

You can modify a cluster even if the standby or spare server is off line. However, you cannot modify or delete the active server of a cluster.

Modifying the topology is described in the following topics:

Modifying an MPE or MRA Cluster

To modify an MPE or MRA cluster:

1. From the **Platform Setting** section of the navigation pane, select **Topology Settings**.
   The **Topology Configuration** page opens.
2. From the content tree, select the cluster you want to modify.
   The **Topology Configuration** page opens, displaying information about the cluster.
3. Click the appropriate button for the changes you want to make:
   - To modify cluster settings, click **Modify Cluster Settings**.
   - To modify the Server-A configuration, click **Modify Server-A**.
   - To modify the Server-B configuration, click **Modify Server-B**.
   - To delete either server configuration, click the appropriate button to modify the server and then click the delete button.

   The appropriate fields on the **Topology Configuration** page become editable.
4. Make changes as required.

   You must make changes to each section individually. You can remove either server from a cluster, but not both. You can select **Forced Standby** on one or more servers of an MPE or MRA cluster.

   Caution: If you force all servers in a cluster into the Standby state, then no server can be active, which effectively removes the cluster from service.

   Note: If you add, remove, or modify a server, the active server will restart.

5. When you finish, click **Save** (or **Cancel** to discard your changes).
   You are prompted, "Warning: You may need to restart the application or reboot the server for the new topology configuration to take effect."
6. Click **OK** (or **Cancel** to discard your changes).

The cluster is modified. You can determine if there is a topology mismatch by using the **System** tab for an affected server.

Modifying a CMP Cluster

To modify a CMP cluster:

1. From the **Platform Setting** section of the navigation pane, select **Topology Settings**.
   The **Topology Configuration** page opens.
2. From the content tree, select the cluster you want to modify.
   The **Topology Configuration** page opens, displaying information about the cluster.

3. Click the appropriate button for the changes you want to make:
   - To modify cluster settings, click **Modify Cluster Settings**.
   - To modify the configuration of the first server defined in the cluster, click **Modify Server-A**.
   - To modify the configuration of the second server defined in the cluster, click **Modify Server-B**.

   The appropriate fields on the **Topology Configuration** page become editable. For information on configurable fields, see *Setting Up a CMP Cluster*.
4. Make changes as required.

   You must make changes to each section individually. You can remove either server from the cluster, but not both. You can select **Forced Standby** on either server of the cluster, but not both, and not at all if the cluster has only one server.

   Note: If you add, remove, or modify a server, the active server will restart.
5. When you finish, click **Save** (or **Cancel** to discard your changes).
   You are prompted, "Warning: You may need to restart the application or reboot the server for the new topology configuration to take effect."
6. Click **OK** (or **Cancel** to discard your changes).

The cluster is modified. You can determine if there is a topology mismatch by using the **System** tab of each policy server profile.

Removing a Cluster from the Topology

You can remove an MPE, MRA, or Site 2 CMP cluster from the topology. (You cannot remove the Site 1 (primary) CMP cluster from the topology.)

Before removing an MPE or MRA cluster from a fully configured system:

- Remove it from the MPE pool on an MRA device, or remove it as a backup MRA device, as appropriate.
- Remove the profiles of its servers; see *Deleting a Policy Server Profile*.

To remove a cluster from the topology:

1. From the **Platform Setting** section of the navigation pane, select **Topology Settings**.
   The Topology Configuration page opens.
2. From the content tree, select the **All Clusters** folder.
   The Cluster Configuration page opens, displaying a cluster settings table listing information about the clusters defined in the topology.
3. In the topology configuration table, in the row listing the cluster you want to remove, click **Delete**.
   You are prompted, "Are you sure you want to delete this Cluster?"
4. Click **Delete** (or **Cancel** to abandon your request).
   The page closes.

The cluster is removed from the topology.

Reversing Cluster Preference

You can change the preference, or predilection, of the servers in a cluster to be active or spare.

To reverse cluster preference:

1. From the **Platform Setting** section of the navigation pane, select **Topology Settings**.
   The **Topology Configuration** page opens.
2. Select the cluster from the content tree.
   The **Topology Configuration** page opens, displaying information about the selected cluster.
3. Click **Modify Cluster Settings**.
   The fields become editable.
4. In the **Cluster Settings** section of the page, toggle the **Site Preference** between **Normal** and **Reverse**.
5. Click **Save** (or **Cancel** to abandon your change).

The cluster preferences are reversed.

Demoting a CMP Cluster

In a two-cluster CMP topology, you can demote the primary cluster (which is typically the Site 1 cluster) to secondary status. You would do this, for example, prior to performing site-wide maintenance that affects service (such as replacing a server), or if the primary cluster has failed completely and is unreachable.

When you demote a CMP cluster, the secondary site (which is typically the Site 2 cluster) can become the primary site. This is a manual process. This status will persist until you manually demote the new primary site or the primary site fails over for some reason.

Caution: Perform cluster demotion before cluster promotion. Avoid having both georedundant clusters active at the same time. Continuous and rapid failovers (flopping back and forth) between georedundant clusters is not recommended and should be avoided. Improper cluster failover can result in loss of data or interruption of network services on the CMP cluster.

To demote a CMP cluster:

1. Log in to the currently active georedundant CMP cluster.
2. From the **Platform Setting** section of the navigation pane, select **Topology Settings**.
   The Topology Configuration page opens, displaying a cluster settings table listing information about the clusters defined in the topology. The name of the primary CMP cluster is marked with "(P)," and the name of the secondary cluster is marked with "(S)." You should see options to **View** and **Demote**.
3. Open a second browser window and log in to the secondary CMP cluster.
   The page displays the message "This server you signed in is the Secondary Active Server."

   Note: The state of the servers of the primary cluster is not available to the secondary active server and appears as Out-of-Service.

4. From the **Platform Setting** section of the navigation pane, select **Topology Settings**.
   The Topology Configuration page opens, displaying a cluster settings table listing information about the clusters defined in the topology. You should see options to **View** and **Promote**.

   Caution: If you do not see the same information in both steps 2 and 4, stop this procedure and do not try to change the current active georedundant cluster. Contact Tekelec Support before proceeding.

5. Return to the browser window logged in to the primary CMP cluster.

You should still be on the Topology Configuration page.

6. In the Cluster Settings table, in the row listing the primary CMP cluster, click **Demote**.
   You are prompted, "Are you sure you want to demote this Cluster?"
7. Click **OK** (or **Cancel** to abandon your request).
   The page displays the message "Demote cluster successfully."
8. Log out of the CMP system for the cluster you have just demoted.
9. Return to the browser window logged in to the secondary CMP cluster.
   You should still be on the Topology Configuration page.
10. Wait two minutes.
11. In the Cluster Settings table, in the row listing the secondary CMP cluster, click **Promote**.
    You are prompted, "Are you sure you want to promote this Cluster?"
12. Click **OK** (or **Cancel** to abandon your request).
    The page displays the message "Promote cluster successfully."
13. Log out of the CMP system for the cluster you have just promoted.
14. Log in to the CMP system for the cluster you have just promoted.
15. From the **Platform Setting** section of the navigation pane, select **Topology Settings**.
    The Topology Configuration page opens, displaying a cluster settings table listing information about the clusters defined in the topology. The cluster is marked with "(P)," and the name of the secondary cluster is marked with "(S)." The old primary cluster may briefly display as "off-line."

    Note: You should see options to **View** and **Demote**. All functions available from the primary CMP cluster should now appear and be accessible.

16. Wait ten minutes and then use the Topology Configuration page to verify that both the primary and secondary CMP clusters are available and have the correct status.

The primary CMP cluster is demoted, and the secondary cluster is promoted to primary status.

Forcing a Server into Standby Status

You can change the status of a server in a cluster to Forced Standby. A server placed into Forced Standby status is prevented from assuming the role Active. You would do this, for example, to the active server prior to performing maintenance on it.

When you place a server into forced standby status, the following happens:

- If the server is active, it demotes itself.
- The server will not assume the active role, regardless of its status or the roles of the other servers in the cluster.
- The server continues as part of its cluster, and reports its status as "Forced-Standby."
- The server coordinates with the other servers in the cluster to take the role Standby or Spare.

Caution: If you force all servers in a cluster into Standby status, you can trigger a site outage.

To force a server into standby status:

1. From the **Platform Setting** section of the navigation pane, select **Topology Settings**.

The Topology Configuration page opens, displaying a cluster settings table listing information about the clusters defined in the topology.

2. In the cluster settings table, in the row listing the cluster containing the server you want to force into standby status, click **View**.
   The Topology Configuration page displays information about the cluster.
3. Select the server. Click **Modify Server-A** or **Modify Server-B**, as appropriate.:
4. Select **Forced Standby**.
5. Click **Save** (or **Cancel** to abandon your request).
   The page closes.

The server is placed in standby status.

Configuring SNMP Settings

You can configure SNMP settings for the CMP system and all Policy Management servers in the topology network.

Note: SNMP settings configuration must be done on the active server in the primary cluster. A banner warning appears if the login is not on the active primary CMP system.

To configure SNMP settings:

1. Log in to the CMP system from its server address as a user with administrator privileges.

   The navigation pane is displayed.

2. From the **Platform Setting** section of the navigation pane, select **SNMP Setting**.

   The **SNMP Settings** page displays.

3. Click **Modify**.

   The **SNMP Settings** page opens.

4. Edit the settings.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

Table 3: SNMP Attributes describes the SNMP attributes that can be edited.

Table 3: SNMP Attributes

Field Name	Description
Manager 1-5	SNMP Manager to receive traps and send SNMP requests. Each Manager field can be filled as either a valid host name or an IPv4 address. A hostname should include only alphanumeric characters. Maximum length is 20 characters, and it is not case-sensitive. This field can also be an IP address. An IP address should be in a standard dot-formatted IP address string. The field is required to allow the Manager to receive traps.

Field Name	Description
	By default, these fields are empty. **Note:** The IPv6 address is not supported.
Enabled Versions	Supported SNMP versions: • **SNMPv2c** • **SNMPv3** • **SNMPv2c and SNMPv3 (default)**
Traps Enabled	Enable the sending SNMPv2 traps (default is enabled). **Note:** This option must be selected to use the SNMP Trap Forwarding feature. Clear the checkbox to disable sending SNMPv2 traps.
Traps from individual Servers	Enable sending traps from an individual server (default is disabled). **Note:** To use the SNMP Trap Forwarding feature, ensure that this option is not selected. Clear the checkbox to send traps from the active CMP system only.
SNMPv2c Community Name	The SNMP read-write community string. The field is required if SNMPv2c is enabled. The name can contain alphanumeric characters and cannot exceed 31 characters in length. The name cannot be either **`private`** or **`public`**. The default value is **`snmppublic`**.
SNMPv3 Engine ID	Configured Engine ID for SNMPv3. The field is required If SNMPv3 is enabled. The Engine ID includes only hexadecimal digits (0-9 and a-f). The length can be from 10 to 64 digits. The default is no value (empty).
SNMPv3 Security Level	SNMPv3 Authentication and Privacy options. 1. **No Auth No Priv** — Authenticate using the Username. No Privacy. 2. **Auth No Priv** — Authentication using MD5 or SHA1 protocol.

Field Name	Description
	3. **Auth Priv** — Authenticate using MD5 or SHA1 protocol. Encrypt using the AES and DES protocol. The default value is **Auth Priv**.
SNMPv3 Authentication Type	Authentication protocol for SNMPv3. Options are: 1. **SHA-1** — Use Secure Hash Algorithm authentication. 2. **MD5** — Use Message Digest authentication. The default value is **SHA-1**.
SNMPv3 Privacy Type	Privacy Protocol for SNMPv3. Options are: 1. **AES** — Use Advanced Encryption Standard privacy. 2. **DES** — Use Data Encryption Standard privacy. The default value is **AES**.
SNMPv3 Username	The SNMPv3 User Name. The field is required if SNMPv3 is enabled. The name must contain alphanumeric characters and cannot not exceed 32 characters in length. The default value is **`TekSNMPUser`**.
SNMPv3 Password	Authentication password for SNMPv3. This value is also used for msgPrivacyParameters. The field is required If SNMPv3 is enabled. The length of the password must be between 8 and 64 characters; it can include any character. The default value is **`snmpv3password`**.

Configuring the Upsync Log Alarm Threshold

You can configure the threshold of outstanding updates to a slave machine that triggers an alarm. When the outstanding updates reaches a configured percent of the upsync log capacity, an event is issued and the current condition of the connection (volume of outstanding data, current throughput, time of the event, and so forth) is logged.

The events are tracked in the MPE/MRA replication report. See *Viewing the MPE/MRA Replication Statistics Report* for more information.

To configure the upsync log alarm threshold:

1. From the **Platform Setting** section of the navigation pane, select **Platform Configuration Setting**.

   The **Platform Configuration** page is displayed.

2. Click **Modify**.
3. Enter the threshold.
4. When you finish, click **Save** (or **Cancel** to discard your changes).

Defining Global Configuration Settings

This section describes how to configure global CMP settings.

Setting the Precedence Range

When overlapping policy and charging control (PCC) quality of service (QoS) rules apply to the same Gx or Gxx Diameter session, precedence is applied to determine which rule is installed on the gateway. In the case of an overlap, the rule with the lower precedence value is installed. Some vendor gateways require unique precedence, or else reject rules. You can configure MPE devices to maximize the probability that all rules have unique PCC rule precedences. This is a global configuration setting that affects all MPE devices managed by this CMP system.

Note: This does not guarantee rule precedence uniqueness. Operator-defined rules are not validated to ensure precedence uniqueness; if you define such rules, you must track their precedence values yourself.

To set the precedence range, do the following:

1. From the **Policy Server** section of the navigation pane, select **Global Configuration Settings**. The content tree displays a list of global configuration settings; the initial group is **Precedence Range**.
2. From the content tree, select the **Precedence Range** group.
   The Precedence Range Configuration page opens in the work area.
3. On the Precedence Range Configuration page, click **Modify**.
   The Modify Precedence Range page opens.
4. Enter values for the configuration attributes:
   a) **AF-Triggered** — Enter the minimum and maximum values for rules triggered by Rx requests. The default range is 400 to 899.
   b) **UE-Triggered** — Enter the minimum and maximum values for rules triggered by user equipment-initiated resource requests. This range cannot overlap with the AF range. The default range is 1000 to 1999.
   c) **Default Session** — If no other rules are installed when a Gx eHRPD, E-UTRAN, or GPRS session is established, a default rule is installed. Enter the default session precedence. The default precedence is 3000.
5. When you finish, click **Save** (or **Cancel** to discard your changes).
   The Precedence Range Configuration page closes.

The reserved precedence ranges are configured.

Precedence values not set aside here are available for your use in defining rules. By default, you can use 0–399, 900–999, 2000–2999, and 301–4,294,967,295.

Range changes do not automatically cause deployed rules to be redeployed with new precedence values. Also, range changes do not automatically cause revalidation of defined traffic profiles.

When traffic profiles are imported, they are imported regardless of their configured precedence values. The CMP system displays a message reminding you to check the precedence values of the imported traffic profiles. See *Importing an XML File to Input Objects* for more information.

Setting UE-Initiated Procedures

When enabled, this feature allows an MPE device to trap UE-Init resource modification requests and reject them using the specified parameters. This feature applies to Gx and Gxx (Gxa, Gxc) interfaces.

To enable or disable processing of UE-Initiated procedures or to change configuration attributes:

1. From the **Policy Server** section of the navigation pane, select **Global Configuration Settings**.
   The content tree displays a list of global configuration settings.
2. From the content tree, select the **UE-Initiated Procedures**.
   The UE-Initiated Procedures page opens in the work area group.
3. On the UE-Initiated Procedures page, click **Modify**.
   The Modify UE-Initiated Procedures page opens.
4. Enter values for the configuration attributes:
   a) **Reject UE-Initiating Request** — Select to enable this feature to reject UE-Initiated resource modification requests gracefully, or leave unchecked to process normally with no impact (by ignoring specific AVPs relevant to the UE-Initiated procedure request). Default is unchecked (disabled).
   b) **Experimental Result Code** — Enter the numeric value that is returned in the Experimental-Result-Code AVP as part of the CCA message (if no configured code exists). Enter an integer between 0 and 2,147,483,647. The default value is 5144.
   c) **Experimental Result Code Name** — Enter the description of the error that is returned in the Experimental-Result-Code AVP as part of the CCA message. Enter a string value up to 255 characters in length. The default name is DIAMETER_ERROR_TRAFFIC_MAPPING_INFO_REJECTED.
   d) **Experimental Result Code Vender Id** — Enter the vender ID that is included in the Experimental-Result-Code AVP as part of the CCA message. Enter an integer between 0 and 2,147,483,647. The default ID is 10415.
   e) **Experimental Result Code Vendor Name** — Enter the vender name that is included in the Experimental-Result-Code AVP as part of the CCA message. Enter a string value up to 255 characters in length. The default name is 3GPP.
5. When you finish, click **Save** (or **Cancel** to discard your changes).
   The UE-Initiated Procedures page closes.

The UE-initiated attributes are configured.

Setting Stats Settings

You can define when and how measurement statistic values are reset.

To change stats settings, do the following:

1. From the **Policy Server** section of the navigation pane, select **Global Configuration Settings**.
   The content tree displays a list of global configuration settings.
2. From the content tree, select the **Stats Settings** folder.
   The Stats Settings page opens in the work group area.
3. On the Stats Settings page, click **Modify**.
   The Modify Stats Settings page opens.
4. Enter values for the configuration attributes:
   a) **Stats Reset Configuration** — From the pulldown menu, select **Manual** or **Interval**. When in Manual mode, numeric values can only reset when the system restarts (for example, on failover or initial startup) or when you issue a reset command. Manual mode disables the resetting of numeric fields at regular intervals but does not alter historical data collection. When configured for Interval mode, numeric values are reset at regular intervals, controlled by the Stats Collection Period variable. In Interval mode, a reset occurs on the hour and then every 5, 10, 15, 20, 30 or 60 minutes afterwards, depending on the value selected in Stats Collection Period, providing a better idea of the performance of the Policy Management system at specific times of day. The default value is Manual.
   b) **Stats Collection Period** — When the Stats Reset Configuration variable is set to Interval, specify the time interval to use from the pulldown menu. Options are 5, 10, 15, 20, 30, and 60 minutes.
5. When you finish, click **Save** (or **Cancel** to discard your changes).
   The Stats Settings page closes.

Caution: Saving the changes to the data causes the historical stats data to be lost.

The Stats Settings attributes are configured.

Setting eMPS ARP Settings

The Enhanced Multimedia Priority Service (eMPS) feature allows prioritization of IMS-based calls. The feature allows National Security/Emergency Preparedness users to make calls over the public network when the network is congested by giving those calls/sessions priority in the network over other traffic.

The values configured through the CMP system, using the process below, are used as the default Allocation and Retention Policy (ARP) values for all MPE devices associated with the CMP system when a session is identified as Priority and the ARP values are not defined through policy.

To enable or disable prioritization of IMS-based calls:

1. From the **Policy Server** section of the navigation pane, select **Global Configuration Settings**.
   The content tree displays a list of global configuration settings.
2. From the content tree, select the **eMPS ARP Settings** folder.
   The Priority Value page opens in the work area.
3. On the Priority Value page, click **Modify**.
   The eMPS ARP Settings page opens.
4. Enter values for the configuration attributes:
   a) **Priority Value** — Defines the relative importance of a resource request. Enter a value from 1 to 15.

b) **Preemption Capability** — Defines whether a service data flow can get resources that were already assigned to another service data flow with a lower priority level. Select **Enable** or **Disable** from the pulldown list.

c) **Preemption Vulnerability** — Defines whether a service data flow can lose the resources assigned to it so that a service data flow with a higher priority level can be admitted. Select **Enable** or **Disable** from the pulldown list.

5. When you finish, click **Save** (or **Cancel** to discard your changes).
   The eMPS ARP Settings page closes.

The eMPS ARP Settings attributes are configured.

Setting PDN APN Suffixes

Access point name (APN) suffix matching on the MPE device is performed by reading the APN suffixes configured on the CMP system. An APN is considered a match based on the longest suffix it has in common after a case-insensitive comparison.

The MPE device dynamically creates a new stats object the first time it receives a new APN suffix match for a PDN connection. Once it is created, each new PDN connection for that APN updates the current object. If a stats object has not been created for an APN suffix, the stats object is not displayed in the APN reports page.

If the MPE device receives a PDN connection without a configured APN suffix match, then the connection is added to a stats object called **OtherAPN**.

PDN connections per APN suffix are shown in the PDN APN suffix report. See *Viewing the PDN APN Suffix Report* for more information.

Up to 25 different APN suffixes can be configured. Each suffix is limited to 64 characters.

To configure PDN APN suffixes:

1. From the **Policy Server** section of the navigation pane, select **Global Configuration Settings**.
   The content tree displays a list of global configuration settings.
2. From the content tree, select the **PDN APN Suffixes** folder.
   The **PDN APN Suffix Administration** page opens in the work area, listing the configured PDN APN suffixes.
3. Click **Create PDN APN Suffix**.
4. Enter the following values:
   a) **Name** — Enter the name of the APN suffix.
   b) **Value** — Enter a value for the APN suffix.
   c) **Description** — Enter descriptive text.
5. Click **Save** (or **Cancel** to cancel your changes).
   the PDN APN suffix is added to the list.

The APN suffix is created.

Chapter 4

Managing Multimedia Policy Engine Devices

Topics:

Managing Multimedia Policy Engine Devices describes how to use the CMP system to configure and manage the Multimedia Policy Engine (MPE) devices in a network.

Note: The MPE device is the Policy Management policy server. The terms *policy server* and *MPE device* are synonymous.

Policy Server Profiles

A policy server profile contains the configuration information for an MPE device (which can be a single server, a two-server cluster, or a three-server cluster). The CMP system stores policy server profiles in a configuration database. Once you define profiles, you deploy them to MPE devices across the network.

The following subsections describe how to manage policy server profiles. For information on deploying defined policies to an MPE device, see *Deploying a Policy or Policy Group to MPE Devices*.

Creating a Policy Server Profile

You must establish the Policy Management network topology before you can create policy server profiles.

To create a policy server profile:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the **ALL** group.
   The **Policy Server Administration** page opens in the work area.
3. Click **Create Policy Server**.
   The **New Policy Server** page opens.
4. Enter values for the configuration attributes:
   a) **Associated Cluster** (required) — Select the cluster with which to associate this MPE device.
   b) **Name** — Name of this MPE device. The default is the associated cluster name. A name is subject to the following rules:
      - Is case insensitive (uppercase and lowercase are treated as the same)
      - Must be no longer than 255 characters
      - Must not contain quotation marks (") or commas (,)
   c) **Description / Location** (optional) — Information that defines the function or location of this MPE device.
   d) **Secure Connection** — Designates whether or not to use the HTTPS protocol.
   e) **Type** — Defines the policy server type:
      - **Oracle** (the default) — The policy server is an MPE device and can be fully managed by the CMP.
      - **Unmanaged** — The policy server is not an MPE device and therefore cannot be actively managed by the CMP. This selection is useful when an MPE device is routing traffic to a non Oracle policy server.
5. When you finish, click **Save** (or **Cancel** to discard your changes).
   The profile appears in the list of policy servers.

You have defined the policy server profile.

For most protocols to function correctly, once a policy server profile is created, you must configure attribute information on the **Policy Server** tab (see *Configuring Protocol Options on the Policy Server*).

Once you have defined policy server profiles for the MPE devices in your Policy Management network, you can associate network elements with them (see *Managing Network Elements*).

Configuring or Modifying a Policy Server Profile

To configure or modify a policy server profile:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the policy server.

   The Policy Server Administration page opens in the work area.

   The page contains the following tabs:

   - **System** — Defines the system information associated with this policy server, including the name, host name or IP address in IPv4 or IPv6 format, information about the policy server, and whether or not the policy server uses a secure connection to any management system (such as the CMP).
   - **Reports** — Displays various statistics and counters related to the physical hardware of the cluster, policy execution, and network protocol operation. Reports cannot be modified.
   - **Logs** — Displays the Trace Log, Syslog, and SMS log configurations.
   - **Policy Server** — Lets you associate applications and network elements with the MPE device and configure protocol information.
   - **Diameter Routing** — Lets you configure the Diameter peer and route tables.
   - **Policies** — Lets you manage policies that are deployed on the policy server.
   - **Data Sources** — Lets you configure interfaces to LDAP (Lightweight Directory Access Protocol), Diameter Sh, or SPR (Subscriber Profile Repository) systems.
   - **Session Viewer** — Displays the Session Viewer.

3. Select the tab that contains the information you want to modify and click **Modify**.
4. When you finish your modifications, click **Save** (or **Cancel** to discard your changes).

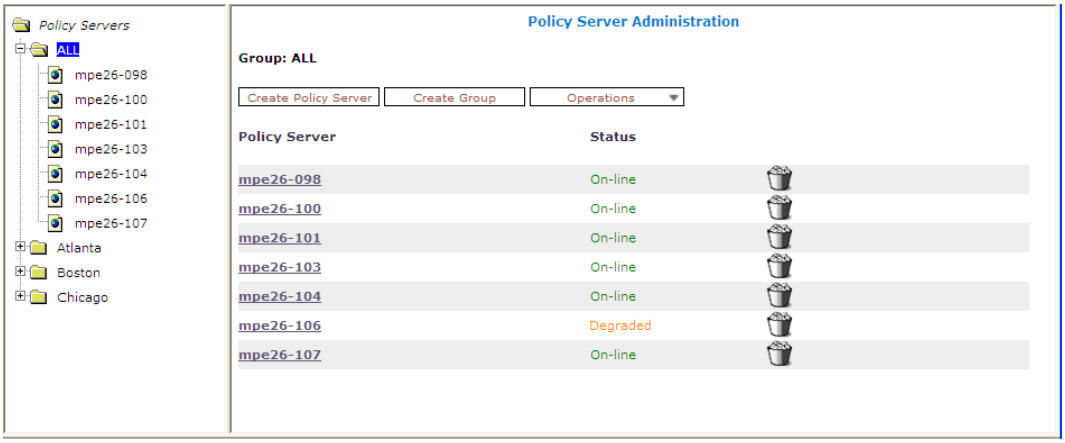
Deleting a Policy Server Profile

Deleting a policy server (MPE device) profile from the ALL group also deletes it from any associated group. You cannot delete a policy server profile if it is configured in an MPE pool.

To delete an MPE device profile:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the **ALL** group.

   The **Policy Server Administration** page opens in the work area, displaying all defined MPE devices; for example:



3. Use one of the following methods to select the MPE device profile to delete:
   - From the work area, click (trash can) located next to the MPE device profile you want to delete.
   - From the policy server group tree, select the MPE device; the **Policy Server Administration** page opens. Click the **System** tab, and then click **Delete**.

   You are prompted, "Are you sure you want to delete this Policy Server?"
4. Click **OK** to delete the MPE device profile (or **Cancel** to cancel the request).
   The profile is removed from the list.

The policy server profile is deleted.

Configuring Protocol Options on the Policy Server

To configure protocol options on an MPE device:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the MPE device.
   The **Policy Server Administration** page opens.
3. Select the **Policy Server** tab.
   The current configuration options are displayed.
4. Click **Modify** and define options as necessary.
   Table 4: Policy Server Protocol Configuration Options defines available options. (The options you see may vary depending on the mode in which your system is configured.)
5. When you finish, click **Save** (or **Cancel** to discard your changes).

Table 4: Policy Server Protocol Configuration Options

Attribute	Description
Associations	

Attribute	Description
Applications	The application profiles associated with this MPE device. To modify this list, click **Manage**. For more information on application profiles, see *Managing Application Profiles*.
Network Elements	The network elements associated with this MPE device. To modify this list, click **Manage**. For more information on network elements, see *Managing Network Elements*.
Network Element Groups	The network element groups associated with this MPE device. To modify this list, select or deselect groups. For more information on network element groups, see *Managing Network Elements*.
Subscriber Indexing	**Note:** The indexing parameters to use depend on how Sh is used. If you are unsure which indexing method(s) to configure, contact Tekelec Support.
Index by Username	Select to index the associated subscriber profile repository by account ID.
Index by NAI	Select to index the associated subscriber profile repository by network access ID.
Index by E.164 (MSISDN)	Select to index the associated subscriber profile repository by E.164 phone number.
Index by IMSI	Select to index the associated subscriber profile repository by IMSI number).
Index by IP Address	Select to index the associated subscriber profile repository by IP address. You can select **Index by IPv4**, **Index by IPv6**, or both formats. The default is both formats.
Overrides by APN	Select to configure an alternate subscriber indexing by IP address for a specific access point name (APN). In the **Overrides by APN** section, click **Add**. Enter the APN and click **Save** to enable **Index by IPv4**, **Index by IPv6**, or both. You can create new APN overrides by cloning or editing existing APN overrides. You can also delete an APN override.
Configuration	
Time of Day Triggering	Select **Enable** or **Disable** (the default) from the pulldown menu. If you select **Enable**, this MPE device supports time-of-day triggering when evaluating policy rules. For more information on time-of-day triggering, see *Managing Policy Time Periods*.
Billing Day	If enabled, you can configure a global monthly billing day for subscribers who do not have a specific day configured in their profiles in a backend database.
Billing Day of Month	If **Billing Day** is enabled, enter the day of the month on which subscriber usage counters are reset. This date is the default billing date for all subscribers handled by this MPE device; billing dates can be changed on a per-subscriber basis.

Attribute	Description
Billing Time Zone	Select the time zone used for billing cycle calculations. If this feature is configured, the user equipment time zone, even if reported, is irrelevant for billing cycle calculations.
Observe Daylight Savings Changes	If selected, the MPE device observes Daylight Savings Time for the configured Billing Time Zone.
Default Local Time Mode	Select the time used within a user's session from the pulldown menu: **System Local Time** to use the local time of the MPE device (the default) or **User Local Time** to use the user's local time. **Note:** If the time zone was never provided for the user equipment, system local time is applied.
Enable Pro Rate	If disabled, all subscribers' full monthly quota is granted for the billing cycle following a quota reset. If enabled, all subscribers' monthly quota is prorated for the billing cycle following a quota reset, based on the value of the **Billing Date Effective** field in the subscriber's profile. This is a global setting affecting all subscribers. (If the field value is null, usage will not be prorated.)
Billing Date Effective Name	Enter the name of the custom field in subscriber profiles to use for the SPR variable **NewBillingDateEffective**. The default is null. This is a global setting affecting all subscribers. To specify a local time in the SPR, the field must be in the format *yyyy-mm-dd*T*hh*:*mm*:*ss*; to specify a time zone (UTC offset), the field must be in the format *yyyy-mm-dd*T*hh*:*mm*:*ssZ* (for example, 2011-10-30T00:00:00-5:00).
Track Usage for Unknown Users	If enabled, the MPE device tracks usage and state per subscriber ID, even if the subscriber is not registered in the SPR. If tracking was enabled and is now disabled, usage and state is no longer tracked for unknown users, but existing usage and state data is retained.
Subscribe For Unknown Users	If Validate User is *off* (at the MPE device), then the unknown users are allowed to create sessions. In this case, if Subscribe for Unknown Users is enabled, then the MPE device will subscribe for those users. **Note:** This setting is only for the MPE device and does not have any effect on the SPR. There are settings in the SPR that must be set to allow auto-enrolling.
Use Single Lookup	If enabled, the MPE device reads multiple Sh user data blocks (subscriber, quota usage, and entity state) with a single read request. If you enable this feature, you must also configure the Sh data source with the option **Notif-Eff**. If disabled, separate lookups are used.
Use Combined Writes	The MPE will combine the updates (PURs) resulting from a single user request into a single PUR update to the SPR. The PUR will

	contain both the quota usage and state updates for the user. This reduces the number of transactions between the MPE and SPR.
Cache Quota Usage	If enabled, the MPE device caches the quota usage objects locally for as long as the user session exists. If disabled, objects are cached for a default of 60 seconds.
Cache Entity State	If enabled, the MPE device caches the entity state objects locally for as long as the user session exists. If disabled, objects are cached for a default of 60 seconds.
Subscribe Quota Usage	Subscribe to receive notifications from the SPR for any changes to the quota.
Subscribe Entity State	Subscribe to receive notifications from the SPR for any changes to the entity state.
RADIUS-S	
RADIUS Shared Secret	Authenticates RADIUS messages received from external gateways (that is, PDSN or HA). This field must be configured with a value or the RADIUS-S protocol will not work. Also, each gateway must be configured to use this value when sending messages to the MPE device, or the messages received from that gateway will be dropped.
Untiered Plan Name	When the MPE device is set to RADIUS-S mode, this attribute indicates that a matching plan name does not participate in any tiered service plan. On a successful lookup for a given subscriber, the plan name returned by LDAP is compared to the Untiered Plan Name configured for the MPE device via the **Policy Server** tab. If they match, no default QoS values are sent to the gateway for the subscriber. If the Untiered Plan Name is null, this only matches if the subscriber has an entry in LDAP with no value for the associated attribute. The default value is null.
Default Downstream Profile Default Upstream Profile	Define the upstream and downstream bandwidth parameters that are used when establishing a default traffic profile using RADIUS-S. You can override these parameters by configuring policy rules that apply different profiles. If a default profile is not configured, and the policy rules do not set the bandwidth parameters, a default traffic profile is sent to the Gateway to disable policing.
Index by Username	Select if the RADIUS database is indexed by subscriber account ID.
Index by NAI	Select if the RADIUS database is indexed by subscriber network address ID.
Index by Calling Station ID	Select if the RADIUS database is indexed by subscriber calling station ID.
Index by IP Address	Select if the RADIUS database is indexed by subscriber IP address.
Diameter	

Diameter Realm	The domain of responsibility (for example, **`galactel.com`**) for the MPE device.
Diameter Identity	The fully qualified domain name (FQDN) of the MPE device (for example, **`mpe3.galactel.com`**).
Default Resource Id	The bearer used if a GGSN does not send any bearer information in a Credit-Control Request (CCR). Enter an alphanumeric string of up to 100 characters. The default is no resource ID (that is, no bearer).
Correlate PCEF sessions	If selected, the primary PCEF Gx session will share information with all secondary sessions that share an IP address within the same IP-CAN session. Up to 10 different Gx sessions can be correlated to one subscriber. By default, PCEF sessions are not correlated, and do not share information.
Validate user	If enabled, sessions for unknown users are rejected.
Diameter PCEF Default Profile	Select the default traffic profile from the list that will be applied during PCEF session establishment using the Gx or Ty protocols, or if no other SCE traffic profile is applied as a result of a policy being triggered.
Use Synchronous Sd	If selected, the MPE device establishes an Sd session before sending a Gx CCA message to a traffic detection function (TDF).
Identify Duplicate sessions based on APN	If enabled, the MPE device will detect duplicate sessions based on access point name (APN). This makes it possible to remove duplicate sessions if they become excessive.
Subscriber ID to detect duplicate sessions	Available only if "Identify Duplicate sessions based on APN" is selected. Select the subscriber index type to use from the pulldown list: **Username**, **NAI**, **E.164 (MSISDN)**, or **IMSI**.
Diameter AF Default Profiles	
	Define the bandwidth parameters that are used when a request from an Application Function (AF) does not contain sufficient information for the MPE device to derive QoS parameters. These profiles are defined per media type: **Default**, **Audio**, **Video**, **Data**, **Application**, **Control**, **Text**, **Message**, and **Other**. (The **Default** profile is used when a profile for a media type is not defined.) To specify values, create Diameter profiles in the general profile configuration.
Default Charging Servers	
Primary Online Server	FQDN of the primary online charging server (used, for example, for prepaid accounts).
Primary Offline Server	FQDN of the primary offline charging server (used, for example, for billed accounts).
Secondary Online Server	FQDN of the secondary (backup) online charging server.
Secondary Offline Server	FQDN of the secondary (backup) offline charging server.

SMPP Configuration	
SMPP Enabled	Select to enable Short Message Peer to Peer (SMPP) messaging to subscribers. To send an SMS message to a subscriber, an MSISDN must be present in the subscriber's profile. Messages can be up to 254 characters long.
Validate Message Length	Select to validate message length.
SMPP Long Message Support	If selected, SMS messages longer than 160 characters are split into segments and reassembled by the receiving device. Messages of up to 1000 characters are supported.
Delivery Method for Long Message	Select the message delivery method for long messages from the pulldown list: **Segmentation and Reassembly (SAR)** (the default) or **Message Payload**.
(Primary) SMSC Host	Enter the FQDN or IP address of the primary Short Messaging Service Center store-and-forward server, which accepts SMS messages from the relay server.
SMSC Port	Enter the port number on which the primary Short Messaging Service Center store-and-forward server is listening for SMS messages. The default port is 2775.
ESME System ID	Enter the system ID of the primary External Short Messaging Entity. Sending the ID and password values authenticates the relay server as a trusted source. **Note:** This value must be configured on the primary SMPP server.
ESME Password	Enter the password of the primary External Short Messaging Entity. Sending the ID and password values authenticates the relay server as a trusted source. **Note:** This value must be configured on the SMPP server.
Confirm ESME Password	Re-enter the primary ESME password for verification. **Note:** This setting is only available from the Modify page.
(Secondary) SMSC Host	Enter the FQDN or IP address of the secondary Short Messaging Service Center store-and-forward server, which accepts SMS messages from the relay server. The secondary SMSC server is used if the primary server fails.
SMSC Port	Enter the port number on which the secondary Short Messaging Service Center store-and-forward server is listening for SMS messages. The default port is 2775.
ESME System ID	Enter the system ID of the secondary External Short Messaging Entity. Sending the ID and password values authenticates the relay server as a trusted source. **Note:** This value must be configured on the secondary SMPP server.

ESME Password	Enter the password of the secondary External Short Messaging Entity. Sending the ID and password values authenticates the relay server as a trusted source. **Note:** This value must be configured on the SMPP server.
Confirm ESME Password	Re-enter the secondary ESME password for verification.
ESME Source Address	Enter the source address for a SUBMIT_SM operation in SMPP Protocol V3.4. The default is none.
ESME Source Address TON	Select the source address Type of Number (TON) from the pulldown menu: **UNKNOWN** (the default), **INTERNATIONAL**, **NATIONAL**, **NETWORK SPECIFIC**, **SUBSCRIBER NUMBER**, **ALPHANUMERIC**, or **ABBREVIATED**.
ESME Source Address NPI	Select the source address Number Plan Indicator (NPI) from the pulldown menu: **UNKNOWN** (the default), **ISDN (E163/E164)**, **DATA (X.121)**, **TELEX (F.69)**, **LAND MOBILE (E.212)**, **NATIONAL**, **PRIVATE**, **ERMES**, **INTERNET (IP)**, or **WAP CLIENT ID**.
Character Encoding Scheme	Select the character-set encoding for SMS messages from the pulldown menu: **SMSC Default Alphabet**, **IA5 (CCITT T.50)/ASCII (ANSI X3.4)**, **Latin 1 (ISO-8859-1)**, **Cyrillic (ISO-8859-5)**, **Latin/Hebrew (ISO-8859-8)**, **UCS2 (ISO/IEC-10646)**, **ISO-2022-JP (Music Codes)**, **JIS (X 0208-1990)**, or **Extended Kanji JIS(X 212-1990)**.
SMSC Default Encoding Scheme	Select the SMSC default encoding from the pulldown menu: **UTF-8** or **GSM7**.
Request Delivery Receipt	Select the global default behavior when evaluating the policy action **send SMS** from the pulldown menu: **No Delivery Receipt**, **Delivery Receipt on success and failure**, or **Delivery Receipt on failure**.

SMTP Configuration	
SMTP Enabled	Select to enable Simple Mail Transport Protocol (SMTP) messaging (email) to subscribers. SMTP notifications are triggered from policy action and sent through an SMS Relay (SMSR) function to an external mail transfer agent (MTA). **Note:** There is no delivery receipt for the SMTP messages sent from the SMSR, only confirmation that it reached the configured MTA.
MTA Host	Enter the FQDN or IP address of the Mail Transfer Agent server, which accepts SMTP messages from the SMSR function.
MTA Port	Enter the port number on which the MTA server is listening for SMTP messages. The default port is 25.

MTA Username	Enter the system ID of the SMSR function. Sending the ID and password values authenticates the SMSR function as a trusted source. **Note:** This value must be configured on the MTA.
MTA Password	Enter the password of the SMSR function. Sending the ID and password values authenticates the SMSR function as a trusted source. **Note:** This value must be configured on the MTA.
Confirm MTA Password	Re-enter the password for verification. **Note:** This is a new configuration setting for the SMTP connection.
Default From Address(es)	Enter the source address for an SMTP message. Enter up to five comma-separated static values, or up to five comma-separated references to custom fields in the subscriber profile. The default is none. **Note:** The total number of To, CC, and BCC addresses is limited to five.
SMTP Connections	The number of SMTP connections. They range from 1-10. **Note:** SMTP connections can be increased to support a higher throughput.
Default Reply-To Address(es)	Enter the email address automatically inserted into the To field when a user replies to an email message. For most email messages, the From and Reply-To fields are the same, but this is not necessarily so. If no Default Reply-To is specified here, the From address is used. Optionally enter a static email address to use for Reply-To. The default is none.
Default CC Address(es)	Enter the copy address for an SMTP message. Enter up to five comma-separated static values, or up to five comma-separated references to custom fields in the subscriber profile. The default is none. **Note:** The total number of To, CC, and BCC addresses is limited to five.
Default BCC Address(es)	Enter the blind copy recipient address for an SMTP message. Enter up to five comma-separated static values, or up to five comma-separated references to custom fields in the subscriber profile. The default is none. **Note:** The total number of To, CC, and BCC addresses is limited to five.
Default Signature	Enter the text that appears as a signature in an SMTP message. The default is none.

RADIUS Configuration

Default Passphrase	If the source IP address of a received RADIUS message does not match any of the IP addresses configured for a NAS device, and no passphrase is defined for the NAS device, then the MPE device will attempt to decode the message using this default passphrase. Enter the passphrase to use. The default is **radius**.
Analytics	
Policy Analytics Enabled	If the *Analytics Data Stream* (ADS) feature is enabled, select the **Policy Analytics Enabled** option to generate an ADS for the MPE.

Configuring MPE Advanced Settings

The Advanced configuration page provides access to factory-default attribute settings that are not normally changed.

Caution: Do not attempt to change a configuration key without first consulting with Tekelec Technical Support.

The MPE Advanced Settings page is used for the following:

- *Configuring Session Clean Up Options*
- *Configuring Configuration Key Changes*
- *Configuring Load Shedding Rules*

Configuring Session Clean Up Options

Session cleanup options are used to configure the methods used for cleaning up stale sessions and how often cleanup occurs.

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the MPE device.
   The **Policy Server Administration** page opens.
3. Select the **Policy Server** tab.
   The configuration settings for the policy server are displayed.
4. Click **Advanced**.
   Advanced configuration settings, including the session clean up options are displayed and can be edited.

Table 5: Session Clean Up Options

Attribute	Description
Enable Session Clean Up	Select to turn on session clean up. The default is enabled.

Attribute	Description
Max Session Cleanup Rate (sessions/sec)	The rate at which the cleanup task attempts to clean stale sessions. The default is 50 sessions/sec. Valid range is 1–50 sessions/sec. Do not modify this setting without consulting technical support.
Max Session Iteration Rate (sessions/sec)	The maximum rate at which the cleanup task iterates through the sessions database. Default value is 1000. Valid range is 1–1000. Do not modify this setting without consulting technical support.
Max Duration For Session Iteration (hours)	The maximum duration to iterate through the sessions. Default value is 2 hours. Valid range is 1–2 hours. Do not modify this setting without consulting technical support.
Session Cleanup Start Time	The time of day when the cleanup task occurs. Click the associated radio button and enter a value or select a value from the menu. No default value is defined.
Session Cleanup Interval (hours)	The interval at which the cleanup task occurs. Click the associated radio button and enter a value. The default is 6 hours. A value of 0 disables cleanup. Do not modify this setting without consulting technical support.
Session Validity Time (hours)	The amount of time after which all sessions except Rx sessions are declared as stale. The default is 24 hours.
Max Session Validity Time (hours)	The maximum amount of time after which the session is cleaned up after an error. The default is 48 hours. Valid range is 1–48.
Override Cleanup Audit	Select to turn override clean up audit on. When selected, the cleanup task bypasses the audit process and deletes all sessions that are stale for the session validity time. The default is deselected.
Sy Session Audit Enabled	Select to turn on auditing for the Sy session. When selected, the Sy session is checked for the association with at least one IP-CAN session. If there is not an IP-CAN session association, the Sy session is removed and an STR message is sent to the OCS. If there is at least one IP-CAN session associated with the Sy session, an SLR (INTERMEDIATE) message is sent to audit stale Sy sessions. If this option is deselected (the default), the Sy session is checked for IP-CAN session associations. If there is an association, the Sy session is deemed active; otherwise, it is removed and an STR message is sent to the OCS.
Sy Session Validity Time (Hours)	The amount of time after which an Sy session is declared as stale. The default is 10 hours.
Sy Session Max Validity Time (Hours)	The amount of time used to validate an Sy session after it is declared stale (inactive). If it is not validated, the session is removed and the MPE device attempts to create a new Sy session for the subscriber. The default is 48 hours.

Attribute	Description
Enable Audit for Auth Lifetime	Select to enable the feature maximum and minimum times for AAR-I messages of Rx sessions that contain the Supported Feature AVP with the Support of Rx Subscription Expiry bit set (the Authorization-Lifetime AVP in the AAR-I is optional).
Auth Lifetime (sec)	The maximum lifetime for an Rx session.
Min Auth Lifetime (sec)	The minimum lifetime for an Rx session.
Enable Grace Period of Subscription Expiry	Select to allow a grace period, which specifies how aggressively Rx sessions are purged.
Grace Period of Subscription Expiry (sec)	The amount of time between an Rx session reaching its Auth Lifetime value and the session being deleted.

5. When finished making changes, click **Save** (or **Cancel** to discard changes).
   The settings are applied to the selected MPE device.

Configuring Configuration Key Changes

Configuration key changes are made using the Other Advanced Configuration Settings section of the Advanced configuration page of the selected MPE device.

Make configuration key changes as follows:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the MPE device.
   The **Policy Server Administration** page opens.
3. Select the **Policy Server** tab.
   The configuration settings for the policy server are displayed.
4. Click **Advanced**.

   Configuration Key changes are made using the **Other Advanced Configuration Settings** section.

   - **To add a key to the table** — Click **Add**; the **Add Configuration Key Value** window opens. Enter the following values:
     - **Configuration Key** — The attribute to set
     - **Value** — The attribute value (up to 255 characters)

     When you finish, click **Save** (or **Cancel** to discard your changes). The key is displayed in the table with its defined and default values.

     Caution: There is no input validation on values. Also, if you overwrite a setting that is configurable using the CMP GUI, the value adopted by the MPE device is undetermined.

   - **To clone a key in the table** — Select an existing key in the table and click **Clone**; the Clone Configuration Key Value window opens with that key's information filled in. Make changes as required. When you finish, click **Save** (or **Cancel** to discard your changes).

- **To edit a key in the table** — Select an existing key in the table and click **Edit**; the Edit Configuration Key Value window opens with that key's information. Make changes as required. When you finish, click **Save** (or **Cancel** to discard your changes).
- **To delete a key from the table** — Select an existing key in the table and click **Delete**; you are prompted, "Are you sure you want to delete the selected Configuration Key Value(s)?" Click **Delete** to remove the key (or **Cancel** to cancel your request).

5. When finished making changes, click **Save** (or **Cancel** to discard changes).
   The settings are applied to the selected MPE device.

Configuring Load Shedding Rules

You can configure how an MPE device reacts to a processing backlog. This state is called "busyness."

Use the **Load Shedding Configuration** section of the **Advanced Configuration** page to define up to three levels of busyness (from Level 1, the least busy, to Level 3, the most busy) for an MPE device based on the amount of backlog. To reach a configured level of busyness:

- The backlog of outstanding messages in a node crosses a pre-defined threshold for the level.
- The backlog has been above the busyness level threshold for a minimum amount of time.

At each level, the MPE device can be configured to take one of the following actions (referred to as rules) until the busyness level clears:

- Reject new messages with a specific result code (default is DIAMETER_TOO_BUSY).
- Drop the message.

Note: Configuration keys must also be used in configuring load shedding options. Contact technical support for assistance.

Configure the load shedding rules as follows:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the MPE device.
   The **Policy Server Administration** page opens.
3. Select the **Policy Server** tab.
   The Policy Server configuration settings are displayed.
4. Click **Advanced**.
   Advanced configuration settings are displayed and can be edited.
5. On the **Load Shedding Configuration** section of the page, **Enabled** is selected by default.
6. Configure the rules for the busyness levels:
   a) Click the arrow next to the level to expand the level.
   b) Click **Add**.
      The **Add Load Shedding Rule** dialog appears.
   c) Enter the values for the load shedding rule:
      - **Name** — Name of the rule.
      - **Application** — Select the application the rule applies to. You can select **Gx**, **Gy**, **Gxx**, **Rx**, **Sh**, or **Sy**.
      - **Message** — Type of message the rule applies to (which depends on the application chosen).

- **Request Types** (available depending on the message selected) — Select the Request-Type attribute-value pairs (AVPs) that the message must contain. You can select **Initial**, **Update**, and/or **Terminate**.
- **APNs** — Enter a CSV list of one or more access point names that the message must contain.
- **Action** — Select the action to be taken if the criteria are met for the busyness level. You can select **Drop** (drop the message); **Answer With** (select a code from the drop-down list), or **Answer With Code** (enter a code) and **Vendor ID** (enter a vendor ID).

d) Click **Save** (or **Cancel** to discard your changes).
The rule is displayed in the table.

7. Once a rule is defined, you can optionally clone, edit, or delete it by selecting it and clicking the appropriate button.
8. When finished making changes, click **Save** (or **Cancel** to discard your changes).

The settings are applied to the selected MPE device.

Configuring Data Source Interfaces

Before the MPE device can communicate with any external data sources, you must configure the interface. To configure a data source interface:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the policy server.
The **Policy Server Administration** page opens.
3. Select the **Data Sources** tab.
The current data sources are displayed, listing the administrative state, subscription state, type, primary address, secondary address, and tertiary address.
4. To modify the list of data sources, click **Modify**.

   The **Modify Data Sources** page opens. The functions available from this table are as follows:

   - **To add a data source to the table** — Select the data source type from the **Add** pulldown list; the appropriate **Add Data Source** window opens. Configure values as appropriate.
     - For LDAP data sources, see *Configuring an LDAP Data Source*.
     - For an Sh data source, see *Configuring an Sh Data Source*.
     - For an Sy data source, see *Configuring an Sy Data Source*.
   - **To clone a data source in the table** — Select an existing data source in the table and click **Clone**; the **Clone Data Source** window opens with the information for the data source. Make changes as required.
   - **To edit a data source in the table** — Select the data source in the table and click **Edit**; the **Edit Data Source** window opens, displaying the information for the data source. Change the configuration values as required.
   - **To delete a data source from the table** — Select the data source in the table and click **Delete**; you are prompted, "Are you sure you want to delete the selected data source(s)?" Click **Delete** to remove the data source entry (or **Cancel** to cancel your request).
   - **To change the order of the list** — If you define multiple data sources, they are searched in the order displayed in this list. To change the order, select a data source and click the **Up** or **Down**.

When you finish, click **Save** (or **Cancel** to discard your changes).

5. The following general settings are available:
   - **Merge Search Results** — If you define multiple data sources and a search returns results from more than one source, the results are displayed in source order. To display one sorted list instead, select this option.
   - **Subscription Enabled Via Policy Only** — For detailed information, see the SPR documentation.
6. When you finish, click **Save** (or **Cancel** to discard your changes).

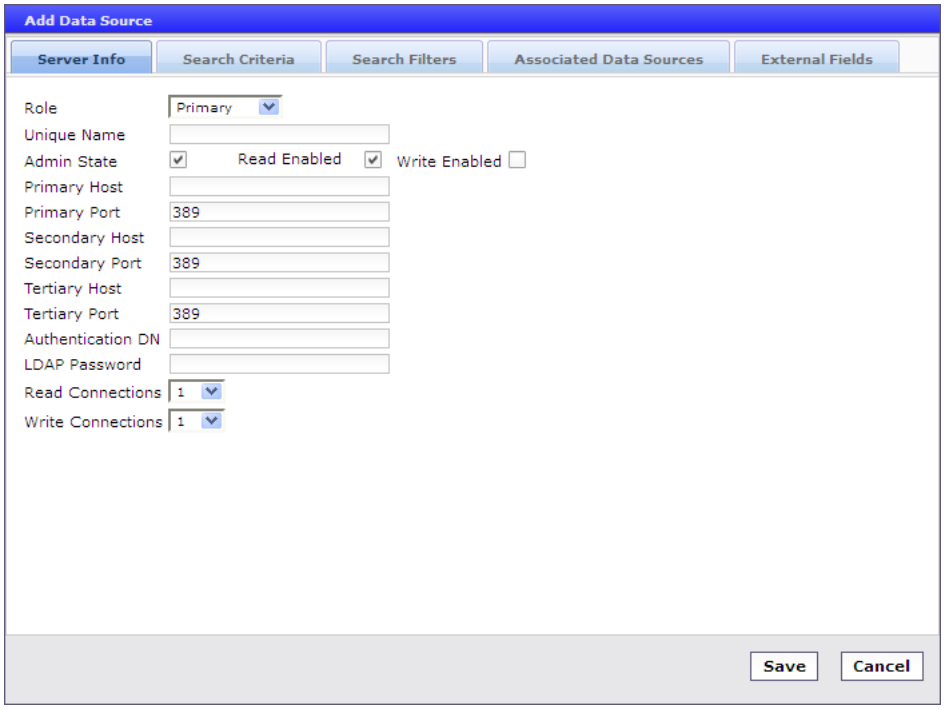
Configuring an LDAP Data Source

For LDAP, you can configure connections to up to three servers. The **Add Data Source** window contains the following tabs:

Server Info
Search Criteria
Search Filters
Associated Data Sources
External Fields

Server Info Tab

On the **Server Info** tab, enter the following:



- **Role**— Data source attribute:
  - **Primary** — The data source which performs the initial level of lookups.

  - **Secondary** — Indicates a dependency on the results of the prior lookup. It must initially be associated with the primary data source and configured to be used in a subscriber lookup.

- **Unique Name** — Name given to associate with the created LDAP.
- **Admin State** — Select to enable this data source. Selected by default.
- **Read Enabled** — Select to enable read access to this data source. Selected by default.
- **Write Enabled** — Select to enable write access to this data source.
- **Primary Host** — FQDN or IP address in IPv4 or IPv6 format of primary LDAP server.
- **Primary Port** — Port number of primary server. The default port number is 389.
- **Secondary Host** — FQDN or IP address in IPv4 or IPv6 format of secondary LDAP server.
- **Secondary Port** — Port number of secondary server. The default port number is 389.
- **Tertiary Host** — FQDN or IP address in IPv4 or IPv6 format of tertiary LDAP server.
- **Tertiary Port** — Port number of tertiary server. The default port number is 389.
- **Authentication DN** — The Distinguished Name (DN) used for binding to the LDAP server. The DN can refer to an entry in the directory or to a relative distinguished name (RDN). RDN attributes include cn (common name), uid (user ID), ou (organizational unit), and o (domain name). For example:

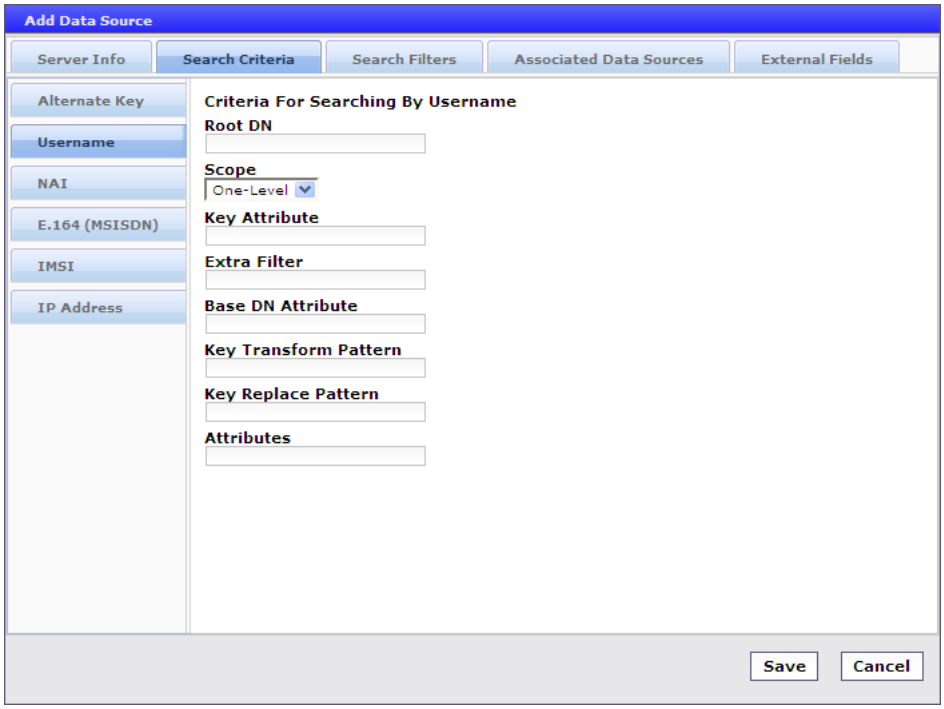
  `cn=PolicyServer,ou=galactel,o=galactel.com`

- **LDAP Password** — Provides read-only access to the LDAP directory. The MPE device must bind to the LDAP server with the DN and password to access the database. Example: **`LDAPpassword`**.
- **Read Connections** — Enabled for data sources set in the Secondary role. Select up to 10 connections.
- **Write Connections** — Disabled for data sources set in the Secondary role. Select up to 10 connections.

If merged results are enabled, multiple primary data sources are searched asynchronously. Secondary searches are dependent on the results of the primary they are associated with, and will run as soon as the results are returned from that primary. The secondary searches will not wait for the results of other primary data sources before initiating.

Search Criteria Tab

On the **Search Criteria** tab, enter the following:



1. Select how the LDAP database is indexed:
   - **Alternate Key**— The Alternate Key has an LDAP data source role of *primary*.

     Note: If you select alternate key indexing, there are no options, so the rest of tab becomes blank.

   - **Username** — The database is indexed by user name (account ID).
   - **NAI** — The database is indexed by NAI (network access ID).
   - **E.164 (MSISDN)** — The database is indexed by E.164 (E.164 phone number).
   - **IMSI** —The database is indexed by International Mobile Subscriber Identity.
   - **IP Address** —The database is indexed by IP address.
2. **Root DN** — The root distinguished name for the LDAP search.
3. **Scope** — Scope of the LDAP search:
   - **Object** — Restrict the scope of the LDAP search to the specified object.
   - **One-Level** (the default) — Extend the scope of the LDAP search one level under the given search base.
   - **Sub-Tree** — Extend the scope of the LDAP search to the whole subtree under the given search base.
4. **Key Attribute** — The attribute whose value is checked to match the key value; used to construct a search filter of the form *KeyAttribute=KeyValue*.
5. **Base DN Attribute** — This attribute will be prefixed to the root distinguished name when building the DN for a search.
6. **Key Transform Pattern** — Regular expression (regex) pattern to use to transform a key.
7. **Key Replace Pattern** — Replacement string to use to transform the key.

For example, **17$2** means the new string starts with "17" and is followed by the group 2 ($2) pattern.

8. **Attributes**— Comma-separated list of entries defining how to save attributes in the object returned from the LDAP search.

   The default is null, meaning that all values are saved using the attribute name used in LDAP. Otherwise, each entry should be one of the following:

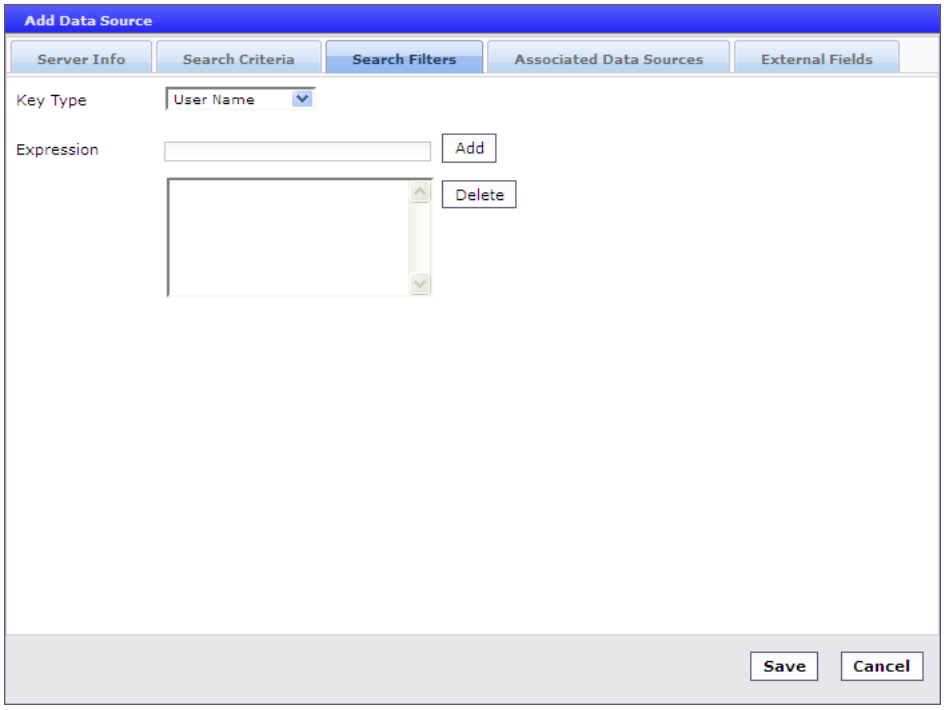
   - *attr* — A field is saved with the same name and value as the specified attribute.
   - *field=attr* — A field with the specified name is saved with the value of the specified attribute.
   - *field=attr*[*from*:*to*] —A field with the specified name is saved with a substring of the value of the specified attribute.

   The substring is determined by the *from* and *to* values. A value of 0 in *from* indicates the beginning of the value, and a value of 0 in *to* indicates the end of the value.

Search Filters Tab

You can configure any number of filters per search type per data source. For example, if a data source supports searching by MSISDN and IMSI, you can define multiple MSISDN and IMSI filters. It is best to order filtered data sources higher than unfiltered ones.

To define filters, on the **Search Filters** tab, enter the following:



1. **Key Type** — Select from the list:
   - **User Name** (the default) — User name (account ID)
   - **NAI** — Network address ID

- **E.164(MSISDN)**— E.164 phone number
- **IMSI** — International Mobile Subscriber Identity
- **IP Address** — IP address

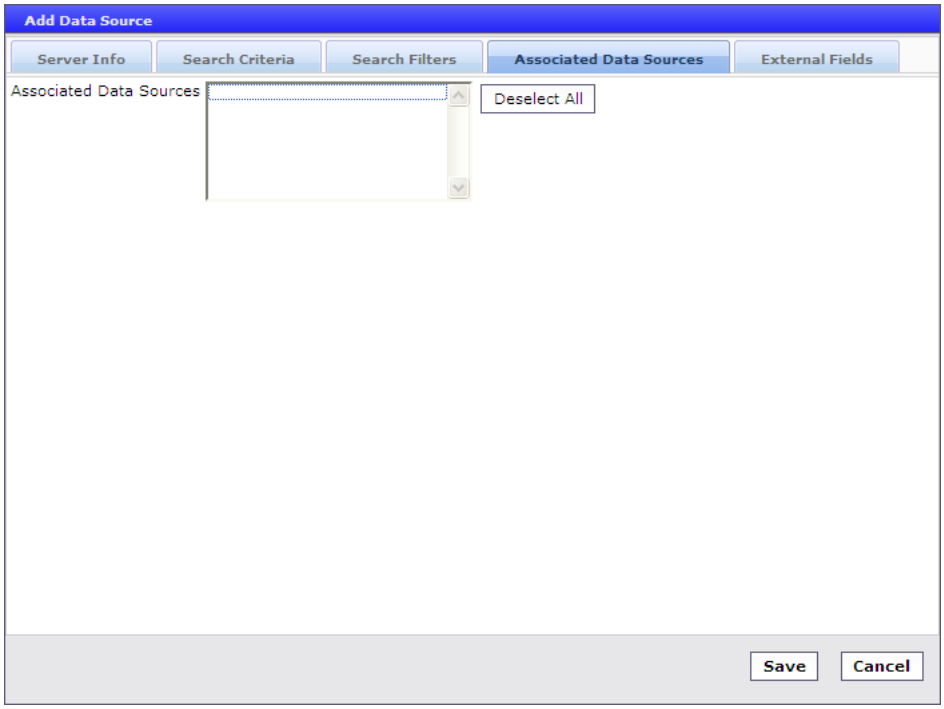
2. **Expression** — Enter a regular expression.
   For example:
   - **`508.*`** — Matches numbers beginning with "508"
   - **`*@galactel.com`** — Matches strings ending with "@galactel.com"
   - **`.*`** — Matches any input string

   To add the expression to the list, click **Add**. To remove an expression from the list, select it in the list and click **Delete**.
3. When you finish, click **Save** (or **Cancel** to abandon your changes).
   The expression is added to the filters.

The LDAP data source filters are defined.

Associated Data Sources Tab

On the **Associated Data Sources** tab, enter the following:



- **Associated Data Sources** — A list of associated secondary data sources. The list is displayed on the Priority order of the secondary data sources. For example:

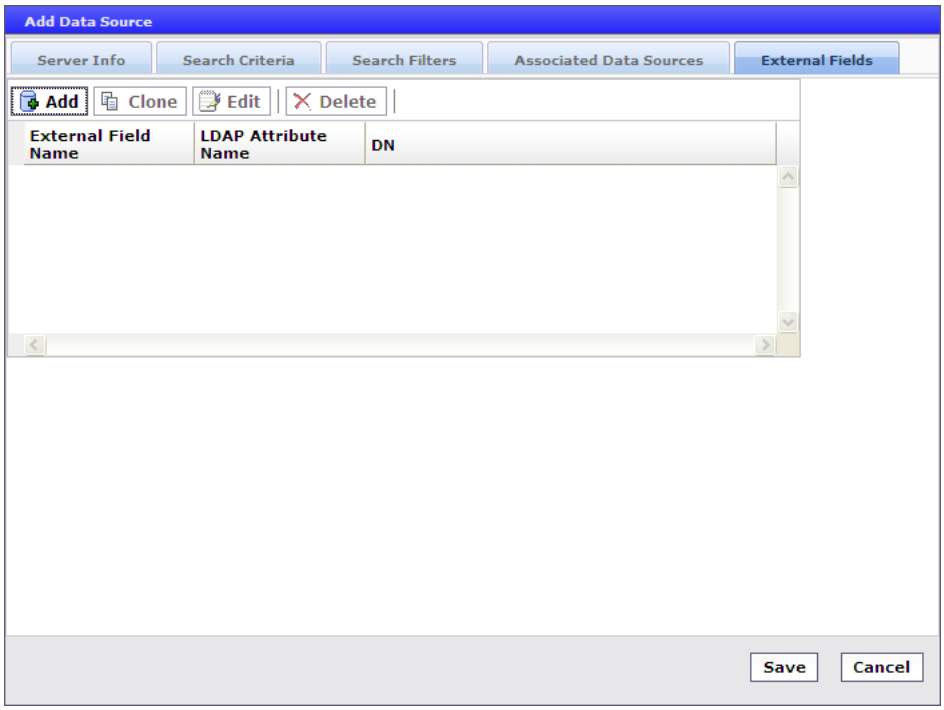
```
LDAP1.AssociatedLDAPs=1234567890111111, 123456789022222
```

Note: Select **Deselect All** if you want to deselect your choices.

External Fields Tab

The **External Fields** tab lets you define external fields and map them to specific LDAP attributes and distinguished names (DNs). This lets you use the same external field name when writing a policy that will be deployed across multiple MPE devices. You can define up to 50 attributes per data source.

The functions available from the **External Fields** tab are as follows:



- **To add a field to the table** — Click **Add**; the **Add External Field** window opens. Enter the external field name, LDAP attribute name, and distinguished name (DN). Click **Save** when you finish (or **Cancel** to close the window and abandon your change).
- **To clone a field in the table** — Select an existing field in the table and click **Clone**; the **Clone External Field** window opens with that field's information filled in. Make changes as required. Click **Save** when you finish (or **Cancel** to close the window and abandon your change).
- **To edit a field in the table** — To edit a field name or value, select the field in the table and click **Edit**; the **Edit External Field** window opens, displaying the field's information. Make changes as required. Click **Save** when you finish (or **Cancel** to close the window and abandon your change).
- **To delete a field from the table** — Select the field(s) in the table and click **Delete**; you are prompted, "Are you sure you want to delete the selected External Field(s)?" Click **Delete** to remove the data source entry (or **Cancel** to cancel your request).

Configuring an Sh Data Source

For an Sh data source, you can define two active primary connections and two standby backup connections. An incoming message can be handled from either active connection. You can subscribe

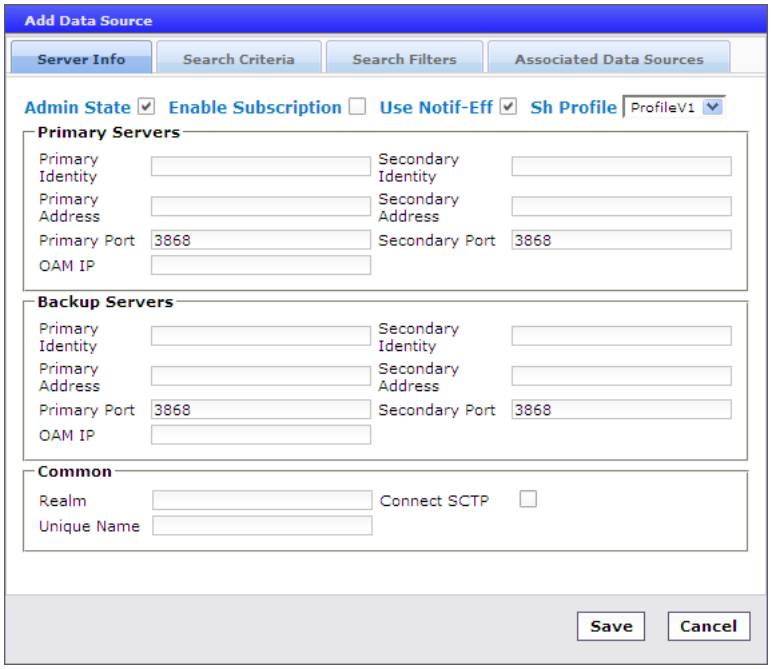
through the MPE device (via the Sh interface) to receive notifications on changes to the Quota and Entity State objects.

If an Sh request originated by the MPE device fails, the error code returned is compared against a set of error codes, and if the code matches the request is retried, one time. An Sh request is sent to the primary connections first, and to the secondary connection only so long as no primary connection is available.

You can receive subscription notifications as changes are implemented to the Quota and Entity state by adding a configured data source and selecting **Enable Subscription**.

Server Info Tab

On the **Server Info** tab, enter the following:



1. **Admin State** — Enable this data source.

   Selected by default.

2. **Enable Subscription** — Enable the Sh subscribe/notify function to manage dynamic profile changes. The data is returned in one XML response. If disabled, separate lookups are used.
3. **Use Notif-Eff** — Enable reads of multiple user data blocks (subscriber, quota, and entity state).
4. **Sh Profile** — Select **ProfileV1** (the default) for using third-party HSS, **ProfileV2** for an HSS/Sh (7.5 or earlier version), **Profile V3** for using SPR (8.0 or later version), or **ProfileV4** (to support provisioning of pass, rollover, and top-up information).

   Note: ProfileV4 is the only Sh profile available for MDF servers.

5. **Primary Servers**:
   a) **Primary Identity** — Primary server host name.
   b) **Primary Address** — IP address, in IPv4 or IPv6 format, of the primary server.
   c) **Primary Port** — Primary server port number.

The default is 3868.

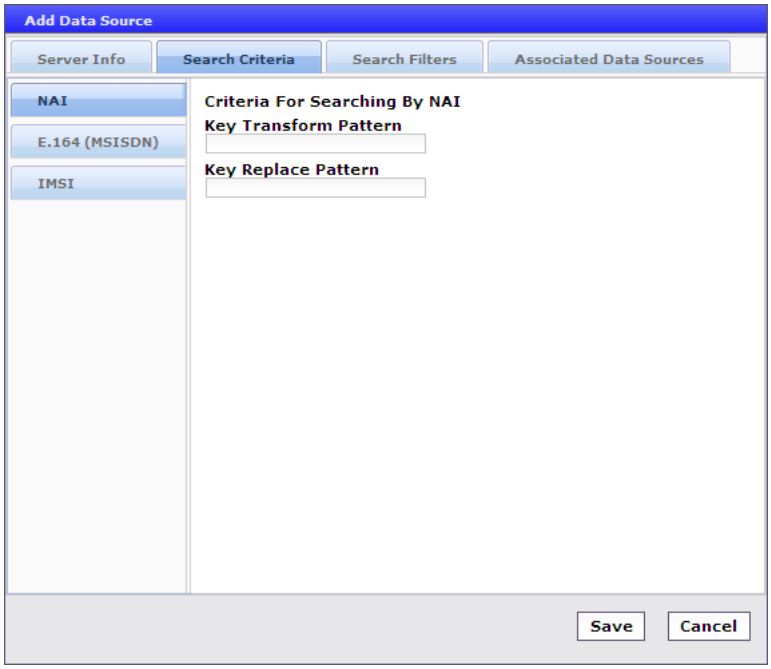
d) **Secondary Identity** — Secondary server host name.
e) **Secondary Address** — IP address, in IPv4 or IPv6 format, of the secondary server.
f) **Secondary Port** — Secondary server port number.
The default is 3868.
g) **OAM IP** — The SPR feature queries and edits data from the Sh data source via RESTful API.

6. **Backup Servers**:
a) **Primary Identity** — Primary backup server name.
b) **Primary Address** — IP address, in IPv4 or IPv6 format, of the primary backup server.
c) **Primary Port** — Primary backup server port number.
The default is 3868.
d) **Secondary Identity** — Secondary backup server name.
e) **Secondary Address** — IP address, in IPv4 or IPv6 format, of the secondary backup server.
f) **Secondary Port** — Secondary backup server port number.
The default is 3868.
g) **OAM IP** — The SPR feature queries and edits data from the Sh data source via RESTful API.
7. **Common**:
a) **Realm**— Server realm; for example, **`galactel.com`**.
b) **Unique Name**— The unique name assigned to the server.
c) **Connect SCTP**— Indicates whether the Sh data source can support SCTP protocol. If checked, an MPE device can communicate with the Sh data source in SCTP.
8. When you finish, click **Save** (or **Cancel** to discard your changes).

The Sh data source is configured.

Search Criteria Tab

On the **Search Criteria** tab, enter the following:

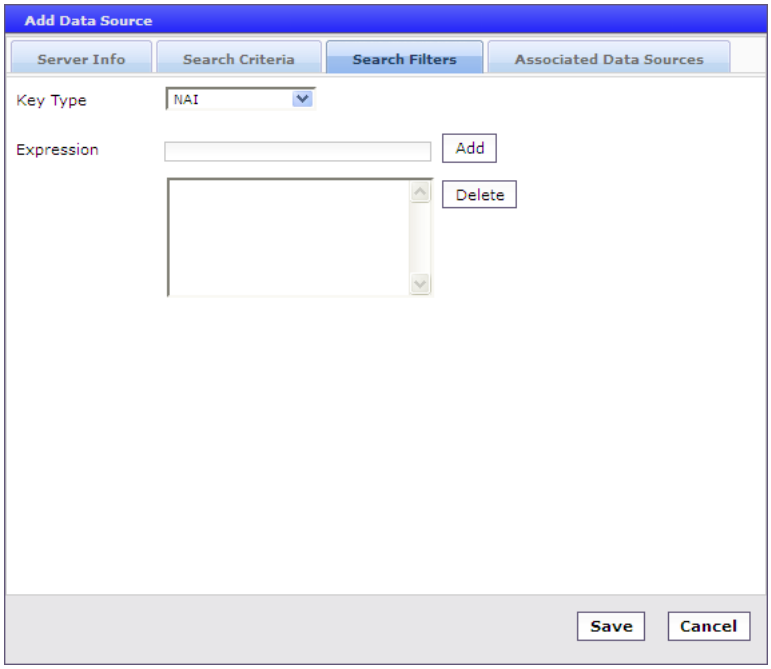


1. Select how the database is indexed:
   - **NAI** — The database is indexed by NAI (network access ID).
   - **E.164 (MSISDN)** — The database is indexed by E.164 (E.164 phone number).
   - **IMSI** —The database is indexed by International Mobile Subscriber Identity.
2. **Key Transform Pattern** — Regular expression (regex) pattern to use to transform a key.
3. **Key Replace Pattern** — Replacement string to use to transform the key.
   For example, **17$2** means the new string starts with "17" and is followed by the group 2 ($2) pattern.
4. When you finish, click **Save** (or **Cancel** to abandon your changes).

Search Filters Tab

You can configure any number of filters per search type per data source. For example, if a data source supports searching by MSISDN and IMSI, you can define multiple MSISDN and IMSI filters. It is best to order filtered data sources higher than unfiltered ones.

To define filters, on the **Search Filters** tab, enter the following:



1. **Key Type** — Select from the list:
   - **NAI** — Network address ID
   - **E.164 (MSISDN)** — E.164 phone number
   - **IMSI** (the default) — International Mobile Subscriber Identity
2. **Expression** — Enter a regular expression. For example:
   - **`508.*`** — Matches numbers beginning with "508"
   - **`*@galactel.com`** — Matches strings ending with "@galactel.com"
   - **`.*`** — Matches any input string

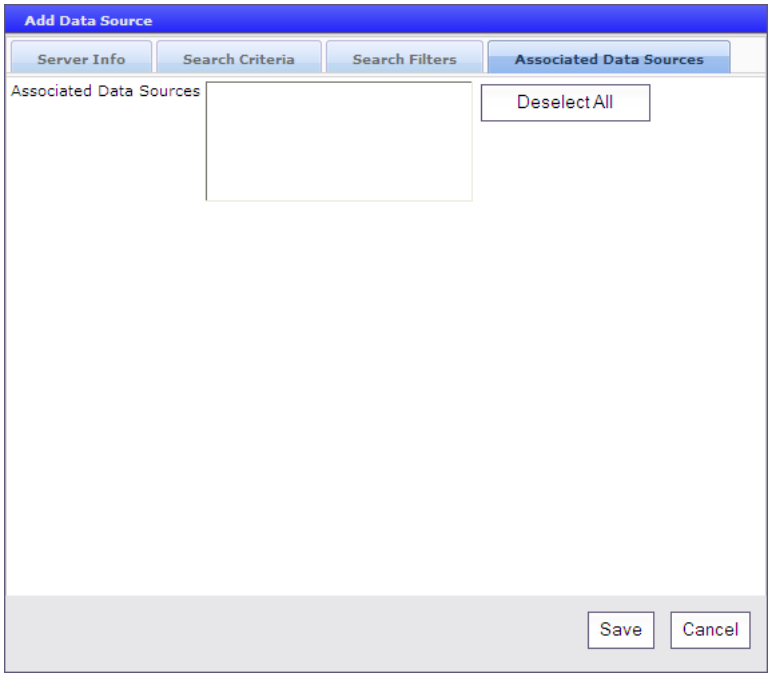
   To add the expression to the list, click **Add**. To remove an expression from the list, select it in the list and click **Delete**.
3. When you finish, click **Save** (or **Cancel** to discard your changes).

The Sh data source filters are defined.

Associated Data Sources Tab

If you have defined multiple data sources, you can select which one is associated with this Sh data source on the **Associated Data Sources** tab.

To associate a data source, on the **Associated Data Sources** tab, enter the following:



1. **Associated Data Sources** — Displays a list of defined secondary data sources. Select the data source(s) to associate with this Sh data source.

   Select **Deselect All** if you want to deselect your choices.

2. When you finish, click **Save** (or **Cancel** to discard your changes).

The associated data sources are defined.

Configuring an Sy Data Source

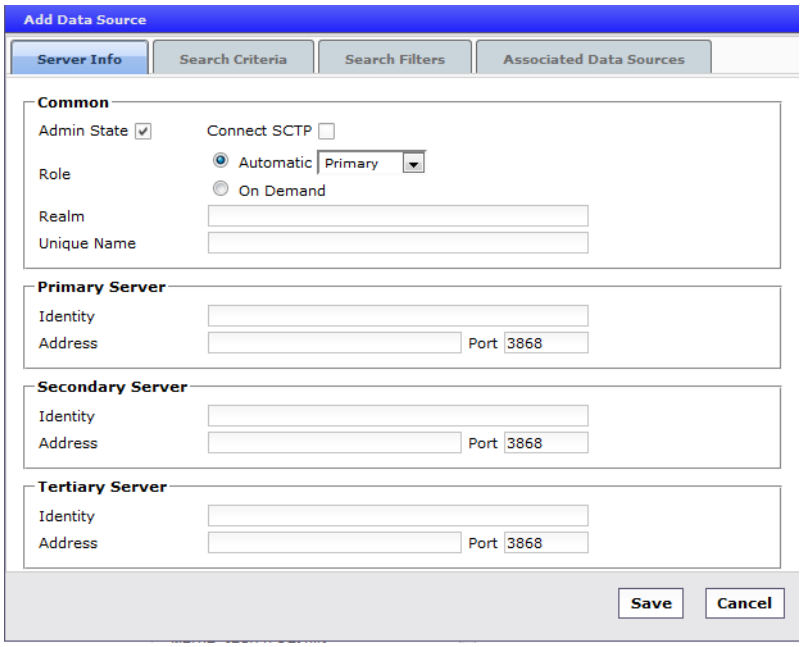
Sy is a Diameter interface between a PCRF and an online charging server (OCS). It provides spending information using policy counter identifiers for a particular subscriber. An MPE device can use this data to drive policy decisions for the subscriber. (For information on defining policy counter IDs, see *Managing Policy Counter Identifiers*.)

For an Sy data source, you can define a primary, secondary, and tertiary server. An Sy request is sent to the primary connections first. If the primary server is not available then the request is sent to the secondary connection. If the primary and secondary connections are unavailable then the request is sent to the tertiary server. Connections are used in order always defaulting to the highest server available. As soon as a higher connection is available, requests resume on that connection.

When an Sy data source is defined with an automatic role, that data source is available as an associated data source for the primary data source. Associated data sources are available as secondary and tertiary server data sources on all primary Sy, HSS, or LDAP data sources. You must select the secondary or tertiary Sy data source and associate it with the primary data source to create the connection. Connections are used in order, always defaulting to the highest connection available. As soon as a higher connection is available, calls resume on that connection.

Server Info Tab

On the **Server Info** tab, enter the following:



1. **Common** (information common to all configured Sy servers):
   a) **Admin State** — Enable this data source.
   b) **Connect SCTP**— Indicates whether the Sy data sources support the SCTP protocol. If checked, an MPE device can communicate with the Sy data sources using SCTP. The default is to use the TCP protocol.
   c) **Role** — Determines how and when the data sources are used to look up information on the OCS.

      1. Select **Automatic** to automatically access a data source, or **On Demand** to use a policy to access a data source.
      2. Select **Primary** (the default) if this group of data sources will be queried directly when Sy data is needed, or **Secondary** if this group of data sources will be queried only after a successful query to another primary data source.

   d) **Realm** (required) — Defines the Diameter realm of the primary and optional secondary servers; for example, **`galactel.com`**.
   e) **Unique Name** (required) — Name to identify this group of servers in the CMP database.
2. **Primary Server**:
   a) **Identity** (required) — Fully qualified domain name (FQDN) of the primary server.
   b) **Primary Address** — IP address, in IPv4 or IPv6 format, of the primary server. If omitted, the primary identity is used to look up the server address.
   c) **Primary Port** — Primary server port number. The default port number is 3868.
3. **Secondary Server**:
   a) **Identity** — FQDN of the secondary server.

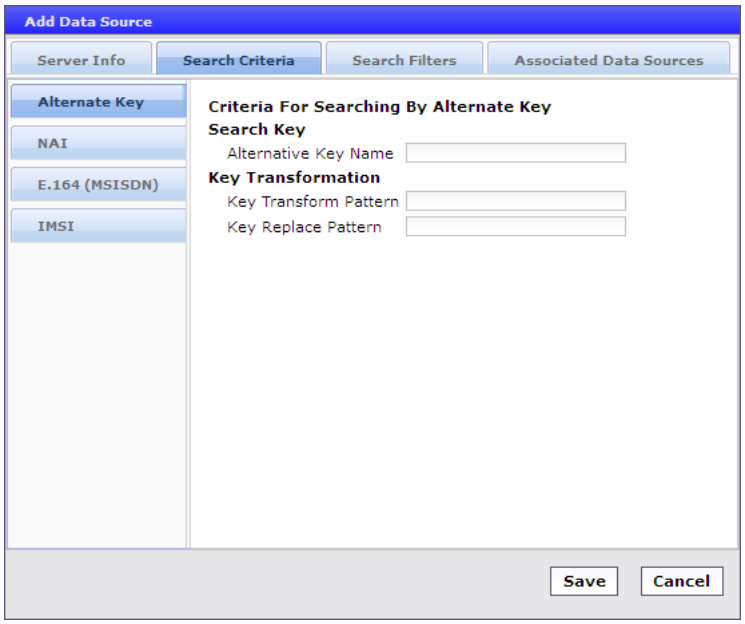
b) **Primary Address** — IP address, in IPv4 or IPv6 format, of the backup server. If omitted, the secondary server primary identity is used to look up the server address.
c) **Primary Port** — Secondary server port number. The default port number is 3868.

4. **Tertiary Server**:
   a) **Identity** — FQDN of the tertiary server.
   b) **Primary Address** — IP address, in IPv4 or IPv6 format, of the tertiary server. If omitted, the tertiary server primary identity is used to look up the server address.
   c) **Primary Port** — Backup server port number. The default port number is 3868.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The Sy data source is configured.

Search Criteria Tab

On the **Search Criteria** tab, enter the following:



1. Using the tabs on the left, select how the database is indexed:
   - **Alternate Key** (the default) — If the data source role is defined as primary, the window is blank; if the data source role is defined as secondary, the Alternate Key fields are available. If the fields are present, enter the **Alternative Key Name**.
   - **NAI** — The database is indexed by NAI (network access ID).
   - **E.164 (MSISDN)** — The database is indexed by E.164 (E.164 phone number).
   - **IMSI** —The database is indexed by International Mobile Subscriber Identity.
2. **Key Transform Pattern** — When searching the database, this is a regular expression (regex) pattern to use to transform a key.
3. **Key Replace Pattern** — When searching the database, this is a replacement string to use to transform the key.

For example, **17$2** means the new string starts with "17" and is followed by the group 2 ($2) pattern.

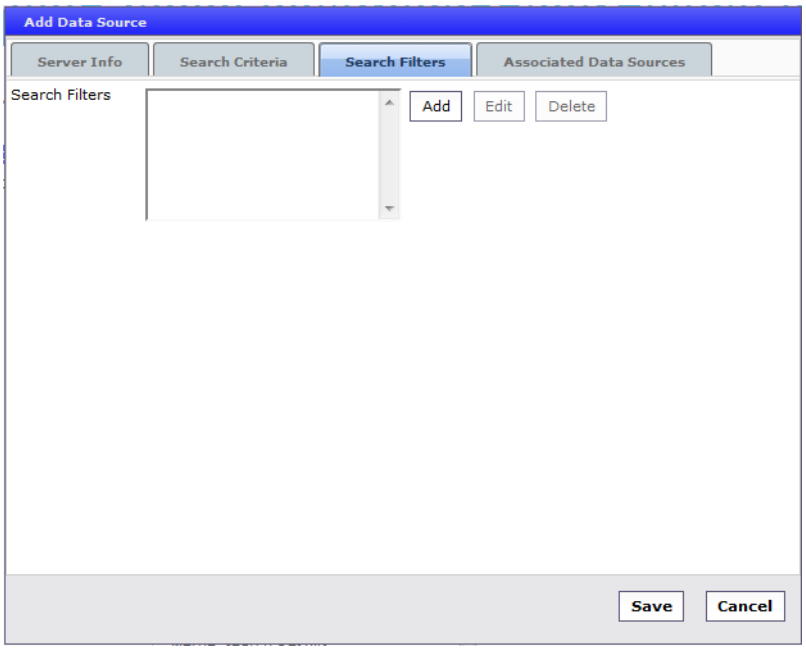
4. When you finish, click **Save** (or **Cancel** to abandon your changes).

You have defined the search criteria.

Search Filters Tab

By defining search filters you can configure the MPE device to direct subscriber lookups to particular data sources. If there are multiple Sy data sources, you must define search filters. You can configure any number of filters per search type per data source. For example, if a data source supports searching by MSISDN and IMSI, you can define multiple MSISDN and IMSI filters. Tekelec recommends ordering filtered data sources before unfiltered ones.

To define filters, on the **Search Filters** tab, enter the following:



1. Click **Add**.
   The **Add Search Key Value** window opens.
2. In the**Key Type** field, select the type:
   - **NAI** (the default) — Network address ID
   - **E.164 (MSISDN)** — E.164 phone number
   - **IMSI** — International Mobile Subscriber Identity
   - **Alternate Filter** (if the data source is defined with the role of Secondary) — Specifies a subscriber profile attribute retrieved from the primary data source lookup. For example, if the primary Sh data source returned a subscriber profile attribute named "PaymentPlan" with a value of either "Prepaid" or "Postpaid," you could set up an alternate filter on the alternate field "PaymentPlan" to direct Sy lookups for "Prepaid" subscribers to one data source and lookups for "Postpaid" to a different data source.
3. **Expression** — Enter a regular expression. For example:

- **`508.*`** — Matches numbers beginning with "508"
- **`*@galactel.com`** — Matches strings ending with "@galactel.com"
- **`.*`** — Matches any input string

4. When you finish, click **Save** (or **Cancel** to discard your changes).
   The filter is added to the filters list. To remove an expression from the list, select it and click **Delete**.

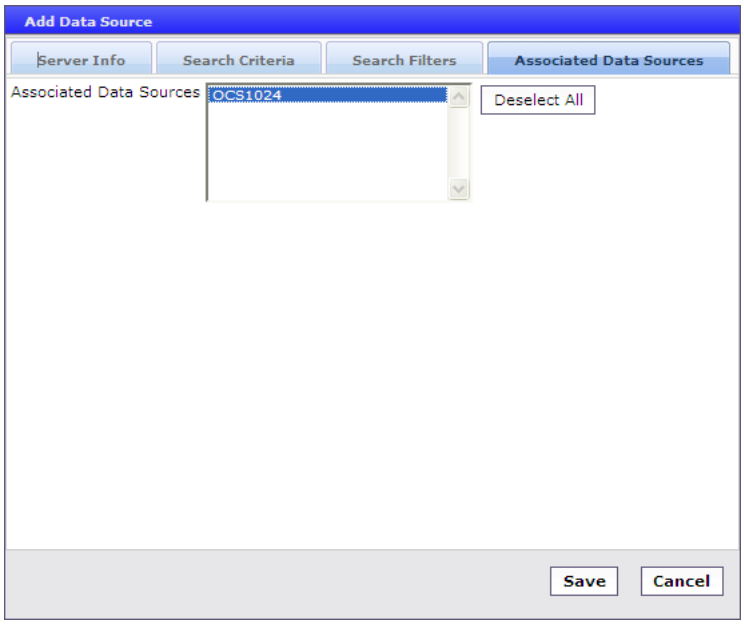
The Sy data source filters are defined.

Associated Data Sources Tab

If you have defined multiple automatic data sources, you can select which one is associated with this Sy data source on the **Associated Data Sources** tab.

Note: For an Sy data source that has a secondary or tertiary role, or has a role of on-demand, this tab is blank.

To associate a data source, on the **Associated Data Sources** tab, enter the following:



1. **Associated Data Sources** — Displays a list of defined data sources. Select the data source(s) to associate with this Sy data source.

   Select **Deselect All** if you want to deselect your choices.

2. When you finish, click **Save** (or **Cancel** to discard your changes).

The associated data sources are defined.

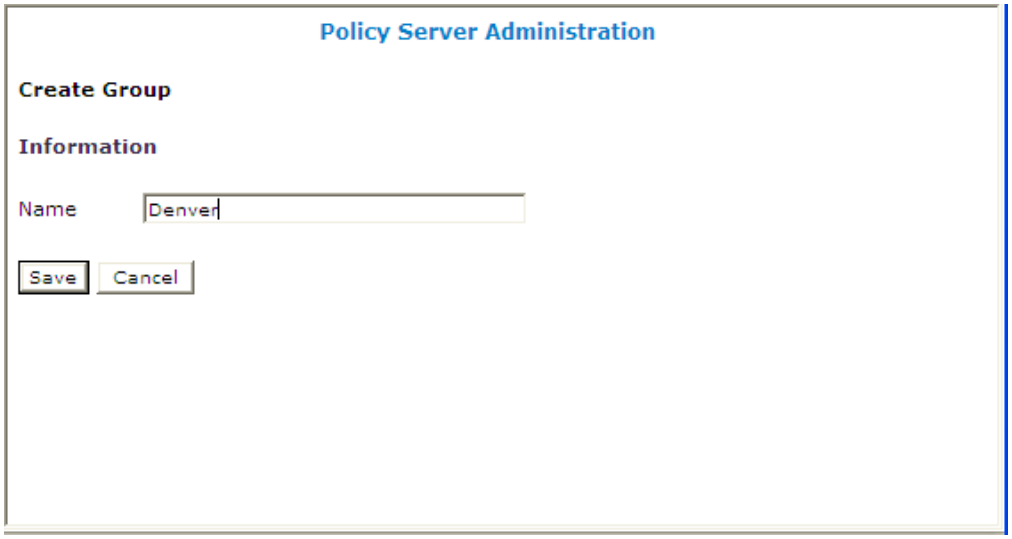
Working with Policy Server Groups

For organizational purposes, you can aggregate the MPE devices in your network into groups. For example, you can use groups to define authorization scopes. The following subsections describe how to manage policy server (MPE) groups.

Creating a Policy Server Group

To create a policy server group:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the **ALL** group.
   The Policy Server Administration page opens in the work area.
3. On the Policy Server Administration page, click **Create Group**.
   The Create Group page opens.
4. Enter the name of the new policy server group.
   The name cannot contain quotation marks (") or commas (,).



5. When you finish, click **Save** (or **Cancel** to discard your changes).
   The new group appears in the content tree.

You have created a policy server group.

Adding a Policy Server to a Policy Server Group

To add a policy server to a policy server group:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.

2. From the content tree, select the policy server group.
   The **Policy Server Administration** page opens in the work area, displaying the contents of the selected policy server group.
3. On the **Policy Server Administration** page, click **Add Policy Server**.
   The **Add Policy Server** page opens, displaying the policy servers not already part of the group.
4. Click the policy server you want to add; use Ctrl or Shift-Ctrl to select multiple policy servers.
5. When you finish, click **Save** (or **Cancel** to cancel the request).

The policy server is added to the selected group.

Creating a Policy Server Sub-group

You can create sub-groups to further organize your policy server network. To add a policy server sub-group to an existing policy server group:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the policy server group.
   The **Policy Server Administration** page opens in the work area, displaying the contents of the selected policy server group.
3. On the **Policy Server Administration** page, click **Create Sub-Group**.
   The **Create Group** page opens.
4. Enter the name of the new sub-group.
   The name cannot contain quotation marks (") or commas (,).
5. When you finish, click **Save** (or **Cancel** to discard your changes).
   The sub-group is added to the selected group.

Renaming a Policy Server Group

To modify the name assigned to a policy server group or sub-group:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the policy server group or sub-group.
   The **Policy Server Administration** page opens in the work area.
3. On the **Policy Server Administration** page, click **Modify**.
   The **Modify Group** page opens.
4. Enter the new name in the Name field.
   The name cannot contain quotation marks (") or commas (,).
5. When you finish, click **Save** (or **Cancel** to cancel the request).
   The group is renamed.

Removing a Policy Server Profile from a Policy Server Group

Removing a policy server profile from a policy server group or sub-group does not delete the profile. To delete a policy server profile, see *Deleting a Policy Server Profile*.

To remove a policy server profile from a policy server group or sub-group:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the policy server group or sub-group.
   The **Policy Server Administration** page opens in the work area, displaying the contents of the selected policy server group or sub-group.
3. Remove the policy server profile using one of the following methods:

   Note: The policy server is removed immediately; there is no confirmation message.

   - Click the Remove (scissors) icon located next to the policy server you want to remove.
   - From the content tree, select the policy server; the **Policy Server Administration** page opens. Click the **System** tab. Click **Remove**.

   The policy server is removed from the group or sub-group.

Deleting a Policy Server Group

Deleting a policy server group also deletes any associated sub-groups. However, any policy server profiles associated with the deleted group or sub-groups remain in the ALL group. You cannot delete the ALL group.

To delete a policy server group or subgroup:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the policy server group or sub-group.
   The **Policy Server Administration** page opens in the work area, displaying the contents of the selected policy server group or sub-group.
3. On the **Policy Server Administration** page, click **Delete**.
   You are prompted, "Are you sure you want to delete this Group?"
4. Click **OK** to delete the group (or **Cancel** to cancel the request).

The policy group is deleted.

Enabling or Disabling All Sh Connections

You can manually enable or disable all Sh connections for all MPE devices in a group. Operations are recorded in the audit log. An alarm is raised if either operation fails.

Note: If the enable or disable operation encounters an exception, the operation is not retried.

To manually disable or enable all Sh connections:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.

2. From the content tree, select the group containing the MPE device.
3. Select the **Operations** menu.
4. Select **Enable Sh** or **Disable Sh**.
   The Bulk Enable Sh or Bulk Disable Sh window opens, stating the number of servers that will be affected by the action and allowing you to select the number of seconds between performing the operation on each server.
5. Click **Enable Sh** or **Disable Sh** to perform the action (or **Cancel** to cancel the action).

Sh connections for all of the MPE devices in the group are disabled or enabled.

Reapplying the Configuration to Policy Management Devices

You can reapply the configuration to an individual MPE or MRA device (server), or to all MPE or MRA devices in a group. When you reapply the configuration, the CMP system completely reconfigures the server with topology information, ensuring that the configuration matches the data in the CMP system. This action is not needed during normal operation but is useful in the following situations:

- When the servers of a cluster are replaced, the new servers come up initially with default values. Reapplying the configuration lets you redeploy the entire configuration rather than reconfiguring the server field by field. You should also apply the Rediscover Cluster operation to the CMP system to re-initialize the Cluster Information Report for the device, thereby clearing out status of the failed servers.
- After upgrading the software on a server, it is recommended that you reapply the configuration from the CMP system to ensure that the upgraded server and the CMP system are synchronized.
- The server configuration may go out of synchronization with the CMP system (for example, when a break in the network causes communication to fail between the CMP system and the server). If such a condition occurs, the CMP system displays the server status on its **System** tab with the notation "Config Mismatch." You can click the notice to display a report comparing the server configuration with the CMP database information. Reapplying the configuration brings the server back into synchronization with the CMP database.

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. To reapply the configuration for an individual MPE or MRA device:
   a) From the content tree, select the **ALL** group.
      The **Policy Server Administration** page opens in the work area.
   b) From the **ALL** group, select the server.
      The **Policy Server Administration** page opens to the **System** tab, displaying information for that server.
   c) Click **Reapply Configuration**.
      An in-progress message appears. When the operation is complete you are prompted, "The configuration was applied successfully."

The individual server or all of the servers in a group are synchronized with the CMP system.

Resetting Counters

The **Reset Counters** option is included in the **Operations** menu when the **Stats Reset Configuration** option is set to **Interval**. The **Reset All Counters** option is included in the **Operations** menu when the **Stats Reset Configuration option** is set to **Manual**. See *Setting Stats Settings* for more information.

To reset the counters associated with a group of MPE or MRA servers:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the group that contains the servers of interest.
   The Policy Server Administration page opens in the work area.
3. From the **Operations** menu, select **Reset Counters** or **Reset All Counters**.
   A confirmation dialog appears, stating the number of servers that will be affected and allowing you to specify the amount of time between applying the operation to each server in the group.

The counters are reset.

Checking the Status of an MPE Server

The CMP lets you view the status of MPE servers, either collectively (all servers within the topology) or individually.

- **Group View** — Select **ALL** from the policy server content tree to view all the defined MPE servers, or select a specific policy server group or sub-group to view just the servers associated with that group. The display in the work area includes a status column that indicates the following states:
  - **On-line** — The servers in the cluster have completed startup, and their database services are synchronized.
  - **Degraded** — At least one server is not functioning properly (its database services are not synchronized or it has not completed startup) or has failed, but the cluster continues to function with the active server. This state sets alarm ID 70005 with severity Major.

    Note: If a cluster status is **Degraded**, but the server details do not show any failures or disconnections, then the cluster is performing a database synchronization operation. Until the synchronization process has completed, the server cannot perform as the active server.

  - **Out of Service** — Communication to the cluster has been lost.
  - **No Data:** Communication to the cluster has been lost. This status value provides backward compatibility with previous Policy Management releases. It can be observed during the upgrade process.
  - **Config Mismatch** — The MPE device configuration does not match the CMP database.
- **Policy Server Profile View** — Select a server from the content tree, then click the **System** tab to view the device's current operating status (**On-line** or **Off-line**) and profile configuration.

Figure 11: Group View shows an example of a Group View in which one of the servers is degraded.

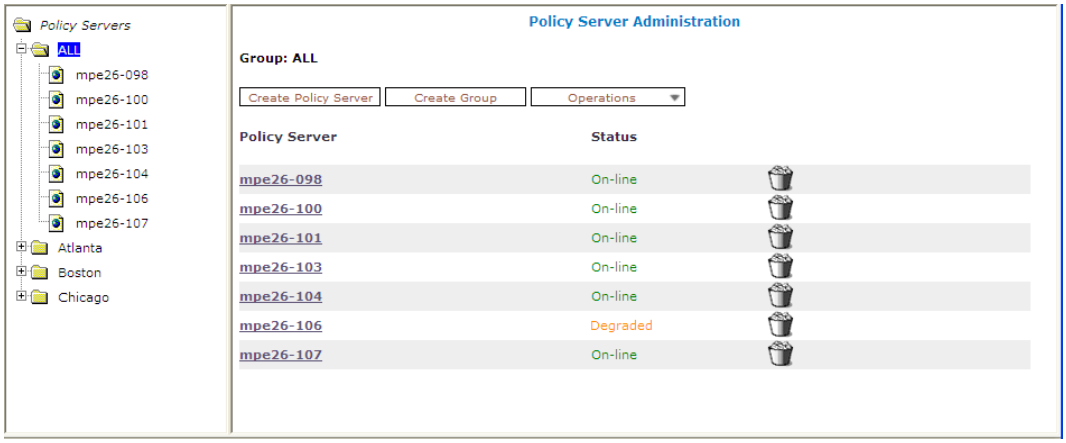


Figure 11: Group View

- **Trash can icon** — Click (trash can) to delete an MPE server.

Policy Server Reports

The **Reports** tab lets you view a hierarchical set of reports that you can use to monitor both the status and the activity of a specific policy server.

Report pages provide the following information:

- **Mode** — Shows whether data collection is currently **Active** or **Paused**, **Absolute** (displaying statistics since the last reset) or **Delta** (displaying changes in the statistics during the last 10-second refresh period).
- **Buttons** — The buttons let you navigate between reports, or control the information displayed within the report. The following list describes the buttons; which buttons are available depend on your configuration and differ from one report page to the next:
  - **Show Absolute/Show Deltas** — Switches between absolute mode (statistics since last reset) and delta mode (statistics since last display).
  - **Reset Counters/Reset All Counters** — Resets counters on the current page, or all counters under Policy Statistics and Protocol Statistics, back to initial values (except for "Session count" and "Downstream Bandwidth" under Network Elements).
  - **Rediscover Cluster** — Rediscovers the cluster, deleting any failed servers that have been removed from service.
  - **Pause/Resume** — Stops or restarts automatic refreshing of displayed information. The refresh period is 10 seconds.
  - **Cancel** — Returns to previous page.

The CMP system also displays various statistics and counters related to the following:

- **Cluster** — Information about the cluster.
- **Blades** — Information about the individual physical components in the cluster.
- **Time Period** — Information about the current time period and transition status.
- **Policy Statistics** — Information about the execution of policy rules.

- **Quota Profile Statistics** — Information about quota profiles.
- **Traffic Profile Statistics** — Information about traffic profiles.
- **Session Cleanup Statistics** — Information about removal of stranded subscriber sessions.
- **Protocol Statistics** — Information about the active network protocols.
- **Latency Statistics** — Information about protocol latency.
- **Event Trigger Statistics** — Information about triggered events.
- **Error Statistics** — Information about any errors, arranged by protocol.
- **Data Source Statistics** — Information about LDAP, Sh, Sy, and SPR activity.
- **KPI Interval Statistics** — Information about the configured reporting interval for key performance indicator (KPI) statistics.

Note: The Cluster Information Report is also available as a selection on the navigation pane.

Cluster Information Report

The fields that are displayed in the Cluster Information Report section include the following:

- **Cluster Status** — The status of the cluster:
  - **On-line**: If one server, it is active; if two servers, one is active and one is standby; if three servers, one is active, one is standby, one is spare.
  - **Degraded**: One server is active, but at least one other server is not available.
  - **Out-Of-Service**: No server is active.
  - **No Data**: The CMP system cannot reach the server.
- **Site Preference** — The preference of the cluster (Normal or Reversed). Default status is Normal.

Also within the Cluster Information Report is a listing of all the servers (blades) contained within the cluster. A symbol () indicates which server currently has the external connection (the active server). The report also lists the following server-specific information:

- **Overall** — Displays the current topology state (Active, Standby, Forced-Standby, or Spare), number of server (blade) failures, and total uptime (time providing active or standby policy or GUI service). For the definitions of these states, see *Server Status*.
- **Utilization** — Displays the percentage utilization of disk (of the /var/camiant filesystem), average value for the CPU utilization, and memory.

The **Actions** buttons let you restart the Policy Management software on the server or restart the server itself.

Time Period

The Time Period section shows the current time period for the cluster ("none" if the cluster is not in any time period) and the status of its last transition:

- **N/A** — No time periods are defined, or the cluster has not yet transitioned to any time periods.
- **Transitioning** — The cluster is updating sessions based on a time period's transition.
- **Completed** — The cluster has updated all affected sessions (either successfully or not) after a time period transition.
- **Aborted** — The transition was stopped by a CMP user.

- **Incomplete** — The transition has not completed, due to a communication failure with an enforcement device.

Policy Statistics

The Policy Statistics section summarizes policy rule activity within the MPE device. This is presented as a table of statistics for each policy rule that is configured for the MPE device.

The following statistics are included:

- **Name** — Name of the policy being polled.
- **Evaluated** — Number of times the conditions in the policy were evaluated.
- **Executed** — Number of times policy actions were executed. This implies that the conditions in the policy evaluated to be true.
- **Ignored** — Number of times the policy was ignored. This can happen because the policy conditions refer to data which was not applicable given the context in which it was evaluated.

To see statistics per policy, click the (details...) hyperlink. All existing policies are displayed in a statistics table, with Evaluated, Executed, and Ignored counter values listed for each.

To see details for a specific policy with the distribution of execution time, click the policy name. In addition to Evaluated, Executed, and Ignored, the following details are displayed:

- **Total Execution Time (ms)** — The summary of all execution durations, where execution duration is measured starting at the beginning of the policy conditions evaluation until the execution finishing.
- **Maximum Execution time (ms)** — The longest execution duration of the policy.
- **Average Execution time (ms)** — The average of all execution durations of the policy.
- **Processing Time Statistics** — number of policies processed per time range, in milliseconds. Ranges include 0-20, 20-40, 40-60, 60-80, 80-100, 100-150, 150-200, 200-250, and >250.

Traffic Profile Statistics

The Traffic Profile Statistics section summarizes traffic profile activity within the MPE device. This is presented as a table of statistics for each traffic profile that is configured for the MPE device. For more information on traffic profiles, see *Managing Traffic Profiles*.

The following statistics are included:

- **Name** — Name of the traffic profile.
- **Install Attempts** — Number of times the MPE device attempted to install the traffic profile.
- **Removed by PCRF** — Number of times the MPE device removed a traffic profile.
- **Failed or Removed by Gateway** — Number of times the traffic profile failed or was removed by a gateway.

To see statistics per traffic profile, click the (details...) hyperlink. All traffic profiles in the MPE device are displayed in a statistics table. To see details for a specific traffic profile, click the name of the traffic profile.

Session Cleanup Statistics

The Session Cleanup Statistics section summarizes the activity of removing stale or stranded subscriber sessions within the MPE device.

For information on configuring session cleanup, see *Configuring Session Clean Up Options*.

The following statistics are included:

- **Ready for Cleanup** — Number of sessions that are stale.
- **Removed on unknown session id** — Number of sessions removed because the session ID is no longer valid.
- **Reauthorized** — Number of sessions reauthorized.
- **Reauthorization Timeout** — Number of sessions for which the reauthorization request timed out.
- **Removed for Expiration** — Number of sessions removed.

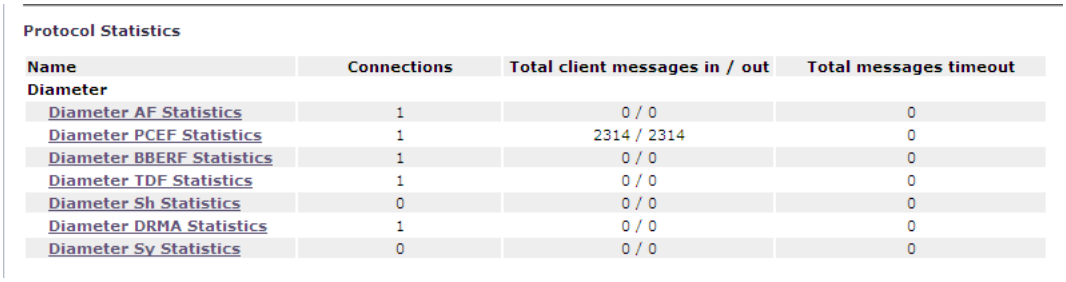
Protocol Statistics

The Protocol Statistics section summarizes the protocol activity within the MPE device. This information is presented as a table of summary statistics for each protocol. Some protocols are broken down into sub-entries to distinguish between the different types of protocol activity.

The summary protocol statistics are the following:

- **Connections** — If the protocol is connection oriented, the current number of established connections using each protocol.
- **Total client messages in / out** — The total number of incoming and outgoing messages received and sent using each protocol.
- **Total messages timeout** — The total number of incoming and outgoing messages that timed out using each protocol.

Figure 12: Sample Protocol Statistics shows a sample.



Protocol Statistics

Name	Connections	Total client messages in / out	Total messages timeout
Diameter			
Diameter AF Statistics	1	0 / 0	0
Diameter PCEF Statistics	1	2314 / 2314	0
Diameter BBERF Statistics	1	0 / 0	0
Diameter TDF Statistics	1	0 / 0	0
Diameter Sh Statistics	0	0 / 0	0
Diameter DRMA Statistics	1	0 / 0	0
Diameter Sy Statistics	0	0 / 0	0

Figure 12: Sample Protocol Statistics

You can click the name of each entry in the Protocol Statistics table to display a detailed report page. For most protocols, this report page displays a set of counters that break down the protocol activity by message type, message response type, errors, and so on.

Many of the protocol report pages also include a table that summarizes the activity for each client or server with which the MPE device is communicating through that protocol. These tables let you select a specific entry to further examine detailed protocol statistics that are specific to that client or server.

Since many of these statistics contain detailed protocol-specific summaries of information, the specific definitions of the information that is displayed are not included here. For more specific information, see the appropriate technical specification that describes the protocol in which you are interested (see *Other Publications*).

Note:

1. Statistical information is returned from the MPE device as a series of running "peg counts." To arrive at interval rate information, such as session success and failure counts, two intervals are needed to perform the difference calculation. Also, statistical information, such as session activation counts, is kept in memory and is therefore not persisted across the cluster. After a failover, non-persistent metrics must be repopulated based on resampling from the newly active primary server. Therefore, when an MPE device is brought on line, or after a failover, one or more sample periods will display no statistical information.
2. Historical network element statistical data is inaccurate if configuration values (such as capacity) were changed in the interim. If the network element was renamed in the interim, no historical data is returned.

For example, the DRMA statistics are the following:

- **RUR_SEND_COUNT** — The number of RUR messages sent.
- **RUR_RECV_COUNT**— The number of RUR messages received.
- **RUA_SEND_SUCCESS_COUNT**— The number of RUA success messages sent.
- **RUA_RECV_SUCCESS_COUNT**— The number of RUA success messages received.
- **RUA_SEND_FAILURE_COUNT**— The number of RUA failure messages sent.
- **RUA_RECV_FAILURE_COUNT**— The number of RUA failure messages received.
- **LNR_SEND_COUNT**— The number of LNR messages sent.
- **LNR_RECV_COUNT**— The number of LNR messages received.
- **LNA_SEND_SUCCESS_COUNT**— The number of LNA success messages sent.
- **LNA_RECV_SUCCESS_COUNT**— The number of LNA success messages received.
- **LNA_SEND_FAILURE_COUNT**— The number of LNA failure messages sent.
- **LNA_RECV_FAILURE_COUNT**— The number of LNA failure messages received.
- **LSR_SEND_COUNT**— The number of LSR messages sent.
- **LSR_RECV_COUNT**— The number of LSR messages received.
- **LSA_SEND_SUCCESS_COUNT**— The number of LSA success messages sent.
- **LSA_RECV_SUCCESS_COUNT**— The number of LSA success messages received.
- **LSA_SEND_FAILURE_COUNT**— The number of LSA failure messages sent.
- **LSA_RECV_FAILURE_COUNT**— The number of LSA failure messages received.

Latency Statistics

The Latency Statistics section summarizes latency information, for Diameter protocols, within the MPE device. This is presented as a table of statistics for each configured protocol. Each protocol lists the number of connections.

To see details for a specific protocol, click the protocol name. Statistics are displayed for the maximum and average transaction time for messages sent and received, as well as the distribution of execution times.

You can control the information displayed within the detailed report using the following buttons:

- **Reset Counters** — Resets all latency counters.
- **Show Absolute/Show Deltas** — Switches between absolute mode (statistics between last reset) and delta mode (statistics since last display).
- **Pause/Resume** — Stops or restarts automatic refreshing of displayed information. The refresh period is ten seconds.
- **Cancel** — Returns to the previous page.

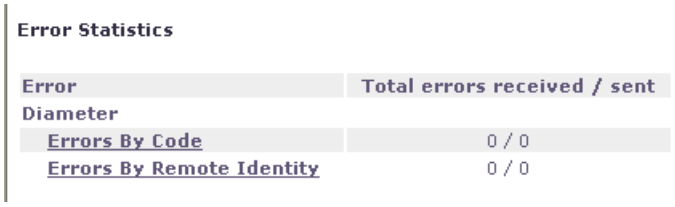
Event Trigger Statistics

The Event Trigger Statistics section summarizes any event triggers reported by the MPE device. This is presented as a table of overall statistics for event triggers by code and event triggers by application.

You can click the name of each entry in the Event Trigger table to display a detailed report page listing activity by specific event triggers

Error Statistics

The Error Statistics section summarizes any protocol-related errors reported by the MPE device. This is presented as a table of overall statistics for each protocol that is configured for the MPE device. *Figure 13: Sample Error Statistics* shows a sample.


Error Statistics

Error	Total errors received / sent
Diameter	
Errors By Code	0 / 0
Errors By Remote Identity	0 / 0

Figure 13: Sample Error Statistics

The following summary statistics are displayed:

- **Error** — List of protocols configured on this MPE device.
- **Total errors received/sent** — Total number of errors received or sent in this protocol.

You can click the name of each entry in the Error Statistics table to display a detailed report page. For most protocols, this report page displays a set of counters that break down the errors by error code and the remote identity of each client or server with which the MPE device is communicating through that protocol.

Data Source Statistics

The Data Source Statistics section summarizes the data source activity within the MPE device. Information is available for each data source. You can click the name of each entry in the Data Source Statistics table to display a detailed report page.

LDAP Statistics

For an LDAP data source, the Data Source Statistics page displays the following statistics:

- **Number of successful searches**
- **Number of unsuccessful searches**
- **Number of searches that failed because of errors**
- **Max Time spent on successful searches (ms)**
- **Max Time spent on unsuccessful searches (ms)**
- **Average time spent on successful searches (ms)**
- **Average time spent on unsuccessful searches (ms)**

- **Number of successful updates**
- **Number of unsuccessful updates**
- **Number of updates that failed because of errors**
- **Time spent on successful updates (ms)**
- **Time spent on unsuccessful updates (ms)**
- **Max Time spent on successful update (ms)**
- **Max Time spent on unsuccessful update (ms)**
- **Average time spent on successful updates (ms)**
- **Average time spent on unsuccessful updates (ms)**

Sh Statistics

For an Sh data source, the Data Source Statistics page displays the following statistics:

- **Number of successful searches**
- **Number of unsuccessful searches**
- **Number of searches that failed because of errors**
- **Number of search errors that triggered the retry**
- **Max Time spent on successful search (ms)**
- **Max Time spent on unsuccessful search (ms)**
- **Average time spent on successful searches (ms)**
- **Average time spent on unsuccessful searches (ms)**
- **Number of successful updates**
- **Number of unsuccessful updates**
- **Number of updates that failed because of errors**
- **Number of update errors that triggered the retry**
- **Time spent on successful updates (ms)**
- **Time spent on unsuccessful updates (ms)**
- **Max Time spent on successful update (ms)**
- **Max Time spent on unsuccessful update (ms)**
- **Average time spent on successful updates (ms)**
- **Average time spent on unsuccessful updates (ms)**
- **Number of successful subscriptions**
- **Number of unsuccessful subscriptions**
- **Number of subscriptions that failed because of errors**
- **Number of subscription errors that triggered the retry**
- **Number of unsubscription errors that triggered retry**
- **Time spent on successful subscriptions (ms)**
- **Time spent on unsuccessful subscriptions (ms)**
- **Max Time spent on successful subscription (ms)**
- **Max Time spent on unsuccessful subscription (ms)**
- **Average time spent on successful subscriptions (ms)**
- **Average time spent on unsuccessful subscriptions (ms)**
- **Number of successful unsubscriptions**
- **Number of unsuccessful unsubscriptions**
- **Number of unsubscriptions that failed because of errors**

- **Number of unsubscription errors that triggered the retry**

Sy Statistics

For an Sy data source, the Data Source Statistics page displays the following statistics:

- **Number of successful searches**
- **Number of unsuccessful searches**
- **Number of searches that failed because of errors**
- **Max Time spent on successful search (ms)**
- **Max Time spent on unsuccessful search (ms)**
- **Average time spent on successful searches (ms)**
- **Average time spent on unsuccessful searches (ms)**

SPR Statistics

For an SPR system, the Data Source Statistics page displays the following statistics:

- **Number of successful searches**
- **Number of unsuccessful searches**
- **Number of searches that failed because of errors**
- **Max Time spent on successful search (ms)**
- **Max Time spent on unsuccessful search (ms)**
- **Average time spent on successful searches (ms)**
- **Average time spent on unsuccessful searches (ms)**
- **Number of successful updates**
- **Number of unsuccessful updates**
- **Number of updates that failed because of errors**
- **Time spent on successful updates (ms)**
- **Time spent on unsuccessful updates (ms)**
- **Max Time spent on successful update (ms)**
- **Max Time spent on unsuccessful update (ms)**
- **Average time spent on successful updates (ms)**
- **Average time spent on unsuccessful updates (ms)**
- **Number of successful subscriptions**
- **Number of unsuccessful subscriptions**
- **Number of subscriptions that failed because of errors**
- **Number of successful unsubscriptions**
- **Number of unsuccessful unsubscriptions**
- **Max Time spent on successful unsubscription (ms)**
- **Max Time spent on unsuccessful unsubscription (ms)**
- **Average time spent on successful unsubscriptions (ms)**
- **Average time spent on unsuccessful subscriptions (ms)**

Database Statistics

The Database Statistics section summarizes the read/write activity for the MPE device database. Click **Database Status Statistics** to display the last reset time (that is, the last time that you clicked **Reset All Counters**), the last collection time, and cumulative read/write activity. Data is collected every 10 seconds.

KPI Interval Statistics

The KPI Interval Statistics section summarizes the maximum key performance indicator (KPI) values recorded by the Policy Management cluster during the previous recording interval. Intervals are recorded on the quarter hour.

The following interval statistics are displayed:

- **Interval StartTime** — Timestamp of when the current interval started.
- **Configured Length (Seconds)** — Configured interval length. The value of 900 seconds (15 minutes) is fixed.
- **Actual Length (Seconds)** — Actual interval length. When data is collected over a full interval, this value matches the Configured Length value.
- **Is Complete** — Displays 0 or 1, where 1 indicates that data was collected for a full interval.
- **Interval MaxTransactionsPerSecond** — The highest value of the counter MaxTransactionsPerSecond during the previous interval.
- **Interval MaxMRABindingCount** — The highest value of the counter MaxMRABindingCount during the previous interval. (This value is 0 on MPE clusters.)
- **Interval MaxSessionCount** — The highest value of the counter MaxSessionCount during the previous interval.
- **Interval MaxPDNConnectionCount** — The highest value of the counter MaxPDNConnectionCount during the previous interval.

You can control the information displayed within the detailed report using the following buttons:

- **Pause/Resume** — Stops or restarts automatic refreshing of displayed information.
- **Cancel** — Returns to the previous page.

Note: If a cluster has just started up and no data is available, the Interval StartTime is displayed as "Undefined" and the maximum values are displayed as 0. If a cluster has started up and a recording interval has completed but it is less than 15 minutes, the value of Actual Length will not match Configured Length, and the maximum values are displayed as 0.

Policy Server Logs

The log files trace the activity of a Policy Management device. You can view and configure the logs for an individual cluster.

To view the log:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups.

2. From the content tree, select the Policy Management device.
   The **Policy Server Administration** page opens in the work area.
3. On the **Policy Server Administration** page, select the **Logs** tab.

   Log information, including the log levels, is displayed. *Figure 14: Policy Server Logs Tab* shows an example. You can configure the following logs:

   - **Trace log** — Records application-level notifications.
   - **Policy Syslog** — Records policy-processing activity. Supports the standard UNIX logging system, in conformance with RFC 3164.
   - **SMS log** — Contains all Short Message Peer-to-Peer Protocol (SMPP) notification sent by the MPE device as well as delivery receipts from a Short Message Service Center (SMSC) server.
   - **SMTP log** — Contains all Simple Mail Transfer Protocol (SMTP) messages sent by the MPE device.

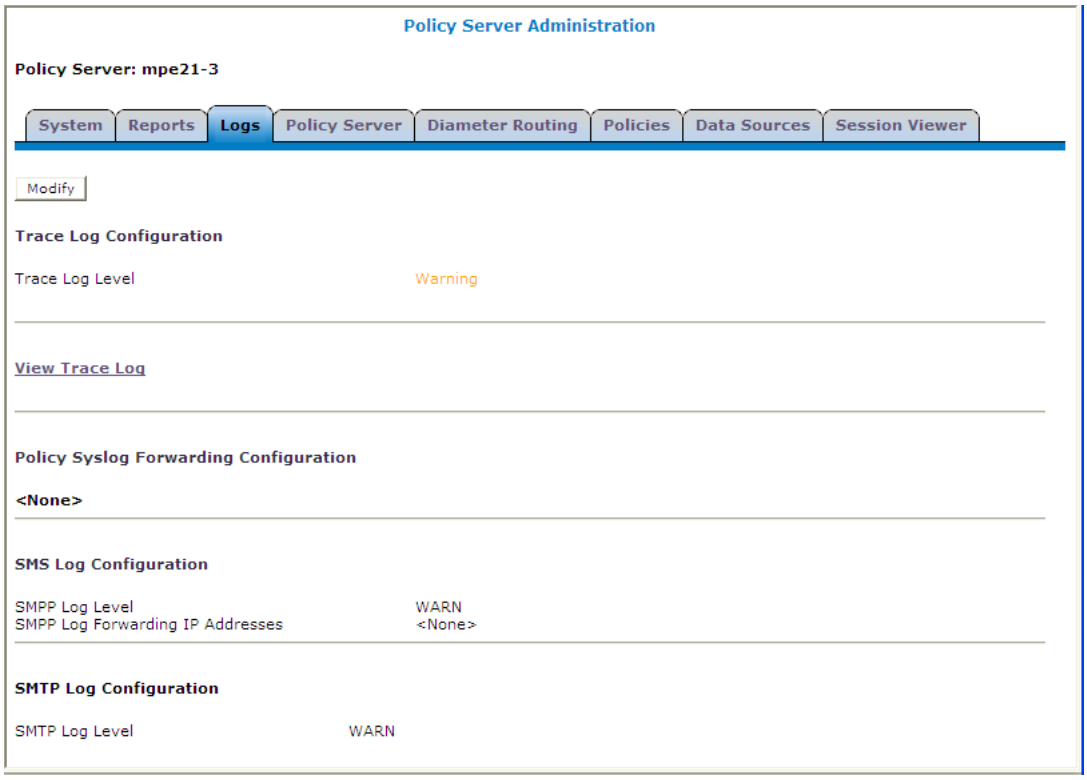


Figure 14: Policy Server Logs Tab

Viewing the Trace Log

The trace log records Policy Management application notifications, such as protocol messages, policy messages, and custom messages generated by policy actions, for individual servers. Trace logs are not replicated between servers in a cluster, but they persist after failovers. You can use the log to debug problems by tracing through application-level messages. You can configure the severity of messages that are recorded in the trace log.

Note: Prior to V7.5, the trace log was called the event log, which also contained platform events. Platform and connectivity events are now displayed as alarms. Additionally, prior to V7.5, a policy log file recorded the activity of the Policy Rules Engine, at seven levels: Alert, Critical, Error, Warning, Notice, Info, and Debug. This information is now recorded in the trace log, which is a database table, at eight levels: Emergency (ID 4560), Alert (ID 4561), Critical (4562), Error (ID 4563), Warning (ID 4564), Notice (ID 4565) Info (ID 4566), and Debug (4567).

To view log information using the Trace Log Viewer:

1. Select the device to view:
   - To view an MPE device, from the **Policy Server** section of the navigation pane, select **Configuration**.
   - To view an MRA device, from the **MRA** section of the navigation pane, select **Configuration**.

   The content tree displays a list of groups; the initial group is **ALL**.
2. From the content tree, select the device.
   The appropriate **Administration** page opens in the work area.
3. On the **Administration** page, select the **Logs** tab.
   Log information for the selected device is displayed.
4. Click **View Trace Log**.

   The **Trace Log Viewer** window opens. While data is being retrieved, the in-progress message "Scanning Trace Logs" appears.

   All events contain the following information:
   - **Date/Time** — Event timestamp. This time is relative to the server time.
   - **Code** — The event code. For information about event codes and messages, see the *Troubleshooting Guide*.
   - **Severity** — Severity level of the event. Application-level trace log entries are not logged at a higher level than Error.
   - **Message** — The message associated with the event. If additional information is available, the event entry shows as a link. Click the link to see additional detail in the frame below.
5. You can filter the events displayed using the following:
   - **Trace Log Viewer for Server** — Select the individual server within the cluster.
   - **Start Date/Time** — Click  (calendar icon), select the starting date and time, then click **Enter**.
   - **End Date/Time** — Click  (calendar icon), select the ending date and time, then click **Enter**.
   - **Trace Code(s)** — Enter one or a comma-separated list of trace code IDs. Trace code IDs are integer strings up to 10 digits long.
   - **Use timezone of remote server for Start Date/Time** — Select to use the time of a remote server (if it is in a different time zone) instead of the time of the CMP server.
   - **Severity** — Filter by severity level. Events with the selected severity and higher are displayed. For example, if the severity selected is **Warning**, the trace log displays events with the severity level Warning.
   - **Contains** — Enter a text string to search for. For example, if you enter **`connection`**, all events containing the word connection appear.

     Note: The **Start Date/Time** setting overrides the **Contains** setting. For example, if you search for events happening this month, and search for a string that appeared in events last month and this month, only results from this month appear.

After entering the filtering information, click **Search**. The selected events are displayed.

By default, the window displays 25 events per page. You can change this to 50, 75, or 100 events per page by selecting a value from the **Display results per page** pulldown list.

Events that occur after the Trace Log Viewer starts are not visible until you refresh the display. To refresh the display, click any of the following:

- **Show Most Recent** — Applies filter settings and refreshes the display. This displays the most recent log entries that fit the filtering criteria.
- **Next/Prev** — Once the number of trace log entries exceeds the page limit, pagination is applied. Use the **Prev** or **Next** buttons to navigate through the trace log entries. When the **Next** button is not visible, you have reached the most recent log entries; when the **Prev** button is not visible, you have reached the oldest log entries.
- **First/Last** — Once the number of trace log entries exceeds the page limit, pagination is applied. Use the **First** and **Last** buttons to navigate to the beginning or end of the trace log. When the **Last** button is not visible, you have reached the end; when the **First** button is not visible, you have reached the beginning.

When you are finished viewing the trace log, click **Close**.

Syslog Support

Notifications generated by policy actions are sent to the standard UNIX syslog. No other notifications are forwarded to syslog. For information on policy actions, see *Optional Policy-Processing Actions*.

Note: This feature is separate from TPD syslog support.

The SMPP Log

The SMPP log is a policy action-generated notification that contains all Short Message Peer-to-Peer Protocol notifications sent by the MPE device as well as delivery receipts from a Short Message Service Center (SMSC) server. In SMPP or XML mode, SMPP info appears on the MPE **Logs** tab of the **MPE Configuration** page, under the **SMS Log Configuration** heading. You can configure the severity of messages that are written to the SMPP log as well as set a forwarding address.

The SMTP Log

The SMTP log contains all Simple Mail Transfer Protocol messages sent by the MPE device, as well as any ACK messages received from a mail transfer agent (MTA). In SMPP or XML mode, SMTP Log info appears on the MPE **Logs** tab of the **MPE Configuration page**, under the **SMTP Log Configuration** heading. You can configure the severity of messages that are written to the SMTP log.

Configuring Log Settings

From the **Logs** tab you can configure the log settings for the servers in a cluster. To configure log settings:

1. From the **Logs** tab, click **Modify**.
   The editable fields open in the work area.

2. In the **Modify Trace Log Settings** section of the page, configure the Trace Log Level.

   This setting indicates the minimum severity of messages that are recorded in the trace log. These severity levels correspond to the syslog message severities from RFC 3164. Adjusting this setting allows new notifications, at or above the configured severity, to be recorded in the trace log. The levels are:

   - **Emergency** — Provides the least amount of logging, recording only notification of events causing the system to be unusable.
   - **Alert** — Action must be taken immediately in order to prevent an unusable system.
   - **Critical** — Events causing service impact to operations.
   - **Error** — Designates error events which may or may not be fatal to the application.
   - **Warning** (the default) — Designates potentially harmful situations.
   - **Notice** — Provides messages that may be of significant interest that occur during normal operation.
   - **Info** — Designates informational messages highlighting overall progress of the application.
   - **Debug** — Designates information events of lower importance.

   Caution: Before changing the default logging level, consider the implications. Lowering the trace log level setting from its default value (for example, from "Warning" to "Info") causes more notifications to be recorded in the trace log and can adversely affect performance. On the other hand, raising the log level setting (for example, from "Warning" to "Alert") causes fewer notifications to be recorded in the trace log, and could cause you to miss important notifications.

3. In the **Modify Policy Syslog Forwarding Settings** section of the page, configure the syslog forwarding settings. You can direct notifications to up to five remote systems. For each system, enter the following:

   a) **Hostname/IP Addresses** — Remote system hostname or IP address.

   Caution: Forwarding addresses are not checked for loops. If you forward events on System A to System B, and then forward events on System B back to System A, a message flood can result, causing dropped packets.

   b) **Facility** — Select from Local0 (the default) to Local7.

   c) **Severity** — Filters the severity of notifications that are written to syslog:

      - **Emergency** — Provides the least amount of logging, recording only notification of events causing the system to be unusable.
      - **Alert** — Action must be taken immediately in order to prevent an unusable system.
      - **Critical** — Events causing service impact to operations.
      - **Error** — Designates error events which may or may not be fatal to the application.
      - **Warning** (the default) — Designates potentially harmful situations.
      - **Notice** — Provides messages that may be of significant interest that occur during normal operation.
      - **Info** — Designates informational messages highlighting overall progress of the application.
      - **Debug** — Designates information events of lower importance.

4. In the **Modify SMS Log Settings** section of the page (which only appears when in SMPP mode), configure the following:

   a) **SMPP Log Level** — Indicates the severity of messages that are written to the file SMPP.log.

Adjusting this setting allows any new events, at or above the configured severity, to be written to the SMPP log.

Note: You can optionally enable the syslog forwarding address for new logs.

Valid levels are:

- **OFF** — Turns off logging.
- **ERROR** — Designates error events which may or may not be fatal.
- **WARN** (the default) — Designates potentially harmful situations.
- **INFO** — Designates informational messages highlighting overall progress.
- **DEBUG** — Designates information events of lower importance.
- **TRACE** — Designates informational events of very low importance.
- **ALL** — Records all logging levels.

b) **SMPP Log Forwarding IP Addresses** — You can forward SMPP.log entries to multiple syslog servers.

5. In the **Modify SMTP Log Settings** section of the page (which only appears when in SMPP mode), configure the **SMTP Log Level**.

   This setting indicates the minimum severity of messages that are recorded in the SMTP log. These severity levels correspond to the syslog message severities from RFC 3164. Adjusting this setting allows new notifications, at or above the configured severity, to be recorded in the SMTP log. The levels are:

   - **OFF** — Turns off logging.
   - **ERROR** — Designates error events which may or may not be fatal.
   - **WARN** (the default) — Designates potentially harmful situations.
   - **INFO** — Designates informational messages highlighting overall progress.
   - **DEBUG** — Designates information events of lower importance.
   - **TRACE** — Designates informational events of very low importance.
   - **ALL** — Records all logging levels.

6. When you finish, click **OK** (or **Cancel** to discard your changes).

The log configurations are changed.

Analytics Data Stream

You can obtain a data feed with real-time analytics data from one or more MPE devices. The data feed is referred to as the Analytics Data Stream (ADS) and is generated by events that occur in the system. The ADS contains data about message processing in the MPE and specific details about the policies that are triggered by those messages. The policy-related messages in the ADS are known as Policy Event Records (PERs).

Data contained in the ADS messages can analyzed by a third-party Analytics system. The MPE supports load-balancing of ADS messages across multiple connections for efficient transmission to a single analytics client.

Data is sent as a byte-encoded set of type length values (TLV) over a client-initiated TCP connection. The analytics client implements a customized interface to read and process the data sent from the MPE

over the connection. TLVs represent different pieces of information about an event, which when pieced together make up a ADS message.

The ADS feature is implemented using a defined set of TLVs so that the data sent from the MPE can be targeted at any third-party analytics client. Refer to the *Analytics Data Stream Reference* for a list of supported TLVs for the feature.

The ADS feature is configured from the Mode Settings page. See *CMP Modes* for information on configuring the ADS feature.

After the feature is configured, ADS can be enabled for specific MPE devices (see *Configuring Protocol Options on the Policy Server*), policies (see *Creating a New Policy*), or policy groups (see *Managing Analytics Data Stream Generation for a Policy Group*).

Chapter 5

Configuring Protocol Routing

Topics:

Routing enables a Policy Management device to forward requests to other Policy Management devices for further processing. The following routing messages and protocols are supported:

- Diameter applications: Rx, Gq, Ty, Gxx, Gx, Gy, and Sd

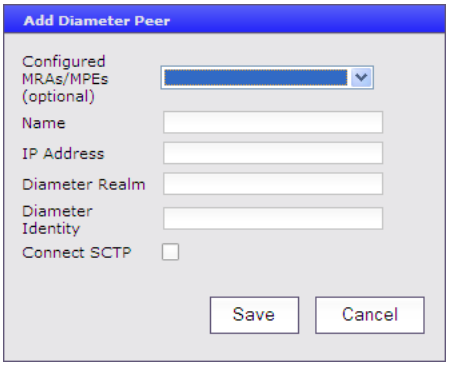
Configuring Diameter Peers

Policy Management devices support Diameter Rx, Gq, Ty, Gxx, Gx, Gy, and Sd applications. For example, traffic control is supported using the Diameter Gx application. When a subscriber attaches to the network (for example, using a phone) via a GGSN (Gateway GPRS Support Node), the GSSN can establish a session with an MPE device using a Diameter Gx CCR (Credit Control Request) message. The MPE device responds to the request with a Gx CCA (Credit Control Answer) message.

To configure Diameter peers:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups.
2. From the content tree, select the MPE device.
   The **Policy Server Administration** page opens in the work area.
3. Select the **Diameter Routing** tab.
   The Diameter Routing configuration settings are displayed.
4. Click **Modify Peers**. The **Modify the Diameter Peer Table** page opens. The functions available from this table are as follows:

   - **To add a peer to the table** — Click **Add**; the **Add Diameter Peer** window opens:



   Enter the following:

   - **Configured MRAs/MPEs (optional)** — If you are defining an existing Policy Management cluster as a Diameter peer, select it from this list; the other fields are populated.
   - **Name** — Name of the peer device (which must be unique within the CMP database).
   - **IP Address** — IP address in IPv4 or IPv6 format of the peer device.

     If not specified, the MPE device uses a DNS lookup to resolve the value in the Diameter Identity field into an IP address and try to connect.

   - **Diameter Realm** — The peer's domain of responsibility (for example, **`galactel.com`**).
   - **Diameter Identity** — Fully qualified domain name (FQDN) of the peer device (for example, **`mpe33.galactel.com`**).
   - **Connect SCTP**— Connect to the peer device using Stream Control Transmission Protocol (SCTP).

   When you finish, click **Save** (or **Cancel** to discard your changes).

- **To clone a peer in the table** — Select an existing peer in the table and click **Clone**; the Clone **Diameter Peer** window opens with the information for the peer device. Make changes as required. When you finish, click **Save** (or **Cancel** to discard your changes).
- **To edit a peer in the table** — Select an existing peer in the table and click **Edit**; the **Edit Diameter Peer** window opens with the information for the peer device. Make changes as required. When you finish, click **Save** (or **Cancel** to discard your changes).
- **To delete a peer from the table** — Select an existing peer in the table and click **Delete**; you are prompted, `Are you sure you want to delete the selected Diameter Peer(s)?` Click **Delete** (or **Cancel** to cancel your request). The peer entry is removed.

5. When you finish, click **Save** (or **Cancel** to discard your changes).
   The Diameter peer is added to the table.

You have defined a Diameter peer.

Configuring Diameter Routes

By default, Diameter messages are processed locally. In a network with multiple Policy Management devices, messages can be routed, by realm, application, or user ID, for processing by peers or other realms.

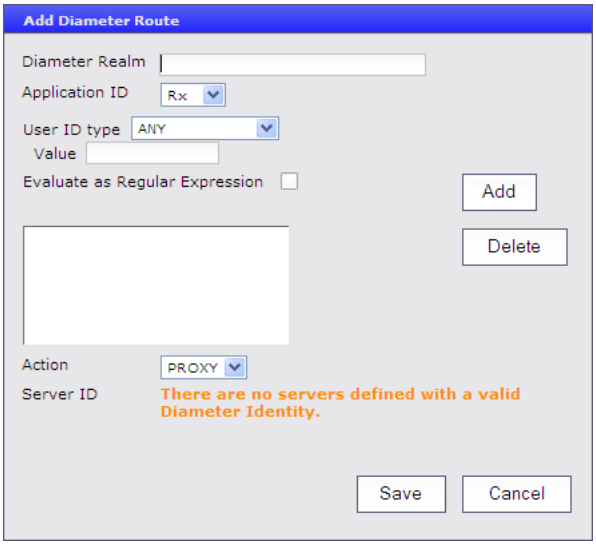
To configure the **Diameter route** table:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups.
2. From the content tree, select the policy server.
   The **Policy Server Administration** page opens in the work area.
3. On the **Policy Server Administration** page, select the **Diameter Routing** tab.
   The Diameter Routing configuration settings are displayed.
4. Click **Modify Routes**.

   The **Modify the Diameter Route Table** page opens.

   The functions available from this table are as follows:

   - **To add a route to the table** — Click **Add**; the **Add Diameter Route** window opens:



The fields are as follows:

- **Diameter Realm** — For example, **`galactel.com`**.
- **Application ID** — Select **Rx** (the default), **Gq**, **Ty**, **Gx**, **Gy**, **Gxx**, or **All**.

  Note: You can include only one application per route rule. For multiple applications, create multiple rules.

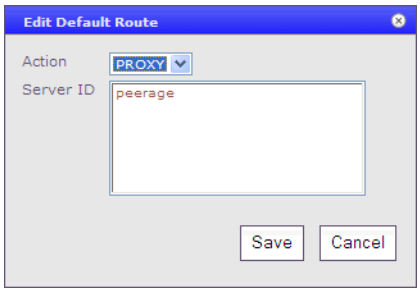
- **User ID type** — Select **ANY** (the default), **E.164(MSISDN)**, **IMSI**, **IP**, **NAI**, **PRIVATE**, **SIP_URI**, or **USERNAME**.
- **Value** — Enter the user ID to be routed (for example, an NAI or E.164 number). Separate user IDs using a comma (,); use an asterisk (*) as a wildcard character. To add the user ID to the list, click **Add**; to remove one or more user IDs from the list, select them and click **Delete**.
- **Evaluate as Regular Expression** — The check box allows the matching of route criteria using regular expression syntax, opposed to the previously supported matching wildcards.
- **Action** — Select **PROXY** (stateful route, the default), **RELAY** (stateless route), or **LOCAL** (process on this device).
- **Server ID** — Select a destination peer from the list.

  Note: You can define a server with a Diameter identity.

When you finish, click **Save** (or **Cancel** to abandon your changes).

- **To change the order of a route in the table** — Select an existing route in the table and click **Up** or **Down**. The order of routes is changed.
- **To clone a route in the table** — Select an existing route in the table and click **Clone**; the **Clone Diameter Route** window opens with that route's information filled in. Make changes as required. When you finish, click **Save** (or **Cancel** to discard your changes).
- **To edit a route in the table** — Select an existing route in the table and click **Edit**; the **Edit Diameter Route** window opens with that route's information. Make changes as required. When you finish, click **Save** (or **Cancel** to discard your changes).
- **To delete a route from the table** — Select one or more existing routes and click **Delete**; you are prompted, `Are you sure you want to delete the selected Diameter Route(s)?` Click **Delete** (or **Cancel** to cancel your request). The route entry is removed.

5. To define the default route, click **Edit** in the **Default Route** section.
   The Edit Default Route window opens:



   Enter the default action (**PROXY**, **RELAY**, or **LOCAL**) and peer server ID. When you finish, click **Save** (or **Cancel** to discard your changes).

6. To delete the default route, click **Delete**.
7. When you finish, click **Save** (or **Cancel** to discard your changes).

The Diameter routes are configured.

Chapter 6

Managing Network Elements

Topics:

Managing Network Elements describes how to define network elements within the CMP system.

Network elements are the devices, servers, or functions within your network with which Policy Management systems interact.

About Network Elements

A network element is a high-level device, server, or other entity within your network for which you would like to use an MPE device to manage Quality of Service (QoS). Examples include the following:

- Gateway GPRS support node (GGSN)
- Router
- Server

Once you have defined a network element in the CMP database, you associate it with the MPE device that you will use to manage that element.

There are also lower-level entities within the network that the MPE device manages that are not considered network elements. These are sub-elements, such as an interface on a router, or devices that are connected directly to network elements. Typically, there is no need to define these lower-level entities, because once a network element is associated with an MPE device the lower-level devices related to that network element are discovered and associated automatically.

Create a network element profile for each device you are associating with an MPE device. After defining a network element in the CMP database, configure its protocol options. The options available depend on the network element type.

For ease of management, once you define network elements, you can combine them into network element groups.

Defining a Network Element

You must define a network element for each device associated with any of the MPE devices within the network. To define a network element:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select the network element group in which you want to define the **network element**.
   (See *Creating a Network Element Group* for information on creating network element groups.)
   The **Network Element Administration** page opens in the work area.
3. On the **Network Element Administration** page, click **Create Network Element**.
   The **New Network Element** page opens.
4. Enter information as appropriate for the network element:
   a) **Name** (required) — The name you assign to the network element.
      Enter up to 250 alphanumeric characters. The name can include underscores (_), hyphens (-), colons (:), and periods (.).
   b) **Host Name/IP Address** (required) — Registered domain name, or IP address in IPv4 or IPv6 format, assigned to the network element.
   c) **Backup Host Name** — Alternate address that is used if communication between the MPE device and the network element's primary address fails.
   d) **Description/Location** — Free-form text.

Enter up to 250 characters.

e) **Type** (required) — Select the type of network element.
The supported types are:

- **PDSN** — Packet Data Serving Node (with the sub-types **Generic PDSN** or **Starent**)
- **HomeAgent** — Customer equipment Home Agent (with the sub-types **Generic HomeAgent** or **Starent**)
- **GGSN** — Gateway GPRS Support Node
- **HSGW** — HRPD Serving Gateway
- **PGW** — Packet Data Network Gateway
- **SGW** — Serving Gateway
- **DPI** — Deep Packet Inspection device
- **DSR** — Diameter Signaling Router device (available for MRA only)

f) **Capability** — This field is valid for some network element types. When present, it contains the following options:

- **TDF-Solicit** — DPI accepts Sd session establishment requests from the MPE device.
- **Time-Tariff** (PGW, DPI) — these network element types support Time-Tariff functionality.
- **SCE-Gx** (DPI)
- **Usage-Report-26** (GGSN, PGW, SGW, DPI) — these network element types are compatible with usage_report event trigger value 26.

g) **Capacity** — Not applicable.

5. Select one or more policy servers (MPE devices) to associate with this network element.
6. Select one or more MRA devices to associate with this network element.
7. To add a network element to a network element group, select the group (see *Adding a Network Element to a Network Element Group*).
8. When you finish, click **Save** (or **Cancel** to discard your changes).
The network element is displayed in the **Network Element Administration** page.

You have created the definition for a network element.

Modifying a Network Element

To modify a network element:

1. From the **Network** section of the navigation pane, select **Network Elements**.
The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select the network element.
The **Network Element Administration** page opens in the work area.
3. On the **Network Element Administration** page, click **Modify**.
The **Modify Network Element** page opens.
4. Modify network element information.
For a description of the fields contained on this page, see *Defining a Network Element*.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

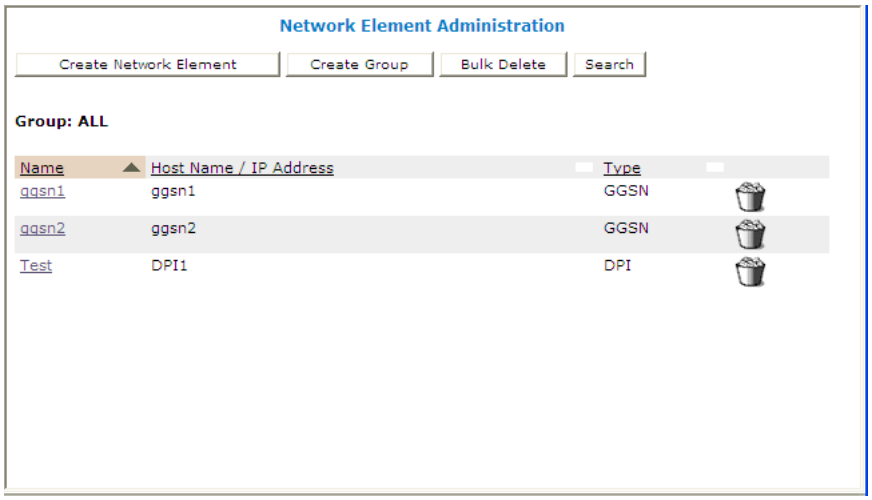
The network element definition is modified.

Deleting Network Elements

Deleting a network element definition removes it from the list of items that a Policy Management device can support. To delete a network element definition, delete it from the ALL group. Deleting a network element from the ALL group also deletes it from every group with which it is associated.

To delete a network element:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select the **ALL** group.
   The Network Element Administration page opens in the work area, displaying all defined network elements.
3. From the work area, click the **Delete** icon, located to the right of the network element you want to delete:



   You are prompted: "Are you sure you want to delete this Network Element?"
4. Click **OK** to delete the network element (or **Cancel** to cancel the request).
   The network element is removed from the list.

You have deleted the definition of the network element.

Bulk Delete

A large network can contain a great many network elements. To perform a bulk delete of network element definitions:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select **ALL**.
   The Network Element Administration page opens in the work area.
3. On the Network Element Administration page, click **Bulk Delete**.
   The Bulk Delete Network Elements page opens.
4. Select the network elements or network element groups to delete.

By default, the Search Pattern entry box contains an asterisk (*) to match all network elements. To search for a subset of network elements, enter a search pattern (for example, **`star*`**, **`*pGw`**, or **`*-*`**), click **Filter**, and select from the filtered results.

5. Click **Bulk Delete** (or **Cancel** to cancel the request).
   You are prompted: "Are you sure you want to delete all the selected Network Elements?"
6. Click **OK** to delete the network elements (or **Cancel** to cancel the request).
   The system displays the message "m Folder(s) and n Network Element(s) were deleted successfully."

The selected network element(s) or group(s) are deleted from the CMP database and all associated MPE devices.

Finding a Network Element

The Search function lets you find a specific network element within a large configuration. To search the CMP database for a specific network element:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select **ALL**.
   The **Network Element Administration** page opens in the work area.
3. On the **Network Element Administration** page, click **Search**.
   The **Network Element Search Criteria** window opens.
4. Enter the search criteria. Searches are not case sensitive. You can use the asterisk (*) and question mark (?) wildcard characters.
   - **Name** — The name assigned to the network element.
   - **Host Name/IP Address** — The domain name or IP address, in IPv4 or IPv6 format, of the network element.
   - **Description** — The information pertaining to the network element that helps identify it within the network. Enter up to 250 characters.
5. After entering search criteria, click **Search** (or **Cancel** to cancel the request).
   The **Search Results** page opens in the work area, displaying the results of the search.

The last search results are held in a Search Results folder in the content tree until you close the **Search Results** page.

Configuring Options for Network Elements

The following subsections describe how to configure options for a given network element type. The network elements types available depend on the operating mode in which your CMP system is configured, and may differ from the list given here.

Note: Configuration changes made in the CMP system could potentially be reverted on an MPE device if the scheduled run time of the OSSI Distributor task on the Management Agent is before the scheduled run time for the CMP system. The discrepancy is resolved when the OSSI Distributor Task runs on the CMP system. See *Managing Scheduled Tasks* for more information.

GGSN

To configure interface information for a GGSN network element:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select a network element.
   The Network Element Administration page opens in the work area.
3. On the Network Element Administration page, select the **GGSN** tab and then click **Modify**.
   The Modify Network Element page opens.
4. Configure the following information:
   a) **Diameter Realm** — Specifies the network element's domain of responsibility (for example, **`galactel.com`**).
   b) **Diameter Identity** — Specifies the FQDN of the network element (for example, **`ggsn1024.galactel.com`**).

      Click **Add** to define multiple identities used by the network element. To delete one of the identities, select it from the list and click **Delete**.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The GGSN device is defined.

HSGW

To configure interface information for an HSGW network element:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select a network element.
   The Network Element Administration page opens in the work area.
3. On the Network Element Administration page, select the **HSGW** tab and then click **Modify**.
   The Modify Network Element page opens.
4. Configure the following information:
   a) **Diameter Realm** — Specifies the network element's domain of responsibility (for example, **`galactel.com`**).
   b) **Diameter Identity** — Specifies the FQDN of the network element (for example, **`hsgw1024.galactel.com`**).

      Click **Add** to define multiple identities used by the network element. To delete one of the identities, select it from the list and click **Delete**.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The HSGW device is defined.

PGW

To configure interface information for a packet data network gateway (PGW) network element:

1. From the **Network** section of the navigation pane, select **Network Elements**.

The content tree displays a list of network element groups; the initial group is **ALL**.

2. From the content tree, select a network element.
   The Network Element Administration page opens in the work area.
3. On the Network Element Administration page, select the **PGW** tab and then click **Modify**.
   The Modify Network Element page opens.
4. Configure the following information:
   a) **Diameter Realm** — Specifies the network element's domain of responsibility (for example, **`galactel.com`**).
   b) **Diameter Identity** — Specifies the FQDN of the network element (for example, **`pgw1024.galactel.com`**).

      Click **Add** to define multiple identities used by the network element. To delete one of the identities, select it from the list and click **Delete**.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The PGW device is defined.

SGW

To configure interface information for a signaling gateway (SGW) network element:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select a network element.
   The Network Element Administration page opens in the work area.
3. On the Network Element Administration page, select the **SGW** tab and then click **Modify**.
   The Modify Network Element page opens.
4. Configure the following information:
   a) **Diameter Realm** — Specifies the network element's domain of responsibility (for example, **`galactel.com`**).
   b) **Diameter Identity** — Specifies the FQDN of the network element (for example, **`sgw1024.galactel.com`**).

      Click **Add** to define multiple identities used by the network element. To delete one of the identities, select it from the list and click **Delete**.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The SGW device is defined.

DPI

To configure interface information for a deep packet inspection (DPI) network element:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select a network element.
   The Network Element Administration page opens in the work area.
3. On the Network Element Administration page, select the **DPI** tab and then click **Modify**.
   The Modify Network Element page opens.

4. Configure the following information:
   a) **Diameter Realm** — Specifies the network element's domain of responsibility (for example, **galactel.com**).
   b) **Diameter Identity** — Specifies the FQDN of this network element (for example, **dpi56.galactel.com**) and click **Add**.

      Repeat this step to define multiple identities if multiple identities are used by this network element. To delete one of the identities, select it from the list and click **Delete**.
   c) **SCTP Enabled** (available if DPI capability is **TDF-Solicit**) — By selecting the check box, you connect to the traffic detection function (TDF) using the SCTP protocol. TCP is the default connection protocol.
   d) **Allow direct connection from MPE** (available if DPI capability is **TDF-Solicit**) — By selecting the check box, TDF connects directly to Sd with the MPE device (bypassing the MRA device).
   e) **TDF Port** (available if DPI capability is **TDF-Solicit**) — Enter the port number used to communicate with the TDF device. The default port is 3868.
   f) **Watch Dog Interval** (available if DPI capability is **TDF-Solicit**) — Enter the watchdog timer interval in seconds. The default is 30 seconds.
   g) **Response Timeout** (available if DPI capability is **TDF-Solicit**) — Enter the response timeout interval in seconds. The default is 5 seconds.
   h) **Reconnect Delay** (available if DPI capability is **TDF-Solicit** and **Allow direct connection from MPE** is selected) — Enter the response time in seconds. The default is 3 seconds.
   i) **Associated MRA identity** (available if DPI capability is **TDF-Solicit**) — Select the MRA device from the drop-down list.
      You cannot associate a DPI device with an MRA device if you have selected **Allow direct connection from MPE**.
   j) **Backup TDF Identity** (available if DPI capability is **TDF-Solicit**) — Select the backup TDF device from the drop-down list.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The DPI device is defined.

DSR

The Tekelec Diameter Signaling Router (DSR) network element is available for the Multi-Protocol Routing Agent (MRA) only. To configure interface information for a DSR network element:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select a network element.
   The **Network Element Administration** page opens in the work area.
3. Select the **DSR** tab and then click **Modify**.
   The **Modify Network Element** page opens.
4. Configure the following information:
   a) **Diameter Realm** — Specifies the network element's domain of responsibility (for example, **galactel.na.com**).
   b) **Diameter Identity** — Enter the FQDN of this network element (for example, **dsr56.galactel.com**) and click **Add**.

Repeat this step to define multiple identities if multiple identities are used by this network element. To delete one of the identities, select it from the list and click **Delete**.

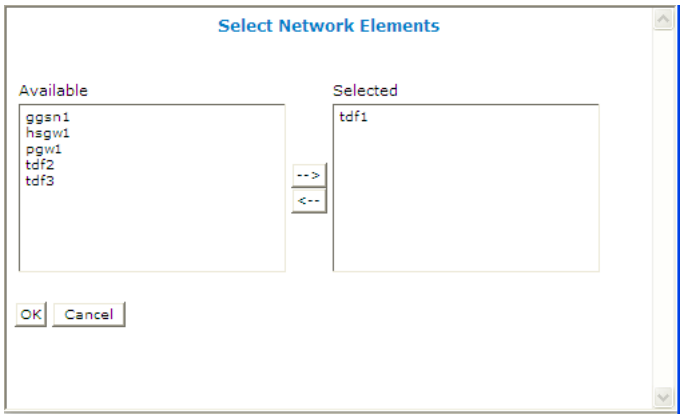
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The DSR device is defined.

Associating a Network Element with an MPE Device

To associate a network element with an MPE device:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the MPEdevice.
   The **Policy Server Administration** page opens in the work area.
3. On the **Policy Server Administration** page, select the **Policy Server** tab.
   In the **Associations** section lists the network elements associated with the MPE device.
4. Click **Modify**.
   The **Modify Policy Server** page opens.
5. To the right of the list of network elements in the **Associations** section, click **Manage**.
   The **Select Network Elements** window opens; for example:



6. Select the network elements in the **Available** list and click **-->**.
   If there are 50 or fewer defined network elements, they appear in the **Available** list. Select a network element from the **Available** list and click **-->**. The network element is moved to the **Selected** list.
   If there are more than 50 defined network elements, the **Available** list is initially blank. To add available items, enter a search string in the **Search Patterns** field. Searches are not case sensitive. You can use the wildcard characters * and ?. When you finish, click **Filter**. The network elements are moved to the **Selected** list.
   To disassociate a network element from the MPE device, select the network element from the **Selected** list and click **<--**. To select multiple entries, use the Ctrl and Shift keys.
7. When you finish, click **OK** (or **Cancel** to discard your changes).
   The selected network elements are added to the list of network elements managed by this MPE device.

8. To associate a network element group with the MPE device, select the group from the list of network element groups located under **Associations**.
9. When you finish, click **Save**, located at the bottom of the page (or **Cancel** to discard your changes).

The network element is associated with this MPE device.

Working with Network Element Groups

For organizational purposes, you can aggregate the network elements in your network into groups. For example, you can use groups to define authorization scopes or geographic areas. You can then perform operations on all the network elements in a group with a single action.

Creating a Network Element Group

To create a network element group:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select the **ALL** group.
   The **Network Element Administration** page opens in the work area.
3. On the **Network Element Administration** page, click **Create Group**.
   The **Create Group** page opens.
4. Enter the name of the new network element group.

   The name can be up to 250 characters long and must not contain quotation marks (") or commas (,).
5. Enter a text description of the network group.
6. When you finish, click **Save** (or **Cancel** to discard your changes).
   The new group appears in the content tree.

You have created a network element group.

Adding a Network Element to a Network Element Group

Once a network element group is created, you can add individual network elements to it. To add a network element to a network element group:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select the network element group.
   The **Network Element Administration** page opens in the work area, displaying the contents of the selected network element group.
3. On the **Network Element Administration** page, click **Add Network Element**.

   The **Add Network Elements** page opens. The page supports both small and large networks, as follows:

   - If there are 25 or fewer network elements defined, the page displays the network elements not already part of the group. (*Figure 15: Add Network Element Page* shows an example.)

- If there are more than 25 network elements defined, the page does not display any of them. Instead, use the **Search Pattern** field to filter the list. Enter an asterisk (*) to generate a global search, or a search pattern to locate only those network elements whose name matches the pattern (for example, `star*`, `*pGw`, or `*-*`). When you have defined a search string, click **Filter**; the page displays the filtered list.

4. Select the network element you want to add; use the Ctrl or Shift keys to select multiple network elements.

   You can also add previously defined groups of network elements by selecting those groups.

5. When you finish, click **Save** (or **Cancel** to cancel the request).

The network element is added to the selected group, and a message indicates the change; for example, "2 Network Elements were added to this group".

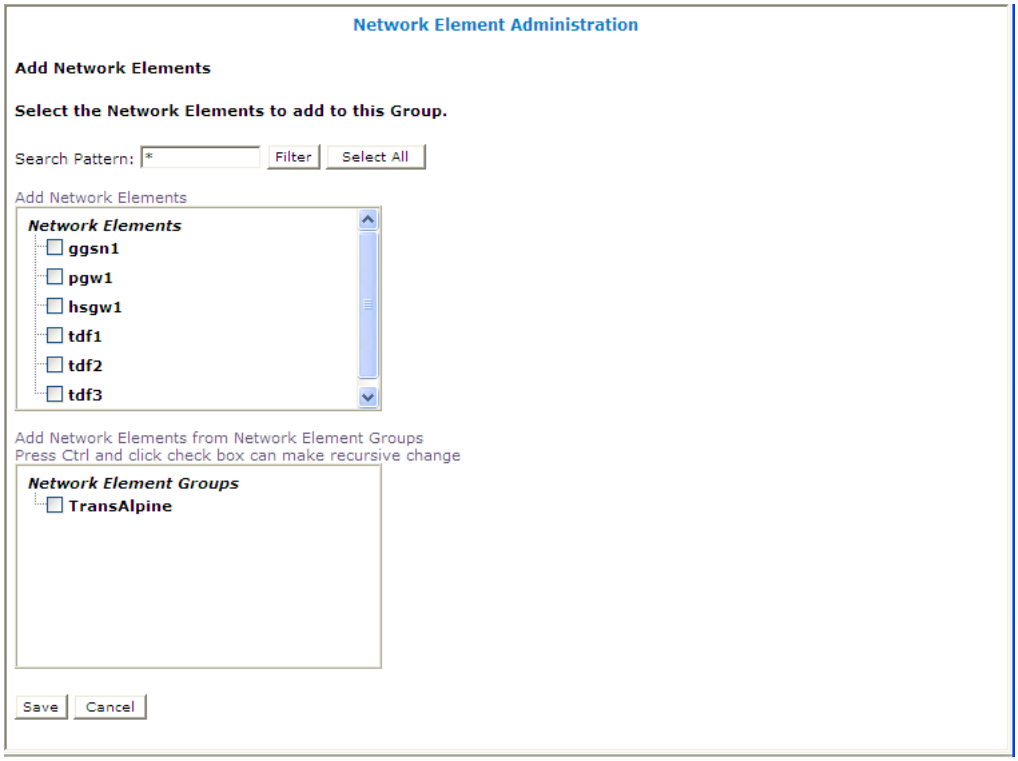


Figure 15: Add Network Element Page

Creating a Network Element Sub-group

You can create sub-groups to further organize your network element network. To add a network element sub-group to an existing network element group:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select the network element group.
   The **Network Element Administration** page opens in the work area, displaying the contents of the selected network element group.
3. On the **Network Element Administration** page, click **Create Sub-Group**.

The **Create Group** page opens.

4. Enter the name of the new sub-group.
   The name cannot contain quotation marks (") or commas (,).
5. Enter a text description of the sub-group.
6. When you finish, click **Save** (or **Cancel** to discard your changes).

The sub-group is added to the selected group, and now appears in the listing.

Deleting a Network Element from a Network Element Group

Removing a network element from a network element group or sub-group does not delete the network element from the ALL group, so it can be used again if needed. Removing a network element from the ALL group removes it from all other groups and sub-groups.

To remove a network element from a network element group or sub-group:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select the network element group or sub-group.
   The **Network Element Administration page** opens in the work area, displaying the contents of the selected network element group or sub-group.
3. Remove the network element using one of the following methods:
   - On the **Network Element Administration** page, click the **Delete** icon, located to the right to the network element you want to remove. You are prompted, "Are you sure you want to delete this Network Element from the group?" Click **OK** (or **Cancel** to cancel your request). The network element is removed from the group or sub-group, and a message indicates the change; for example, "Network Element deleted successfully."
   - From the content tree, select the network element; the **Network Element Administration** page opens. Click the **System** tab and then click **Remove**.

The network element is removed from the group or sub-group.

Modifying a Network Element Group

To modify a network element group or sub-group:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups; the initial group is **ALL**.
2. From the content tree, select the network element group or sub-group.
   The **Network Element Administration** page opens in the work area.
3. On the **Network Element Administration** page, click **Modify**.
   The **Modify Group** page opens.
4. Modify the name or description.
5. When you finish, click **Save** (or **Cancel** to cancel the request).

The group is modified.

Deleting a Network Element Group or Sub-group

Deleting a network element group also deletes any associated sub-groups. However, any network elements associated with the deleted groups or sub-groups remain in the ALL group, from which they can be used again if needed. You cannot delete the ALL group.

To delete a network element group or sub-group:

1. From the **Network** section of the navigation pane, select **Network Elements**.
   The content tree displays a list of network element groups.
2. From the content tree, select the network element group or sub-group.
   The Network Element Administration page opens in the work area, displaying the contents of the selected network element group or sub-group.
3. On the Network Element Administration page, click **Delete**.
   You are prompted, "Are you sure you want to delete this Group?"
4. Click **OK** to delete the group (or **Cancel** to cancel the request).

The network element group or sub-group is deleted.

Chapter 7

Managing Application Profiles

Topics:

Managing Application Profiles describes how to create and manage application profiles within the CMP system.

An application is a service provided to network subscribers for which you want to manage Quality of Service (QoS).

About Application Profiles

An application is a service provided to users of your network for which you want to manage quality of service (QoS). Examples include voice over IP (VoIP) telephony, video on demand (VoD), and gaming. Once you have defined an application profile in the CMP database, you can associate it with the MPE devices that will manage that application.

When you offer application services in your network, there are typically many servers in your network that provide that service. These servers are referred to as Application Managers or Application Servers. When these servers are establishing a session that requires quality of service they issue a request to a policy charging and rules function (PCRF).

When defining an application profile in the CMP database, you specify protocol information that is used by MPE devices to identify Application Managers and thus associate each request with its associated application. This lets the MPE device apply policy rules to the request that you have defined for the associated application.

Creating an Application Profile

To create an application profile:

1. From the **Policy Server** section of the navigation pane, select **Applications**.
   The content tree displays the **Applications** group.
2. Select the **Applications** group.
   The Application Administration page opens in the work area.
3. On the Application Administration page, click **Create Application**.
   The New Application page opens.
4. Enter the following application profile information:
   a) **General Configuration**:
      - **Name** — Name assigned to the application. The name can be up to 250 characters long and must not contain quotation marks (") or commas (,).
      - **Description/Location** (optional) — Free-form text.
      - **Connection IP Address(s)** — Enter the IP address(es), in IPv4 or IPv6 format, that are used by Application Managers for this application. To include an address in the connection list, type it and click **Add**; to remove an address from the list, select it and click **Delete**.
      - **Latency Sensitive** — Select this option if the application is latency sensitive.

   b) **Policy Servers associated with this Application**: select a policy server (MPE device) to associate it with this network element.
   c) **Diameter**:
      - **Diameter Identity** — Enter the Diameter identity (typically a fully qualified domain name) or identities used by application functions for this application. Click **Add** to define multiple values. To delete an existing value, select it from the list and click **Delete**.
5. When you finish, click **Save** (or **Cancel** to discard your changes).
   The application profile is created and stored in the **Applications** group.

The application profile is created.

Modifying an Application Profile

To modify an application profile:

1. From the **Policy Server** section of the navigation pane, select **Applications**.
   The content tree displays the **Applications** group.
2. Select the **Applications** group.
   The Application Administration page opens in the work area, listing the application profiles.
3. On the Application Administration page, select the application profile you want to modify.
   The profile is displayed.
4. Click **Modify**.
   The Modify Application page opens.
5. Modify the application profile information as necessary.
   See *Creating an Application Profile* for a description of the fields on this page.
6. When you finish, click **Save** (or **Cancel** to discard your changes).

The application profile is modified.

Deleting an Application Profile

To delete an application profile:

1. From the **Policy Server** section of the navigation pane, select **Applications**.
   The content tree displays the **Applications** group.
2. Select the **Applications** group.
   The Application Administration page opens in the work area.
3. Delete the application profile using one of the following methods:
   - From the work area, click the Delete icon, located to the right of the profile you wish to delete.
   - From the content tree, select the application and click **Delete**. You are prompted, "Are you sure you want to delete this Application?"
4. Click **OK** (or **Cancel** to cancel the request).

The application profile is deleted from the CMP database and all MPE devices.

Chapter 8

Managing Match Lists

Topics:

Managing Match Lists describes how to create and manage match lists in the CMP system.

A match list is a set of defined values that can represent IDs or Internet addresses. Match lists provide whitelist and blacklist functions in policy rules. Match lists support wildcard matching.

Creating a Match List

To create a match list:

1. From the **Policy Server** section of the navigation pane, select **Match Lists**.
   The content tree displays the **Match Lists** group.
2. Select the **Match Lists** group.
   The Match List Administration page opens in the work area.
3. On the Match List Administration page, click **Create Match List**.
   The New Match List page opens.
4. Enter the following information:
   a) **Name** — The name assigned to the match list. The name can be up to 40 characters long and must not contain quotation marks (") or commas (,).
   b) **Description/Location** — Free-form text.
   c) **Type** — Select from the following:
      - **string** (the default) — The list consists of strings.
      - **wildcard string** — The list consists of wildcard match patterns that use an asterisk (*) to match zero or more characters or a question mark (?) to match exactly one character.
      - **IPV4 address** — The list consists of IP addresses in IPv4 format.
      - **IPV6 address** — The list consists of IP addresses in IPv6 format.

   d) **Items** — Type an entry and click **Add**; to remove one or more entries from the list, select them and click **Delete**.

      The following match types are available:

      - **APN** (access point name)
      - **User Equipment Identity**
      - **USER IMSI**
      - **USER E.164**
      - **USER SIP URI**
      - **USER NAI**
      - **Serving MCC-MNC**
      - **Cell Identifier**
      - **Location Area Code**
      - **Service Area Code**
      - **Routing Area Code**
      - **Routing Area Identifier**
      - **Tracking Area Code**
      - **E-UTRAN Cell Identifier**

      You can enter a match string combining multiple types (for example, a Location Area Code and a Service Area Code) by separating the types with commas (,); for example, *lac1*,*sac1*. If you define multiple-type match lists, the types must be in the order shown.

5. When you finish, click **Save** (or **Cancel** to discard your changes).

The match list is created.

Modifying a Match List

To modify a match list:

1. From the navigation pane, select **Match Lists**.
   The content tree displays the **Match Lists** group.
2. From the content tree, select the **Match Lists** group.
   The Match List Administration page opens, displaying the list of defined match lists.
3. Select the match list you want to modify.
   Match list information is displayed.
4. Click **Modify**.
   The Modify Match List page opens.
5. Modify match list information as required.
   (You cannot change the type.)
6. When you finish, click **Save** (or **Cancel** to discard your changes).

The match list is modified.

Note: You can also use the OSSI XML Interface to import and export match lists. This facilitates bulk changes or record keeping. For more information, see the *OSSI XML Interface Definitions Reference Guide*.

Deleting a Match List

To delete a match list:

1. From the **Policy Server** section of the navigation pane, select **Match Lists**.
   The content tree displays the **Match Lists** group.
2. From the content tree, select the **Match Lists** group.
   The Match List Administration page opens, displaying the list of defined match lists.
3. Delete the match list using one of the following methods:
   - From the work area, click the Delete icon, located to the right of the match list you want to delete.
   - From the content tree, select the match list and click **Delete**. You are prompted, "Are you sure you want to delete this Match List?"
4. Click **OK** (or **Cancel** to cancel the request).

The match list is deleted.

Chapter 9

Managing Policy Counter Identifiers

Topics:

Managing Policy Counter Identifiers describes how to create and manage policy counter IDs in the CMP system.

A policy counter ID defines the name, optional description, and default online charging server (OCS) value for which status can be received from the OCS server. Policy counter IDs are used in policies, and grouped together here for ease of management.

About Policy Counter IDs

A policy counter ID defines the name, optional description, and default online charging server (OCS) value for which status can be received from the OCS server. Once defined, you can use policy counter IDs in policies.

In the Sy reference point, an OCS acts as the server and the MPE device acts as the client. For a subscriber, the MPE device requests status from the OCS for a set of policy counter IDs. If the request is successful, the OCS returns the status information for the subscriber to the MPE device and an Sy session is created for the subscriber. The OCS automatically sets up a subscription for the requested policy counter IDs and then notifies the MPE device of any changes to those values.

The Sy protocol provides for four types of messages between the MPE device and the OCS:

1. For the MPE device to request status for an initial set of policy counter IDs and subscribe for notifications for those policy counter IDs
2. For the MPE device to request an update status and possibly update the policy counter ID subscription
3. For the OCS to notify the MPE device of a status change for a set of policy counter IDs for a subscriber
4. For the MPE device to end the Sy session with the OCS, cancelling all subscriptions associated with that session

You can define policy counter IDs in the CMP database and then refer to them in policies.

Creating a Policy Counter ID

To create a policy counter ID:

1. From the **Policy Server** section of the navigation pane, select **Policy Counter ID**.
   The content tree displays the **Policy Counter ID** group. The default group is **ALL**.
2. Select the **Policy Counter ID** group.
   The Policy Counter ID Administration page opens in the work area.
3. On the Policy Counter ID Administration page, click **Create Policy Counter ID**.
   The New Policy Counter ID page opens.
4. Enter the following information:
   a) **Name** (required) — The name assigned to the Policy Counter ID. This is the name you use in policies. The name can be up to 255 characters long and must not contain quotation marks (") or commas (,).
   b) **Identifier** (required) — Free-form text. This is the key between the MPE device and the OCS.
   c) **Description** — Free-form text.
   d) **Default Status** — Free-form text. The default status for this policy counter ID.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The policy counter ID is created.

Modifying a Policy Counter ID

To modify a policy counter ID:

1. From the navigation pane, select **Policy Counter ID**.
   The content tree displays the **Policy Counter ID** group.
2. From the content tree, select the **Policy Counter ID** group.
   The Policy Counter ID Administration page opens, displaying the list of defined Policy Counter IDs.
3. Select the Policy Counter ID you want to modify.
   Policy Counter ID information is displayed.
4. Click **Modify**.
   The Policy Counter ID List page opens.
5. Modify Policy Counter ID information as required.
6. When you finish, click **Save** (or **Cancel** to discard your changes).

The Policy Counter ID is modified.

Note: You can also use the OSSI XML Interface to import and export match lists. This facilitates bulk changes or record keeping. For more information, see the *OSSI XML Interface Definitions Reference Guide*.

Deleting a Policy Counter ID

You cannot delete a policy counter ID that is being used in a deployed policy condition.

To delete a policy counter ID:

1. From the **Policy Server** section of the navigation pane, select **Policy Counter ID**.
   The content tree displays the **Policy Counter ID** group.
2. From the content tree, select the **Policy Counter IDs** group.
   The Policy Counter ID Administration page opens, displaying the list of defined policy counter IDs.
3. Delete the policy counter ID using one of the following methods:
   - From the work area, click the Delete icon, located to the right of the policy counter ID you want to delete.
   - From the content tree, select the policy counter ID and click **Delete**.

   You are prompted, "Are you sure you want to delete this Policy Counter ID?"
4. Click **OK** (or **Cancel** to cancel the request).

The policy counter ID is deleted.

Policy Counter ID Groups

For organizational purposes, you can aggregate policy counter IDs into groups. Once a policy counter ID group is created, it can be populated with individual policy counter IDs. The following subsections describe how to manage policy counter ID groups.

Creating a Policy Counter ID Group

To create a policy counter ID group:

1. From the **Policy Server** section of the navigation pane, select **Policy Counter ID**.
   The content tree displays a list of Policy Counter ID groups; the initial group is **ALL**.
2. From the content tree, select the **ALL** group.
   The Policy Counter ID Administration page opens in the work area, listing all defined policy counter IDs.
3. On the Policy Counter ID Administration page, click **Create Group**.
   The Create Group page opens.
4. Enter the name of the new Policy Counter ID group.

   The name can be up to 250 characters long and must not contain quotation marks (") or commas (,).
5. Optionally, enter a description of the Policy Counter ID group.
6. When you finish, click **Save** (or **Cancel** to discard your changes).
   The new group appears in the content tree.

The Policy Counter ID group is created.

Adding a Policy Counter ID to a Policy Counter ID Group

To add a policy counter ID to a policy counter ID group:

1. From the **Policy Server** section of the navigation pane, select **Policy Counter ID**.
   The content tree displays a list of policy counter ID groups; the initial group is **ALL**.
2. From the content tree, select the policy counter ID group.
   The **Policy Counter ID Administration** page opens in the work area, displaying the contents of the selected policy counter ID group.
3. Click **Add Policy Counter ID**.
   The **Add Policy Counter ID** page opens, displaying the policy counter IDs not already part of the group.
4. Select the policy counter ID you want to add; use the Ctrl or Shift keys to select multiple policy counter IDs.
5. When you finish, click **Save** (or **Cancel** to cancel the request).

The policy counter ID is added to the policy counter ID group.

Modifying a Policy Counter ID Group

To modify a policy counter ID group:

1. From the **Policy Server** section of the navigation pane, select **Policy Counter ID**.
   The content tree displays a list of policy counter IDs; the initial group is **ALL**.
2. From the content tree, select the policy counter ID group you want to modify.
   The Policy Counter ID Administration page opens in the work area.
3. On the Policy Counter ID Administration page, click **Modify**.
   The Modify Group page opens.
4. Edit the information in the fields.
   The name cannot contain quotation marks (") or commas (,).
5. When you finish, click **Save** (or **Cancel** to cancel the request).

The group is modified.

Deleting a Policy Counter ID from a Policy Counter ID Group

Deleting a policy counter ID from a policy counter ID group does not delete the ID. To delete a policy counter ID, see *Deleting a Policy Counter ID*.

To delete a policy counter ID from a policy counter ID group:

1. From the **Policy Server** section of the navigation pane, select **Policy Counter ID**.
   The content tree displays the list of policy counter ID groups.
2. From the content tree, select the policy counter ID group.
   The **Policy Counter ID Administration** page opens in the work area, displaying the contents of the selected policy counter ID group.
3. Click  (scissors icon), located to the right of the policy counter ID you want to remove.
4. Click **OK** to delete the policy counter ID (or **Cancel** to cancel the request).

The policy counter ID is deleted from the group.

Deleting a Policy Counter ID Group

Deleting a policy counter ID group does not delete any policy counter IDs associated with the deleted group; profiles remain in the ALL group. You cannot delete the ALL group.

To delete a policy counter ID group:

1. From the **Policy Server** section of the navigation pane, select **Policy Counter ID**.
   The content tree displays the list of policy counter ID groups.
2. From the content tree, select the policy counter ID group you want to delete.
   The Policy Counter ID Administration page opens in the work area, displaying the contents of the selected policy counter ID group.
3. On the Policy Counter ID Administration page, click **Delete**.
   You are prompted, “Are you sure you want to delete this Group?”
4. Click **OK** to delete the group (or **Cancel** to cancel the request).

The policy counter ID group is deleted.

Chapter 10

Managing Quotas

Topics:

Managing Quotas describes how to create and manage Gx and Gy quotas in the CMP system.

A quota sets a limit on a subscriber's usage, by any combination of volume (bytes of data), time (seconds of usage), or events (which are service specific). A quota can be applied by a policy rule trigger, or a quota can be applied by default if no policy rule is triggered. Quotas include pass, rollover, and top-up units.

Note: The actual options you see depend on whether or not your CMP system is configured in Gx mode, Gy mode, or both.

About Quotas

A quota specifies restrictions on the amount of data volume, active session time, or service-specific events that a subscriber can consume. A single quota can express limits on any combination of volume, time, or events. Quotas can be associated with a time period during which activity is measured.

Quota Profile

A quota profile specifies default values for quotas and defines how quotas are implemented. There are two types of quota profiles:

plan A plan describes a subscriber's basic, recurring service. Plans include policy characteristics such as time and volume limits. These characteristics can be computed automatically or through policy rules. Policy actions grant plans, based on a subscriber's tier or entitlement.

A basic quota refers to the quota associated with a plan and is used to handle recurring, periodic quotas typical of post-paid mobile data plans. The controls on a basic quota can be overridden by passes, rollovers, and top-ups.

pass A pass is a one-time override that temporarily replaces or augments a subscriber's default plan or service.

For example, a subscriber who is normally not able to stream video to their device, but wants to view a special event, can purchase a pass that allows streaming.

Multiple passes can be assigned to the same subscriber. These passes are processed using the following criteria:

- The highest priority pass is processed first.
- If priorities are equal, the pass with the earliest expiration date/time is processed first.
- If expiration date/times are equal, the pass with the earliest purchase date/time is processed first.
- If purchase date/times are equal, the passes are processed in alphabetical order of the instance IDs.

The pass that is processed first according to these criteria is referred to as the 'best' pass.

Passes can be added to pass groups. Adding a pass to a pass group associates that pass to all other passes in the pass group.

Pass groups can be used to determine pass expiration extension. The expiration date/time value of a new pass can be extended to match an expiration date/time value in the future of any pass in the same pass group.

A pass can belong to only one pass group. If the pass group is deleted, then the *group* field of each pass in the pass group is set to null. If the name of the pass group is changed, then the *group* field of each pass in the pass group is set to the new name.

Creating a Plan

In Gx mode, the MPE device can track and enforce a subscriber's total IP-CAN session time and volume usage by day, week, or month, or track aggregate volume usage per IP-CAN session. In Gy mode, the MPE device can track usage for multiple services based on time, volume, specific event, rollover information, and top-up information.

Note: If the optional 3GPP-MS-TimeZone AVP is enabled, the MPE device can reset the quota based on the user local time. If so, and user equipment enters a different time zone near the end of a quota cycle, the subscriber may find that the quota reset earlier than expected, or the service provider may find that the quota reset later than expected.

To create a plan:

1. From the **Policy Server** section of the navigation pane, select **Quota Profiles**.
   The content tree displays the **Plans** and **Passes** groups.
2. Select the **Plans** group.
   The **Plan Administration** page opens in the work area.
3. Click **Create Plan**.
   The **New Plan** page opens.
4. Enter the following information:
   a) **Name** — The name of the plan. The name can be up to 255 characters long and must not contain quotation marks (") or commas (,).
   b) **Description/Location** — Free-form text.
   c) **Quota Profile Type** — Select whether the plan is assigned to an individual subscriber or a pool of subscribers. The default value is **Subscriber**.

      Note: If you select **Pool**, items can be added to support the account (Max Leakage Threshold, Dynamic Grant, etc). Once the plans are created, they are applied to subscribers.

   d) **Max Leakage Threshold (MB)** — Maximum amount by which the usage can exceed. The range is 0–2147483647 (Max 32-bit integer). The default is 0.
   e) **Enable Dynamic Grant** (optional) — Specifies whether to track grant dynamically for the subscriber. This will cause the granted values to be updated by the MPE device to the SPR. If the box is checked, then the configuration is set to true. The default value is false.
   f) **Max Sessions Used For Dynamic Grant**— Number of simultaneous sessions used in the dynamic grant algorithm for granting quota. Enabled when **Enable Dynamic Grant** is selected. The range is 1–2147483647 (Max 32-bit integer). The default is 20 sessions.

      Note: Do not enter a value if dynamic grant is not enabled.

   g) **Minimum Grant Size**— The minimum plan amount granted by the MPE device. Enabled when **Enable Dynamic Grant** is selected. The value of the field depends upon the component (time/service-specific/volume) that is being granted by the MPE device.

      - time — minimum number of seconds
      - service-specific — minimum number of units
      - volume (total/input/output) — minimum number of megabytes

      The default is 0.

Note: The value of the **Minimum Grant Size** field applies to all of the components that are granted by the MPE device. Make sure that the value reflects the minimum amount for all components. For example, a value of *5* would mean 5,000,000 bytes for volume AND 5 seconds for time. A low value for time could lead to a high number of messages being generated.

h) **Reset Frequency** — Select how often subscriber plan usage counters are reset: **Monthly** (default), **Weekly**, **Daily**, or **Never**.

- If you select **Weekly**, a **Select Day** field appears. Weekly quotas are reset at midnight on the day you select from the list.
- If you select **Daily**, an **Hour: Minute** field appears. Enter the hour and minute (in 24-hour format) at which quotas are reset.

i) **Reset Time Variable** — Optionally, specify a variable allowing the reset time for the plan bucket to be based on any substitutable policy variable in the subscriber profile.
The MPE device uses the variable name and substitutes it to calculate the actual reset time for the plan bucket. The substitutable variable names are the same as the substitutable policy variables, that is, variables that are substituted in policy actions, such as {User.State.Property1}. Curly braces ({}) can be used but are not required.

- For a monthly plan bucket, specify a variable whose value is either a billing day (between 1 and 31) or a time of day (such as 11:02), in which case the billing day is retrieved using the current mechanism (that is, use the subscriber profile; if not set, use the global billing day); or an actual datetime, following the xsd:datetime (similar to custom fields and entity states), specifying the first reset time for the quota bucket. The MPE device manages setting the "nextResetTime" on the quota usage records by computing the closest datetime in the future that is a multiple of a month away from the configured datetime, conserving the time of day.
- For a weekly plan bucket, specify a variable containing either a time of day, in which case the day of the week is taken from the configured "fixed" day of the week, or a datetime representing the first reset time. The MPE device computes the next reset time similarly to the monthly bucket, but using multiple of one week instead.
- For a daily plan bucket, specify a variable containing either a time of day or a datetime. In both cases, the MPE device computes the next reset time based on the time of day.

j) **Report Offset Limit (minutes)** — The maximum minutes the MPE device will add to the quota's reset time when it calculates the session revalidation time. The range is 0 - 180.

k) **Initial Total Volume Limit (bytes)** — Select **None** (default) or select **Specify Limit** and enter a value.

l) **Initial Upstream Volume Limit (bytes)** — Gx or Gy mode. Select **None** (default) or select **Specify Limit** and enter a value.

m) **Initial Downstream Volume Limit (bytes)** — Gx or Gy mode. Select **None** (default) or select **Specify Limit** and enter a value.

n) **Volume Threshold Percentage (%)** — Gy mode only. Enter a threshold percentage.
Below this percentage of volume quota, the charging traffic function must re-authorize.

o) **Initial Time Limit (seconds)** — Select **None** (default) or select **Specify Limit** and enter a session time limit value.

p) **Time Threshold Percentage (%)** — Gy mode only. Enter a threshold percentage.
Below this percentage of time quota, the charging traffic function must re-authorize.

q) **Initial Service Specific Limit (events)** — Gy mode only. Select **None** (default) or select **Specify Limit** and enter a value.

r) **Event Threshold Percentage (%)** — Gy mode only. Enter a threshold percentage.

Below this percentage of event quota, the charging traffic function must re-authorize.

s) **Interim Reporting Interval (seconds)** — Gy mode only. How often the charging traffic function (such as a GGSN) must report quota usage to the MPE device. Select **None** (default) or select **Specify Interval** and enter a time interval.

5. **Quota Exhaustion Action** — Gy mode only. The action the charging traffic function (such as a GGSN) takes when a subscriber reaches the quota grant:
   - **N/A** (the default) — Take no action.
   - **TERMINATE** — Terminate the subscriber's session.
   - **REDIRECT** — If you select this action, additional configuration fields appear:
     - **Restriction Filters** — Enter a comma-separated list of Diameter IP Filter rules
     - **Filter ID List** — Enter a comma-separated list of named filters on the charging traffic function
     - **Redirect Server Type** — Select **IPv4**, **IPv6**, **URL**, or **SIP URI**
     - **Redirect Server Address** — Enter the server address
   - **RESTRICT ACCESS** — If you select this action, additional configuration fields appear:
     - **Restriction Filters** — Enter a comma-separated list of Diameter IP Filter rules
     - **Filter ID List** — Enter a comma-separated list of named filters on the charging traffic function
6. **Quota Convention** — Select the name of a quota convention (see *About Quota Conventions*). This selection associates the plan with a rollover or top-up.

   If you do not select a quota convention, then a default quota convention is assumed by the system. There is no rollover in a default quota convention.
7. When you finish, click **Save** (or **Cancel** to discard your changes).

The plan is created.

Modifying a Plan

To modify a plan:

1. From the **Policy Server** section of the navigation pane, select **Quota Profiles**.
   The content tree opens, displaying the **Plans** and **Passes** groups.
2. From the content tree, select the **Plans** group.
   The Plan Administration page opens, displaying the list of defined plans.
3. Select the plan you want to modify.
   The work area displays information about the plan.
4. Click **Modify**.
   The Modify Plan page opens.
5. Modify plan information as required.

   For a description of the fields contained on this page, see *Creating a Plan*.
6. When you finish, click **Save** (or **Cancel** to abandon your changes).

The plan is modified.

Deleting a Plan

You cannot delete a plan that is referenced in a policy. Otherwise, to delete a plan:

1. From the **Policy Server** section of the navigation pane, select **Quota Profiles**.
   The content tree opens, displaying the **Plans** and **Passes** groups.
2. From the content tree, select the **Plans** group.
   The **Plan Administration** page opens, displaying the list of defined plans.
3. Delete the plan using one of the following methods:
   - From the work area, click the **Delete** icon, located to the right of the plan you want to delete.
   - From the content tree, select the plan and click **Delete**.

   You are prompted, `Are you sure you want to delete this Plan?`
4. Click **OK** to delete the plan (or **Cancel** to cancel the request).

The plan is deleted.

Creating a Pass

To create a pass:

1. From the **Policy Server** section of the navigation pane, select **Quota Profiles**.
   The content tree opens, displaying the **Plans** and **Passes** groups.
2. From the content tree, select the **Passes** group.
   The content tree displays a list of passes and groups. The initial group is **ALL**.
3. From the content tree, select the **ALL** group.
   The Pass Administration page opens in the work area.
4. On the Pass Administration page, click **Create Pass**.
   The New Pass page opens.
5. Enter the following information:
   a) **Name** — The name of the pass or top-up. The name can be up to 255 characters long and must not contain quotation marks ("), colons (:), or commas (,).
   b) **Description/Location** — Free-form text.
   c) **Priority** — Defines the order of use when a subscriber has multiple instances of a pass. Higher priority passes are used before lower priority passes. A higher number indicates a higher priority.
      The range is -32768 - 32767 (Max 16-bit short).
   d) **Active Time Period** — The period during which the pass may be used.
   e) **Initial Total Volume Limit (bytes)** — Gy mode only. The initial value for total volume units granted by the pass. Select **None** (default) or select Specify Limit and enter a value. If you select **None**, then total volume units are not granted.
   f) **Initial Upstream Volume Limit (bytes)** — Gy mode only. The initial value for output volume units granted by the pass. Select **None** (default) or select **Specify Limit** and enter a value. If you select **None**, then output volume units are not granted.

g) **Initial Downstream volume Limit (bytes)** — Gx or Gy mode. The initial value for input volume units granted by the pass. Select **None** (default) or select **Specify Limit** and enter a value. If you select **None**, then input volume units are not granted.

h) **Initial Time Limit (seconds)** — Gx or Gy mode. The initial value for time units granted by the pass. Select **None** (default) or select **Specify Limit** and enter a value. If you select **None**, then time units are not granted.

i) **Initial Service Specific Limit (events)** — Gy mode only. The initial value for service specific units granted by the pass. Select **None** (default) or select **Specify Limit** and enter a value. If you select **None**, then service specific units are not granted.

j) **Interim Reporting Interval (seconds)** — Gy mode only. The number of seconds after which the gateway must revalidate any grant with the MPE. Select **None** (default) or select **Specify Interval** and enter a value.

k) **Duration** — The period after first use in which the pass must be used or expired.

l) **Expiration Date Extension Method** — The criteria used for extending an expiration date.

Possible values are:

- **NONE** — The expiration date/time value of this pass cannot be extended or used to extend the expiration date/time values of other passes.
- **Name** — The expiration date/time value of this pass can be used to extend the date/time value of passes in the same pass group.
- **Group** — The expiration date/time value of this pass can be extended to match the date/time value of any pass in the same pass group.

m) **Quota Exhaustion Action** — Gy mode only. The action to take when all units in the pass are exhausted.

Possible values are:

- **N/A**
- **TERMINATE** — Terminate the Subscriber's session
- **REDIRECT** — If you select this action, additional configuration fields appear:
  - **Restriction Filters** — Enter a comma-separated list of Diameter IP Filter rules.
  - **Filter ID List** — Enter a comma-separated list of named filters on the charging traffic function
  - **Redirect Server Type** — Select IPv4, IPv6, URL, or SIP URI
  - **Redirect Server Address** — Enter the server address
- **RESTRICT ACCESS** — If you select this action, additional configuration fields appear:
  - **Restriction Filters** — Enter a comma-separated list of Diameter IP Filter rules
  - **Filter ID List** — Enter a comma-separated list of named filters on the charging traffic function

6. When you finish, click **Save** (or **Cancel** to abandon your request).
   The pass is created and appears in the **Pass** group.

The pass is created.

Modifying a Pass

To modify a pass:

1. From the **Policy Server** section of the navigation pane, select **Quota Profiles**.
   The content tree displays the **Plans** and **Passes** groups.
2. From the content tree, select the **Passes** group.
   The content tree displays a list of passes and pass groups. The initial group is **ALL**.
3. Select the pass you want to modify.
   The Pass Administration page opens in the work area.

   Note: If the pass has been added to a pass group, then the pass group name is shown in the **Group** field.

4. Click **Modify**.
   The Modify Pass page opens.
5. Modify Pass information as required.
   For a description of the fields contained on this page, see *Creating a Pass*.

   Note: You cannot edit pass group information from this page. To assign the pass to a different pass group, you must remove the pass from the current pass group (see *Removing a Pass from a Pass Group* and add the pass to a new pass group (see *Adding a Pass to a Pass Group*).

6. When you finish, click **Save** (or **Cancel** to abandon your changes).

The pass is modified.

Deleting a Pass

To delete a pass from the system:

1. From the **Policy Server** section of the navigation pane, select **Quota Profiles**.
   The content tree opens, displaying the **Plans** and **Passes** groups.
2. From the content tree, select the **Passes** group.
   The content tree displays a list of passes and pass groups. The initial group is **ALL**.
3. From the content tree, select the **ALL** group.
   The Pass Administration page opens in the work area.
4. Delete the pass, using one of the following methods:

   - From the work area, click the **Delete** icon, located to the right of the pass you want to delete.
   - From the content tree, select the pass and click **Delete**.

   You are prompted, "Are you sure you want to delete this Pass?"
5. Click **OK** to delete the pass (or **Cancel** to cancel the request).

The pass is deleted from the system.

Creating a Pass Group

To create a pass group:

1. From the **Policy Server** section of the navigation pane, select **Quota Profiles**.
   The content tree displays the **Plans** and **Passes** groups.
2. From the content tree, select the **Passes** group.
   The content tree displays a list of passes and pass groups. The initial group is **ALL**.
3. From the content tree, select the **ALL** group.
   The Pass Administration page opens in the work area.
4. On the Pass Administration page, click **Create Group**.
   The Create Group page opens in the work area.
5. Enter the following information:
   a) **Name** — The name of the pass group. The name can be up to 255 characters long and must not contain quotation marks (") or commas (,).
   b) **Description/Location** — Free-form text.
6. When you finish, click **Save** (or **Cancel** to discard your changes).

The pass group is created.

Adding a Pass to a Pass Group

To add a pass to a pass group:

1. From the **Policy Server** section of the navigation pane, select **Quota Profiles**.
   The content tree displays the **Plans** and **Passes** groups.
2. From the content tree, select the **Passes** group.
   The content tree displays a list of passes and pass groups. The initial group is **ALL**.
3. From the content tree, select the pass group where you want to add the pass.
   The Pass Administration page opens in the work area.
4. On the Pass Administration page, click **Add Pass**.
   The Add Pass page opens in the work area.
5. Select the pass that you want to add.

   Note: Passes can belong to only one pass group.
6. Click **Save** to add the pass (or **Cancel** to discard your changes).

   See *Removing a Pass from a Pass Group* for instructions on removing a pass from a pass group.

A pass is added to the selected pass group.

Modifying a Pass Group

To modify a pass group:

1. From the **Policy Server** section of the navigation pane, select **Quota Profiles**.
   The content tree displays the **Plans** and **Passes** groups.
2. From the content tree, select the **Passes** group.
   The content tree displays a list of passes and pass groups. The initial group is **ALL**.
3. From the content tree, select the pass group you want to modify.
   The **Pass Group Administration** page opens in the work area.
4. Click **Modify**.
   The **Modify Group** page opens in the work area.
5. Modify the pass group information.

   Note: If you change the name of a pass group, then the **group** field for each pass in the pass group changes to the new name.

6. When you finish, click **Save** (or **Cancel** to abandon your changes).

The pass group is modified.

Removing a Pass from a Pass Group

To remove a pass from a pass group:

1. From the **Policy Server** section of the navigation pane, select **Quota Profiles**.
   The content tree displays the **Plans** and **Passes** groups.
2. From the content tree, select the **Passes** group.
   The content tree displays a list of pass groups. The initial group is **ALL**.
3. From the content tree, select the pass group that contains the pass you want to remove.
   The Pass Group Administration page opens in the work area.
4. On the Pass Group Administration page, click the 'X' icon located to the right of the pass that you want to remove from the pass group.

The pass is removed from the pass group.

Deleting a Pass Group

Note: Deleting a pass group resets the group field of each pass in the pass group to null. The passes are not deleted from the system.

To delete a pass group:

1. From the **Policy Server** section of the navigation pane, select **Quota Profiles**.
   The content tree displays the **Plans** and **Passes** groups.

2. From the content tree, select **Passes**.
   The content tree displays a list of pass groups. The initial group is **ALL**.
3. From the content tree, select the pass group you want to delete.
   The Pass Group Administration page opens in the work area.
4. On the Pass Group Administration page, click **Delete**.
5. You are asked "Are you sure you want to delete this Group?". Click **OK** to delete the pass group (or **Cancel** to cancel the request).

The pass group is deleted.

Chapter 11

Managing Quota Conventions

Topics:

Describes how to create and manage quota passes (passes).

Managing Quota Conventions describes how to manage the usage of rollovers and top-ups using the CMP system.

Note: The actual options you see depend on whether or not your CMP system is configured in Gx mode, Gy mode, or both.

About Quota Conventions

A quota convention controls top-ups and rollovers of plans.

Caution: If a plan contains more than one type of counter (for example, time and volume), then ALL of the counters for that entire plan must be exhausted before a rollover and/or top-up for either type of counter is activated. Depending on how policy rules are written (see *Understanding and Creating Policy Rules*), this functionality could lead to an unintended effect on the end-user's service. If the intent is to apply separate limits on different units, then separate quotas should be defined and independent top-ups or rollovers may be applied.

Rollover

A rollover allows a subscriber to carry forward unused units from one billing cycle to another. For example, if a subscriber is allowed 10 gigabytes of data a month and only uses 9, the remaining gigabyte of data can be saved for use in the next month. Rollover units can accumulate and can be carried across multiple months. You can establish a quota convention that rollover units are consumed after plan units are exhausted, or before.

Top-up

A top-up allows a subscriber to obtain additional units for an existing plan. For example, if a plan allows 20 gigabytes of traffic per month, but near the end of the month the subscriber has only 1 gigabyte left, the subscriber can obtain an additional 5 gigabytes. These units are used after the initial units are exhausted and do not roll over.

Multiple top-ups can be present and enforced in the database at the same time and are processed by the MPE device. Multiple top-ups can be assigned to the same subscriber. These top-ups are consumed in the following order:

- The highest priority top-up is consumed first.
- If priorities are equal, the top-up with the earliest expiration date/time is consumed first.
- If expiration date/times are equal, the top-up with the earliest purchase date/time is consumed first.
- If purchase date/times are equal, the top-ups are consumed in alphabetical order of the instance IDs.

The top-up that is processed first according to these criteria is referred to as the “best” top-up.

You can establish a quota convention that top-up units are consumed after rollover units are exhausted, or before. However, plan units are always consumed before top-up units.

Note: Top-ups are enabled using the **Quota Conventions** option. Top-up information is configured on the Subscriber Profile Repository (SPR) database. Refer to the SPR documentation for more information.

Creating a Quota Convention

To create a quota convention:

1. From the **Policy Server** section of the navigation pane, select **Quota Conventions**.
   The content tree displays the **Quota Conventions** group.
2. Select the **Quota Conventions** group.
   The Quota Convention Administration page opens in the work area.
3. On the Quota Convention Administration page, click **Create Convention**.
   The New Quota Convention page opens.
4. Enter the following information:
   a) **Name** — The name of the quota convention. The name can be up to 255 characters long and must not contain quotation marks (") or commas (,).
   b) **Description/Location** — Free-form text.
   c) **Rollover usage** — Specifies how rollover units are used with respect to top-up units.
      The possible values are:
      - **Default** — Rollover units are used before top-up units unless the highest priority top-up expires in the next 24 hours.
      - **Rollover after Top-up** — Top-up units are used before rollover units.
      - **Rollover before Top-up** — Rollover units are used before top-up units.

   d) **Interval percentage of the limits (%)** — The maximum percent of the units that can be rolled over during one billing cycle reset. The range is 0.0 – 100.0.
   e) **Max percentage of the limits (%)** — The maximum percent of the units that can be saved as a rolled limit at any time. The range is 0.0 – 1200.0.
   f) Enable the following options by selecting the associated checkbox:
      - **Rollover Time Units** — Roll over time.
      - **Rollover Total Volume** — Roll over total volume.
      - **Rollover Input Volume** — Roll over input volume.
      - **Rollover Output Volume** — Roll over output volume.
      - **Rollover Service Specific Units** — Roll over service-specific units.
      - **Discard Rollover on Rollover Calculation** — Rollover units are not saved beyond one cycle.
      - **Consume Rollover before Quota** — Rollover units are used before plan units.

        Note: Rollover units can be consumed before plan (quota) units, and top-up units can be consumed before rollover units. However, top-up units cannot be consumed before plan units.

      - **Enable Top-ups** — Enable top-up units.

5. When you finish, click **Save** (or **Cancel** to abandon your request).

The quota convention is created.

Modifying a Quota Convention

To modify a quota convention:

1. From the **Policy Server** section of the navigation pane, select **Quota Conventions**.
   The content tree opens.
2. From the content tree, select the **Quota Conventions** group.
   The **Quota Convention Administration** page opens, displaying the list of defined services.
3. Select the quota convention you want to modify.
   The work area displays information about the quota convention.
4. Click **Modify**.
   The **Modify Quota Convention** page opens.
5. Modify quota convention information as required.
   For a description of the fields contained on this page, see *Creating a Quota Convention*.
6. When you finish, click **Save** (or **Cancel** to abandon your changes).

The quota convention is modified.

Associating a Quota Convention with a Plan

Associate a quota convention with a plan as follows:

1. Create a quota convention. See *Creating a Quota Convention*.
2. Create a plan or open an existing plan for modification. See *Creating a Plan* and *Modifying a Plan*.
3. In the **Quota Convention** field, select the name of the quota convention you want to associate with the plan.
4. Click **Save** to save your changes.

The quota convention is associated with a plan.

Deleting a Quota Convention

To delete a quota convention:

1. From the **Policy Server** section of the navigation pane, select **Quota Conventions**.
   The content tree displays the **Quota Conventions** group.
2. From the content tree, select the **Quota Conventions** group.
   The **Quota Convention Administration** page opens, displaying the list of defined quota conventions.
3. Delete the quota convention using one of the following methods:
   - From the work area, click the **Delete** icon, located to the right of the quota convention you want to delete.
   - From the content tree, select the quota convention and click **Delete**. You are prompted, "Are you sure you want to delete this Quota Convention?"

4. Click **OK** (or **Cancel** to cancel the request).

The quota convention is deleted.

Chapter 12

Managing Services and Rating Groups

Topics:

Managing Services and Rating Groups describes how to create and manage Gy services and rating groups in the CMP system.

A service is an identification of a class of traffic; for example, voice, peer-to-peer, or multimedia. You can apply a quota or a rating group (but not both) to a service.

For organizational purposes, you can associate services into rating groups. This is a convenient way of allowing multiple services to share the same quota.

Note: The actual options you see depend on whether or not your CMP system is configured in Gx mode, Gy mode, or both. For information on defining quotas, see *Managing Quotas*.

Creating a Service

To create a service:

1. From the **Policy Server** section of the navigation pane, select **Services & Rating Groups**.
   The content tree displays the **Services & Rating Groups** group.
2. Select the **Services & Rating Groups** group.
   The Service Administration page opens in the work area.
3. On the Service Administration page, click **Create Service**.
   The New Service page opens.
4. Enter the following information:
   a) **Name** (required) — The name assigned to the service. The name can be up to 255 characters long and must not contain quotation marks (") or commas (,).
   b) **Description/Location** — Free-form text.
   c) **Service Identifier** — A unique numeric identifier.
   d) **Rating Group** — Select **None** (the default) or one of the rating groups defined in the CMP database.
   e) **Quota** — Select **None** (the default) or one of the quotas defined in the CMP database.
5. When you finish, click **Save** (or **Cancel** to abandon your request).
   The service is created and appears in the **Services** group.

The service is created.

Modifying a Service

To modify a service:

1. From the **Policy Server** section of the navigation pane, select **Services & Rating Groups**.
   The content tree opens.
2. From the content tree, select the **Services** group.
   The **Service Administration** page opens, displaying the list of defined services.
3. Select the service you want to modify.
   The work area displays information about the service.
4. Click **Modify**.
   The **Modify Service** page opens.
5. Modify service information as required.
   For a description of the fields contained on this page, see *Creating a Service*.
6. When you finish, click **Save** (or **Cancel** to abandon your changes).

The service is modified.

Deleting a Service

To delete a service:

1. From the **Policy Server** section of the navigation pane, select **Services & Rating Groups**.
   The content tree opens.
2. From the content tree, select the **Services** group.
   The Service Administration page opens, displaying the list of defined services.
3. Delete the service using one of the following methods:
   - From the work area, click the Delete icon, located to the right of the service you want to delete.
   - From the content tree, select the service and click **Delete**.

   You are prompted, "Are you sure you want to delete this Service?"
4. Click **OK** to delete the service (or **Cancel** to cancel the request).

The service is deleted.

About Rating Groups

For organizational purposes, you can aggregate services into rating groups. The same quotas apply to all the services in a rating group. Once a rating group is created, you can populate it with services.

Creating a Rating Group

To create a rating group:

1. From the **Policy Server** section of the navigation pane, select **Services & Rating Groups**.
   The content tree displays the **Services & Rating Groups** group.
2. Select the **Services & Rating Groups** group.
   The Service Administration page opens in the work area.
3. On the Service Administration page, click **Create Rating Group**.
   The Create Rating Group page opens.
4. Enter the following information:
   a) **Name** (required) — The name assigned to the rating group. The name can be up to 255 characters long and must not contain quotation marks ("), colons (:), or commas (,).
   b) **Description/Location** — Free-form text.
   c) **Rating Group Identifier** — A unique numeric identifier.
   d) **Quota** — Select **None** (the default) or one of the quotas defined in the CMP.
5. When you finish, click **Save** (or **Cancel** to discard your changes).
   The rating group is created and stored in the **Services & Rating Groups** folder.

The rating group is created.

Adding a Service to a Rating Group

To add a service to a rating group:

1. From the **Policy Server** section of the navigation pane, select **Services & Rating Groups**.
   The content tree displays the **Services & Rating Groups** group.
2. In the content tree, select the rating group to which you want to add a service.
   The **Rating Group Administration** page opens in the work area.
3. Click **Add Service**.
   The **Add Service** page opens, displaying the services not already part of the group.
4. Select the service you want to add; use the Ctrl or Shift keys to select multiple services.
5. When you finish, click **Save** (or **Cancel** to cancel the request).

The service is added to the selected rating group.

Modifying a Rating Group

You cannot rename a rating group that is referenced in a policy. Otherwise, to modify a rating group:

1. From the **Policy Server** section of the navigation pane, select **Services & Rating Groups**.
   The content tree displays the **Services & Rating Groups** group.
2. In the content tree, select the rating group you want to modify.
   The work area displays information about the rating group.
3. On the **Rating Group Administration** page, click **Modify**.
   The **Modify Rating Group** page opens.
4. Make changes. For information on the fields on this page, see *Creating a Rating Group*.
5. When you finish, click **Save** (or **Cancel** to cancel the request).

The rating group is modified.

Removing a Service from a Rating Group

Removing a service from a rating group does not delete the service. To delete a service, see *Deleting a Service*.

To remove a service from a rating group:

1. From the **Policy Server** section of the navigation pane, select **Services & Rating Groups**.
   The content tree displays the **Services & Rating Groups** group.
2. In the content tree, select the rating group from which you want to remove the service.
   The work area displays information about the rating group.
3. Remove the service using one of the following methods:
   - On the Rating Group Administration page, click the Remove icon, located to the right to the service you want to remove. The service is removed from the rating group immediately; there is no confirmation message.
   - From the content tree, select the service in the rating group; the Service Administration page opens, displaying information about the service. Click **Delete**. You are prompted, "Are you sure you want to delete this Service?" Click **OK** (or **Cancel** to abandon the request).

The service is removed from the rating group.

Deleting a Rating Group

Deleting a rating group does not delete any services associated with the deleted group; services remain in the Services & Rating Groups group. You cannot delete the Services & Rating Groups group. You cannot delete a rating group that is referenced in a policy. Otherwise, to delete a rating group:

1. From the **Policy Server** section of the navigation pane, select **Services & Rating Groups**.
   The content tree displays the **Services & Rating Groups** group.
2. From the content tree, select the rating group you want to delete.
   The Rating Group Administration page opens in the work area, displaying the contents of the selected rating group; for example:

3. On the Rating Group Administration page, click **Delete**.
   You are prompted, "Are you sure you want to delete this Group?"
4. Click **OK** (or **Cancel** to cancel the request).

The rating group is deleted.

Chapter 13

Managing Traffic Profiles

Topics:

Managing Traffic Profiles defines how to create and manage traffic profiles in the CMP system.

About Traffic Profiles

A traffic profile is a set of values defined for parameters that are used in protocol messages within the MPE device. Typically, these traffic profile values are used to define the Quality of Service (QoS) for sessions that are managed by those protocol messages. You can use traffic profiles to implement policy and charging control (PCC) rules.

Traffic profiles are used in the MPE device under several situations; for example:

- They define default settings for protocol messages (see *Creating a Traffic Profile*)
- They modify protocol messages, thus modifying the QoS for sessions managed by those messages (see *Creating a New Policy*)

A traffic profile can be applied by a policy rule trigger, or by default if no policy rule is triggered.

Each traffic profile has a type associated with it. Since each protocol supports different parameters for controlling QoS settings, the available MPE parameters depend on the underlying protocol. Therefore, each profile type is associated with a single protocol, but a single protocol can support multiple profile types.

You can create multiple traffic profiles of the same type, as the values of the parameters for each profile determine the actual QoS that is associated with that profile. For example, one possible set of traffic profiles is as follows:

- **Default** — default predefined profile
- **P2P** — profile for peer-to-peer traffic
- **RATE_LIMIT_128K** — profile to limit download rate to 128 Kbps
- **RATE_LIMIT_64K** — profile to limit download rate to 64 Kbps

Creating a Traffic Profile

To create a traffic profile:

1. From the **Policy Server** section of the navigation pane, select **Traffic Profiles**.
   The content tree displays the **Traffic Profiles** group. The default group is **ALL**.
2. Select the **Traffic Profiles** group.
   The Traffic Profile Administration page opens in the work area, listing available traffic profiles.
3. On the Traffic Profile Administration page, click **Create Traffic Profile**.
   The New Traffic Profile page opens.
4. Enter the following information:
   a) **Name** — The name assigned to the profile. The name can be up to 255 characters long and must not contain quotation marks (") or commas (,).
   b) **Traffic Profile Type** — Select from the following:
      - **ADC Rule** (the default) — an application detection control rule.
      - **Diameter QoS**
      - **PCC Profile** — a policy and charging control profile.
      - **PCC Rule** — a policy and charging control rule.

- **Predefined ADC Rule** — a pre-defined ADC rule residing on the PCEF device.
- **Predefined ADC Rule Base** — a pre-defined group of ADC rules residing on the PCEF device.
- **Predefined PCC Rule** — a pre-defined PCC rule residing on the PCEF device.
- **Predefined PCC Rule Base** — a pre-defined group of PCC rules residing on the PCEF device.

c) Protocol Fields — The set of protocol fields displayed on the Traffic Profile page varies depending on the Traffic Profile Type selected. *Table 6: Traffic Profile Type Configuration Parameters* describes the protocol fields for each traffic profile type.

5. When you finish, click **Save** (or **Cancel** to discard your changes).

The traffic profile is defined.

Table 6: Traffic Profile Type Configuration Parameters

Traffic Profile Type	Configuration Parameter	Description
ADC Rule	Rule Name	Uniquely identifies the ADC rule. Used to reference an ADC rule in communication between the MPE device and a PCEF within one IP-CAN session.
	Uplink Max Authorized Rate (bps)	Maximum authorized bandwidth in bits per second for uplinks (user equipment to network).
	Downlink Max Authorized Rate (bps)	Maximum authorized bandwidth in bits per second for downlinks (network to user equipment).
	Monitoring Key	Select the value of the monitoring key that may apply to the ADC rule.
	Flow Status	Select from the following: • **ENABLED_UPLINK** • **ENABLED_DOWNLINK** • **ENABLED** • **DISABLED**
	Precedence	Precedence value of the profile. The lower the precedence, the higher the priority.
	TDF Application Identifier	Determines the traffic that belongs to the application.
	TDF Redirect Support	Select from the following: • **N/A** (the default) • **REDIRECTION_DISABLED** • **REDIRECTION_ENABLED**
	TDF Redirect Address Type	Select from the following: • **N/A** (the default)

Traffic Profile Type	Configuration Parameter	Description
		• **IPv4** • **IPv6** • **URL** • **SIP_URI**
	TDF Redirect Server Address	The address of the TDF redirect server.
	Mute Notification	Used to disable application detection notifications from the TDF device. Select from the following: • **N/A** (the default) • **MUTE_REQUIRED**
Diameter QoS	QoS Class Identifier	Identifies the QoS class. Select from the following: • **1 = Conversational 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**
	Uplink Max Authorized Rate (bps)	Maximum authorized bandwidth in bits per second for uplinks (user equipment to network).
	Downlink Max Authorized Rate (bps)	Maximum authorized bandwidth in bits per second for downlinks (network to user equipment).
	Uplink Min Guaranteed Rate (bps)	Minimum guaranteed bandwidth in bits per second for uplinks (user equipment to network). Only applicable if the QoS class identifier is between 1 and 4.
	Downlink Min Guaranteed Rate (bps)	Minimum guaranteed bandwidth in bits per second for downlinks (network to user equipment). Only applicable if the QoS class identifier is between 1 and 4.
	ARP Priority Level	Allocation and Retention Priority level of the service flows associated with this Diameter profile. Specify **1** (highest) to **15** (lowest).
	ARP Preemption Capability	Select from the following: • **PREEMPTION_CAPABILITY_ENABLED** • **PREEMPTION_CAPABILITY_DISABLED**

Traffic Profile Type	Configuration Parameter	Description
	ARP Preemption Vulnerability	Select from the following: • **PREEMPTION_VULNERABILITY_ENABLED** • **PREEMPTION_VULNERABILITY_DISABLED**
	Resource Allocation Notification	Indicates that the allocation of resources for the related PCC rules will be confirmed. Select from the following: • **Enable_Notification**
PCC Profile	QoS Class Identifier	Identifies the QoS class. Select from the following: • **1 = Conversational 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**
	Uplink Max Authorized Rate (bps)	Maximum authorized bandwidth in bits per second for uplinks (user equipment to network).
	Downlink Max Authorized Rate (bps)	Maximum authorized bandwidth in bits per second for downlinks (network to user equipment).
	Uplink Min Guaranteed Rate (bps)	Minimum guaranteed bandwidth in bits per second for uplinks (user equipment to network). Only applicable if the QoS class identifier is between 1 and 4.
	Downlink Min Guaranteed Rate (bps)	Minimum guaranteed bandwidth in bits per second for downlinks (network to user equipment). Only applicable if the QoS class identifier is between 1 and 4.
	ARP Priority Level	Allocation and Retention Priority level of the service flows associated with this Diameter profile. Specify 1 (highest) to 15 (lowest).
	ARP Preemption Capability	Select from the following: • **PREEMPTION_CAPABILITY_ENABLED** • **PREEMPTION_CAPABILITY_DISABLED**
	ARP Preemption Vulnerability	Select from the following: • **PREEMPTION_VULNERABILITY_ENABLED** • **PREEMPTION_VULNERABILITY_DISABLED**

Traffic Profile Type	Configuration Parameter	Description
	Service Identifier	Credit-control service identifier associated with the traffic defined by this rule. Only applicable if online charging is enabled.
	Rating Group	Credit-control rating group associated with the traffic defined by this profile. Only applicable if online charging is enabled.
	Reporting Level	Select from the following: • **SERVICE_IDENTIFIER_LEVEL** • **RATING_GROUP_LEVEL**
	Online Charging	Specifies whether or not online charging is enabled in this profile. Select from the following: • **DISABLE_ONLINE** • **ENABLE_ONLINE**
	Offline Charging	Specifies whether or not offline charging is enabled in this profile. Select from the following: • **DISABLE_OFFLINE** • **ENABLE_OFFLINE**
	Metering Method	Specifies whether this profile meters by duration, volume, or both. Select from the following: • **DURATION** • **VOLUME** • **DURATION_VOLUME**
	Flow Status	Select from the following: • **ENABLED_UPLINK** • **ENABLED_DOWNLINK** • **ENABLED** • **DISABLED**
	Flow Description(s)	IP flows associated with this profile. A comma-separated list of Diameter IP Filter rules following the format specified in RFC 3588 section 4.3. As of Release 9.0, the Flow Description(s) field will be used in the following cases: • The old Traffic Profile is imported, and the Flow Description is not an empty string. • The upgrade from an older version is in process and the existing Traffic Profile Flow Description is not an empty string.

Traffic Profile Type	Configuration Parameter	Description
		For all other cases, the **Use Flow Information(s)** fields will be used to indicate the IP flows.
	Use Flow Information(s)	IP flow description, TOS traffic class, TOS traffic class mask, and flow direction information associated with the profile. Multiple Flow-Information(s) can be added to the same traffic profile. This field is used instead of the **Flow Description(s)** field. **Note:** If the **Flow Description(s)** field is populated, then the **Use Flow Information(s)** field cannot be used. Click **Add** next to the **Use Flow Information(s)** field to access the Flow Information fields. Double-click each column to edit the values in the column. Click **Del** next to an existing Flow Information row to delete the row.
	Precedence	Precedence value of the profile. The lower the precedence, the higher the priority.
	Resource Allocation Notification	Indicates that the allocation of resources for the related PCC rules will be confirmed. Select from the following: • **ENABLE_NOTIFICATION**
PCC Rule	Rule Name	Name identifying the provisioned PCC (policy and charging control) rule. The name must not contain apostrophes (').
	QoS Class Identifier	Identifies the QoS class. Select from the following: • **1 = Conversational 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**
	Uplink Max Authorized Rate (bps)	Maximum authorized bandwidth in bits per second for uplinks (user equipment to network).
	Downlink Max Authorized Rate (bps)	Maximum authorized bandwidth in bits per second for downlinks (network to user equipment).
	Uplink Min Guaranteed Rate (bps)	Minimum guaranteed bandwidth in bits per second for uplinks (user equipment to network). Only applicable if the QoS class identifier is between 1 and 4.

Traffic Profile Type	Configuration Parameter	Description
	Downlink Min Guaranteed Rate (bps)	Minimum guaranteed bandwidth in bits per second for downlinks (network to user equipment). Only applicable if the QoS class identifier is between 1 and 4.
	ARP Priority Level	Allocation and Retention Priority level of the service flows associated with this PCC rule. Specify **1** (highest) to **15** (lowest).
	ARP Preemption Capability	Select from the following: • **PREEMPTION_CAPABILITY_ENABLED** • **PREEMPTION_CAPABILITY_DISABLED**
	ARP Preemption Vulnerability	Select from the following: • **PREEMPTION_VULNERABILITY_ENABLED** • **PREEMPTION_VULNERABILITY_DISABLED**
	Service Identifier	Credit-control service identifier associated with the traffic defined by this rule. Only applicable if online charging is enabled.
	Rating Group	Credit-control rating group associated with the traffic defined by this rule. Only applicable if online charging is enabled.
	Monitoring Key	Value of the monitoring key.
	Reporting Level	Select from the following: • **SERVICE_IDENTIFIER_LEVEL** • **RATING_GROUP_LEVEL**
	Online Charging	Specifies whether or not online charging is enabled in this profile. Select from the following: • **DISABLE_ONLINE** • **ENABLE_ONLINE**
	Offline Charging	Specifies whether or not offline charging is enabled in this profile. Select from the following: • **DISABLE_OFFLINE** • **ENABLE_OFFLINE**
	Metering Method	Specifies whether this profile meters by duration, volume, or both. Select from the following: • **DURATION** • **VOLUME** • **DURATION_VOLUME**

Traffic Profile Type	Configuration Parameter	Description
	Flow Status	Select from the following: • **ENABLED_UPLINK** • **ENABLED_DOWNLINK** • **ENABLED** • **DISABLED**
	Flow Description(s)	IP flows associated with this profile. This is a comma-separated list of Diameter IP Filter rules following the format specified in RFC 3588 section 4.3.
	Use Flow Information(s)	IP flow description, TOS traffic class, TOS traffic class mask, and flow direction information associated with the profile. Multiple Flow-Information(s) can be added to the same traffic profile. This field is used instead of the **Flow Description(s)** field. **Note:** If the **Flow Description(s)** field is populated, then the **Use Flow Information(s)** field cannot be used. Click **Add** next to the **Use Flow Information(s)** field to access the Flow Information fields. Double-click each column to edit the values in the column. Click **Del** next to an existing Flow Information row to delete the row.
	Precedence	Precedence value of the profile. The lower the precedence, the higher the priority.
	Resource Allocation Verification	Indicates that the allocation of resources for the related PCC rules will be confirmed. Select from: • **ENABLE_NOTIFICATION**
	TDF Application Identifier	Determines the traffic that belongs to the application.
	TDF Redirect Support	Select from the following: • N/A (the default) • REDIRECTION_DISABLED • REDIRECTION_ENABLED
	TDF Redirect Address Type	Select from the following: • N/A (the default) • IPv4 • IPv6 • URL • SIP_URI
	TDF Redirect Server Address	The address of the TDF redirect server.

Traffic Profile Type	Configuration Parameter	Description
Predefined ADC Rule	Rule Name	Name of the predefined rule. The name must not contain apostrophes (').
	Description	Description of the rule.
Predefined ADC Rule Base	Rule-Base Name	Name of the predefined rule-base name. The name must not contain apostrophes (').
	Description	Description of the rule base.
Predefined PCC Rule	Rule Name	Name of the predefined rule. The name must not contain apostrophes (').
	Description	Description of the rule.
	Monitoring Key	Select **N/A** or the name of a monitoring key defined in the CMP database. See *Managing Monitoring Keys* for information on monitoring keys.
Predefined PCC Rule Base	Rule-Base Name	Name of the predefined rule-base name. The name must not contain apostrophes (').
	Description	Description of the rule base.

Modifying a Traffic Profile

To modify a traffic profile:

1. From the **Policy Server** section of the navigation pane, select **Traffic Profiles**.
   The content tree opens.
2. From the content tree, select the **Traffic Profiles** group.
   The Traffic Profile Administration page opens, displaying the list of defined traffic profiles.
3. Select the profile you want to modify.
   Profile information is displayed.
4. Click **Modify**.
   The Modify Traffic Profile page opens.
5. Modify profile information as required.
   For a description of the fields contained on this page, see *Creating a Traffic Profile*.
6. When you finish, click **Save** (or **Cancel** to abandon your changes).

The traffic profile is modified.

Deleting a Traffic Profile

You cannot delete a traffic profile that is deployed on an MPE device.

To delete a traffic profile:

1. From the **Policy Server** section of the navigation pane, select **Traffic Profiles**.
   The content tree opens.
2. From the content tree, select the **Traffic Profiles** group.
   The Traffic Profile Administration page opens, displaying the list of defined traffic profiles.
3. Delete the traffic profile using one of the following methods:
   - From the work area, click the Delete icon, located to the right of the traffic profile you want to delete.
   - From the content tree, select the traffic profile and click **Delete**.

   You are prompted, "Are you sure you want to delete this Traffic Profile?"
4. Click **OK** to delete the traffic profile (or **Cancel** to cancel the request).

The traffic profile is deleted.

Traffic Profile Groups

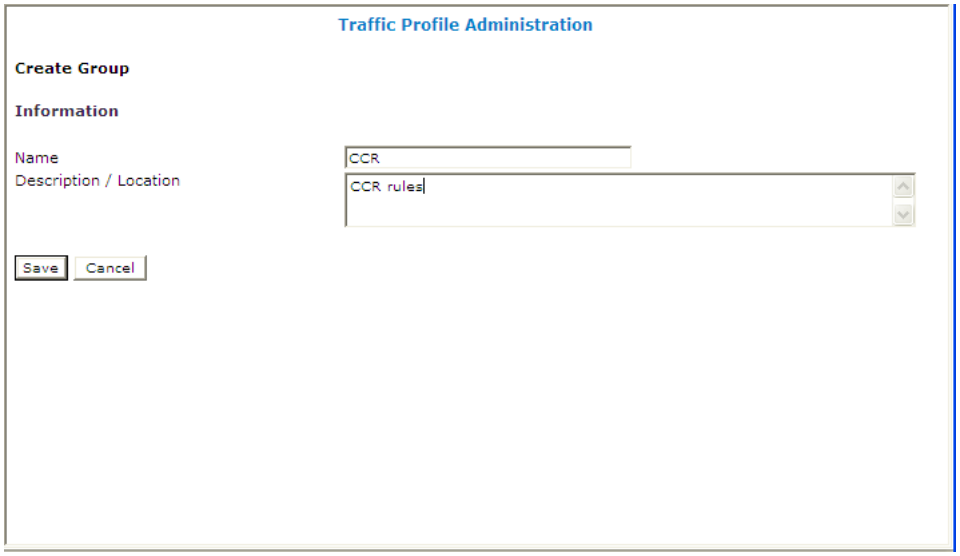
For organizational purposes, you can aggregate traffic profiles into groups. Once a traffic profile group is created, it can be populated with individual traffic profiles. The following subsections describe how to manage traffic profile groups.

Creating a Traffic Profile Group

To create a traffic profile group:

1. From the **Policy Server** section of the navigation pane, select **Traffic Profiles**.
   The content tree displays a list of traffic profile groups; the initial group is **ALL**.
2. From the content tree, select the **ALL** group.
   The Traffic Profile Administration page opens in the work area, listing all defined traffic profiles.
3. On the Traffic Profile Administration page, click **Create Group**.
   The Create Group editor page opens.
4. Enter the name of the new traffic profile group.

   The name can be up to 250 characters long and must not contain quotation marks (") or commas (,).
5. Optionally, enter a description of the traffic profile group; for example:



6. When you finish, click **Save** (or **Cancel** to discard your changes).
   The new group appears in the content tree.

The traffic profile group is created.

Adding a Traffic Profile to a Traffic Profile Group

To add a traffic profile to a traffic profile group:

1. From the **Policy Server** section of the navigation pane, select **Traffic Profiles**.
   The content tree displays a list of traffic profile groups; the initial group is **ALL**.
2. From the content tree, select the traffic profile group.
   The **Traffic Profile Administration** page opens in the work area, displaying the contents of the selected traffic profile group.
3. Click **Add Traffic Profile**.
   The **Add Traffic Profile** page opens, displaying the traffic profiles not already part of the group. *Figure 16: Add Traffic Profile Page* shows an example.
4. Select the traffic profile; use the Ctrl or Shift keys to select multiple traffic profiles.
5. When you finish, click **Save** to add the traffic profile to the selected group (or **Cancel** to cancel the request).

The traffic profile is added to the traffic profile group.

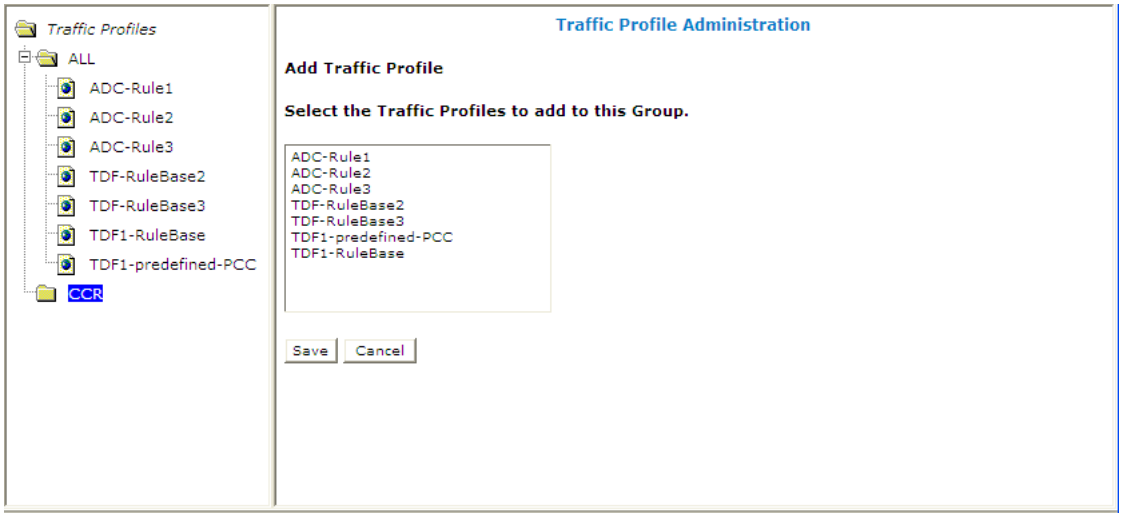


Figure 16: Add Traffic Profile Page

Modifying a Traffic Profile Group

To modify a traffic profile group:

1. From the **Policy Server** section of the navigation pane, select **Traffic Profiles**.
   The content tree displays a list of traffic profile groups; the initial group is **ALL**.
2. From the content tree, select the traffic profile group you want to modify.
   The Traffic Profile Administration page opens in the work area.
3. On the Traffic Profile Administration page, click **Modify**.
   The Modify Group page opens.
4. Edit the information in the fields.
   The name cannot contain quotation marks (") or commas (,).
5. When you finish, click **Save** (or **Cancel** to cancel the request).

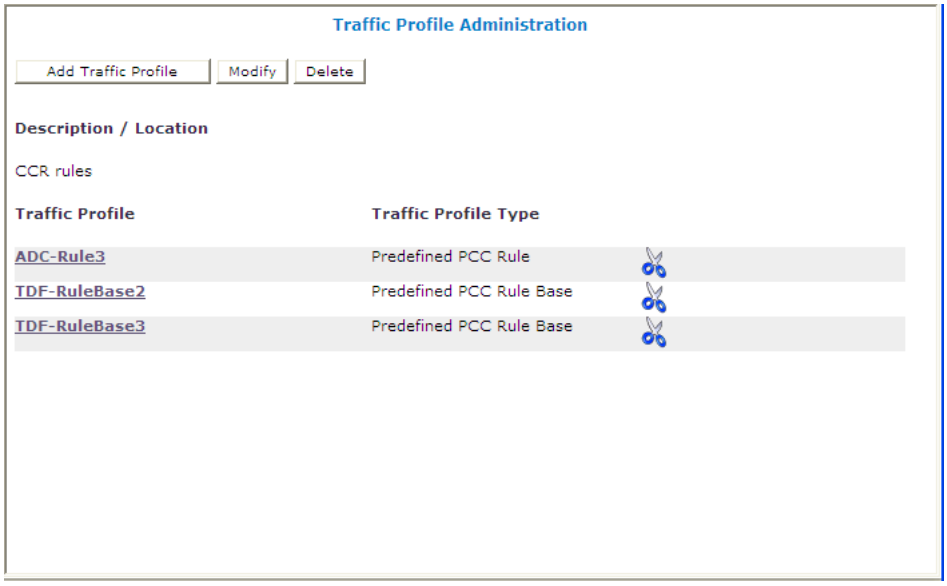
The group is modified.

Removing a Traffic Profile from a Traffic Profile Group

Removing a traffic profile from a traffic profile group does not delete the profile. To delete a traffic profile, see *Deleting a Traffic Profile*.

To remove a traffic profile from a traffic profile group:

1. From the **Policy Server** section of the navigation pane, select **Traffic Profiles**.
   The content tree displays the list of traffic profile groups.
2. From the content tree, select the traffic profile group.
   The **Traffic Profile Administration** page opens in the work area, displaying the contents of the traffic profile group; for example:



3. Remove the traffic profile using one of the following methods:
   - Click the **Delete** icon, located to the right of the traffic profile you want to remove.
   - From the traffic profile group in the content tree, select the traffic profile and click **Remove**.

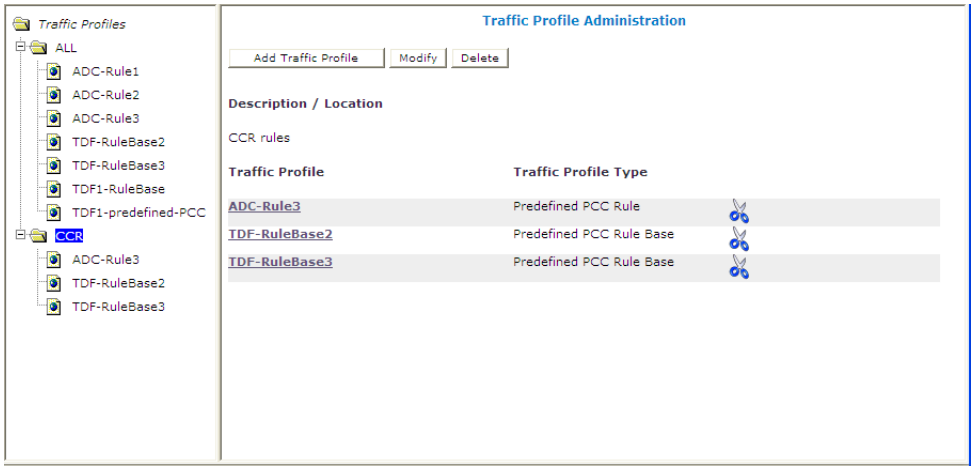
The traffic profile is removed from the group; there is no confirmation message.

Deleting a Traffic Profile Group

Deleting a traffic profile group does not delete any traffic profiles associated with the deleted group; profiles remain in the ALL group. You cannot delete the ALL group.

To delete a traffic profile group:

1. From the **Policy Server** section of the navigation pane, select **Traffic Profiles**.
   The content tree displays the list of traffic profile groups.
2. From the content tree, select the traffic profile group you want to delete.
   The Traffic Profile Administration page opens in the work area, displaying the contents of the selected traffic profile group; for example:



3. On the Traffic Profile Administration page, click **Delete**.
   You are prompted, "Are you sure you want to delete this Group?"
4. Click **OK** to delete the group (or **Cancel** to cancel the request).

The traffic profile group is deleted.

Chapter 14

Managing Retry Profiles

Topics:

Managing Retry Profiles describes how to create and manage retry profiles in the CMP system.

A retry profile specifies the circumstances under which installation of a policy and charging control (PCC) rule is retried if the rule is reported to have failed.

About Retry Profiles

A retry profile specifies the circumstances under which installation of a policy and charging control (PCC) rule is retried if the rule is reported to have failed (for example, because the establishment of a network-initiated bearer failed), as indicated by a Charging-Rule-Report. The retry action consists of a configurable number of retry attempts, after initially waiting a configurable period of time and then using an exponential back-off algorithm.

A retry profile can be applied by a policy rule trigger, or by default if no policy rule is triggered.

You can define multiple retry profiles, each with different parameter values.

Note: See *Configuring Data Source Interfaces* for information on configuring the interval to wait for a failure before considering the rule installation successful.

Creating a Retry Profile

To create a retry profile:

1. From the **Policy Server** section of the navigation pane, select **Retry Profile.**
   The content tree displays the **Retry Profile** group.
2. Select the **Retry Profile** group.
   The Retry Profile Administration page opens in the work area, listing available retry profiles.
3. On the Retry Profile Administration page, click **Create Retry Profile.**
   The New Retry Profile page opens.
4. **Enter the following information:**
   a) **Name** — Unique name assigned to the profile. The name can be up to 255 characters long and must not contain quotation marks (") or commas (,).
   b) **Description/Location** — Free-form text describing the profile.
   c) **Retry Profile Type** — Select from **ADC Retry Profile** or **PCC Retry Profile.**
   d) **Maximum Retry Attempt** — The maximum number of retry attempts after an initial failure, from 1 to 10.
   The default is five attempts.
   e) **Initial Retry Interval** — How long to wait, in seconds, after a reported failure before retrying. The default is 10 seconds. Type a value from 0 to 30 seconds. To specify a retry immediately after a reported failure, type 0.
   f) **Maximum Retry Interval** — The maximum wait, in seconds, after a reported failure before retrying.
   The default is 60 seconds. Type a value from 1 to 180 seconds.
   g) **Rule Failure Code** — The upper box lists available rule failure codes; the lower box lists rule failure codes installed in the profile.
   The failure codes RESOURCES_LIMITATION and RESOURCE_ALLOCATION_FAILURE are installed by default. To add a rule failure code to the profile, select it in the upper box and click **Add**. To remove a rule failure code from the profile, select it in the lower box and click **Delete**.

   Note: If the profile does not contain any rule failure codes, the MPE device will retry the rule installation regardless of the failure code reported.

5. When you finish, click **Save** to define the retry profile (or **Cancel** to discard your changes).

The retry profile is created.

Modifying a Retry Profile

To modify a retry profile:

1. From the **Policy Server** section of the navigation pane, select **Retry Profile**.
   The content tree opens.
2. From the content tree, select the **Retry Profile** group.
   The Retry Profile Administration page opens, displaying the list of defined retry profiles.
3. Select the profile you want to modify.
   Profile information is displayed.
4. Click **Modify**.
   The Modify Retry Profile page opens.
5. Modify profile information as required.
   For a description of the fields contained on this page, see *Creating a Retry Profile*.
6. When you finish, click **Save** (or **Cancel** to abandon your changes).

The retry profile is modified.

Deleting a Retry Profile

To delete a retry profile:

1. From the **Policy Server** section of the navigation pane, select **Retry Profile**.
   The content tree opens.
2. From the content tree, select the **Retry Profile** group.
   The Retry Profile Administration page opens, displaying the list of defined retry profiles.
3. Delete the retry profile using one of the following methods:
   - From the work area, click the Delete icon, located to the right of the retry profile you want to delete.
   - From the content tree, select the retry profile and click **Delete**.

   You are prompted, "Are you sure you want to delete this Retry Profile?"
4. Click **OK** to delete the retry profile (or **Cancel** to abandon your request).

The retry profile is deleted.

Chapter 15

Managing Charging Servers

Topics:

Managing Charging Servers describes how to define and manage charging servers within the CMP system.

A charging server is an application that calculates billing charges.

About Charging Servers

A charging server is an application that calculates billing charges for a wireless subscriber. The CMP supports both online and offline charging servers:

- An online server calculates charges against a prepaid account for an event and returns information on how long the subscriber can use the service; it can affect, in real time, the service rendered.
- An offline server calculates charges for a service to an account, and does not affect (in real time) the service rendered.

Defining a Charging Server

To define a charging server:

1. From the navigation pane, select **Charging Servers**.
   The content tree displays the **Charging Servers** group.
2. Select the **Charging Servers** group.
   The Charging Server Administration page opens in the work area.
3. On the Charging Server Administration page, click **Create Charging Server**.
   The New Charging Server page opens.
4. Enter information as appropriate for the charging server:
   a) **Name** (required) — The name you assign to the charging server.
      The name can be up to 250 characters long and must not contain colons (:), quotation marks ("), or commas (,).
   b) **Description/Location** — Free-form text that identifies the charging server within the network.
      Enter up to 250 characters.
   c) **Host Name** (required) — Fully qualified domain name assigned to the charging server.
   d) **Port** — The port number on which the charging server is listening for messages.
      If left blank, port 3868 is used.
   e) **Transport** — The transport protocol used to communicate with the charging server.
      Select **tcp**, **udp**, or **sctp** from the list.
   f) **Protocol** — Specifies the AAA protocol used to communicate with the charging server.
      Select **diameter**, **radius**, or **tacacs+** from the list.

      Note: If you configure the Transport protocol as **udp**, you cannot configure the Protocol as **diameter**.

   g) **Security** — Select if transport security is used to communicate with the charging server.
5. When you finish, click **Save** (or **Cancel** to discard your changes).
   The charging server is displayed in the Charging Server Administration page.

   Once you define charging servers, you can select them as default charging servers when configuring an MPE device (see *Configuring Protocol Options on the Policy Server*) or use them in policy actions in the policy wizard (see *User State Conditions*).

Modifying a Charging Server

To modify the definition of a charging server:

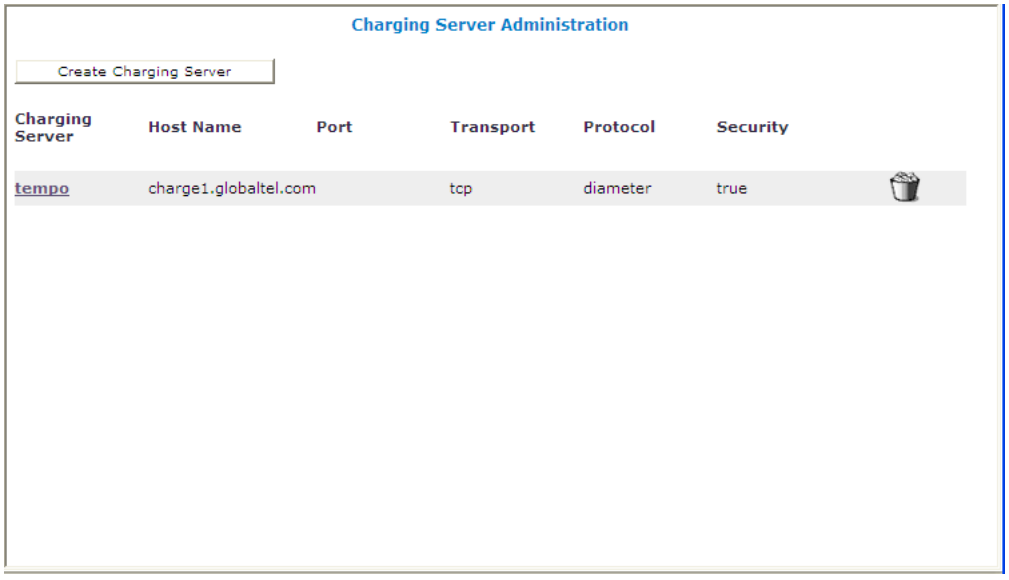
1. From the **Policy Server** section of the navigation pane, select **Charging Servers**.
   The Charging Server Administration page opens in the work area, listing the defined charging servers.
2. On the Charging Server Administration page, select the charging server you want to modify.
   The Charging Server Administration page displays information about the charging server.
3. Click **Modify**.
   The Modify Charging Server page opens.
4. Modify charging server information as required.
   For a description of the fields contained on this page, see *Defining a Charging Server*.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The charging server definition is modified.

Deleting a Charging Server

To delete a charging server:

1. From the **Policy Server** section of the navigation pane, select **Charging Servers**.
   The Charging Server Administration page opens in the work area, listing the defined charging servers; for example:



2. Delete the charging server using one of the following methods:

- From the work area, click the Delete icon, located to the right of the charging server you wish to delete.
- From the content tree, select the charging server and click **Delete**.

You are prompted: "Are you sure you want to delete this Charging Server?"

3. Click **OK** to delete the charging server (or **Cancel** to cancel the request).

The charging server definition is removed from the list.

Associating a Charging Server with an MPE Device

To associate a charging server with an MPE device:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the policy server.
   The **Policy Server Administration** page opens in the work area.
3. On the **Policy Server Administration** page, select the **Policy Server** tab.
   The **Default Charging Servers** section of the page lists charging servers associated with this policy server.
4. Click **Modify**.
   The **Modify Policy Server** page opens.
5. In the **Default Charging Servers** section, select the Primary Online Server, the Primary Offline Server, the Secondary Online Server, and the Secondary Offline Server from the lists.
6. When you finish, click **Save** (or **Cancel** to discard your changes).

The selected charging servers are defined as serving this MPE device.

Chapter 16

Managing Policy Time Periods

Topics:

Managing Policy Time Periods describes how to create and manage time periods in the CMP system.

A policy time period is used in policy time-of-day conditions.

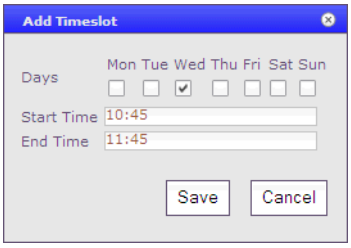
About Policy Time Periods

You can define a library of time periods to specify in policy time-of-day conditions. For example, you can define "peak" and "off-peak" periods, and then associate different policies with different periods. Time periods can include different times of day as well as different days of the week.

Creating a Time Period

To create a time period:

1. From the **Policy Server** section of the navigation pane, select **Time Periods**.
   The content tree displays the **Time Period Administration** group.
2. From the content tree, select the **Time Period Administration** group.
   The Time Period Administration page opens in the work area.
3. Click **Create Time Period**.
   The New Time Period page opens.
4. To configure the time period, enter the following:
   a) **Name** (required) — Name of the time period.
      The name must not contain quotation marks (") or commas (,).
   b) **Description / Location** — A descriptive phrase.
   c) **Precedence** (required) — A positive integer.
      The lower the number, the higher the precedence. If time periods overlap, the time period with the highest precedence (lowest number) applies.
   d) **Time Slot** (required) — Click in the time slot area.
      The Add Timeslot window opens; for example:



   - To create a time slot, select one or more days, and start and end times for the selected day(s), in 15-minute intervals, in the format *hh*:*mm*. A time period must be at least one hour. When you finish, click **Save**.
   - To edit an existing time slot, select it; the Edit Timeslot window opens. Edit the timeslot and click **Save**.
   - To delete an existing time slot, select it; the Edit Timeslot window opens. Click **Delete**; the timeslot is deleted.

5. When you finish defining the time period, click **Save** (or **Cancel** to cancel your request).

The time period is added to the library, and you can now include it in a policy time condition.

Deleting a Time Period

To delete a time period:

1. From the **Policy Server** section of the navigation pane, select **Time Periods**.
   The content tree displays the **Time Period Administration** group.
2. From the content tree, select the **Time Period Administration** group.
   The Time Period Administration page opens in the work area.
3. Select the time period using one of the following methods:
   - From the work area, click the Delete icon, located to the right of the time period you want to delete.
   - From the content tree, select the time period and click **Delete**. You are prompted, "Are you sure you want to delete this Time Period?"
4. Click **OK** (or **Cancel** to cancel the request).

The time period is deleted.

Time-of-Day Triggers

Time-of-day triggers are supported for Diameter Gx sessions. If time-of-day triggers are configured, the MPE device periodically examines policies and provisions the appropriate policies to enforcement points, even for connected subscribers.

For example, if a subscriber connects to a network during an off-peak period and continues to use the network into a peak period, the MPE device removes the off-peak policy rule at the enforcement point at the appropriate time and installs the peak policy rule.

The MPE device evaluates policies every 15 minutes: on the hour, 15 minutes past the hour, 30 minutes past the hour, and 45 minutes past the hour. If a time period is changed, it can take up to 15 minutes for the change to take effect.

Note: If a time period transition occurs and an MPE device is still updating sessions for the previous period, the MPE device aborts the updates in progress and processes the new transition by updating the sessions based on the time periods to which it transitioned.

Time-of-day triggering must be enabled as part of MPE configuration. For more information, see *Configuring Protocol Options on the Policy Server*.

Chapter 17

Mapping Serving Gateways to MCCs/MNCs

Topics:

Mapping Serving Gateways to MCCs/MNCs describes how to map serving gateways to mobile country codes (MCCs) and mobile network codes (MNCs) in the CMP system.

About Mapping Serving Gateways to MCCs/MNCs

An SGSN (Serving GPRS Support Node) may not provide a GGSN (Gateway GPRS Support Node) with accurate or complete mobile country code (MCC) or mobile network code (MNC) information. If not, the GGSN cannot pass this information on to the PCRF (including an MPE device), reducing the PCRF's ability to detect specific roaming scenarios. The MCC/MNC mapping table provides a mechanism for the MPE device to convert an SGSN IP address (a value the GGSN can determine without SGSN input) to the proper MCC/MNC value. You can map multiple serving gateways to each MCC/MNC pair. Once the MCC/MNC values are determined, they can be used in policies to differentiate subscriber treatment based on the specific roaming scenario.

Creating a Mapping

To create a mapping:

1. From the **Policy Server** section of the navigation pane, select **Serving Gateway/MCC-MNC Mapping**.
   The content tree displays the **Serving Gateway/MCC-MNC Mappings** group.
2. Select the **Serving Gateway/MCC-MNC Mappings** group.
   The Serving Gateway/MCC-MNC Mappings Administration page opens in the work area, listing available mappings.
3. On the Serving Gateway/MCC-MNC Mappings Administration page, click **Create Serving Gateway/MCC-MNC Mapping**.
   The New Serving Gateway/MCC-MNC Mapping page opens.
4. Enter the following information:
   a) **Name** (required) — The name assigned to the mapping.
      The name can be up to 250 characters long and must not contain quotation marks (") or commas (,).
   b) **Description** — A descriptive phrase.
   c) **MCC-MNC** (required) — The MCC-MNC pair, in the format *mccmnc*; for example, 310012 for Verizon Wireless in the United States.
   d) **Serving Gateway IP Address/Subnet** (required) — The IP address or subnet, in IPv4 or IPv6 format, of a serving gateway.
      To add an address to the mapping list, type it and click **Add**. To remove one or more mappings from the list, select them and click **Delete**.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The mapping is created and stored in the Serving Gateway/MCC-MNC Mappings group.

Modifying a Mapping

To modify a Serving Gateway/MCC-MNC mapping:

1. From the **Policy Server** section of the navigation pane, select **Serving Gateway/MCC-MNC Mapping**.
   The content tree opens.
2. From the content tree, select the **Serving Gateway/MCC-MNC Mappings** group.
   The Serving Gateway/MCC-MNC Mappings Administration page opens, displaying the list of defined mappings.
3. Select the mapping you want to modify.
   Mapping information is displayed.
4. Click **Modify**.
   The Modify Serving Gateway/MCC-MNC Mapping page opens.
5. Modify mapping information as required.
   For a description of the fields contained on this page, see *Creating a Mapping*.
6. When you finish, click **Save** (or **Cancel** to abandon your changes).

The mapping is modified.

Deleting a Mapping

To delete a serving gateway/MCC-MNC mapping:

1. From the **Policy Server** section of the navigation pane, select **Serving Gateway/MCC-MNC Mapping**.
   The content tree opens.
2. From the content tree, select the **Serving Gateway/MCC-MNC Mappings** group.
   The Serving Gateway/MCC-MNC Mappings Administration page opens, displaying the list of defined mappings.
3. Delete the mapping using one of the following methods:
   - From the work area, click the Delete icon, located to the right of the mapping you want to delete.
   - From the content tree, select the mapping and click **Delete**. You are prompted, "Are you sure you want to delete this Serving Gateway/MCC-MNC mapping?"
4. Click **OK** to delete the Serving Gateway/MCC-MNC mapping (or **Cancel** to cancel the request).

The mapping is deleted.

Chapter 18

Managing Monitoring Keys

Topics:

Managing Monitoring Keys describes how to create and manage monitoring keys in the CMP system.

The monitoring key associates quota profiles with policy and charging control (PCC) and application detection control (ADC) rules for usage tracking.

Note: The actual options you see depend on whether or not your CMP system is configured in Gx mode, Gy mode, or both.

About Monitoring Keys

A monitoring key is a unique string that identifies the quota profile to be used by a policy and charging control (PCC) rule and application detection control (ADC) rule for usage tracking. The monitoring key is associated with the quota profile by selecting a policy action that grants usage to a selected number of quota profiles. You configure monitoring keys through the CMP system.

The PCC Rule Profile is used to populate the Charging Rule Definition attribute-value pair (AVP) and the ADC Rule definition AVP values in a Diameter message when a new rule is installed. Therefore, the monitoring key to be defined in the PCC Rule Profile is specified in the Monitoring Key AVP, which is contained in the Charging Rule Definition or ADC Rule Definition AVP for that particular rule. The monitoring key is supported for Sd and Release 9 is not needed. When reporting usage to the MPE device, the monitoring key associated with the PCC/ADC Rule is included in a Usage Monitoring AVP, along with the usage accumulated. The usage accumulated is reported for the total volume, uplink volume, or downlink volume.

At the session level, the monitoring key is optional, but is set by the selection of the appropriate policy action. These policy actions include the ability to:

- Disable or re-enable usage tracking for specified monitoring keys
- Request a usage report from the PCEF for specified monitoring keys
- Monitor multiple PCC/ADC rules against the same quota
- Monitor usage for a PCC/ADC rule or session level against multiple quotas such as monthly and daily quotas

  Note: The granted usage sent to the PCEF/TDF will always be the smallest remaining amount of the quotas, and the re-validation time will always be calculated based on the shortest or closest time in the future for the quotas.

- Change a monitoring key for a rule or session level during the middle of a session upon receiving a Credit Control Request (CCR) update message

Creating a Monitoring Key

1. From the **Policy Server** section of the navigation pane, select **Monitoring Key**.
   The content tree displays the Monitoring Key group.
2. Select the **Monitoring Key** group.
   The Monitoring Key Administration page opens in the work area.
3. On the Monitoring Key Administration page, click **Create Monitoring Key**.
   The New Monitoring Key page opens.
4. Enter information as appropriate for the monitoring key:
   a) **Name** (required) — The name you assign to the monitoring key.
      The name can be up to 255 characters long and must not contain quotation marks (") or commas (,).
   b) **Description** — Free-form text that identifies the monitoring key.
      Enter up to 250 characters.

c) **Type** (required) — The level assigned to the monitoring key.

Select **PCC_RULE_LEVEL** value (1), **ADC_RULE_LEVEL** value (2), or **SESSION_LEVEL** from the list.

d) **Key** — Specifies unique string from all other monitoring keys.

The key can be up to 255 characters long and must not contain backslashes (\), quotation marks ("), semcolons (;), commas (,), or apostrophes (').

5. When you finish, click **Save** (or **Cancel** to discard your changes).

The monitoring key is displayed in the Monitoring Key Administration page.

Once you define monitoring keys, you can select them from the PCC Rule Profile when configuring quota profiles or use them in policy actions in the policy wizard (see *User State Conditions*).

Modifying a Monitoring Key

1. From the **Policy Server** section of the navigation pane, select **Monitoring Key**.
The Monitoring Key Administration page opens in the work area, listing the defined monitoring keys.
2. On the Monitoring Key Administration page, select the monitoring key you want to modify.
The Monitoring Key Administration page displays information about the monitoring key.
3. Click **Modify.**
The Modify Monitoring Key page opens.
4. Modify monitoring key information as required.

For a description of the fields contained on this page, see *Creating a Monitoring Key*.

5. When you finish, click **Save** (or **Cancel** to discard your changes).

The monitoring key definition is modified.

Deleting a Monitoring Key

1. From the **Policy Server** section of the navigation pane, select **Monitoring Key**.
The Monitoring Key Administration page opens in the work area, listing the defined monitoring keys.
2. Delete the monitoring key using one of the following methods:

- From the work area, click the Delete icon, located to the right of the monitoring key you wish to delete.
- From the content tree, select the monitoring key and click **Delete**.

You are prompted, "Are you sure you want to delete this Monitoring Key?"

3. Click **OK** (or **Cancel** to abandon the request).
The monitoring key is removed from the listing.

The monitoring key is deleted.

Chapter 19

Managing Third-Party AVPs

Topics:

Managing Third- Party AVPs describes how to create, modify, and delete third-party AVPs in the CMP system.

Third-party attribute-value pairs (AVPs) are used to encapsulate protocol-specific data for routing, authentication, authorization, and accounting information.

About AVPs

An attribute-value pair (AVP) is used to encapsulate protocol-specific information with usage monitoring supported by the MPE device. Diameter messages such as RAA, CCA, CCR, and RAR are supported by third-party AVP policy conditions. The supported outgoing messages set or remove third-party AVPs in Diameter.

Note: The Diameter messages listed above are only examples. There are many messages associated with Diameter.

You can create policy conditions to evaluate the presence of third-party AVPs in Diameter messages or group AVPs during policy execution. A policy condition can check for the presence of third-party AVPs in incoming Diameter messages and evaluate their values. Custom AVPs are located at the end of a Diameter message or group AVP when defined. For example, the custom defined AVP appears at the end of this message:

```
 Charging-Rule-Install: : <AVP Header: 1001>
*[Charging-Rule-Definition]
*[Charging-Rule-Name]
*[Charging-Rule-Base-Name]
[Bearer-Identifier]
[Rule-Activation-Time]
[Rule-Deactivation-Time]
[Resource-Allocation-Notification]
[Charging-Correlation-Indicator]
*[AVP]
```

A Set or Get SPR user attribute value can be set to the defined third-party AVP in Diameter messages. You can also set or remove defined third-party AVPs during the execution point.

A third-party AVP is identified by a unique identifier in the following format:

name:*vendorId*

For example:

Condition	**where the request AVP NEW_TEST_AVP3:555 value is numerically equal to 2012**
Parameters	The AVP name and vendor ID. In the example above, the vendor ID is 555.
Description	A well-defined AVP custom name is referred to if the vendor ID is not specified.

When entering and sending a new third-party AVP definition to an MPE or MRA device, the definition must include the AVP name, code, vendor ID, data type, and an optional AVP flag.

Validation of the AVP code, Name, and vendor ID prohibits a user from overwriting the existing base AVPs.

These AVP actions include the ability to perform the following:

- Routing
- Authentication
- Authorization

- Accounting

Creating an AVP

To create an AVP:

1. From the **Policy Server** section of the navigation pane, select **Custom AVP Definitions**.
   The content tree displays the Custom AVP Definitions group.
2. Select the **Custom AVP Definitions** group.
   The AVP Definition Administration page opens in the work area.
3. On the AVP Definition Administration page click **Create AVP Definition**.
   The New AVP Definition page opens.
4. Enter information as appropriate for the AVP Definition:
   a) **AVP Name** (required) — The name you assign to the AVP Definition.
      The name can be up to 255 characters long and must not contain the following characters: " , : ; > < . (period)
   b) **Description** — Free-form text that identifies the AVP Definition.
      Enter up to 250 characters.
   c) **AVP Code** (required) — A unique numeric value assigned to the new AVP definition.
   d) **Vendor Id** — Enter the vendor ID. The default is 0.
   e) **Mandatory Flag** — A non-mandatory field which when checked requires that the third-party AVP match exactly what is configured in the CMP database.
   f) **Protect Flag** — A non-mandatory field which when checked specifies the protected AVP values.
   g) **May Encrypt Flag** — The AVP is encrypted if the checkbox is specified.
   h) **Vendor Specific Flag** — The AVP is vendor specific if the checkbox is specified.

      Note: This box is checked automatically if the value of the vendor Id is not 0.

   i) **AVP Type** — Select the available data type from the pulldown list:

      - **address**
      - **enumerated**
      - **float32**
      - **float64**
      - **grouped**
      - **id**
      - **int32**
      - **int64**
      - **ipFilterRule**
      - **octetString**
      - **time**
      - **uint32**
      - **uint64**
      - **uri**
      - **utf8String**

j) **Parent AVP** — If the AVP is a member of a grouped AVP, then the parent AVP must be specified. Select one of the following from the pulldown list:

- **ADC-Rule-Definition:10415**
- **ADC-Rule-Install:10415**
- **ADC-Rule-Remove:10415**
- **ADC-Rule-Report:10415**
- **AF-Correlation-Information:10415**
- **Acceptable-Service-Info:10415**
- **Access-Network-Charging-Identifier-Gx:10415**
- **Access-Network-Charging-Identifier:10415**
- **Access-Network-Physical-Access-ID:10415**
- **Allocation-Retention-Priority:10415**
- **Application-Detection-Information:10415**
- **CC-Money**
- **Charging-Information:10415**
- **Charging-Rule-Definition-3GPP2:5535**
- **Charging-Rule-Definition:10415**
- **Charging-Rule-Event-Cisco:9**
- **Charging-Rule-Event-Trigger-Cisco:9**
- **Charging-Rule-Install-3GPP2:5535**
- **Charging-Rule-Install:10415**
- **Charging-Rule-Remove:10415**
- **Charging-Rule-Report-3GPP2:5535**
- **Charging-Rule-Report:10415**
- **Codec-Data-Tmp:10415**
- **Codec-Data:10415**
- **Cost-Information**
- **Default-EPS-Bearer-Qos:10415**
- **E2E-Sequence**
- **Envelope:10415**
- **Event-Report-Indication:10415**
- **Explicit-Route-Record:21274**
- **Explicit-Route:21274**
- **Failed-AVP**
- **Final-Unit-Indication**
- **Flow-Description-Info:5535**
- **Flow-Description:10415**
- **Flow-Grouping:10415**
- **Flow-Info:5535**
- **Flow-Information:10415**
- **Flow:10415**
- **G-S-U-Pool-Reference**
- **Granted-Qos:5535**
- **Granted-Service-Unit**
- **Juniper-Discovery-Descriptor:2636**

- **Juniper-Provisioning-Descriptor:2636**
- **LI-Indicator-Gx:12951**
- **LI-TargetMFAddr:12951**
- **Media-Component-Description:10415**
- **Media-Sub-Component:10415**
- **Multiple-Services-Credit-Control**
- **Offline-Charging:10415**
- **PCEF-Forwarding-Info:971**
- **PCEF-Info:971**
- **PS-Furnish-Charging-Information:10415**
- **PS-information:10415**
- **Packet-Filter-Information:10415**
- **Qos-Information-3GPP2:5535**
- **Qos-Information:10415**
- **Qos-Rule-Install:10415**
- **Qos-Rule-Definition:10415**
- **Qos-Rule-Remove:10415**
- **Qos-Rule-Report:10415**
- **Reachable-Peer:21274**
- **Redirect-Information:10415**
- **Redirect-Server**
- **Requested-Qos:5535**
- **Requested-Service-Unit**
- **Service-Information:10415**
- **Service-Parameter-Info**
- **Siemens-DL-SDP-Data:4329**
- **Siemens-UL-SDP-Data:4329**
- **Subscription Id**
- **Subscription-Id-3GPP:10415**
- **Supported-Features:10415**
- **TDF-Information:10415**
- **TFT-Packet-Filter-Information:10415**
- **TMO-Redirect-Server-29168**
- **Time-Quota-Mechanism:10415**
- **Trigger:10415**
- **Tunnel-Header-Filter:10415**
- **Unit-Value**
- **Usage-Monitoring-Control:21274**
- **Usage-Monitoring-Information:10415**
- **Used-Service-Unit**
- **User-Equipment-Info**
- **User-Location-Info-3GPP:10415**
- **VZW-Access-Network-Physical-Access-ID:12951**
- **Vendor-Specific-Application-Id**
- **Vzw-Trigger:12951**

5. When you finish, click **Save** (or **Cancel** to abandon your request).
   The custom AVP definition is displayed in the AVP Definition Administration page.

The custom AVP is defined.

Modifying an AVP

To modify an AVP:

1. From the **Policy Server** section of the navigation pane, select **Custom AVP Definitions**.
   The AVP Definition Administration page opens in the work area, listing the defined AVPs.
2. On the AVP Definition Administration page, select the AVP you want to modify.
   The AVP Definition Administration page opens, displaying information about the AVP.
3. Click **Modify.**
   The Modify AVP Definition page opens.
4. Modify AVP information as required.
   For a description of the fields contained on this page, see *Creating an AVP*.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The AVP definition is modified.

Deleting an AVP

To delete an AVP:

1. From the **Policy Server** section of the navigation pane, select **Custom AVP Definitions**.
   The AVP Definition Administration page opens in the work area, listing the defined monitoring keys.
2. Delete the AVP using one of the following methods:
   - From the work area, click the **Delete** icon, located to the right of the AVP you wish to delete.
   - From the content tree, select the AVP and click **Delete**.

   You are prompted, "Are you sure you want to delete this AVP?"
3. Click **OK** (or **Cancel** to abandon your request).
   The AVP is removed from the list.

The AVP is deleted.

Chapter 20

Managing Multi-Protocol Routing Agents

Topics:

Managing Multi-Protocol Routing Agents describes how to define and manage Multi-Protocol Routing Agent (MRA) devices in the CMP system.

Note: For more information on using MRA servers, refer to the *Front End User's Guide*.

Configuring the CMP System to Manage an MRA Cluster

The Multi-Protocol Routing Agent (MRA) device is a standalone entity that supports Multimedia Policy Engine (MPE) devices. The CMP system is used to manage all MRA functions. Before this can occur, the CMP operating mode must support managing MRA clusters.

To reconfigure the CMP operating mode, complete the following:

Caution: CMP operating modes should only be set in consultation with Tekelec Technical Support. Setting modes inappropriately can result in the loss of network element connectivity, policy function, OM statistical data, and cluster redundancy.

1. From the **Help** navigation pane, select **About**.
   The About page opens, displaying the CMP software version number.
2. Click the **Mode** button.
   Consult with Tekelec Technical Support for information on this button.
   The Mode Settings page opens.
3. At the bottom of the page, select **Manage MRAs**.
4. Click **OK**.
   The browser page closes and you are automatically logged out.
5. Refresh the browser page.
   The Welcome admin page is displayed.

You are now ready to define an MRA cluster profile, specify network settings for the MRA cluster, and associate MPE devices with the MRA cluster.

Defining an MRA Cluster Profile

You must define a profile for each MRA cluster you are managing. To define an MRA cluster profile:

1. From the **MRA** section of the navigation pane, select **Configuration**.
   The content tree displays a list of MRA groups; the initial group is **ALL**.
2. From the content tree, select the ALL group.
   The **MRA Administration** page opens in the work area.
3. On the **MRA Administration** page, click **Create Multi-protocol Routing Agent**.
   The New **MRA** page opens.
4. Enter information as appropriate for the MRA cluster:
   a) **Associated Cluster** (required) — Select the MRA cluster from the pulldown list.
   b) **Name** (required) — Enter a name for the MRA cluster.
      The name can be up to 32 characters long. The name can contain any alphanumeric characters except quotation marks (") and commas (,).
   c) **Description/Location** (optional) — Free-form text.
      Enter up to 250 characters.

d) **Secure Connection** — Select to enable a secure HTTP (HTTPs) connection instead of a normal connection (HTTP).

The default is a non-secure (HTTP) connection.

e) **Stateless Routing** — Select to enable stateless routing. In stateless routing, the MRA cluster only routes traffic; it does not process traffic.

The default is stateful routing.

5. When you finish, click **Save** (or **Cancel** to discard your changes).
The MRA cluster profile is displayed in the **MRA Administration** page.

The MRA cluster profile is defined. If you are setting up multiple MRA clusters, you must define multiple cluster profiles. Repeat the above steps to define additional profiles.

Modifying an MRA Cluster Profile

To modify MRA cluster profile settings:

1. From the **MRA** section of the navigation pane, select **Configuration**.
The content tree displays a list of MRA groups; the initial group is **ALL**.
2. From the content tree, select the MRA cluster profile.
The **MRA Administration** page opens in the work area.
3. On the **System** tab of the **MRA Administration** page, click **Modify**.
The **Modify System Settings** page opens.
4. Modify MRA system settings as required.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The MRA cluster profile settings are modified.

Configuring Protocol Options on an MRA Device

To configure protocol options on an MRA device:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the MRA device.
The **Policy Server Administration** page opens.
3. On the Policy Server Administration page, select the **Policy Server** tab.
The current configuration options are displayed.
4. Click **Modify** and define options as necessary.

Table 7: MRA Protocol Configuration Options defines available options that pertain specifically to MRA devices. (The options may vary depending on the configuration mode of the system.)

5. When you finish, click **Save** (or **Cancel** to discard your changes).

Table 7: MRA Protocol Configuration Options

Attribute	Description
Subscriber Indexing	**Note:** The indexing parameters to use depend on how Sh is used. If you are unsure which indexing method(s) to configure, contact customer support.
Index by Username	Select if the associated subscriber profile repository is indexed by account ID.
Index by NAI	Select if the associated subscriber profile repository is indexed by network access ID.
Index by E.164 (MSISDN)	Select if the associated subscriber profile repository is indexed by E.164 phone number.
Index by IMSI	Select if the associated subscriber profile repository is indexed by IMSI number).
Index by IP Address	Select if the associated subscriber profile repository is indexed by IP address. You can select **Index by IPv4**, **Index by IPv6**, or both formats.
Overrides by APN	Select to perform subscriber indexing for a specific IP address and a specific APN name. In the **Overrides by APN** section, click **Add**. Enter the APN name and click **Save** to enable **Index by IPv4**, **Index by IPv6**, or both. You can create new APN overrides by cloning or editing existing APN overrides. You can also delete an APN override.

Working with MRA Groups

MRA groups let you organize MRA cluster profiles into groups. You can create, rename, and delete MRA groups, and add and remove MRA cluster profiles from groups.

Creating an MRA Group

To create an MRA group:

1. From the **MRA** section of the navigation pane, select **Configuration**.
   The content tree displays a list of MRA groups; the initial group is **ALL**.
2. From the content tree, select the **ALL** group.
   The **MRA Administration** page opens in the work area.
3. On the **MRA Administration** page, click **Create Group**.
   The Create Group page opens.
4. Enter the name of the new CMP group.

   The name can be up to 250 characters long and must not contain quotation marks (") or commas (,).

5. When you finish, click **Save** (or **Cancel** to abandon your request).
   The new group appears in the content tree.

The MRA group is created.

Adding an MRA Cluster Profile to an MRA Group

Once an MRA group is created, you can add MRA cluster profiles to it. To add an MRA cluster profile to an MRA group:

1. From the **MRA** section of the navigation pane, select **Configuration**.
   The content tree displays a list of MRA groups; the initial group is **ALL**.
2. From the content tree, select the an MRA group.
   The **MRA Administration** page opens in the work area, displaying the contents of the selected MRA group.
3. On the **MRA Administration** page, click **Add Multi-protocol Routing Agent**.
   The **Add Multi-protocol Routing Agent** page opens.
4. Select the MRA cluster profile you want to add; use the Ctrl or Shift keys to select multiple MRA cluster profiles.
5. When you finish, click **Save** (or **Cancel** to abandon the request).

The MRA cluster profile is added to the MRA group.

Deleting an MRA Cluster Profile from an MRA Group

Removing an MRA cluster profile from an MRA group does not delete the MRA cluster profile from the ALL group, so it can be used again if needed. Removing an MRA cluster profile from the ALL group removes it from all other groups.

To delete an MRA cluster profile from an MRA group (other than ALL):

1. From the **MRA** section of the navigation pane, select **Configuration**.
   The content tree displays a list of MRA groups; the initial group is **ALL**.
2. From the content tree, select the an MRA group.
   The **MRA Administration** page opens in the work area, displaying the contents of the selected MRA group.
3. Remove the MRAcluster profile using one of the following methods:
   - On the **MRA Administration** page, click the **Delete** icon, located to the right of the MRA cluster profile you want to remove.
   - From the content tree, select the MRA cluster profile; the **MRA Administration** page opens. On the **System** tab, click **Remove**.

   The MRA cluster profile is removed from the group.

Deleting an MRA Group

Deleting an MRA group also deletes any associated sub-groups. However, any MRA cluster profiles associated with the deleted groups or sub-groups remain in the ALL group. You cannot delete the ALL group.

To delete an MRA group or sub-group:

1. From the **MRA** section of the navigation pane, select **Configuration**.
   The content tree displays a list of MRA groups; the initial group is**ALL**.
2. Select the MRA group or subgroup from the content tree.
   The contents of the selected MRA group are displayed.
3. Click **Delete**.
   You are prompted: "Are you sure you want to delete this Group?"
4. Click **OK** to delete the selected group (or **Cancel** to abandon the request).

The MRA group is deleted.

Enabling Stateless Routing

To enable stateless routing, from within the MRA creation page or within the **System** tab for the MRA, select **Stateless Routing** (*Figure 17: Enabling Stateless Routing* shows an example).

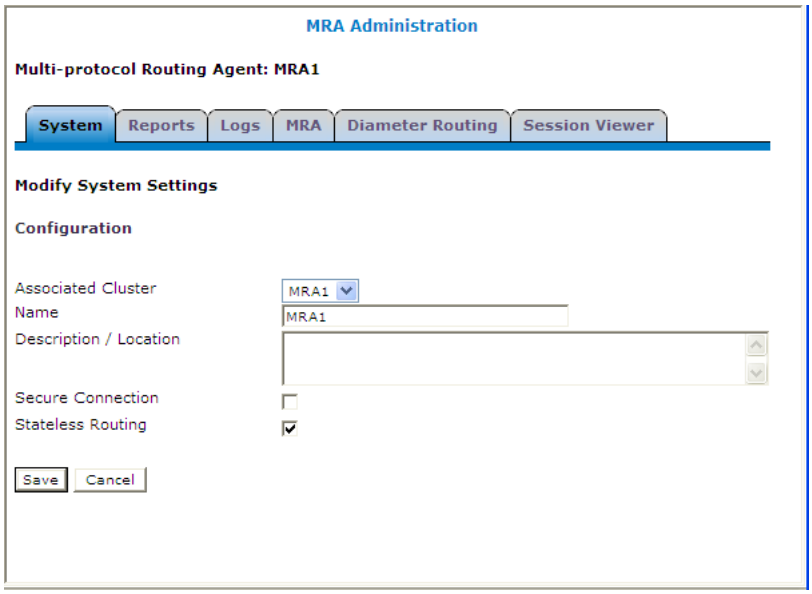


Figure 17: Enabling Stateless Routing

Reapplying the Configuration to Policy Management Devices

You can reapply the configuration to an individual MPE or MRA device (server), or to all MPE or MRA devices in a group. When you reapply the configuration, the CMP system completely reconfigures the server with topology information, ensuring that the configuration matches the data in the CMP system. This action is not needed during normal operation but is useful in the following situations:

- When the servers of a cluster are replaced, the new servers come up initially with default values. Reapplying the configuration lets you redeploy the entire configuration rather than reconfiguring the server field by field. You should also apply the Rediscover Cluster operation to the CMP system to re-initialize the Cluster Information Report for the device, thereby clearing out status of the failed servers.

- After upgrading the software on a server, it is recommended that you reapply the configuration from the CMP system to ensure that the upgraded server and the CMP system are synchronized.
- The server configuration may go out of synchronization with the CMP system (for example, when a break in the network causes communication to fail between the CMP system and the server). If such a condition occurs, the CMP system displays the server status on its **System** tab with the notation "Config Mismatch." You can click the notice to display a report comparing the server configuration with the CMP database information. Reapplying the configuration brings the server back into synchronization with the CMP database.

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. To reapply the configuration for an individual MPE or MRA device:
   a) From the content tree, select the **ALL** group.
      The **Policy Server Administration** page opens in the work area.
   b) From the **ALL** group, select the server.
      The **Policy Server Administration** page opens to the **System** tab, displaying information for that server.
   c) Click **Reapply Configuration**.
      An in-progress message appears. When the operation is complete you are prompted, "The configuration was applied successfully."

The individual server or all of the servers in a group are synchronized with the CMP system.

Resetting Counters

The **Reset Counters** option is included in the **Operations** menu when the **Stats Reset Configuration** option is set to **Interval**. The **Reset All Counters** option is included in the **Operations** menu when the **Stats Reset Configuration option** is set to **Manual**. See *Setting Stats Settings* for more information.

To reset the counters associated with a group of MPE or MRA servers:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the group that contains the servers of interest.
   The Policy Server Administration page opens in the work area.
3. From the **Operations** menu, select **Reset Counters** or **Reset All Counters**.
   A confirmation dialog appears, stating the number of servers that will be affected and allowing you to specify the amount of time between applying the operation to each server in the group.

The counters are reset.

Chapter 21

Managing Subscriber Profile Repositories

Topics:

Managing Subscriber Profile Repositories describes how to define and manage optional Subscriber Profile Repositories (SPRs) using the CMP system.

An SPR is a system for storing and managing subscriber-specific policy control data as defined in the 3GPP standard.

Note: For information on operating SPR devices, refer to the Tekelec *Subscriber Data Management* documentation.

About Subscriber Profile Repositories

A subscriber profile repository (SPR) is a system for storing and managing subscriber-specific policy control data as defined under the 3GPP standard.

An SPR can be deployed in environments where the Multimedia Policy Engine (MPE) device needs access to a separate repository for subscriber data. The SPR acts as a centralized repository for this data so that multiple MPE devices can access and share the data. This data may include profile data (pre-provisioned information that describes the capabilities of each subscriber), quota data (information that represents the subscriber's use of managed resources), or other subscriber-specific data.

The Tekelec SPR includes interfaces for provisioning subscriber information, as well as managing, changing, and accessing this information. These interfaces include an application programming interface (API) for XML provisioning of subscriber profile data, as well as an interactive user interface through the CMP system using a Tekelec proprietary RESTful API interface.

The Tekelec SPR is built upon an existing software base and technology. It not only manages static provisioned subscriber data, but also dynamic intra- and inter-session data from MPE devices—for example, when it is critical to store inter-session quota data centrally so that it can be retrieved upon the next subscriber attachment, wherever that attachment occurs within the network. Intra-session data such as mappings from IP addresses to MSISDNs becomes important as well, especially when managing enforcement points such as DPI devices and optimization gateways where MSISDN/IMSI data is not available. With this the SPR provides both a storage and notification platform for policy operations, as well as a platform for operator provisioning.

For detailed information on the SPR, see the Tekelec Subscriber Data Management (SDM) documentation.

Configuring the CMP System to Manage SPR Subscriber Data

The CMP system can manage SPR subscriber data. Before this can occur, the CMP operating mode must support managing SPR clusters.

Note: The procedures that follow assume that you have installed the SPR software on a device. If you have not, do so now.

To reconfigure the CMP operating mode, complete the following:

Caution: CMP operating modes should only be set in consultation with Tekelec Technical Support. Setting modes inappropriately can result in the loss of network element connectivity, policy function, OM statistical data, and cluster redundancy.

1. From the **Help** section of the navigation pane, select **About**.
   The About page opens, displaying the CMP software version number.
2. Click the **Mode** button.
   Consult with Tekelec Technical Support for information on this button.
   The Mode Settings page opens.

3. In the Mode section, select the mode **Diameter 3GPP**, **Diameter 3GPP2**, or **PCC Extensions**, as appropriate.
4. At the bottom of the page, select **Manage SPR Subscriber Data**.
5. Click **OK**.
   The browser page closes and you are automatically logged out.
6. Refresh the browser page.
   The Welcome admin page is displayed.

You are now ready to define an SPR cluster profile and manage SPR subscriber data.

Configuring the SPR Connection

You must define the operation mode and connection details for the SPR before you can look up subscriber information from the CMP system.

To configure the CMP connection to an SPR database:

1. From the **SPR** section of the navigation pane, select **Configuration**.
   The SPR Connection Configuration page opens in the work area, displaying connection information.
2. On the SPR Connection Configuration page, click **Modify**.
   The Configuration page opens.
3. Enter information as appropriate for the SPR system:
   a) **SPR Operation Mode** (required) — Select from the pulldown list:
      - **SDM RESTful API** (the default)
   b) **Remote Port** (SDM RESTful API mode) — Enter the port (a number from 1 to 65535) to listen on for SPR traffic.
      The default is 8787.
   c) **Secure Connection** (SDM RESTful API mode) — Select to establish a secure connection.
4. When you finish, click **Save** (or **Cancel** to discard your changes).

The SPR connection is configured.

Modifying the SPR Connection

To modify the SPR connection:

1. From the **SPR** section of the navigation pane, select **Configuration**.
   The SPR Connection Configuration page opens in the work area, displaying connection information.
2. On the SPR Connection Configuration page, click **Modify**.
   The Configuration page opens.
3. Modify the configuration information as necessary. See *Configuring the SPR Connection* for information on the fields on this page.
4. When you finish, click **Save** (or **Cancel** to discard your changes).

The SPR connection configuration is modified.

Finding a Subscriber Profile

Once you have defined SPR devices, you can search them for a subscriber profile.

To find a subscriber profile:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The Subscriber Profile Administration page opens.
2. Select the **Data Source Primary Diameter Identity**.
   This is the list of defined SPR devices. You can select any SPR device configured for the Policy Management network. Devices are identified by both their primary identity and MPE device name.
3. Select the **Key Type**:
   - **E.164 (MSISDN)** (the default) — search by Mobile Station International Subscriber Directory Number. This is a number of up to 15 digits.
   - **IMSI** — search by International Mobile Subscriber Identity. This is a number of up to 15 digits.
   - **NAI** — search by Network Access Identifier.
   - **Pool ID** — search by quota pool identifier.
4. **Key String** — enter a search string in the format appropriate for the selected key type.
   The string must match exactly; partial or wildcard searching is not supported.
5. Click **Search**.
   The Subscriber Profile page opens, displaying information about the subscriber.

   Note: If no matching subscriber profile is found, the page displays the message "No matching user is found."
6. When you finish, click **Back to Search Page**.
   The Subscriber Profile Administration page opens.

Creating a Subscriber Profile

If an SPR database is configured to use the RESTful API interface, you can manually create a subscriber profile.

To create a subscriber profile:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The Subscriber Profile Administration page opens.
2. Click **Create Subscriber Profile**.
   The New Subscriber Profile page opens in the work area.
3. Enter the following information:
   a) Select the **Data Source Primary Diameter Identity**.
      You can select any SPR device configured for the Policy Management network.
   b) In the **Key Fields** section, enter one format:

- **NAI** — Network Access Identifier. You must enter a valid user name, optionally followed by a valid realm name. A valid user name consists of the characters &*+0-9?a-z_A-Z{}!#$%'^/=`|~-, optionally separated by a period (.). A valid realm name consists of the characters 0-9a-zA-Z- separated by one or more period (.), but the minus sign (-) cannot be first, last, or adjacent to a period.
- **E.164 (MSISDN)** — Mobile Station International Subscriber Directory Number. Enter up to 15 Unicode digits, optionally preceded by a plus sign (+).
- **IMSI** — International Mobile Subscriber Identity. Enter up to 15 Unicode digits.

c) Optionally, in the **Subscriber Information** section, enter the following:

- **Account ID** — Free-form string that can identify the account for the subscriber. You can enter up to 255 characters.
- **Billing Day** — The day of the month on which the subscriber's associated quota is reset. Enter a number between 0 and 31. If you enter 0 or leave this field blank, then the default global value configured for this MPE device is used instead.
- **Tier** — The subscriber's tier. Enter a tier name defined in the CMP database; or, if you click **Manage**, a window opens from which you can select a tier name. In order to add a tier, you must enter the tier name prior to clicking **Manage**. See *Managing Subscribers* for information on tiers.
- **Entitlements** — The subscriber's entitlement(s). Enter the entitlement name(s); or, if you click **Manage**, a window opens from which you can enter or select entitlement names defined in the CMP database.

  Note: Entitlements are defined external to the CMP system.

- **Custom** — Free-form strings representing custom subscriber fields. You can enter up to 255 characters per field. By default, five fields are available, but if the subscriber profile has more than five custom fields defined, the page displays them. Click **Add** to create additional fields as needed.

4. When you finish, click **Save** (or **Cancel** to discard your changes).

The subscriber profile is defined.

Modifying a Subscriber Profile

To modify a subscriber profile:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The Subscriber Profile Administration page opens.
2. Find the subscriber profile you want to modify.
   Profile information is displayed. (See *Finding a Subscriber Profile* for information on finding a subscriber profile.)
3. Click **Modify**.
   The Subscriber Profile Administration page opens.
4. Modify subscriber profile information as required.
   For a description of the fields contained on this page, see *Creating a Subscriber Profile*.
5. When you finish, click **Save** (or **Cancel** to discard your changes).
   The page displays the message “Subscriber profile updated successfully.”

The subscriber profile is modified.

Deleting a Subscriber Profile

Using the RESTful API operation mode, you can delete a subscriber profile. See *Configuring the SPR Connection* for information on setting the operation mode.

To delete a subscriber profile:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The Subscriber Profile Administration page opens.
2. Find the subscriber profile you want to delete.
   Profile information is displayed. (See *Finding a Subscriber Profile* for information on finding a subscriber profile.)
3. Click **Delete**.
   You are prompted, "Are you sure you want to delete this subscriber profile?"
4. Click **OK** to delete the subscriber profile (or **Cancel** to abandon the request).
   The page displays the message "Subscriber profile successfully deleted."

The subscriber profile is deleted.

Viewing Subscriber Entity States

Subscriber entity states are a set of name-value pairs associated with a subscriber.

To view the entity states associated with a subscriber:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The **Subscriber Profile Administration** page opens.
2. Find the subscriber profile you want to view.
   Profile information is displayed. (See *Finding a Subscriber Profile* for information on finding a subscriber profile.)
3. Click the **State** tab.
   Entity state information is displayed.
4. When you finish, click **Back to Search Page**.

You have viewed the subscriber entity states.

Creating a Subscriber Entity State Property

To create a subscriber entity state property:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The **Subscriber Profile Administration** page opens.
2. Find the subscriber profile you want to modify.

Profile information is displayed. (See *Finding a Subscriber Profile* for information on finding a subscriber profile.)

3. Select the **State** tab.
   Entity state information is displayed.
4. Click **Create**.
   The **Create Property** page opens.
5. Enter the following information:
   a) **Name** — The name assigned to the property.
      The name cannot be blank and must be unique within this list of properties.
   b) **Value** — The property value.
      The value cannot be blank.
6. Click **Save** (or **Cancel** to discard your changes).
   The profile information page opens, and displays the message "Properties created successfully."
7. To create additional properties, repeat steps 4 through 6.
   If you exceed 100 states, you are prompted whether you wish to add more; click **Yes** to continue, or **No** to stop.
8. When you finish, click **Back to Search Page**.
   The page displays the message "Properties created successfully."

The subscriber entity state property is defined.

Modifying a Subscriber Entity State Property

You can modify the value (but not the name) of a subscriber profile entity state property. To modify a subscriber entity state property:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The **Subscriber Profile Administration** page opens.
2. Find the subscriber profile you want to modify.
   Profile information is displayed. (See *Finding a Subscriber Profile* for information on finding a subscriber profile.)
3. Select the **State** tab.
   Entity state information is displayed.
4. In the list of entity state properties, click the property you want to modify.
   The **Modify Property** page opens.
5. Modify the property value as required.
   The value cannot be blank.
6. When you finish, click **Save** (or **Cancel** to abandon your changes).
   The page displays the message "Properties updated successfully."

The subscriber entity state property value is modified.

Deleting a Subscriber Entity State Property

To delete a subscriber entity state property:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The **Subscriber Profile Administration** page opens.
2. Find the subscriber profile you want to modify.
   Profile information is displayed. (See *Finding a Subscriber Profile* for information on finding a subscriber profile.)
3. Select the **State** tab.
   Entity state information is displayed.
4. In the list of entity state properties, use the check boxes to select the property or properties you want to delete.
   To select all properties, click **All**. To deselect all properties, click **None**.
5. Click **Delete**.
   You are prompted, "Delete selected properties?"
6. Click **OK** (or **Cancel** to abandon your request).
   The property or properties are removed from the list, and the page displays the message "Properties deleted successfully."

The subscriber entity state properties are deleted.

Viewing Subscriber Quota Information

To view the quotas associated with a subscriber:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The Subscriber Profile Administration page opens.
2. Find the subscriber profile you want to view.
   Profile information is displayed. (See *Finding a Subscriber Profile* for information on finding a subscriber profile.)
3. Select the **Quota** tab.
   The Subscriber Profile Quota Usage page is displayed. The table provides the following information:

   - **Name** — Quota name defined in the CMP system.
   - **Time Usage** — Usage counter, in seconds, to track time-based resource consumption.
   - **Time Limit** — Time limit, in seconds, defined in the named quota.
   - **Total Volume Usage** — Usage counter, in bytes, to track volume-based resource consumption.
   - **Total Volume Limit** — Volume limit, in bytes, defined in the named quota.
   - **Upstream Volume Usage** — Usage counter, in bytes, to track upstream bandwidth volume-based resource consumption. Also known as Input Volume.
   - **Upstream Volume Limit** — Upstream volume limit, in bytes, defined in the named quota.
   - **Downstream Volume Usage** — Usage counter, in bytes, to track downstream bandwidth volume-based resource consumption. Also known as Output Volume.
   - **Downstream Volume Limit** — Downstream volume limit, in bytes, defined in the named quota.

- **Service Specific Event** — Usage counter to track service-specific resource consumption.
- **Service Specific Event Limit** — Resource consumption limit defined in the named quota.
- **Next Reset Time** — The time after which the usage counters need to be reset.
- **CID** — A unique identifier, assigned by the CMP system. Top-ups and rollovers have the CID of their associated plan.
- **Type** — Defines whether the data is for a quota (plan), pass, rollover, top-up, or default rollover.
- **Quota State** — An internal identifier, which defines whether the option selected in the **Type** field is active or expired.
- **RefInstanceId** — The CID of the plan.

4. When you finish, click **Back to Search Page**.

You have viewed the subscriber quota information.

Adding a Subscriber Quota Category

To add a subscriber quota category:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The **Subscriber Profile Administration** page opens.
2. Find the subscriber profile you want to view.
   Profile information is displayed. (See *Finding a Subscriber Profile* for information on finding a subscriber profile.)
3. Select the **Quota** tab.
   The Quota Usage information appears in the work area.
4. Click **Create**.
   The **Quota Usage** page opens. If you exceed 10 quotas, you are prompted whether you wish to add more; click **Yes** to continue, or **No** to stop.
5. Enter the following information:
   a) **CID** — A unique identifier assigned by the CMP system. Rollovers and top-ups have the CID of their associated plan.

      Note: This information is assigned by the system and should not be changed by the user.

   b) **Name** (required) — Select the name of a quota. You cannot add the same quota twice for a subscriber. See *Managing Quotas* for information on creating quotas.
   c) **Type** — Select the type of quota defined in the CMP system. You can select **quota** (plan), **pass**, **rollover**, **top-up**, or **default rollover**.
   d) **Time (seconds)** — Enter a value, in seconds, to track time consumption.
   The valid range is -2^{63} to $2^{63} - 1$ (a 64-bit value).
   e) **Total Volume (bytes)** — Enter a value, in bytes, to track bandwidth volume consumption.
   The valid range is -2^{63} to $2^{63} - 1$ (a 64-bit value).
   f) **Upstream Volume (bytes)** — Enter a value, in bytes, to track upstream bandwidth volume consumption.
   The valid range is -2^{63} to $2^{63} - 1$ (a 64-bit value).
   g) **Downstream Volume (bytes)** — Enter a value, in bytes, to track downstream bandwidth volume consumption.
   The valid range is -2^{63} to $2^{63} - 1$ (a 64-bit value).

h) **Service Specific Event** — Enter a value representing service-specific resource consumption. The valid range is -2^{63} to $2^{63} - 1$ (a 64-bit value).

i) **Next Reset Time** (required) — Enter a date and time after which the quotas need to be reset, in the format *yyyy-mm-dd*T*hh*:*mm*:*ss*[*Z*] (for example, **`2011-11-01T00:00:01-5:00`**).

Alternatively, click  (calendar) and select a date, enter a time, and optionally select a UTC offset (time zone). When you finish, click **OK** (or **Cancel** to discard the date/time).

j) **Quota State** — This field is an internal identifier and should not be defined by the user.

k) **RefInstanceID** — The CID of the associated plan. This field only applies to a top-up.

Note: This field is an internal identifier and should not be changed by the user.

6. When you finish, click **Save** (or **Cancel** to discard your changes).
The page displays the message "Quota created successfully."

The subscriber quota is defined.

Modifying a Subscriber Quota Category

To modify a subscriber quota category:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
The **Subscriber Profile Administration** page opens.
2. Find the subscriber profile you want to view.
Profile information is displayed. (See *Finding a Subscriber Profile* for information on finding a subscriber profile.)
3. Select the **Quota** tab.
The **Subscriber Profile Quota Usage** page is displayed.
4. Click the name of the quota you want to modify.
The **Quota Usage** page opens, displaying information about the quota.
5. Modify subscriber quota information as required.
For a description of the fields contained on this page, see *Adding a Subscriber Quota Category*.
6. When you finish, click **Save** (or **Cancel** to discard your changes).
The page displays the message "Quota updated successfully."

The subscriber quota category is modified.

Deleting a Subscriber Quota Category

To delete a subscriber quota category:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
The **Subscriber Profile Administration** page opens.
2. Find the subscriber profile you want to modify.
Profile information is displayed. (See *Finding a Subscriber Profile* for information on finding a subscriber profile.)
3. Select the **Quota** tab.

Entity quota information is displayed.

4. In the list of quotas, use the check boxes to select the quota or quotas you want to delete.
   To select all quotas, click **All**. To deselect all quotas, click **None**.
5. Click **Delete**.
   You are prompted, "Delete selected properties?"
6. Click **OK** (or **Cancel** to abandon your request).
   The quota or quotas are removed from the list, and the page displays the message "Quota deleted successfully."

The subscriber quota categories are deleted.

Adding a Member to a Pooled Quota Group

You can add a member and associate a subscriber when creating a pooled quota group.

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The Subscriber Profile Administration page opens.
2. Select **Create Pooled Quota Group**.
   The New Pooled Quota Group Profile page opens.
3. In the **Data Source Primary Diameter Identity** section of the page, select one of the configured V3 data sources.
4. In the **Key Fields** section of the page, enter the **Pool ID**.

   The pool ID is an alphanumeric string of up to 255 characters that can contain hyphens (-) and underscores (_) but no spaces. `0` is invalid.
5. (Optional) In the **Subscriber Information** section of the page, enter the following:
   a) **Account ID** — The account identification given to the specific quota.
   b) **Billing Day** — The billing day of the subscriber pool. This field is used only for monthly.
   c) **Tier** — Enter the name of a tier defined in the CMP database; or click **Manage** to select a tier.
   d) **Entitlements** — Click **Manage** and select one or more entitlement names defined in the CMP database.
   e) **Custom 1, Custom 2, Custom 3, Custom 4, Custom 5** — Enter name value fields. You can refer to them in policies.
   f) **Custom N** — If you click **Add**, you can add additional custom fields.
6. **Membership Information** (optional): To add a member or associate a subscriber to the quota, select the **Key Type** and add a **Key String**.

   Note: When associating a subscriber, the subscriber key string must be entered.

   a) **Key Type** — The type of Pool ID. Click **Add** to add a Pool ID search value. You can select one of the following:
      - **E.164 (MSISDN)**
      - **IMSI**
      - **NAI**

   b) **Key String** — Enter the key string or click **Add** to add a Pool ID search value.
7. When you finish, click **Save** (or **Cancel** to discard your changes).

The member is added to the pooled quota group.

Querying by Pool ID

You can query a new quota by specifying the Pool ID Key Type and Key String value.

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The **Subscriber Profile Administration** page opens.
2. Select **Pool ID** in the **Key Type** pulldown and enter a **Key String**. Click **Search**.
   The **Pool Group Quota Profile** page opens with the search results. The following tabs are displayed:
   - **Pool Profile**
   - **Pool Quota**
   - **Pool State**
3. You can select the **Modify**, **Delete**, or **Back to Search Page** options.

Creating a Pool Quota Profile

A pool quota profile can be created for the purpose of tracking and displaying usage threshold events.

To create a pool quota profile:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The Subscriber Profile Administration page opens.
2. Select a **Data Source Primary Diameter Identity**, and the **Key Type** of **Pool ID.**
3. Enter a **Key String**, and click **Search**.
   The Pool Profile page opens.
4. Click **Pool Quota Profile**.
   The Quota Usage section displays.
5. Click **Create**.
6. Enter the following:
   - **Name** — Select the name of the pool state.
   - **Type** — Select the quota being assigned to the pool. You can select **quota** (plan), **pass**, **top-up**, **roll-over**, or **roll-over-def**.

     If you select **roll-over-def**, rollover units are consumed before top-up units unless the highest priority top-up expires in the next 24 hours.
   - **Time** (seconds) — The amount of time attributed to the quota in seconds.
   - **Total Volume** (bytes) — The amount of volume attributed to a length of time.
   - **Upstream Volume** (bytes) — Traffic from the handset (or other device) to the network.
   - **Downstream Volume** (bytes) — Traffic directed to the handset or other device.
   - **Service Specific Event** — Tracks text information.
   - **Next Reset Time** — The reset date and time of the subscriber or pool quota usage.

Note: This is typically the billing day, although for a daily quota the usage is normally reset at midnight or shortly thereafter.

7. When you finish, click **Save** (or **Cancel** to discard your changes).

The pool quota profile is created.

Modifying a Pool Quota Profile

A pool quota profile can be modified if you want to make changes to the subscriber information or membership information.

To modify a pool quota profile:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The **Subscriber Profile Administration** page opens.
2. Select a **Data Source Primary Diameter Identity**, and the **Key Type** of **Pool ID.**
3. Enter a **Key String**, and click **Search**.
   The **Pool Profile** page opens with **Pool Profile** as the default.
4. Click **Pool Quota Profile**.
   The **Pool Quota Profile** view displays.
5. Select the profile that you want to modify.
6. Modify any of the fields.

   Note: The **Name** field cannot be changed.

7. When you finish, click **Save** (or **Cancel** to discard your changes).

The pool quota profile is modified.

Deleting a Pool Quota Profile

A pool quota profile can be deleted.

To delete a pool quota profile:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The Subscriber Profile Administration page opens.
2. Select a **Data Source Primary Diameter Identity**, and the **Key Type** of **Pool ID.**
   The Data Source Primary Diameter Identity and Key Type are selected.
3. Enter a **Key String** and click **Search**.
   The Pool Profile page opens.
4. Click **Pool Quota Profile**.
   The Quota Usage section displays.
5. Select the name of the properties you want to delete, then click **Delete**.
   You are prompted, "Delete selected properties?"
6. Click **OK**.

The selected properties are deleted.

Modifying a Pool Profile

A pool profile can be modified if you want to make changes to the subscriber information or membership information.

To modify a pool profile:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The Subscriber Profile Administration page opens.
2. Select a **Data Source Primary Diameter Identity**, and the **Key Type** of **Pool ID.**
   The Data Source Primary Diameter Identity and Key Type are selected.
3. Enter a **Key String**, and click **Search**.
   The Pool Profile page opens with Pool Profile as the default.
4. Click **Modify**.
   The Subscriber Profile Configuration page opens.
5. Modify any of the field information.
6. When you finish, click **Save** (or **Cancel** to discard your changes).

The pool profile is modified.

Deleting a Pool Profile

A pool profile can be deleted.

To delete a pool profile:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The Subscriber Profile Administration page opens.
2. Select a **Data Source Primary Diameter Identity**, and the **Key Type** of **Pool ID.**
   The Data Source Primary Diameter Identity and Key Type are selected.
3. Enter a **Key String**, and click **Search**.
   The Pool Profile page opens with Pool Profile as the default.
4. Click **Delete**.
   You are prompted, "Are you sure you want to delete this pool profile?"
5. Click **OK**.

The pool profile is deleted.

Creating a Pool State

A pool state can be created when the data source ShProfile V3 is selected.

To create a pool state:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The Subscriber Profile Administration page opens.
2. Select a **Data Source Primary Diameter Identity**, and the **Key Type** of **Pool ID**.
   The Data Source Primary Diameter Identity and Key Type are selected.
3. Enter a **Key String**, and click **Search**.
   The Pool Profile page opens.
4. Click **Pool State**.
5. Click **Create**.
   The Create Property section is displayed.
6. Enter the following:
   - **Name** — The name of the pool state.
   - **Value** — The value can be any string; for example, **`Profile V1`**, **`V2`**, **`V3`**.
7. When you finish, click **Save** (or **Cancel** to discard your changes).
   The Pool Entity State Properties section is displayed, with the Pool Quota Group Key Fields and the searched Pool ID.

The pool state is created.

Modifying a Pool State

A pool profile can be modified if you want to make changes to the subscriber information or membership information.

To modify a pool profile:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The Subscriber Profile Administration page opens.
2. Select a **Data Source Primary Diameter Identity**, and the **Key Type** of **Pool ID**.
   The Data Source Primary Diameter Identity and Key Type are selected.
3. Enter a **Key String**, and click **Search**.
   The Pool Profile page opens with Pool Profile as the default.
4. Click **Pool State**.
   The Pool Entity State Properties section displays.
5. Select the **Name** of the pool state that you want to modify.
   The Modify Property section displays.
6. The **Name** and **Value** fields are displayed. You can only modify the **Value** field.
7. Modify the **Value**.
8. When you finish, click **Save** (or **Cancel** to discard your changes).

The pool state content is modified.

Deleting a Pool State

A pool state can be deleted.

To delete a pool state:

1. From the **SPR** section of the navigation pane, select **Profile Data**.
   The Subscriber Profile Administration page opens.
2. Select a **Data Source Primary Diameter Identity**, and the **Key Type** of **Pool ID**.
   The Data Source Primary Diameter Identity and Key Type are selected.
3. Enter a **Key String**, and click **Search**.
   The Pool Profile page opens.
4. Click **Pool State**.
   The Pool Entity State Properties section is displayed.
5. Select one or more properties to delete, then click **Delete**.

The properties are deleted.

Chapter 22

Understanding and Creating Policy Rules

Topics:

Policy rules dynamically control how the Multimedia Policy Engine (MPE) processes protocol messages as they pass through it. Using these rules, you can define how and when network resources are utilized by subscribers. For example, when the MPE device receives a request to establish a session with a certain Quality of Service (QoS) level, you can use a policy rule to approve the request as is, to reject the request, or to make changes in the request before it is forwarded to the intended destination network element.

Structure and Evaluation of Policy Rules

The following topics provide an overview of how policy rules are structured and evaluated.

Note: The conditions, actions, and parameters available for your use in creating policy rules depend on the mode in which the CMP system is operating.

Structure of Policy Rules

Understanding how a policy rule is structured is helpful in understanding other Policy Management concepts. A policy rule is defined in an if-then structure, consisting of a set of conditions that the MPE device compares to protocol messages, and a set of actions that are executed (or not executed) when the conditions match. Many conditions can be tested for existence or non-existence (by optionally selecting the logical operator **NOT** or using, where available, the policy condition operator **is** or **is not**).

Policy Parameters

When you define a policy rule, you select from a list of available conditions and actions. Most of the conditions and actions have parameters (that is, they contain placeholders that may be replaced with specific values to allow you to customize them as needed).

For example, consider the following policy rule, which has one condition and two actions:

```
where the device will be handling greater than 100 upstream reserved flows

apply profile Default Downstream Profile to request
continue processing message
```

The condition, **where the device will be handling**..., allows the following parameters to be specified:

- An operator (greater than)
- A value (100)
- The flow direction (upstream)
- The bandwidth reservation type (reserved)

The first action, **apply profile**..., specifies a single parameter that is the name of a traffic profile to be applied to the request. The second action, **continue processing message**, instructs the MPE device to evaluate the remaining rules within the policy rules list (as opposed to immediately accepting or rejecting the request). The conditions and actions that are available for writing policies are discussed later in this section.

Policy Logical Operators

The policy wizard supports creation of rules using an explicit **AND** logical operator that contains a set of conditions. An AND operator must include at least two conditions. The actions are taken if all

conditions are evaluated as true. For example, you can use an AND operator two define two conditions as follows:

```
And
     where the request is re-authorizing an existing session
     where the enforcement session is a DPI enforcement session
.
.
.
```

The policy wizard supports creation of rules using an **OR** logical operator that contains a set of conditions. An OR operator must include at least two conditions. The actions are taken if any condition is evaluated as true. For example, you can define the following set of conditions using an OR operator:

```
Or
     where the request is creating a new session
     where the session is an enforcement session
     where the APN matches one of imode.g1t2
     where the subscriber profile data is not available
.
.
.
```

The policy wizard supports creation of rules using a **NOT** logical operator that contains a single condition. The actions are taken if the condition is evaluated as false. For example, you can define the following using a NOT operator:

```
Not
     where today is a weekend day using CONFIGURED_LOCAL_TIME
.
.
.
```

Note: Many conditions also include optional **is** and **is not** parameters. These parameters are functionally equivalent to (that is, synonymous with) using the **NOT** operator, and you are free to use or mix **NOT** with **is** and **is not** as you prefer.

Finally, the policy wizard supports creation of rules using combinations of logical operators. You can nest operators. For example, you can define the following rule:

```
Or
     And
          Not
               where the service info status is one of FINAL_SERVICE_INFORMATION

          where the session is an enforcement session
     where the session is an application session
     Not
          where the session is an application session

evaluate policy 5555
reject message
```

The policy wizard validates condition trees.

Parent and Reference Policies

As a result of evaluating conditions, a policy can execute another policy. A policy that calls another policy is called a parent policy, and a policy executed by another policy is called a reference policy. A policy can be both a parent policy and a reference policy. Additionally, you can group policies, and a parent policy can execute all the policies in the group.

Note: Do not nest policies more than five levels deep.

Evaluating Policy Rules

To write policy rules, it is important to understand how they are evaluated by the Policy Rules Engine contained within the MPE device, and how the engine fits into the protocol message processing within the MPE device.

If you look at the policy conditions that are available, you will see that many are not protocol specific. Although you can write protocol-specific policy rules, the Policy Rules Engine itself does not have any protocol knowledge. Instead, it deals with a set of abstractions that are mapped to the underlying protocol messages that are being processed. This allows the same policy rules to be used across multiple protocols.

When the MPE device receives a protocol message, it performs the initial processing of that message and then determines whether or not the message should be processed by the Policy Rules Engine. Generally, protocol messages that are either requesting bandwidth or modifying previous requests for bandwidth are processed by the Policy Rules Engine. Most other protocol messages are not. For example, a protocol message that releases bandwidth is typically not processed by the Policy Rules Engine because there is no reason to prevent or modify that action.

Once a message is identified as a candidate for the policy rules, the MPE device attempts to associate as much information with the request as possible. For example:

- Which network elements will be impacted if the request is allowed to proceed?
- Which subscriber is associated with the request? What services is that subscriber entitled to?
- Which application is associated with the message?
- What time zone is the user equipment located in?

The reason for collecting this information is to make it available to the policy rules. The information that can be associated varies and depends on a number of factors, including:

- The protocol in question and how much information is provided in the protocol message
- The amount of network topology information that has been provisioned into the MPE device
- Whether there are other protocol sessions that can be associated with this message
- Whether there are external data sources configured that the MPE device can use to associate information with the message

When the process of associating information with the request is complete, the MPE device analyzes the information and maps it into several important abstractions that are central to the functioning of the Policy Rules Engine:

1. A list of network devices that the request affects. A network device is any network element, any logical or physical sub-component of a network element, or any other network equipment.
2. A list of flows associated with the request. A flow is a logical representation of a QoS enforcement point that is used for a specific purpose (typically in a single direction, either upstream or downstream). A flow is usually characterized by a collection of bandwidth parameters. Different

protocols can have a different number of flows associated with a message. For example, DQoS messages have one or two flows per request (for each direction).

3. A list of policies associated with the request. This includes policy groups and reference policies called by the parent policy.

After constructing these lists, the Policy Rules Engine applies the policy rules according to the following algorithm:

```
For each network device:
   For each flow that is being created or modified:
      For each policy that is being evaluated:
         Evaluate all policy rules
      End
   End
End
```

A "device" is any device that creates a Gx session, such as a PGW or GGSN; the enforcement device associated with the corresponding Gx IP-CAN session; or any device that creates a Gxx session, such as an HSGW.

It should be clear from this algorithm that a single message can result in multiple policies being evaluated, and a policy rule being evaluated multiple times. This is important to understand to ensure that the policy rules you write operate in the way you intended.

By using parent policies, reference policies, and policy groups, you can control the order of policy execution. For example, assume there are four policies: two parent policies, $policy_1$ and $policy_4$, and two reference policies, $policy_2$ and $policy_3$ that are in a policy group, $group_1$. The hierarchy is as follows:

$policy_1$
   $policy_2$
   $policy_3$
$policy_4$

The order of execution can vary, depending on how each policy evaluates and what actions each contains:

- The normal order of execution would be $policy_1$, $policy_2$, $policy_3$, $policy_4$.
- If the conditions in $policy_1$ evaluate to false, the order of execution would be $policy_1$, $policy_4$.
- if $policy_2$ includes the mandatory action "break from policy level," the order of execution would be $policy_1$, $policy_2$, $policy_4$.

If the optional 3GPP-MS-TimeZone AVP is available over the Gx protocol from a PCEF, the MPE device can compute the local time for user equipment, even if the user enters a different time zone or the time offset changes because of Daylight Savings Time.

Note: Policies created using a more recent version of the CMP software may not evaluate and execute as intended on an MPE device running an older version of the MPE software. To ensure that policies are evaluated and executed as intended, update all systems to the same version of the software.

Activating and Deactivating Policy Rules

Rules can be activated and deactivated at specific times by selecting actions that are time-based. The methods by which activation/deactivation times can be defined are:

- **Time Period** — Uses pre-defined time period. At least one time period must be defined to use this option.
- **Policy Table field** — Uses time-related field from a policy table. At least one policy table must be defined, at least one time-related field must be specified in that table, and that table must be selected during the rule definition process to use this option.
- **Absolute time** — Uses exact time, or a combination of the time and date, to define rule activation/deactivation. If only a time is specified, the begin/end dates are calculated as the minimum future dates for those times.
- **Relative time** — Uses the number of hours, minutes, or seconds from the current time to start/end. For example, the value "5" with units of hours would state that a rule should activate (or deactivate) 5 hours after this policy condition is processed by the MPE device. Expressions may include policy variables.

Note: If an activation time is not specified, a rule becomes active immediately. If a deactivation time is not specified (or it is in the past), a rule never deactivates.

Caution: If all rules defined in a system have a deactivation time specified, all rules for the session on a PCEF can become deactivated. To prevent this from occurring, the session on the PCEF is set to revalidated 1 to 30 minutes before the last active rule deactivates.

Using Reference Policies

Multiple policies that share the same conditions can be simplified by including the common conditions in a parent policy and any unique conditions in reference policies. During execution, the common conditions are only evaluated once.

For example, consider the following policies, which apply tiers to session requests. Each policy uses the same conditions, and the Policy Rules Engine evaluates the same conditions up to three times:

```
Bronze Policy
where the request is creating a new session
   and where the flow is an application flow
   and where the AF-Application-ID matches one of voip
   and where the tier is one of Bronze
apply bronze to request
accept message
```

```
Silver Policy
where the request is creating a new session
   and where the flow is an application flow
   and where the AF-Application-ID matches one of voip
   and where the tier is one of Silver
apply silver to request
accept message
```

```
Gold Policy
where the request is creating a new session
   and where the flow is an application flow
   and where the AF-Application-ID matches one of voip
   and where the tier is one of Gold
apply gold to request
accept message
```

Using reference policies in a policy group, the same results can be obtained with the following policies:

```
where the request is creating a new session
   and where the flow is an application flow
   and where the AF-Application-ID matches one of voip
evaluate policy group Tier Policies
```

```
   Bronze Policy
   where the tier is one of Bronze
   apply bronze to request
   accept message
```

```
   Silver Policy
   where the tier is one of Silver
   apply silver to request
   accept message
```

```
   Gold Policy
   where the tier is one of Gold
   apply gold to request
   accept message
```

Creating a New Policy

Policy rules are created and modified using the policy wizard in the CMP system. Once created or modified, the rule is stored in the policy library. The policy wizard guides you step by step to creating a new policy rule. The wizard displays only the options available at each step.

The following procedure describes how to create a new policy rule, using this policy as an example:

```
And
     where the request is creating a new session
     where the session is an application session
     where the APN matches one of imode.g1t2
     where the subscriber profile data is not available
set gg to `op`

reject message
```

To create a new policy rule:

1. From the **Policy Management** section of the navigation pane, select **Policy Library**.
   The content tree displays a list of policy library groups; the default is **ALL**.
2. From the content tree, select the **ALL** group.
   The **Policy Administration** page opens in the work area.
3. Click **Create Policy**.
   The **Create Policy** page opens.
4. Select a starting point for the new policy:
   - **Blank** — The policy rule is created from the beginning, without any attributes being pre-defined.
   - **Use Template** — The policy rule is created based on a user-defined template that can have policy parameters pre-defined. This template can be modified.

- **Copy Existing Policy** — The policy rule is created based on an existing policy rule, which you can modify.

5. Click **Next** (or **Cancel** to close the wizard without saving the policy).
   The **Tables** page opens.
6. Specify the table(s) for the policy. For more details on associating a table with a policy, see *Associating Policy Tables with a Policy Rule*.

   If no tables are associated with the policy, click **Next**.

   - To specify multiple tables, click the selection icon ( ) multiple times
   - To move a table so that it is evaluated earlier in the rule, click the up icon ( )
   - To move a table so that it is evaluated later in the rule, click the down icon ( )
   - To delete a table, click the delete icon ( )

7. When you finish defining tables, click **Next** (or **Cancel** to close the wizard without saving the policy).
   The **Conditions** page opens.
8. Select the policy conditions.

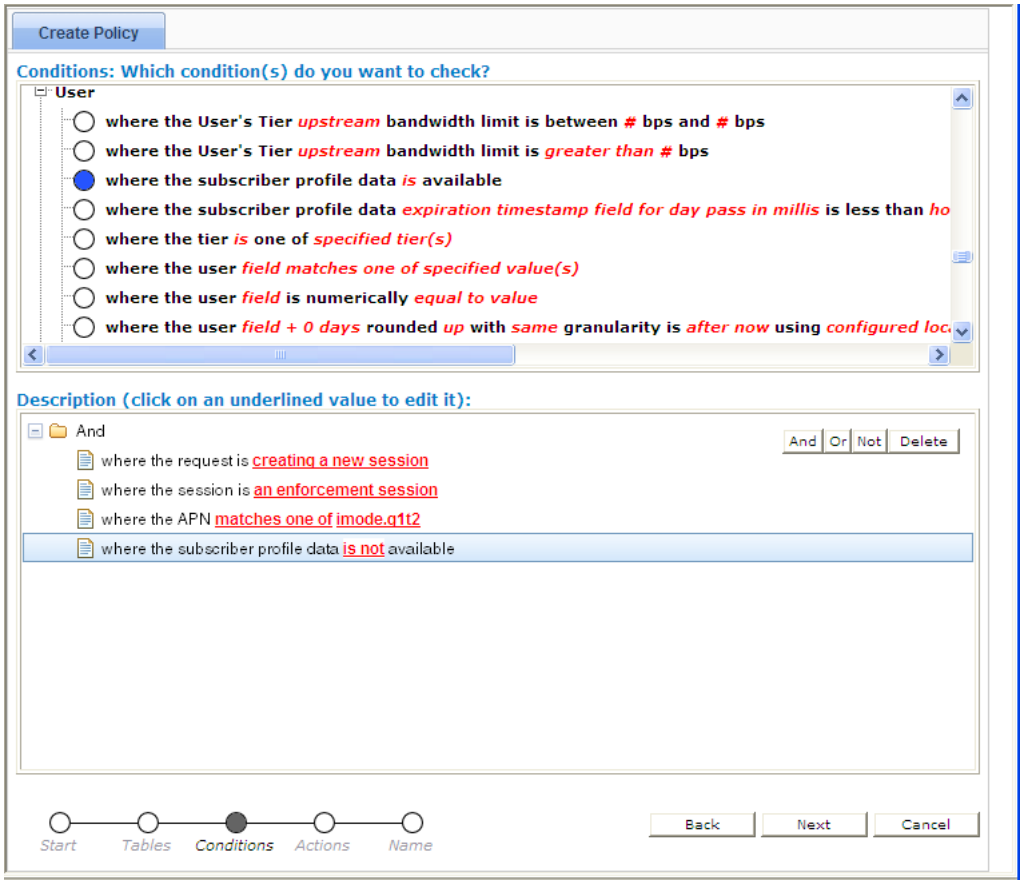
   As a condition is selected, it appears in the Description area at the bottom of the page.

   You can select multiple conditions, enter multiple instances of each condition, change the order of conditions, group conditions logically, or remove conditions:

   - To enter multiple instances of a condition, click the selection icon ( ) in the Conditions window multiple times.
   - To combine a logical group of conditions, click **And** or **Or**, located in the upper right corner of the Description window, and drag the conditions into the container that appears (represented by a folder icon). You can toggle a container between **And** and **Or** by double-clicking on the folder.
   - To change a the evaluation order of a condition or to include the condition within a logical container, drag and drop the condition within the **Description** window. You cannot drop a container onto itself or one of its sub-containers.
   - To negate a condition, change the **is** parameter if present, or click **Not**, located in the upper right corner of the Description window, and drag the condition into the container that appears (represented by a folder icon).
   - To delete a condition or container from the rule, select it and click **Delete**. You are prompted, The focused item and all its children will be deleted. Continue? Click **OK** (or **Cancel** to keep the condition or container).

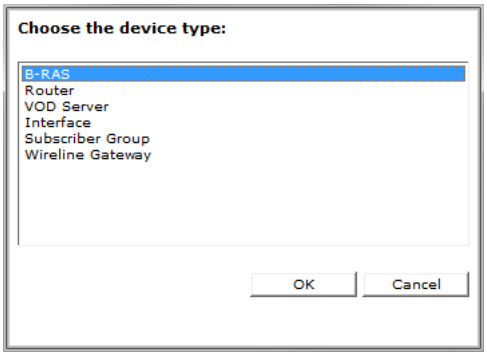
   Tip: To add conditions directly to an existing container, select the container first.

   For example:

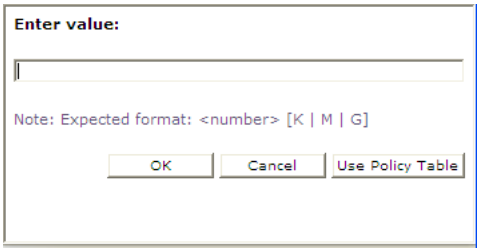


9. If a policy condition includes a parameter that requires further input, it displays red underlined text in the **Description** area. To provide the input, click the red underlined text; a popup window opens, from which you can do one of the following:

   - Select one or more options; for example:



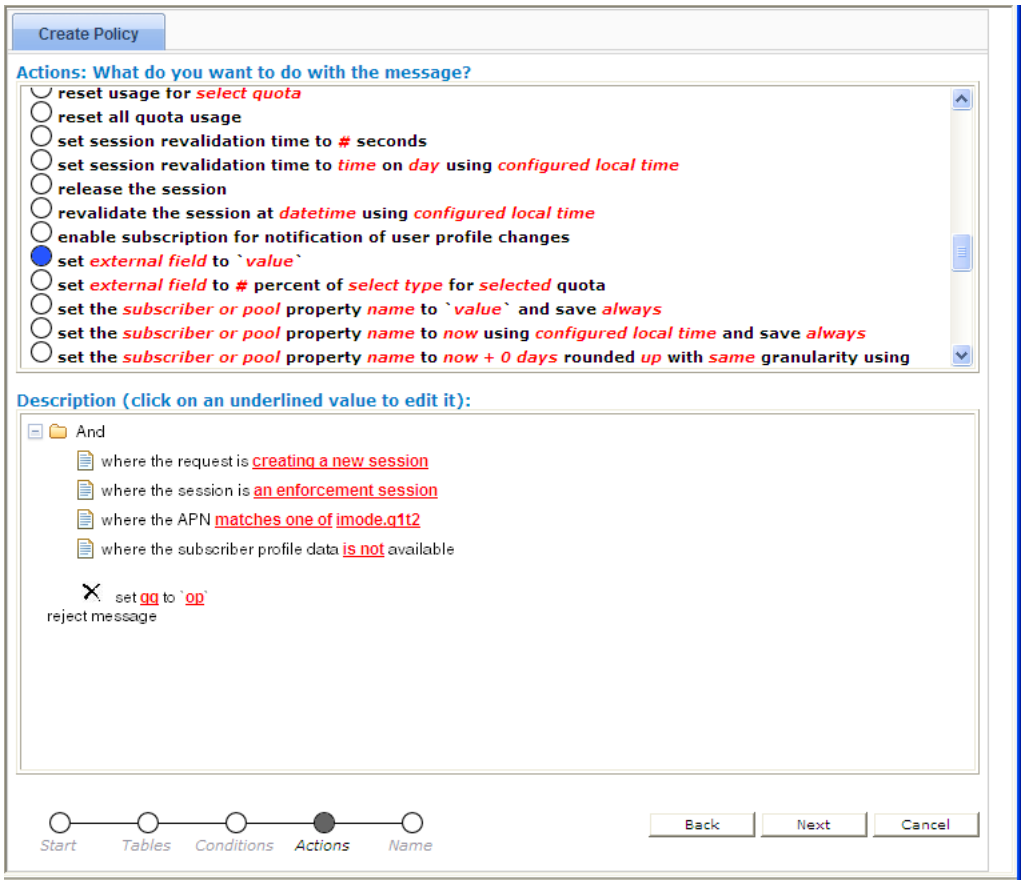
   - Enter a value (such as a traffic bit rate or percentage); for example:



When you finish, click **OK** (or **Cancel** to discard your changes). The popup window closes and the input is added to the policy condition.

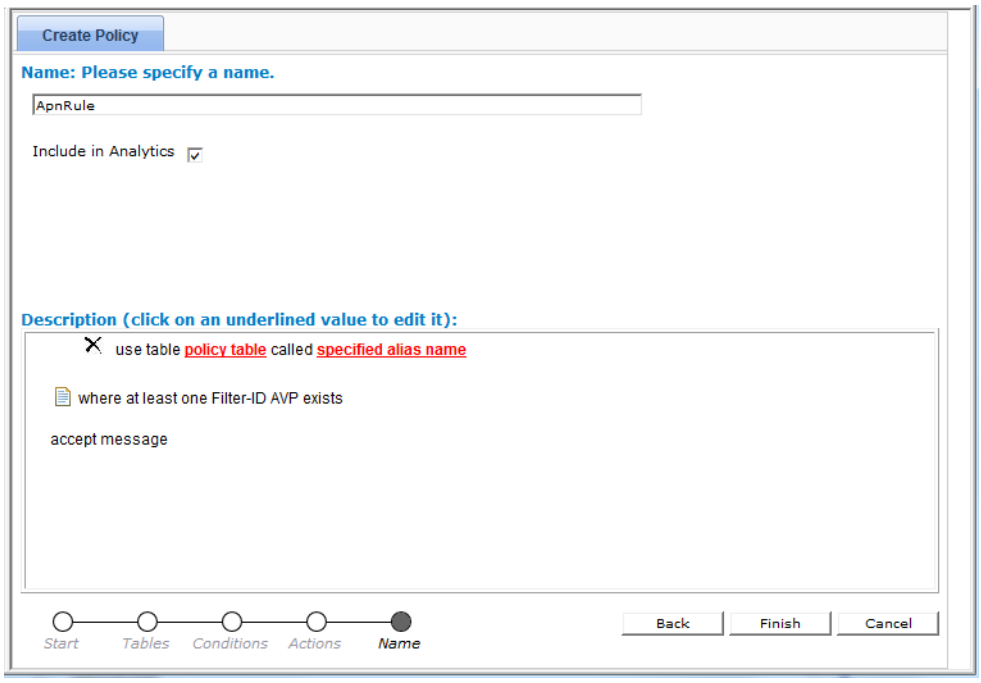
10. When you finish defining policy conditions, click **Next** (or **Cancel** to close the wizard without saving the policy).
    The **Actions** page opens.
11. Select the required action and any optional actions that the MPE device should execute if the policy request matches the defined conditions of the policy rule.

    For example:



- To enter multiple instances of an action, click the selection icon ( ) multiple times
- To move an action so that it is evaluated earlier in the rule, click the up icon ( )
- To move an action so that it is evaluated later in the rule, click the down icon ( )
- To delete an action from the rule, click the delete icon ( )

12. When you finish, click **Next** (or **Cancel** to close the wizard without saving the policy).
    The **Name** page opens.
13. Assign a unique name (where uniqueness is not case sensitive) to the new policy rule; for example:



Note: The name can be up to 255 characters long and cannot contain the following characters: **< > \ ; & ' " =**

14. Click **Include in Analytics** to generate an Analytics Data Stream for the policy.
15. Click **Finish** (or **Cancel** to close the wizard without saving the policy).
    The **Create Policy** page closes.

The policy rule is saved to the policy library in the CMP database.

Once a policy rule is created, you must deploy it to MPE devices so it can take effect. Reference policy rules (rules called by parent policy rules) do not need to be deployed; they are deployed automatically when called by a parent rule. See *Managing Policy Rules*.

Modes Within the Policy Wizard

The behavior of the policy wizard varies depending on the mode in which your CMP system is running. The mode can affect many policy wizard behaviors, including the following:

- Entire categories of conditions are enabled or disabled.
- Specific conditions and/or actions are enabled or disabled.
- Some conditions will have a slightly different appearance.
- The set of valid values for some parameters will vary.

If your policy wizard does not include a category, condition, or action documented here, it means that those categories, conditions, or actions are not relevant in your present CMP mode.

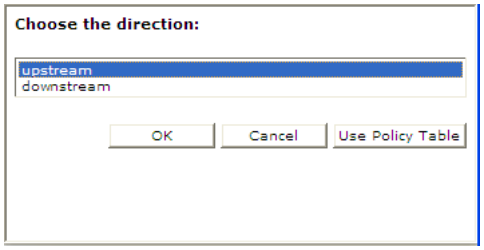
Parameters Within Policy Rules

When you are defining policy rules, both the conditions and actions may contain parameters. Parameters let you customize the specific situation in which a policy rule will be applied. Some conditions and actions may contain multiple parameters. For example, one possible condition is as follows:

```
where the device will be handling greater than 100 upstream reserved flows
```

This condition contains four different parameters. The policy wizard displays the parameters using a red font, with each parameter having a single continuous underline. In this example, greater than is a single parameter, as is 100, upstream, and reserved.

You can click any parameter to open a pop-up window that lets you specify the value of that parameter. Each parameter has a data type associated with it that determines the values that can be specified: some may be numbers, some may be free-form text, and some may be limited to specific sets of values. For example, the following parameter is limited to a set of text values:



If you have many policies with similar structures, you can consolidate them using policy tables to capture the differences. To specify a parameter in a rule that uses a policy table, instead of selecting a value click **Use Policy Table**. For more information on table-driven policies see *Managing Policy Tables*.

Table 8: Common Parameters defines some common parameter types that are used in many of the policy rules. In this table, the column labeled "Default Text" shows the text value that is displayed in the condition or action text when they are initially displayed. (This may be different in some instances, but this value is the default.)

There are also many parameter types that are used in only one condition or action. These parameter types are defined in the sections where those conditions or actions are defined.

Table 8: Common Parameters

Parameter Type	Default Text	Description of Values
app-name	specified name	Names of applications that have been defined in the CMP database.
bandwidth	#	A numeric value that specifies bandwidth in bits per second (bps). You can also type "k", "K", "m","M", "g", or "G" in the value to specify the value in units of kilobits, megabits, or gigabits per second instead.

Parameter Type	Default Text	Description of Values
class-of-service	specified class of	One (or more) of the following: • **Background** • **Conversational** • **Streaming** • **Interactive**
flow-direction	upstream	One of the following: • **upstream** • **downstream** • **upstream or downstream**
ip-address	specified address	An IPv4 or IPv6 address.
log-message	text	Any string. This text may contain policy parameters (as described later in this section) that perform parameter substitution within the message text.
matches-op	matches one of	One of the following: • **matches one of** • **does not match any of**
match-list		A comma-separated list of values, where each value is a wildcard match pattern that uses the "*" character to match zero or more characters and the "?" character to match exactly one character.
number	#	A numeric value. In some circumstances, the numeric value may be required to fall within a certain range of valid values.
operator	greater than	One of the following: • **greater than or equal to** • **greater than** • **less than or equal to** • **less than** • **equal to** • **not equal to**
operator-binary	is	One of the following: • **is** • **is not**
operator-greater	greater than	One of the following: • **greater than or equal to** • **greater than**
operator-less	less than	One of the following: • **less than or equal to**

Parameter Type	Default Text	Description of Values
		• **less than**
percent	#	An integer value between 0 and 100; for certain values, an extended, non-integer percentage that can exceed 100 (for example, 102.4%).
qos-direction	upstream	One of the following: • **upstream** • **downstream**
qos-status	reserved	One or more of the following: • **reserved** • **committed**
seconds	#	A numeric value that specifies time in units of seconds.
string	specified	Any string.
subnet	specified subnet	An IPv4 subnet in CIDR notation (for example, 1.2.3.0/24); or an IPv6 subnet (for example, fc00::1006/64).

Conditions Available for Writing Policy Rules

The policy wizard supports a large number of conditions that can be used for constructing policy rules. To help you find the conditions you want, the conditions are organized into different categories, which are summarized in *Table 9: Policy Condition Categories*.

Table 9: Policy Condition Categories

Category	Description
Request	Conditions that are based on information that is explicitly contained within or related to the protocol message (request) that triggered the policy rule execution.
Application	Conditions related to the application associated with the request.
Network Device Identity	Conditions related to the specific network device for which the policy rule is being evaluated. This includes conditions based on the network device type, as well as those that refer to specific unique identifiers for network devices.
Network Device Usage	Conditions related to the calculated usage for the network device for which the policy rule is being evaluated. This usage includes device-level tracking of both bandwidth and flow/session counts.
Mobility	Conditions that are based on information associated with networks that include mobile subscribers (such as a wireless network).

Category	Description
User	Conditions related to the subscriber, or subscriber account, that is associated with the protocol message that triggered the policy rule execution. This includes subscriber-level and account-level tracking of usage.
User State	Conditions related to subscriber properties.
Policy Context Properties	Conditions related to the context in which a policy is evaluated.
Time of Day	Conditions related to the time at which the policy rules are being executed.
Policy Counters	Conditions related to policy counters stored in online charging servers (OCSs).

The conditions that are included within each of these categories are described in the sections that follow. Conditions are listed in alphabetical order. The parameters that can be modified within each condition are also detailed.

Request Conditions

Request conditions are based on information that is explicitly contained within, or related to, the protocol message (request) that triggered the policy rule execution.

where at least one Filter-ID AVP exists

Description

Tests whether the current request contains one or more Filter-ID AVPs.

where at least one Final-Unit-Action matches *Final-Unit-Action to match*

Syntax

where at least one Final-Unit-Action matches *action*

Parameters

action

One of the following:

- **ACTION_TERMINATE** (the default)
- **ACTION_REDIRECT**
- **ACTION_RESTRICT_ACCESS**

Description

Tests whether the current request contains a Final Unit Action (FUA) attribute-value pair (AVP) matching the specified FUA.

where at least one Final-Unit-Indication AVP exists

Description

Tests whether the current request contains one or more Final-Unit-Indication (FUI) AVPs.

where at least one flow has media type that matches *specified type(s)*

Syntax
where at least one flow has media type that matches *media-type*

Parameters
media-type

One or more of the following media types:

- **Audio**
- **Video**
- **Data**
- **Application**
- **Control**
- **Text**
- **Message**
- **Other**

Description

Triggers a policy based on whether at least one flow matches one or more of the specified media types.

Example

```
where at least one flow has media type that matches Video,Application
```

where at least one flow with media type *specified type(s)* has one of the statuses *specified status(s)*

Syntax
where at least one flow with media type *media-type* has one of the statuses *media-status*

Parameters
media-type

One or more of the following media types:

- **Audio**
- **Video**
- **Data**
- **Application**

- **Control**
- **Text**
- **Message**
- **Other**

media-status

One or more of the following status type:

- **Enabled**
- **Enabled Uplink**
- **Enabled Downlink**
- **Disabled**
- **Removed**

Description

Triggers a policy based on whether at least one flow with one of the specified media types matches at least one of the specified statuses.

Example

```
where at least one flow with media type Video has one of the statuses
Enabled,Enabled Downlink
```

where Filter-ID AVP does not exist

Description
Tests whether the current request contains no Filter-ID AVPs.

where Final-Unit-Indication AVP does not exist

Description

Allows for a condition that will determine if the current request contains a Final-Unit-Indication (FUI) AVP.

where the AF-Application-ID *is* available

Syntax
where the AF-Application-ID *operator-binary* available

Parameters
operator-binary

One of the following:

- **is** (the default)
- **is not**

Description

Checks for the presence or absence of the AF Application Identifier field. A valid AF Application identifier is any string describing the application, for example VoIP or streaming.

where the AF-Application-ID matches one of *specified value(s)*

Syntax
where the AF-Application-ID matches one of *csv*

Parameters
csv

Comma-separated list of text values.

Description

Selects protocol messages based on the Diameter AF Application Identifier field. A valid AF Application identifier is any string describing the application, for example VoIP or streaming.

where the bearer usage is *General*

where the bearer usage is *bearer-usage*

Parameters
bearer-usage

One of the following:

- **General** (the default)
- **IMS Signaling**

Description

Selects protocol message based on the user or equipment information.

where the codec name for the flow *matches one of specified codec name(s)*

Syntax
where the codec name *matches-op csv*

Parameters
matches-op

See *Table 8: Common Parameters*.

csv

Comma-separated list of values.

Description

Selects protocol messages based on the codecs in the flow.

Example

```
where the codec name for the flow matches one of AMR-WB
```

where the DPI session is *a Gx Lite session*

Syntax
where the DPI session is *dpi-session*

Parameters
dpi-session

One of the following:

- **a Gx Lite session** (the default)
- **a Gx Plus session**
- **a SCE Gx session**
- **a TDF Solicit SD session**

Description

Distinguishes between types of DPI sessions.

where the enforcement session is *an IP-CAN session*

Syntax
where the enforcement session is *enforcement-session-type*

Parameters
enforcement-session-type

One or more of the following:

- **an IP-CAN session** (the default)
- **a gateway control session**
- **a DPI enforcement session**

Description

Distinguishes between different types of enforcement sessions.

where the event trigger is one of *specified trigger(s)*

Syntax
where the event trigger is one of *event-trigger*

Parameters
event-trigger

One or more of the following:

- **SGSN_CHANGE**
- **LOSS_OF_BEARER**
- **RECOVERY_OF_BEARER**
- **GW_PCEF_MALFUNCTION**
- **MAX_NR_BEARERS_REACHED**
- **QOS_CHANGE_EXCEEDING_AUTHORIZATION**
- **RAI_CHANGE**
- **USER_LOCATION_CHANGE**
- **OUT_OF_CREDIT**
- **REALLOCATION_OF_CREDIT**
- **REVALIDATION_TIMEOUT**
- **UE_IP_ADDRESS_ALLOCATE**
- **UE_IP_ADDRESS_RELEASE**
- **DEFAULT_EPS_BEARER_QOS_CHANGE**
- **AN_GW_CHANGE**
- **SUCCESSFUL_RESOURCE_ALLOCATION**
- **APPLICATION_START**
- **APPLICATION_STOP**
- **ADC_REVALIDATION_TIMEOUT**
- **QOS_CHANGE**
- **RAT_CHANGE**
- **TFT_CHANGE**
- **PLMN_CHANGE**
- **IP_CAN_CHANGE**
- **RESOURCES_LIMITATION**
- **UE_TIME_ZONE_CHANGE**
- **USAGE_THRESHOLD_REACHED**
- **USAGE_REPORT**
- **TAI_CHANGE**
- **ECGI_CHANGE**
- **CELL_CONGESTED**
- **CELL_CLEAR**
- **SERVICE_FLOW_DETECTION**
- **APN_AMBR_MODIFICATION_FAILURE**
- **USER_CSG_INFORMATION_CHANGE**
- **DEFAULT_EPS_BEARER_QOS_MODIFICATION_FAILURE**
- **USER_CSG_HYBRID_SUBSCRIBED_INFORMATION_CHANGE**
- **USER_CSG_HYBRID_UNSUBSCRIBED_INFORMATION_CHANGE**

Description

Selects protocol messages based on the event trigger.

where the Filter-Ids in the Final-Unit-Indication AVPs match one or more of *Filter-Ids to match* and the search type is *search type*

Syntax
where the Filter-Ids in the Final-Unit-Indication AVPs match one or more of *csv* and the search type is *search*

Parameters
csv

Comma-separated list of text values.

search

One of the following:

- **MATCH_ALL_FROM_ANY_REPORT** (the default)
- **MATCH_NONE**
- **MATCH_ANYONE**
- **MATCH_ALL_FROM_ONE_REPORT**

Description

Provides a minimum of at least one Filter-ID in the message that must match the provisioned value or list. Each ID in the provisioned list must match what is in the message.

where the flow is *an application flow*

Syntax
where the flow is *flow-type*

Parameters
flow-type

One or more of the following:

- **an application flow** (the default)
- **a UE flow**
- **the default flow**

Description

Selects protocol messages based on the type of flow.

where the flow media type is one of *specified type(s)*

Syntax
where the flow(s) media type is one of *media-type*

Parameters
media-type

One or more of the following:

- **Audio**
- **Video**
- **Data**
- **Application**
- **Control**
- **Text**
- **Message**
- **Other**

Description

Selects protocol messages based on the flow or flows' media type.

where the flow media type *matches one of user defined media type(s)*

Syntax
where the flow media type *matches-op csv*

Parameters
matches-op

See *Table 8: Common Parameters*.

csv

Comma-separated list of values.

Description

Selects one or more protocol messages that match one or more user-defined media types.

where the flow packet filter *matches one of specified packet filter(s)*

Syntax
where the flow packet filter *matches-op csv*

Parameters
matches-op

See *Table 8: Common Parameters*.

csv

Comma-separated list of values.

Description

Selects protocol messages based on the packet filters. The packet filters use IPFilterRule format, as defined in the Diameter base protocol (RFC 3588). For example: `permit in ip from 10.0.0.1 to 10.0.0.2 5060`.

where the flow usage is one of *specified usage(s)*

Syntax
where the flow usage is *flow-usage-type*

Parameters
flow-usage-type

One or more of the following:

- **No Information**
- **RTCP**
- **AF Signaling**

Description

Selects protocol messages based on the flow usage.

where the IP-CAN bearer is *the primary bearer*

Syntax
where the IP-CAN bearer is *bearer-type*

Parameters
bearer-type

One or more of the following:

- **the primary bearer**
- **a secondary bearer**

Description

Selects protocol messages based on the IP-CAN bearer type.

where the name(s) of the installed PCC rules *contains one of specified PCC rule name(s)*

Syntax
where the name(s) of the installed PCC rules *containment csv*

Parameters
containment

One of the following:

- **contains one of** (the default)
- **does not contain any of**

csv

Comma-separated list of text values.

Description

Determines whether an installed policy and charging control or application detection control rule contains a specified PCC rule name. See *Managing Traffic Profiles* for information on traffic profiles.

where the PCC rule being reinstalled contains one of *specified rule name(s)* and the retry *is* the final attempt

Syntax

where the PCC rule being reinstalled contains one of *csv* and the retry *operator-binary* the final attempt

Parameters

csv

Comma-separated list of text values.

operator-binary

One of the following:

- **is** (the default)
- **is not**

Description

Reinstalls the specified policy and charging control or application detection control rule depending on whether this is the final retry attempt or not. See *Managing Traffic Profiles* for information on traffic profiles.

where the QoS parameters in the flow are equal to *specified value*

Syntax

where the QoS parameters in the flow are equal to *profile-param*

Parameters

profile-param

Names of profile parameters that are derived from internal representations of protocol messages. For the specific meaning of the fields, consult the specific protocol specifications.

- **Diameter AF Flow-Description**
- **Diameter AF Flow-Status**
- **Diameter AF Flow-Usage**
- **Diameter AF Maximum-Authorized-Data-Rate**
- **Diameter AF Media-Type**

- **Diameter AF PacketTime**
- **Diameter AF QCI**
- **Diameter AF Reservation-Priority**
- **Diameter AF RTCP RR-Bandwidth**
- **Diameter AF RTCP RS-Bandwidth**
- **Diameter APN-Aggregate-Max-Bitrate-DL**
- **Diameter APN-Aggregate-Max-Bitrate-UL**
- **Diameter Bearer ARP Priority Level**
- **Diameter Bearer Guaranteed-Bitrate-DL**
- **Diameter Bearer Guaranteed-Bitrate-UL**
- **Diameter Bearer Maximum-Requested-Bandwidth-DL**
- **Diameter Bearer Maximum-Requested-Bandwidth-UL**
- **Diameter Bearer QCI**
- **Diameter Credit-Control Session Trigger Type**
- **Diameter Default EPS Bearer ARP Preemption Capability**
- **Diameter Default EPS Bearer ARP Preemption Vulnerability**
- **Diameter Default EPS Bearer ARP Priority Level**
- **Diameter Default EPS Bearer QCI**
- **Diameter Enforcement Session Bearer Control Mode Selection**
- **Diameter Enforcement Session Charging Condition Triggers**
- **Diameter Enforcement Session Event Triggers**
- **Diameter Flow-Status**
- **Diameter IP-CAN Session Bearer Control Mode**
- **Diameter IP-CAN Session Default Offline Charging**
- **Diameter IP-CAN Session Default Online Charging**
- **Diameter IP-CAN Session Primary OCS**
- **Diameter IP-CAN Session Primary OFCS**
- **Diameter IP-CAN Session Reporting Reason**
- **Diameter IP-CAN Session Secondary OCS**
- **Diameter IP-CAN Session Secondary OFCS**
- **Diameter IP-CAN Session Usage Monitoring**
- **Diameter IP-CAN Session Usage Reporting**
- **Diameter PCC Rule AF-Charging-Identifier**
- **Diameter PCC Rule ARP Preemption Capability**
- **Diameter PCC Rule ARP Preemption Vulnerability**
- **Diameter PCC Rule ARP Priority Level**
- **Diameter PCC Rule Flow-Status**
- **Diameter PCC Rule Guaranteed-Bitrate-DL**
- **Diameter PCC Rule Guaranteed-Bitrate-UL**
- **Diameter PCC Rule Maximum-Requested-Bandwidth-DL**
- **Diameter PCC Rule Maximum-Requested-Bandwidth-UL**
- **Diameter PCC Rule Metering-Method**
- **Diameter PCC Rule Monitoring-Key**
- **Diameter PCC Rule Offline Charging**
- **Diameter PCC Rule Online Charging**

- **Diameter PCC Rule Precedence**
- **Diameter PCC Rule QCI**
- **Diameter PCC Rule Rating-Group**
- **Diameter PCC Rule Reporting-Level**
- **Diameter PCC Rule Resource Allocation Notification**
- **Diameter PCC Rule Service-Identifier**
- **Diameter PCC Rule Service Flow Detection**
- **SCE Real-Time Monitoring**

Description

Selects protocol messages based on values of specific parameters in the protocol message for which there may be an explicit condition. Depending on the parameter chosen, you may be prompted to enter the value to compare against.

where the QoS upgrade is *supported*

Syntax
where the QoS upgrade is *operator-binary*

Parameters
operator-binary

One of the following

- **not supported**
- **supported** (the default)

Description

Determines whether the QoS upgrade is supported.

where the request AVP Media-Component-Description *exists*

Syntax
where the request AVP Media-Component-Description *accessibility*

Parameters
accessibility

One of the following:

- **exists** (the default)
- **does not exist**

Description

Determines whether the AVP Media-Component-Description is accessible.

where the request AVP *name exists*

Syntax
where the request AVP *avp accessibility*

Parameters
avp

AVP in format *name*:*vendorID*, or a full path [*avp_name1*]:*vendorID*.[*avp_name2*]:*vendorID*… for the members of the grouped AVPs

accessibility

One of the following:

- **exists** (the default)
- **does not exist**

Description

Checks for the presence or absence of the third-party AVP in an incoming Diameter message.

Note: The condition supports both loaded base Diameter AVPs and third-party AVPs.

where the request AVP *name* value is numerically *equal to value*

Syntax
where the request AVP *avp* value is numerically *operator value*

Parameters
avp

AVP in format *name*:*vendorID*, or a full path [*avp_name1*]:*vendorID*.[*avp_name2*]:*vendorID*… for the members of the grouped AVPs

operator

See *Table 8: Common Parameters*.

value

String.

Description

Compares a numerical AVP value against a specified number or policy context number variable value.

Note: The condition supports both loaded base Diameter AVPs and third-party AVPs.

where the request AVP *name* value *contains one of value(s)*

Syntax
where the request AVP *avp* value *containment csv*

Parameters

avp

AVP in format *name*:*vendorID*, or a full path [*avp_name1*]:*vendorID*.[*avp_name2*]:*vendorID*… for the members of the grouped AVPs

containment

One of the following:

- **contains one of** (the default)
- **does not contain any of**

csv

Comma-separated list of text values.

Description

Performs a lookup of the sub-strings in the AVP value. It is possible to check multiple sub-string entries at once. If the operation type is changed, you can check the opposite scenario, which would not include any of the provided sub-strings.

Note: The condition supports both loaded base Diameter AVPs and third-party AVPs.

where the request AVP *name* value *is* contained in Match List(s) *select list(s)*

Syntax

where the request AVP *avp operator-binary match list(s)*

Parameters

avp

AVP in format *name*:*vendorID*, or a full path [*avp_name1*]:*vendorID*.[*avp_name2*]:*vendorID*… for the members of the grouped AVPs

operator-binary

One of the following:

- **is** (the default)
- **is not**

match-list

See *Table 8: Common Parameters*.

Description

Compares the specified AVP value with the values or variables from the specified match list. The condition is where the request AVP name value matches one of the values. The values can be evaluated for equality as well as inequality. To evaluate an AVP value for inequality, the condition **matches one of** must be changed to **does not match any of**.

Note: The condition supports both loaded base Diameter AVPs and third-party AVPs.

where the request AVP *name* value *matches one of value(s)*

Syntax
where the request AVP *avp matches-op csv*

Parameters
avp

AVP in format *name:vendorID*, or a full path [*avp_name1*]:*vendorID*.[*avp_name2*]:*vendorID*… for the members of the grouped AVPs

matches-op

See *Table 8: Common Parameters*.

csv

Comma-separated list of text values.

Description

Compares the specified AVP value with the values or variables from the specified list. The condition is where the request AVP name value matches one of the values. The values can be evaluated for equality as well as inequality. To evaluate a AVP value for inequality, the condition **matches one of** must be changed to **does not match any of**.

Note: The condition supports both loaded base Diameter AVPs and third-party AVPs.

where the request is *creating a new flow*

Syntax
where the request is *change-type*

Parameters
change-type

One or more of the following:

- **creating a new flow** (the default)
- **modifying an existing flow**
- **provisioning a default flow**
- **terminating an existing flow**

Description

Distinguishes between protocol messages based on the type of operation being performed on the flow.

where the request is *creating a new session*

Syntax
where the request is *request-type*

Parameters
request-type

One or more of the following:

- **creating a new session** (the default)
- **modifying an existing session**
- **re-authorizing an existing session**
- **terminating an existing session**

Description

Distinguishes between protocol messages based on the type of operation being performed on the subscriber's session.

where the request is for *reserved* bandwidth

Syntax
where the request is for *qos-status* bandwidth

Parameters
qos-status

See *Table 8: Common Parameters*.

Description

Distinguishes between protocol messages based on the type of bandwidth that is being updated.

where the request is for *upstream* bandwidth

Syntax
where the request is for *qos-direction* bandwidth

Parameters
qos-direction

See *Table 8: Common Parameters*.

Description

Distinguishes between protocol messages based on the direction of bandwidth that is being updated.

where the request MPS Identifier *matches one of value(s)*

Syntax
where the MPS Identifier *matches-op csv*

Parameters
matches-op

See *Table 8: Common Parameters*.

csv

Comma-separated list of text values.

Description

Determines whether the MPS Identifier matches a specified value(s).

where the request *supports* feature *name*

Syntax
where the request *operator-binary* feature *csv*

Parameters
operator-binary

One of the following:

- **supports** (the default)
- **does not support**

csv

Comma-separated list of text values

Description

Determines whether the request supports a specified feature.

where the requested guaranteed *upstream* bandwidth is *greater than* # bps

Syntax
where the requested guaranteed *flow-direction bandwidth* is *operator bandwidth* bps

Parameters
flow-direction

See *Table 8: Common Parameters*.

bandwidth

See *Table 8: Common Parameters*.

operator

See *Table 8: Common Parameters*.

Description

Selects protocol messages based on the amount of bandwidth being requested in a specific direction relative to a numeric value.

where the requested maximum *upstream* bandwidth is *greater than specified* bps

Syntax
where the requested maximum *flow-direction* bandwidth is *operator bandwidth* bps

Parameters
flow-direction

See *Table 8: Common Parameters*.

operator

See *Table 8: Common Parameters*.

bandwidth

See *Table 8: Common Parameters*.

Description

Selects protocol messages based on the maximum amount of bandwidth being requested in a specific direction relative to a numeric value.

Example

```
And
    where the request is creating a new session
    where the session is an application session
   where the requested maximum upstream or downstream bandwidth is greater
 than 2400 bps
reject message
```

where the requested media component description reservation priority is one of *specified*

Syntax
where the requested media component description reservation priority is one of *priority*

Parameters
priority

One or more of the following:

- **DEFAULT**
- **PRIORITY_ONE**
- **PRIORITY_TWO**
- **PRIORITY_THREE**
- **PRIORITY_FOUR**
- **PRIORITY_FIVE**
- **PRIORITY_SIX**
- **PRIORITY_SEVEN**
- **PRIORITY_EIGHT**

- **PRIORITY_NINE**
- **PRIORITY_TEN**
- **PRIORITY_ELEVEN**
- **PRIORITY_TWELVE**
- **PRIORITY_THIRTEEN**
- **PRIORITY_FOURTEEN**
- **PRIORITY_FIFTEEN**

Description

Selects Rx protocol messages based on the requested media component description reservation priority.

where the requested minimum *upstream* bandwidth is *greater than specified* bps

Syntax

where the requested minimum *flow-direction* bandwidth is *operator bandwidth* bps

Parameters

flow-direction

See *Table 8: Common Parameters*.

operator

See *Table 8: Common Parameters*.

bandwidth

See *Table 8: Common Parameters*.

Description

Selects protocol messages based on the minimum amount of bandwidth being requested in a specific direction relative to a numeric value.

Example

```
And
    where the request is creating a new session
    where the session is an application session
    where the requested minimum upstream bandwidth is greater than 10000
bps
reject message
```

where the requested QCI is one of *specified*

Syntax

where the requested QCI is one of *class-of-service*

Parameters

class-of-service

One or more of the following:

- **1** (Conversational 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)

Description

Selects protocol messages based on the QoS class identifier (QCI).

where the requested session reservation priority is one of *specified*

Syntax

where the requested session reservation priority is one of *priority*

Parameters

priority

One or more of the following:

- **DEFAULT**
- **PRIORITY_ONE**
- **PRIORITY_TWO**
- **PRIORITY_THREE**
- **PRIORITY_FOUR**
- **PRIORITY_FIVE**
- **PRIORITY_SIX**
- **PRIORITY_SEVEN**
- **PRIORITY_EIGHT**
- **PRIORITY_NINE**
- **PRIORITY_TEN**
- **PRIORITY_ELEVEN**
- **PRIORITY_TWELVE**
- **PRIORITY_THIRTEEN**
- **PRIORITY_FOURTEEN**
- **PRIORITY_FIFTEEN**

Description

Selects Rx protocol messages based on the requested session reservation priority.

where the requested *upstream* APN aggregate maximum bitrate is *greater than #* bps

Syntax
where the requested *flow-direction* APN aggregate maximum bitrate is *operator bandwidth* bps

Parameters
flow-direction

See *Table 8: Common Parameters*.

operator

See *Table 8: Common Parameters*.

bandwidth

See *Table 8: Common Parameters*.

Description

Selects protocol messages based on the maximum bitrate being requested for an access point name (APN) in a specific direction relative to a numeric value.

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*

Syntax
where the rule report contains one of *csv* and the final unit action is one of *action* and the rule status is *field*

Parameters
csv

Comma-separated list of text values.

action

One of the following:

- **TERMINATE**
- **REDIRECT**
- **RESTRICT_ACCESS**

field

One of the following:

- **active** (the default)
- **inactive**
- **temporarily_inactive**

Description

Selects protocol messages based on whether or not the message contains a specified rule name, reported final unit action, and status received in a rule report.

where the rule report contains one of *specified rule name(s)* and the rule status is *active*

Syntax
where the rule report contains one of *csv* and the rule status is *field*

Parameters
csv

Comma-separated list of text values.

field

One of the following:

- **active** (the default)
- **inactive**
- **temporarily_inactive**

Description

Selects protocol messages based on whether or not a rule name and a status was received in a rule report.

where the rule report contains one of *specified rule name(s)* and the rule status is *active* and the rule failure code is one of *specified failure code(s)*

Syntax
where the rule report contains one of *csv* and the rule status is *field* and the rule failure code is one of *failcode*

Parameters
csv

Comma-separated list of text values.

field

One of the following:

- **active** (the default)
- **inactive**
- **temporarily_inactive**

failcode

One of the following:

- **UNKNOWN_RULE_NAME**
- **RATING_GROUP_ERROR**
- **SERVICE_IDENTIFICATION_ERROR**
- **GW_PCEF_MALFUNCTION**
- **RESOURCES_LIMITATION**
- **MAX_NR_BEARERS_REACHED**

- **UNKNOWN_BEARER_ID**
- **MISSING_BEARER_ID**
- **MISSING_FLOW_DESCRIPTION**
- **RESOURCE_ALLOCATION_FAILURE**
- **UNSUCCESSFUL_QOS_VALIDATION**

Description

Selects protocol messages based on whether a rule name or names, status, and failure code are received in a rule report.

where the rule report contains one of *specified rule name(s)* and the rule status is *active* and the rule failure code is one of *specified failure code(s)* and the maximum retry count *is* reached

Syntax

where the rule report contains one of *csv* and the rule status is *field* and the rule failure code is one of *failcode* and the maximum retry count *operator-binary* reached

Parameters

csv

Comma-separated list of text values.

field

One of the following:

- **active** (the default)
- **inactive**
- **temporarily_inactive**

failcode

One of the following:

- **UNKNOWN_RULE_NAME**
- **RATING_GROUP_ERROR**
- **SERVICE_IDENTIFICATION_ERROR**
- **GW_PCEF_MALFUNCTION**
- **RESOURCES_LIMITATION**
- **MAX_NR_BEARERS_REACHED**
- **UNKNOWN_BEARER_ID**
- **MISSING_BEARER_ID**
- **MISSING_FLOW_DESCRIPTION**
- **RESOURCE_ALLOCATION_FAILURE**
- **UNSUCCESSFUL_QOS_VALIDATION**

operator-binary

One of the following:

- **is** (the default)

- **is not**

Description

Selects protocol messages based on whether a rule name or names, status, failure code, and retry count are received in a rule report.

where the rule report for the flow has status *active*

Syntax
where the rule report for the flow has status *field*

Parameters
field

One of the following:

- **active** (the default)
- **temporarily_inactive**

Description

Tests whether the status of the rule for the flow matches the specified status.

where the *select type* is contained in Match List(s) *select list(s)*

Syntax
where the *field* is contained in Match List(s) *match-list*

Parameters
field

One or more of the following:

- **Serving Gateway Address** — IP address of the serving gateway
- **APN** — Access Point Name
- **User Equipment IMEISV**
- **User Equipment MEID**
- **User Equipment ESN**
- **User Equipment MAC**
- **USER IMSI** — User International Mobile Subscriber Identity
- **USER E.164** — User E.164 phone number
- **User SIP URI** — User Session Initiation Protocol Uniform Resource Identifier
- **User NAI** — User Network Access Identifier
- **Endpoint IP Address** — IP address of the endpoint
- **Serving MCC-MNC** — Serving Mobile Country Code, Mobile Network Code
- **Cell Identifier**
- **Location Area Code** — Unique identifier of a LAC
- **Service Area Code** — Unique identifier of a SAC

- **Routing Area Code** — Identifies a routing area within a location area
- **Routing Area Identifier** — Combination of the location area code and routing area code
- **Tracking Area Code**
- **E-UTRAN Cell Identifier** — Identifies cells within a PLMN
- **MPS Identifier** — MPS-Identifier AVP
- **AF Application Id**
- **Entitlements** — A defined entitlement

match-list

See *Table 8: Common Parameters*.

Description

Selects protocol messages based on whether the messages or associated sessions match any of the values in a match list. Any of the types can be selected in combination. The order will match the list from top to bottom. See *Managing Match Lists* for information about defining match lists.

Example

```
where the USER_IMSI,LAC,SAC is contained in Match List(s)
Black1,Black2,Black3
```

where the *select type* is not contained in Match List(s) *select list(s)*

Syntax

where the *field* is not contained in Match List(s) *match-list*

Parameters

field

One or more of the following:

- **Serving Gateway Address** — IP address of the serving gateway
- **APN** — Access Point Name
- **User Equipment IMEISV**
- **User Equipment MEID**
- **User Equipment ESN**
- **User Equipment MAC**
- **USER IMSI** — User International Mobile Subscriber Identity
- **USER E.164** — User E.164 phone number
- **User SIP URI** — User Session Initiation Protocol Uniform Resource Identifier
- **User NAI** — User Network Access Identifier
- **Endpoint IP Address** — IP address of the endpoint
- **Serving MCC-MNC** — Serving Mobile Country Code, Mobile Network Code
- **Cell Identifier**
- **Location Area Code** — Unique identifier of a LAC
- **Service Area Code** — Unique identifier of a SAC

- **Routing Area Code** — Identifies a routing area within a location area
- **Routing Area Identifier** — Combination of the location area code and routing area code
- **Tracking Area Code**
- **E-UTRAN Cell Identifier** — Identifies cells within a PLMN
- **MPS Identifier** — MPS-Identifier AVP
- **AF Application Id**
- **Entitlements** — A defined entitlement

match-list

See *Table 8: Common Parameters*.

Description

Selects protocol messages based on whether the messages or associated sessions do not match any of the values in a match list. Any of the types can be selected in combination. The order will match the list from top to bottom. See *Managing Match Lists* for information about defining match lists.

Example

```
where the USER_IMSI,LAC,SAC is not contained in Match List(s)
BLACK1,BLACK2,BLACK3
```

where the service info status is one of *specified*

Syntax
where the service info status is one of *status*

Parameters
status

One of the following:

- **FINAL_SERVICE_INFORMATION**
- **PRELIMINARY_SERVICE_INFORMATION**

Description

Selects Rx protocol messages based on the service information status.

where the Service-URN is one of *specified value(s)*

Syntax
where the Service-URN is one of *csv*

Parameters
csv

Comma-separated list of text values.

Description

Selects Rx protocol messages based on the value of the Service-URN field.

where the session is *an enforcement session*

Syntax
where the session is *session-type*

Parameters
session-type

One of the following:

- **an enforcement session** (the default)
- **an application session**
- **a credit control session**

Description

Distinguishes between protocol messages that are operating on different sessions.

where the TDF-Application-Identifier matches one of *specified TDF application id(s)*

Syntax
where the TDF-Application-Identifier matches one of *csv*

Parameters
csv

Comma-separated list of text values.

Description

Selects protocol messages based on the Traffic Detection Function (TDF) Application Identifier field. A valid TDF application identifier is any string describing the TDF.

where the user field *field is* available

Syntax
where the user field *string operator-binary* available

Parameters
string

String.

operator-binary

One of the following:

- **is** (the default)
- **is not**

Description

Determines whether a specified user field is available.

Application Conditions

Application conditions are related to the application associated with the request. See *Managing Application Profiles* for information on creating and managing application profiles.

where the application is latency sensitive

Description

Triggers a policy when the associated application is latency sensitive (can be set in the CMP system when applications are defined).

where the application *is* one of *specified name*

Syntax
where the application *operator-binary* one of *app-name*

Parameters
operator-binary

See *Table 8: Common Parameters*.

app-name

See *Table 8: Common Parameters*.

Description

Triggers a policy based on the associated application.

where the application will be using *greater than #* bps *upstream reserved* bandwidth

Syntax
where the application will be using *operator-greater bandwidth* bps *qos-direction qos-status* bandwidth

Parameters
operator-greater

See *Table 8: Common Parameters*.

bandwidth

See *Table 8: Common Parameters*.

qos-direction

See *Table 8: Common Parameters*.

qos-status

See *Table 8: Common Parameters*.

Description

Triggers a policy based on the total amount of bandwidth used by the associated application as it relates to a defined threshold. This can be further qualified by both the direction and allocation status of the bandwidth. The total represents the amount of bandwidth that is allocated if the current request is approved.

where the application will be using *greater than # upstream reserved* flows

Syntax

where the application will be using *operator-greater bandwidth qos-direction qos-status* flows

Parameters

operator-greater

See *Table 8: Common Parameters*.

bandwidth

See *Table 8: Common Parameters*.

qos-direction

See *Table 8: Common Parameters*.

qos-status

See *Table 8: Common Parameters*.

Description

Triggers a policy based on the total number of flows used by the associated application as it relates to a defined threshold. This can be further qualified by both the direction and allocation status of the flows. The total represents the number of flows that is allocated if the current request is approved.

where there is no application associated with the request

Description

Triggers a policy when there is no associated application.

Network Device Identity Conditions

Network Device Identity conditions are related to the specific network device for which the policy rule is being evaluated. This includes conditions based on the network device type, as well as those that refer to specific unique identifiers for network devices. See *Managing Network Elements* for information on defining the network elements available.

where the device name *matches one of specified name(s)*

Syntax
where the device name *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy based on whether the device name matches one or more wildcard match patterns.

where the device type *is specified type*

Syntax
where the device type *operator-binary device-type*

Parameters
operator-binary

See *Table 8: Common Parameters*.

device-type

One or more of the following:

- **PDSN**
- **GGSN**
- **HomeAgent**
- **HSGW**
- **PGW**
- **SGW**
- **DPI**

Description

Triggers a policy based on the device type for which it is evaluated.

where the endpoint IP address is in *specified subnet*

Syntax
where the endpoint IP address is in *subnet*

Parameters
subnet

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for endpoints whose IP address falls within a specific subnet.

where the endpoint IP address is *specified address*

Syntax
where the endpoint IP address is *ip-address*

Parameters
ip-address

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for a specific endpoint (based on its IP address).

where the network element name *matches one of specified name(s)*

Syntax
where the network element name *matches-op csv*

Parameters
matches-op

See *Table 8: Common Parameters*.

csv

Comma-separated list of values.

Description

Triggers a policy based on the name of the network element for which it is being evaluated.

where the network element type *is specified type*

Syntax
where the network element type *operator-binary element-type*

Parameters
operator-binary

See *Table 8: Common Parameters*.

element-type

One or more of the following:

- **GGSN**

- **PDSN**
- **HomeAgent**
- **HSGW**
- **PGW**
- **SGW**
- **DPI**

Description

Triggers a policy based on the type of network element for which it is being evaluated. If the policy is being evaluated for a device that is not a network element but is contained within a network element (such as an interface within a router) then the network element "container" is used as the basis of comparison.

where the network element's description field is equal to *specified description(s)*

Syntax
where the network element's description field is equal to *string*

Parameters
string

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated if the Description field of the network element matches the specified string.

where the User Equipment ESN *matches one of specified ESN value(s)*

Syntax
where the User Equipment ESN *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific ESN values (based on matching wildcard patterns). A valid ESN value has eight hexadecimal digits, representing the 32 bits of the ESN; for example: A01F3D45.

where the User Equipment IMEISV *matches one of specified IMEISV value(s)*

Syntax
where the User Equipment IMEISV *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific IMEISV values (based on matching wildcard patterns). A valid IMEISV value has 16 decimal digits, as defined in the 3GPP TS 23.003 standard.

where the User Equipment MAC *matches one of specified MAC value(s)*

Syntax
where the User Equipment MAC *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific Media Access Control (MAC) values (based on matching wildcard patterns). A MAC address is formatted as six groups of two hexadecimal digits separated by colons (:) or hyphens (-).

where the User Equipment MEID *matches one of specified MEID value(s)*

Syntax
where the User Equipment MEID *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific MEID values (based on matching wildcard patterns). A valid MEID value has 14 hexadecimal characters; for example: 123456789abcde.

Network Device Usage Conditions

Network Device Usage conditions are related to the calculated usage for the network device for which the policy rule is being evaluated. This usage includes device-level tracking of both bandwidth and flow/session counts.

where the device will be handling *greater than #* bps *upstream reserved* bandwidth

Syntax

where the device will be handling *operator bandwidth* bps *qos-direction qos-status* bandwidth

Parameters

operator

See *Table 8: Common Parameters*.

bandwidth

See *Table 8: Common Parameters*.

qos-direction

See *Table 8: Common Parameters*.

qos-status

See *Table 8: Common Parameters*.

Description

Triggers a policy based on the total amount of bandwidth used by the current device as it relates to a defined threshold. This can be further qualified by both the direction and allocation status of the bandwidth. The total represents the bandwidth that is allocated if the current request is approved.

where the device will be handling *greater than #* bps *upstream reserved* bandwidth in total for *specified application*

Syntax

where the device will be handling *operator bandwidth* bps bandwidth *qos-direction qos-status* bandwidth in total for *app-name*

Parameters

operator

See *Table 8: Common Parameters*.

bandwidth

See *Table 8: Common Parameters*.

qos-direction

See *Table 8: Common Parameters*.

qos-status

See *Table 8: Common Parameters*.

app-name

Names of the applications that are defined in the CMP database.

Description

Triggers a policy based on the total amount of bandwidth allocated for specific applications by the current device as it relates to a defined threshold. This can be further qualified by both the direction and allocation status of the bandwidth. The total represents the bandwidth that is allocated if the current request is approved.

where the device will be handling *greater than # upstream reserved* flows

Syntax

where the device will be handling *operator number qos-direction qos-status* flows

Parameters

operator

See *Table 8: Common Parameters*.

number

See *Table 8: Common Parameters*.

qos-direction

See *Table 8: Common Parameters*.

qos-status

See *Table 8: Common Parameters*.

Description

Triggers a policy based on the total number of flows used by the current device as it relates to a defined threshold. This can be further qualified by both the direction and allocation status of the flows. The total represents the number of flows that are allocated if the current request is approved.

where the device will be handling *greater than # upstream reserved* flows in total for *specified application*

Syntax

where the device will be handling *operator number qos-direction qos-status* flows in total for *app-name*

Parameters

operator

See *Table 8: Common Parameters*.

number

See *Table 8: Common Parameters*.

qos-direction

See *Table 8: Common Parameters*.

qos-status

See *Table 8: Common Parameters*.

app-name

Names of the applications that are defined in the CMP database.

Description

Triggers a policy based on the total number of flows for specific applications used by the current device as it relates to a defined threshold. This can be further qualified by both the direction and allocation status of the flows. The total represents the number of flows that are allocated if the current request is approved.

Mobility Conditions

Mobility conditions are based on information associated with networks that include mobile subscribers (such as a wireless network).

where network initiated requests are *supported*

Syntax
where network initiated requests are *network-request-support*

Parameters
network-request-support

One of the following:

- **not supported**
- **supported** (the default)

Description

Triggers a policy that is only evaluated when network initiated requests are or are not supported.

where the APN *matches one of specified APN value(s)*

Syntax
where the APN *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific access point name (APN) values (based on matching wildcard patterns). A valid APN value is any domain name; for example: `network.operator.com`.

where the BSID *matches one of specified Bsid value(s)*

Syntax
where the BSID *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific BSID values (based on matching wildcard patterns).

where the Cell Identifier *matches one of specified CI value(s)*

Syntax
where the Cell Identifier *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific Cell Identifier values (based on matching wildcard patterns). A valid Cell Identifier is an integer between 0 and 65535.

where the E-UTRAN Cell Identifier *matches one of specified ECI value(s)*

Syntax
where the E-UTRAN Cell Identifier *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific E-UTRAN Cell Identifier values (based on matching wildcard patterns).

where the IP address of the Serving Gateway *matches one of specified address(es)*

Syntax
where the IP address of the Serving Gateway *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific Serving Gateway addresses (based on matching wildcard patterns).

where the IP address of the Serving PCF *matches one of specified address(es)*

Syntax
where the IP address of the Serving PCF *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific Serving PCF addresses (based on matching wildcard patterns).

where the IP-CAN type is *specified*

Syntax
where the IP-CAN type is *ip-can-type*

Parameters
ip-can-type

One or more of the following:

- **3GPP GPRS**
- **3GPP EPS**
- **Non_3GPP EPS**
- **3GPP2**
- **WiMAX**
- **DOCSIS**
- **xDSL**

Description

Triggers a policy that is only evaluated for a protocol message with a specific IP-CAN type.

where the Location Area Code *matches one of specified LAC value(s)*

Syntax
where the Location Area Code *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific Location Area Code values (based on matching wildcard patterns). A valid Location Area Code is an integer between 0 and 65535.

where the MSTimezone DST is *configured daylight savings in hours*

Syntax
where the MSTimezone DST is *offset*

Parameters
offset

One of the following:

- **0 hours**
- **1 hour**
- **2 hours**

Description

Triggers a policy that is only evaluated if the applied Daylight Savings Time offset for the location of a mobile subscriber/mobile station (MS) matches the parameter.

where the MSTimezone offset is *configured timezone offset*

Syntax
where the MSTimezone offset is *offset*

Parameters
offset

Greenwich Mean Time (GMT) time zone offset.

Description

Triggers a policy that is only evaluated if the applied time zone for a mobile subscriber/mobile station (MS) matches the parameter.

where the RAT type is *specified*

Syntax
where the RAT type is *rat-type*

Parameters
rat-type

One or more of the following:

- **GERAN**
- **UTRAN**
- **HSPA Evolution**
- **UMA/GAN**
- **EUTRAN**
- **WLAN**
- **CDMA2000 1x**
- **HRPD**
- **UMB**

Description

Triggers a policy that is only evaluated for a protocol message with a specific Radio Access Technology (RAT) type.

Example

The following example changes usage tracking when a user goes into an HRPD RAT type:

```
where the RAT type is HRPD
and where the event trigger is one of RAT CHANGE
and where the request is modifying an existing session

grant total volume to 100 percent used for hrpd using key3
continue processing message
```

where the Routing Area Code *matches one of specified RAC value(s)*

Syntax

where the Routing Area Code *matches-op match-list*

Parameters

matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific RAC values (based on matching wildcard patterns).

where the Routing Area Identifier *matches one of specified RAI value(s)*

Syntax

where the Routing Area Identifier *matches-op match-list*

Parameters

matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific Routing Area Identifier values (based on matching wildcard patterns). For a description of the format of a Routing Area Identifier, refer to the 3GPP TS 23.003 standard.

where the Service Area Code *matches one of specified SAC value(s)*

Syntax
where the Service Area Code *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific Service Area Code values (based on matching wildcard patterns). A valid Service Area Code is an integer between 0 and 65535.

where the Serving MCC-MNC *matches one of specified MCC-MNC value(s)*

Syntax
where the Serving MCC-MNC *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific mobile country code (MCC)-mobile network code (MNC) values (based on matching wildcard patterns). A valid value consists of a 3-digit mobile country code and a 2- or 3-digit mobile network code, such as **`123045`**. See *Mapping Serving Gateways to MCCs/MNCs* for information on mapping serving gateways to MCCs and MNCs.

where the Tracking Area Code *matches one of specified TAC value(s)*

Syntax
where the Tracking Area Code *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific Tracking Area Code values (based on matching wildcard patterns).

User Conditions

User conditions are related to the quota pool, subscriber or subscriber account that is associated with the protocol message that triggered the policy rule execution. This includes subscriber-level and account-level tracking of usage. The following conditions are available.

where the *subscriber or pool field + 0 days* rounded *up* with *same* granularity is *after now* using *configured local time*

Syntax

where the *subscriber field-name direction duration granularity1* rounded *rounding* with *granularity2* granularity is *datetime-compare datetime* using *time-zone*

Parameters

subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

field-name

String representing a datetime.

direction

One of the following, indicating future or past:

- **+** (the default)
- **-**

duration

Positive integer.

granularity1

The calculated datetime is expressed in this granularity:

- **days** (the default)
- **months**
- **hours**
- **minutes**

rounding

One of the following, indicating rounding up or down:

- **up**
- **down**

granularity2

Rounding, either up or down, is expressed in this granularity:

- **same** (same as *granularity1*)
- **months**
- **days**
- **hours**
- **minutes**

datetime-compare

One of the following:

- **after** (the default)
- **before**
- **at or before**
- **at or after**

datetime

One of the following:

- The local date-time **now** (the default)
- A policy variable
- A date-time in the format *yyyy-mm-dd*T*hh*:*mm*:*ss*+*UTCoffset*

time-zone

One of the following:

- **CONFIGURED LOCAL TIME** (the default) — Calculate the time from the location configured for this MPE device
- **SYSTEM LOCAL TIME** — Calculate the time from the location of this MPE device
- **USER LOCAL TIME** — Calculate the time from the location of the user equipment

Description

Triggers a policy that is evaluated based on the result of a comparison between a base date-time value and an offset against either the current date and time or another date-time for the subscriber or quota pool. If time-zone information is available from the user equipment, time can be calculated from either the MPE device or the user equipment's location. For information on quota pools, see *Managing Quotas*.

Example

```
where the FamilyPlanGold PromoEnrollTime + 10 days rounded up with same
granularity is before now using configured local time
```

where the *subscriber or pool field exists*

Syntax
where the *subscriber fieldname accessibility*

Parameters
subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

fieldname

String.

accessibility

One of the following:

- **exists** (the default)
- **does not exist**

Description

Triggers a policy that is evaluated if the specified field either exists or does not exist within the subscriber or quota pool data. For information on quota pools, see *Managing Quotas*

where the *subscriber or pool field* is numerically *equal to value*

Syntax
where the *subscriber field-name* is numerically *operator value*

Parameters
subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

field-name

String.

operator

See *Table 8: Common Parameters*.

value

Integer value in the inclusive range of -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 (that is, -2^{63} to 2^{63}—1).

Description

Triggers a policy that is evaluated based on the result of a comparison between the value of a specified field and a numerical value for the subscriber or quota pool. For information on quota pools, see *Managing Quotas*.

Example

```
where the FamilyPlanGold total-session-count is numerically less than 5
```

where the *subscriber or pool field matches one of specified value(s)*

Syntax
where the *subscriber field-name matches-op match-list*

Parameters
subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

field-name

String.

matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is evaluated based on the result of a comparison between the value of a specified field and a list of specified values (based on matching wildcard patterns) for the subscriber or quota pool. For information on quota pools, see *Managing Quotas*.

where the *subscriber or pool* profile data *is* available

Syntax
where the *subscriber* profile data *operator* available

Parameters
subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

operator

See *Table 8: Common Parameters*.

Description

Triggers a policy based on whether subscriber or quota pool data is or is not available. For information on quota pools, see *Managing Quotas*.

where the subscriber profile data *expiration timestamp field for day pass in millis* is less than *hours from expiration* hours from expiring

Syntax
where the subscriber profile data *field-name* is less than *number* hours from expiring

Parameters
field-name

String.

number

See *Table 8: Common Parameters*.

Description

Triggers a policy based on whether the value of a subscriber profile timestamp field is less than the specified number of hours away.

where the tier *is* one of *specified tier(s)*

Syntax
where the tier *operator* one of *tiers*

Parameters
operator

See *Table 8: Common Parameters*.

tiers

A comma-separated list of names of one more tiers defined in the CMP database.

Description

Triggers a policy that is or is not evaluated for one or more specific tiers.

where the user does not have any of the *named* entitlements

Syntax
where the user does not have any of the *csv* entitlements

Parameters
csv

Comma-separated list of text values.

Description

Triggers a policy that is evaluated as true for users who do not have any of the specified entitlements. The user must have none of the entitlements in the specified list. See *Managing Subscribers* for information on entitlements.

where the user does not have at least one of the *named* entitlements

Syntax
where the user does not have at least one of the *csv* entitlements

Parameters
csv

Comma-separated list of text values.

Description

Triggers a policy that is evaluated as true for users who do not have all of the specified entitlements. False if the user has all of the entitlements in the specified list. See *Managing Subscribers* for information on entitlements.

where the user E.164 phone number *matches one of specified number(s)*

Syntax
where the E.164 phone number *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific E.164 phone numbers (based on matching wildcard patterns). A valid E.164 phone number is any phone number.

where the user has all of the *named* entitlements

Syntax
where the user has all of the *csv* entitlements

Parameters
csv

Comma-separated list of text values.

Description

Triggers a policy that is only evaluated for users that have specific entitlements. The user must have all the entitlements in the specified list. See *Managing Subscribers* for information on entitlements.

where the user has at least one of the *named* entitlements

Syntax
where the user has at least one of the *csv* entitlements

Parameters
csv

Comma-separated list of text values.

Description

Triggers a policy that is evaluated as true for users that have specific entitlements. The user must have one of the entitlements in the specified list. See *Managing Subscribers* for information on entitlements.

where the user IMSI *matches one of specified number(s)*

Syntax
where the user IMSI *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific IMSI values (based on matching wildcard patterns). A valid IMSI value is not more than 15 digits, including the mobile country code (3 digits), mobile network code (2 to 3 digits), and the mobile station identification number. For example: 310150123456789.

where the user NAI *matches one of specified id(s)*

Syntax
where the user NAI *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific NAI values (based on matching wildcard patterns).

where the user realm *matches one of specified realm(s)*

Syntax
where the user realm *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific realms (based on matching wildcard patterns).

where the user SIP URI *matches one of specified URI(s)*

Syntax
where the user SIP URI *matches-op match-list*

Parameters
matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy that is only evaluated for one or more specific SIP URI values (based on matching wildcard patterns).

where the user will be using *greater than #* bps *upstream reserved* bandwidth

Syntax
where the user will be using *operator bandwidth* bps *qos-direction qos-status* bandwidth

Parameters
operator

See *Table 8: Common Parameters*.

bandwidth

See *Table 8: Common Parameters*.

qos-direction

See *Table 8: Common Parameters*.

qos-status

See *Table 8: Common Parameters*.

Description

Triggers a policy based on the total amount of bandwidth allocated. This can be further qualified by both the direction and allocation status of the bandwidth. The total represents the bandwidth that is allocated if the current request is approved.

where the user will be using *greater than #* bps *upstream reserved* bandwidth in total for *specified application*

Syntax

where the user will be using *operator bandwidth* bps *qos-direction qos-status* bandwidth in total for *app-name*

Parameters

operator

See *Table 8: Common Parameters*.

bandwidth

See *Table 8: Common Parameters*.

qos-direction

See *Table 8: Common Parameters*.

qos-status

See *Table 8: Common Parameters*.

app-name

Names of applications that are defined in the CMP database.

Description

Triggers a policy based on the total amount of bandwidth allocated for specific applications by the associated subscriber as it relates to a defined threshold. This can be further qualified by both the direction and allocation status of the bandwidth. The total represents the bandwidth that is allocated if the current request is approved. See *Managing Application Profiles* for information on applications.

where the user will be using *greater than # upstream reserved* flows

Syntax

where the user will be using *operator number qos-direction qos-status* flows

Parameters

operator

See *Table 8: Common Parameters*.

number

See *Table 8: Common Parameters*.

qos-direction

See *Table 8: Common Parameters*.

qos-status

See *Table 8: Common Parameters*.

Description

Triggers a policy based on the total number of flows used by the associated subscriber as it relates to a defined threshold. This can be further qualified by both the direction and allocation status of these flows. The total represents the number of flows that are allocated if the current request is approved.

where the user will be using *greater than # upstream reserved* flows in total for *specified application*

Syntax

where the user will be using *operator number qos-direction qos-status* flows in total for *app-name*

Parameters

operator

See *Table 8: Common Parameters*.

number

See *Table 8: Common Parameters*.

qos-direction

See *Table 8: Common Parameters*.

qos-status

See *Table 8: Common Parameters*.

app-name

Names of applications that are defined in the CMP database.

Description

Triggers a policy based on the total number of flows for specific applications used by the associated subscriber as it relates to a defined threshold. This can be further qualified by both the direction and allocation status of the flows. The total represents the number of flows that are allocated if the current request is approved. See *Managing Application Profiles* for information on applications.

where the User's Tier *upstream* bandwidth limit is between # bps and # bps

Syntax
where the User's Tier *qos-direction* bandwidth limit is between *bandwidth* bps and *bandwidth* bps

Parameters
qos-direction

See *Table 8: Common Parameters*.

bandwidth

See *Table 8: Common Parameters*.

Description

Triggers a policy that is evaluated for a user tier based on the bandwidth limit. This can be further qualified by the direction of the bandwidth. See *Managing Subscribers* for information on tiers.

Example

```
where the User's Tier downstream bandwidth limit is between 2M bps and 25M
 bps
```

where the User's Tier *downstream* bandwidth limit is *greater than* # bps

Syntax
where the User's Tier *qos-direction* bandwidth limit is *operator bandwidth* bps

Parameters
qos-direction

See *Table 8: Common Parameters*.

operator

See *Table 8: Common Parameters*.

bandwidth

See *Table 8: Common Parameters*.

Description

Triggers a policy that is evaluated for a user tier based on the comparison between the bandwidth limit and a numerical value. This can be further qualified by the direction of the bandwidth. See *Managing Subscribers* for information on tiers.

Example

```
where the User's Tier downstream bandwidth limit is less than or equal to
 25M bps
```

User State Conditions

User State conditions are related to the value of subscriber properties, retrieved by name from a Subscriber Profile Repository (SPR), as policy rules are being executed.

where the *subscriber or pool* property *name + 0 days* rounded *up* with *same* granularity is *after now* using *configured local time*

Syntax
where the *subscriber* property *property-name direction duration granularity1* rounded *rounding* with *granularity2* granularity is *datetime-compare datetime* using *time-zone*

Parameters
subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

property-name

String.

direction

One of the following, indicating future or past:

- **+** (the default)
- **-**

duration

Positive integer.

granularity1

The calculated datetime is expressed in this granularity:

- **days** (the default)
- **months**
- **hours**
- **minutes**

rounding

One of the following, indicating rounding up or down:

- **up** (the default)
- **down**

granularity2

Rounding, either up or down, is expressed in this granularity:

- **same** (same as *granularity1*, the default)
- **months**
- **days**

- **hours**
- **minutes**

datetime-compare

One of the following:

- **after** (the default)
- **before**
- **at or before**
- **at or after**

datetime

One of the following:

- The local date-time **now** (the default)
- A policy variable
- A date-time in the format *yyyy-mm-dd*T*hh:mm:ss+UTCoffset*

time-zone

One of the following:

- **CONFIGURED LOCAL TIME** (the default) — Calculate the time from the location configured for this MPE device
- **SYSTEM LOCAL TIME** — Calculate the time from the location of this MPE device
- **USER LOCAL TIME** — Calculate the time from the location of the user equipment

Description

Triggers a policy that is evaluated for a subscriber or quota pool based on the result of a comparison between a base date-time value and an offset against either the current date-time or another date-time. If time-zone information is available from the user equipment, time can be calculated from either the MPE device or the user equipment's location. For information on quota pools, see *Managing Quotas*.

Examples

```
where the FamilyPlanGold property maintenance-time + 0 minutes
is at or after 2011-10-24T01:00 using configured local time

where the FamilyPlanGold property maintenance-time + 0 minutes
is at or before 2011-10-24T01:00 using configured local time
```

where the *subscriber or pool* property *name exists*

Syntax

where the *subscriber* or pool property *property-name accessibility*

Parameters

subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber

- **pool** — Name of a quota pool defined in the CMP database

property-name

String.

accessibility

One of the following, indicating future or past:

- **exists** (the default)
- **does not exist**

Description

Triggers a policy based on whether or not the specified property exists within the subscriber or quota pool profile. For information on quota pools, see *Managing Quotas*.

where the *subscriber or pool* property *name* is *in* the current billing cycle using *configured local time*

Syntax

where the *subscriber* or pool property *property-name* is *comparison-op* the current billing cycle using *time-zone*

Parameters

subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

property-name

String.

comparison-op

One of the following:

- **in** (the default)
- **not in**
- **before**
- **after**

time-zone

One of the following:

- **CONFIGURED LOCAL TIME** (the default) — Calculate the time from the location configured for this MPE device
- **SYSTEM LOCAL TIME** — Calculate the time from the location of this MPE device
- **USER LOCAL TIME** — Calculate the time from the location of the user equipment

Description

Triggers a policy that is evaluated based on the comparison between the timestamp value of the specified subscriber or pool property and the current billing cycle. If time-zone information is available from the user equipment, time can be calculated from either the MPE device or the user equipment's location. For information on quota pools, see *Managing Quotas*.

Note: When the user local time context is in effect, the MPE device ends the billing cycle or resets the quota based on the user local time. If user equipment enters a different time zone near the end of a billing cycle, the subscriber may find that the billing cycle ended earlier than expected, or the service provider may find that the billing cycle ended later than expected.

Example

```
where the FamilyPlanGold property last-connect-time is in the
current billing cycle using configured local time
```

where the *subscriber or pool* property *name* is numerically *equal to value*

Syntax

where the *subscriber* property *property-name* is numerically *operator value*

Parameters

subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

property-name

String.

operator

See *Table 8: Common Parameters*.

value

Integer value in the inclusive range of –9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 (that is, -2^{63} to $2^{63}-1$).

Description

Triggers a policy based on a numerical comparison between the specified subscriber or quota pool property value and a specified value. For information on quota pools, see *Managing Quotas*.

where the *subscriber or pool* property *name is* the current mobile country code

Syntax

where the *subscriber* property *property-name operator-binary* the current mobile country code

Parameters
subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

property-name

String.

operator-binary

See *Table 8: Common Parameters*.

Description

Triggers a policy that is evaluated based on the comparison between the value of the specified subscriber or quota pool property and the current mobile country code. For information on quota pools, see *Managing Quotas*.

Example

```
where the FamilyPlanGold property current-mcc is not the
current mobile country code
```

where the *subscriber or pool* property *name matches one of `value(s)`*

Syntax
where the *subscriber* property *property-name matches-op `match-list`*

Parameters
subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

property-name

String.

matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy based on whether the specified subscriber or quota pool property value matches a list of specified values (based on matching wildcard patterns). For information on quota pools, see *Managing Quotas*.

Policy Context Property Conditions

Policy Context Properties are user-defined name/value string pairs that can be created from policy actions and evaluated from policy conditions. By using policy context properties, one policy can influence the execution of other policies. Policy context properties exist across multiple policy executions on the same request, but are not persistent across requests.

where the policy context property *name exists*

Syntax
where the policy context property *property-name accessibility*

Parameters
property-name

String.

accessibility

One of the following:

- **exists** (the default)
- **does not exist**

Description

Triggers a policy based on whether or not the specified policy context property exists.

where the policy context property *name* is numerically *equal to value*

Syntax
where the policy context property *property-name* is numerically *operator value*

Parameters
property-name

String.

operator

See *Table 8: Common Parameters*.

value

Integer value in the inclusive range of -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 (that is, -2^{63} to $2^{63} - 1$).

Description

Triggers a policy based on a numerical comparison between the specified policy context property value and a specified value.

Example

The following policy will release the session if the DATA_LIM for the subscriber is changed from non-zero to zero.

```
where the reauth is triggered by subscriber profile update with notification
 type SUBSCRIBER_POOL
And where at least one of pool fields DATA_LIM have been updated
And where the policy context property {Previous.Pool.DATA_LIM} is
numerically greater than 0
release the session
accept message
```

where the policy context property *name matches one of `value(s)`*

Syntax

where the policy context property *property-name matches-op `match-list`*

Parameters

property-name

String.

matches-op

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy based on whether the specified policy context property value matches a list of specified values (based on matching wildcard patterns).

Time-of-Day Conditions

Time-of-Day conditions are related to the time at which the policy rules are being executed.

where the current time *is* between *start time* and *end time* using *configured local time*

Syntax

where the current time *operator-binary* between *time-of-day* and *time-of-day* using *time-zone*

Parameters

operator-binary

See *Table 8: Common Parameters*.

time-of-day

A time, in the format of *hh*:*mm*, where *hh* is a number in the range from 0 to 23.

time-zone

One of the following:

- **CONFIGURED LOCAL TIME** (the default) — Calculate the time from the location configured for this MPE device
- **SYSTEM LOCAL TIME** — Calculate the time from the location of this MPE device
- **USER LOCAL TIME** — Calculate the time from the location configured for the user equipment's location

Description

Triggers a policy based on time. If time-zone information is available from the user equipment, time can be calculated from either the MPE device or the user equipment's location.

where the current time *is* within the *specified* time period(s)

Syntax

where the current time *operator-binary* within the *time-period* time period(s)

Parameters

operator-binary

See *Table 8: Common Parameters*.

time-period

Names of one or more time periods that are defined in the CMP database.

Description

Triggers a policy based on the time period.

where today is a week day using *configured local time*

Syntax

where today is a week day using *time-zone*

Parameters

time-zone

One of the following:

- **CONFIGURED LOCAL TIME** (the default) — Calculate the time from the location configured for this MPE device
- **SYSTEM LOCAL TIME** — Calculate the time from the location of this MPE device
- **USER LOCAL TIME** — Calculate the time from the location configured for the user equipment's location

Description

Triggers a policy based on the day of the week. If time-zone information is available from the user equipment, time can be calculated from either the MPE device or the user equipment's location.

where today is a weekend day using *configured local time*

Syntax
where today is a weekend day using *time-zone*

Parameters
time-zone

One of the following:

- **CONFIGURED LOCAL TIME** (the default) — Calculate the time from the location configured for this MPE device
- **SYSTEM LOCAL TIME** — Calculate the time from the location of this MPE device
- **USER LOCAL TIME** — Calculate the time from the location configured for the user equipment's location

Description

Triggers a policy based on the day of the week. If time-zone information is available from the user equipment, time can be calculated from either the MPE device or the user equipment's location.

where today *is day* using *configured local time*

Syntax
where today *operator-binary day-of-week* using *time-zone*

Parameters
operator-binary

See *Table 8: Common Parameters*.

day-of-week

One of the following:

- **Sunday**
- **Monday**
- **Tuesday**
- **Wednesday**
- **Thursday**
- **Friday**
- **Saturday**

time-zone

One of the following:

- **CONFIGURED LOCAL TIME** (the default) — Calculate the time from the location configured for this MPE device

- **SYSTEM LOCAL TIME** — Calculate the time from the location of this MPE device
- **USER LOCAL TIME** — Calculate the time from the location configured for the user equipment's location

Description

Triggers a policy based on the day of the week. If time-zone information is available from the user equipment, time can be calculated from either the MPE device or the user equipment's location.

Policy Counter Conditions

Policy Counter conditions are related to policy counters stored in online charging servers (OCSs).

where a *current* status *exists* for Policy Counter Id *select name*

Syntax
where a *status* status *accessibility* for Policy Counter Id *counter-name*

Parameters
status

One of the following:

- **pending** — Accesses the pending status closest to the current time.
- **current** — Accesses the current status (the default).

accessibility

One of the following:

- **exists** (the default)
- **does not exist**

counter-name

Name of policy counter ID defined in the CMP database; or enter a string.

Description

Triggers a policy based on whether the specified policy counter ID property exists or does not exist in the selected counter ID status. See *Managing Policy Counter Identifiers* for information on policy counter IDs.

where the Filter-Ids for Policy Counter ID *select name current* status match one or more of *Filter-Ids to match*

Syntax
where the Filter-Ids for Policy Counter ID *counter-name status* status match one or more of *match-list*

Parameters
counter-name

Name of policy counter ID defined in the CMP database; or enter a string.

status

Specifies to access the current or pending Policy Counter. Selecting **pending** accesses the pending status closest to the current time. The defualt is **current**.

accessibility

One of the following:

- **exists** (the default)
- **does not exist**

match-list

See *Table 8: Common Parameters*.

Description

Triggers a policy based on whether the specified policy counter ID property matches the selected counter ID status and filter expression(s). See *Managing Policy Counter Identifiers* for information on policy counter IDs.

where the Final-Unit-Action for Policy Id Counter Id *select name current* status matches *Final-Unit-Action to match*

Syntax

where the Final-Unit-Action for Policy Id Counter Id *counter-name status* status matches *action*

Parameters

counter-name

Name of policy counter ID defined in the CMP database; or enter a string.

status

Specifies to access the current or pending Policy Counter. Selecting **pending** accesses the pending status closest to the current time. The defualt is **current**.

action

The action to match. One of the following:

- **ACTION_TERMINATE** (the default)
- **ACTION_REDIRECT**
- **ACTION_RESTRICT_ACCESS**

Description

Tests whether the Policy Counter ID contains a Final Unit Action (FUA) attribute-value pair (AVP) matching the specified FUA. See *Managing Policy Counter Identifiers* for information on policy counter IDs.

where the Final-Unit-Indication AVP for Policy Counter Id *select name current* status *exists*

Syntax
where the Final-Unit-Indication AVP for Policy Id Counter Id *counter-name status* status *accessibility*

Parameters
counter-name

Name of policy counter ID defined in the CMP database; or enter a string.

status

Specifies to access the current or pending Policy Counter. Selecting **pending** accesses the pending status closest to the current time. The defualt is **current**.

accessibility

One of the following:

- **exists** (the default)
- **does not exist**

Description

Determines whether the Final-Unit-Indication AVP for the Policy Counter ID is accessible. See *Managing Policy Counter Identifiers* for information on policy counter IDs.

where the Policy Counter ID *select name exists*

Syntax
where the Policy Counter ID *counter-name accessibility*

Parameters
counter-name

Name of policy counter ID defined in the CMP database; or enter a string.

accessibility

One of the following:

- **exists** (the default)
- **does not exist**

Description

Triggers a policy based on whether or not the specified policy counter ID property exists or does not exist. See *Managing Policy Counter Identifiers* for information on policy counter IDs.

where the Policy Counter ID *select name current* status *is* contained in Match List(s) *select list(s)*

Syntax
where the Policy Counter ID *counter-name status* status *operator-binary* contained in Match List(s) *match-list*

Parameters
counter-name

Name of policy counter ID defined in the CMP database; or enter a string.

status

Specifies to access either the current or pending Policy Counter. Selecting **pending** accesses the pending status closest to the current time. The defualt is **current**.

operator-binary

See *Table 8: Common Parameters*.

match-list

See *Table 8: Common Parameters*.

Description

Selects protocol messages based on whether the status of a policy counter ID matches, or does not match, any of the values in a match list. Any of the types can be selected in combination. The order will match the list from top to bottom. See *Managing Policy Counter Identifiers* for information on policy counter IDs. See *Managing Match Lists* for information about defining match lists.

where the Policy Counter ID *select name current* status is numerically *equal to value*

Syntax
where the policy context property *counter-name status* status is numerically *operator value*

Parameters
counter-name

Name of policy counter ID defined in the CMP database; or enter a string.

status

Specifies to access either the current or pending Policy Counter. Selecting **pending** accesses the pending status closest to the current time. The defualt is **current**.

operator

See *Table 8: Common Parameters*.

value

Integer value in the inclusive range of -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 (that is, -2^{63} to $2^{63} - 1$).

Description

Triggers a policy based on a numerical comparison between the specified policy counter ID status value and a specified value. See *Managing Policy Counter Identifiers* for information on policy counter IDs.

where the Policy Counter ID *select name current* status *is* between *value* and *value*

Syntax
where the policy counter ID *counter-name status* status *operator-binary* between *value* and *value*

Parameters
counter-name

Name of policy counter ID defined in the CMP database; or enter a string.

status

Specifies to access either the current or pending Policy Counter. Selecting **pending** accesses the pending status closest to the current time. The defualt is **current**.

operator-binary

See *Table 8: Common Parameters*.

value

Integer value in the inclusive range of -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 (that is, -2^{63} to $2^{63} - 1$).

Description

Triggers a policy based on a numerical comparison between the specified policy counter ID value and a pair of specified values, and whether the ID is or is not within the range defined by the two values. See *Managing Policy Counter Identifiers* for information on policy counter IDs.

where the Policy Counter ID *select name current* status *matches one of specified value(s)*

Syntax
where the Policy Counter ID *counter-name status* status *matches-op value-list*

Parameters
counter-name

Name of policy counter ID defined in the CMP database; or enter a string.

status

Specifies to access either the current or pending Policy Counter. Selecting **pending** accesses the pending status closest to the current time. The defualt is **current**.

matches-op

See *Table 8: Common Parameters*.

value-list

A comma-delimited list of values to compare against.

Description

Triggers a policy based on whether the status of a specified policy counter ID value matches, or does not match, a list of specified values (based on matching wildcard patterns). See *Managing Policy Counter Identifiers* for information on policy counter IDs.

where the Policy Counter ID *select name* status *is* equal to default status

Syntax
where the Policy Counter ID *counter-name* status *operator-binary* equal to default status

Parameters
counter-name

Name of policy counter ID defined in the CMP database; or enter a string.

operator-binary

See *Table 8: Common Parameters*.

Description

Selects protocol messages based on whether the policy counter ID status is, or is not, equal to the default status defined for the policy counter ID. See *Managing Policy Counter Identifiers* for information on policy counter IDs.

where the Sy Session *exists*

Syntax
where the Sy Session *accessibility*

Parameters
accessibility

One of the following:

- **exists** (the default)
- **does not exist**

Description

Determines whether the Sy Session is accessible. See *Managing Policy Counter Identifiers* for information on policy counter IDs.

Actions Available for Writing Policy Rules

The policy wizard supports a large number of actions that can be used for constructing policy rules. There are two types of actions:

- **Mandatory policy-processing actions** — This action defines what should happen when the current policy is through executing. When you are creating a policy rule in the policy wizard, these actions are displayed at the top of the list of available actions with a radio button that forces you to select only one of these actions.
- **Optional actions** — This action contains a list of optional actions that you can add to your policy rule. These actions are then executed when the policy rule's conditions have been met. You can select none, one, several, or all of these optional actions. However, each action is limited, so that it can be executed only once per policy rule.

In the same way that you can customize the conditions by editing parameters, many of these actions can be customized by specifying parameter values as well. Actions are listed in alphabetical order. Actions also may be affected by the current mode; hence, some of the actions documented here may not be available in your policy wizard.

Mandatory Policy-Processing Actions

Policy-processing actions define what the Policy Engine should do when the current policy is through executing. The following are the mandatory policy-processing actions; one of these actions must be selected in each policy.

accept message

Description

After executing the current policy rule, the Policy Engine continues with the normal processing of the protocol message but no further policy rules are evaluated.

break from policy level

Description

Stop evaluating the current policy and continue policy evaluation with the next policy at the parent's level. You should use this action only in reference policies.

continue processing message

Description

After executing the current policy rule, the Policy Engine continues with the next policy rule.

reject message

Description

After executing the current policy rule, the Policy Engine terminates all policy-rule processing and rejects the current protocol message. The specific interpretation of “rejecting” the message varies depending on the associated protocol. For most application-level requests this translates into some type of error being sent back to the application.

skip to next device

Description

Stop evaluating policies for the current device and continue policy evaluation with the next device. If there is no next device, policy execution ends.

skip to next flow

Description

Stop evaluating policies for the current flow and continue policy evaluation with the next flow. If there is no next flow, evaluation continues with the next device; if there is no next device, policy execution ends.

Optional Policy-Processing Actions

The following optional policy-processing actions are available.

add custom grouped AVP *name* and send *always*

Syntax
add custom grouped AVP *name* and send *mode*

Parameters
name

Select an existing grouped third-party AVP Name and Vender ID, or an AVP name from an existing policy table.

mode

Select send mode:

- **always** (the default)
- **unless rejected**
- **if rejected**
- or send mode from an existing **Policy Table**

Description

Add or send new custom grouped AVP to the current reply. A condition can be set specifying that the AVP is always set to send mode. If you are defining a new grouped third party AVP with members, the grouped AVP has to appear first in the policy. If you are adding a new member AVP that does not have its parent AVP added yet, the policy attempts to locate this grouped AVP in the rest of the policy. If you are including a grouped AVP multiple times in the same message, you have to follow the order in which it appears in the message.

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

Syntax
Advanced: set values for QoS and Charging parameters to *profile-param*

Parameters
profile-param

Names of profile parameters that are derived from internal representations of protocol messages. This list is lengthy and subject to change as new protocols are supported, and therefore is not given here. The policy wizard includes a customized dialog to help you in the selection of valid values. For the specific meaning of the fields it may be necessary to consult protocol specifications.

Description

Overwrites the corresponding settings in the current protocol message. If you specify settings that are not relevant in the current protocol message, they are ignored. If you select Diameter Enforcement Session Event Triggers, you are presented with another dialog where you can select ECGI_CHANGE and TAI_CHANGE, in addition to the list of previous triggers.

apply *specified profile(s)* to all flows in the request

Syntax
apply *traffic-profile* to all flows in the request

Parameters
traffic-profile

One or more traffic profiles. For more information on traffic profiles, see *Managing Traffic Profiles*.

Description

This parameter allows you to choose different traffic profiles to apply to different types of calls.

apply *specified profile(s)* to flow(s) whose media type matches one of *specified type(s)*

Syntax
apply *traffic-profile* to flow(s) whose media type matches one of *media-type*

Parameters
traffic-profile

One or more traffic profiles. For more information on traffic profiles, see *Managing Traffic Profiles*.

media-type

One or more of the following, used to determine the type of media:

- **Audio**
- **Video**
- **Data**
- **Application**
- **Control**
- **Text**
- **Message**
- **Other**

Description

Applies one or more traffic profiles to one or more flows of the specified type(s). Overwrites the corresponding settings in the protocol messages of the specified flow(s). If multiple traffic profiles are selected they are applied in the order in which they are specified. If a traffic profile contains settings that are not relevant in the current protocol message, they are ignored. The second parameter lets you apply different traffic profiles to flows of different types.

apply *specified profile(s)* to request

Syntax
apply *traffic-profile* to request

Parameters
traffic-profile

One or more traffic profiles. For more information on traffic profiles, see *Managing Traffic Profiles*.

Description

Overwrites the corresponding settings in the current protocol message. If multiple traffic profiles are selected they are applied in the order in which they are specified. If the traffic profile contains settings that are not relevant in the current protocol message, they are ignored.

clear alarm with severity `*severity level*`, id `*unique alarm identifier*` and message `*message text*`

Syntax
clear alarm with severity `*level*`, id `*alarm-id*` and message `*message*`

Parameters
level

One of the following, used to determine which alarm ID is cleared:

- **Critical** (ID 74000)
- **Major** (ID 74001)
- **Minor** (ID 74002)

alarm-id

The alarm ID. If you select **Evaluate as expression**, the text in the field is evaluated as an arithmetic expression, and the result is used.

message

String. This text may contain policy parameters (described later in this section) to perform parameter substitution within the message text. If you select **Evaluate as expression**, the text in the field is evaluated as an arithmetic expression, and the result is used.

Description

Clears an alarm on the CMP Active Alarms display containing the specified severity level and message text. This notification is written to the Alarm History Report with severity Clear. To be cleared, a notification must be uniquely identified by severity and alarm ID. For more information, see *Viewing Active Alarms*.

enable subscription for notification of user profile changes

Description

Causes the MPE device to subscribe to an SPR system for notification of user profile changes.

Note: Within the same MPE device, if subscription to profile updates (that is, Sh:Notify) has occurred (for example, as a result of a policy action), then the MPE device will not resubscribe to update notifications on subsequent triggers (that is, it will not send additional SNR messages to the SPR system).

establish traffic detection session using the IP-CAN TDF information

Description

Use this action to establish an Sd session specified in a Gx CCR request with a single TDF device. On IP-CAN session establishment, the policy action will trigger a TSR command that is sent to the TDF device. This information is received in the TDF-information AVP within the IP-CAN session request.

Example

```
where the request is creating a new session
And where the session is an enforcement session
And where the enforcement session is an IP-CAN session
establish traffic detection session using the IP-CAN TDF information
continue processing message
```

establish traffic detection session with *select network element identity*

Syntax

establish traffic detection session with *tdf*

Parameters
tdf

One or more TDF network elements defined in the CMP database.

Description

On a IP-CAN session establishment, the policy action will trigger a TSR command that is sent to the selected TDF device(s) to establish an Sd session.

Example

```
where the request is creating a new session
And where the session is an enforcement session
And where the enforcement session is an IP-CAN session
establish traffic detection session with tdf1.GalacTel.com,tdf2.GalacTel.com
continue processing message
```

evaluate policy group *select policy group*

Syntax
evaluate policy group *group-name*

Parameters
group-name

Name of a policy group defined in the CMP database.

Description

If the conditions evaluates to true, evaluate the rules in a policy group. When you click the **select policy group** parameter, a pop-up window opens so you can select an existing policy group.

evaluate policy *select policy*

Syntax
evaluate policy *policy-name*

Parameters
policy-name

Name of a policy defined in the CMP database.

Description

If the conditions evaluate to true, evaluate a policy. When you click the **select policy parameter**, a pop-up window opens, giving you the choice of selecting an existing policy or creating a new policy. If you click **Create**, a new **Policy Wizard** tab opens so you can create the new policy. When you save the new policy, it is added to the list of policies available for selection at this point.

fetch Policy Counter(s) *default* from OCS

Syntax
fetch Policy Counter(s) *counter -name* from OCS

Parameters
counter-name

Name of policy counter ID defined in the CMP database; or enter a string.

Description

Retrieve the policy counter(s) for that subscriber from the OCS. If a Policy Counter Group name is selected then all the associated Policy Counters for that group are sent in the SLR message. Leaving the field blank (or unconfigured) indicates that the Policy Counter Identifier list is omitted from the SLR request and all available counters for that subscriber are returned from the OCS.

install *specified* ADC rule(s) for *select scope*

Syntax
install *adc-rule* ADC rule(s) for *adc-rule-scope-install*

Parameters
adc-rule

Names of application detection control traffic profiles that are defined in the CMP database. The traffic profiles must be one of the following types:

- **ADC Rule**
- **Predefined ADC Rule**
- **Predefined ADC Rule Base**

adc-rule-scope-install

One of the following:

- **session**

Description

The specified ADC rule is installed for the session, using the values specified in the associated traffic profile. See *Managing Traffic Profiles* for information on traffic profiles.

Example

```
where the enforcement session is a DPI enforcement session
install ADC1,ADC5,ADC6 ADC rule(s) for session
continue processing message
```

install *specified* ADC rule(s) for *select scope* active between *start time and end time*

Syntax
install *adc-rule* ADC rule(s) for *adc-rule-scope-install* active between *start-and-end-time*

Parameters
adc-rule

Names of application detection control traffic profiles that are defined in the CMP database. The traffic profiles must be one of the following types:

- **ADC Rule**
- **Predefined ADC Rule**
- **Predefined ADC Rule Base**

adc-rule-scope-install

One of the following:

- **session**

start-and-end-time

Specifies the start and end time for rule to be active. If start time is not specified, the rule becomes active immediately. If end time is not specified, the rule never deactivates. Select either absolute time or relative time for both start-time and end-time:

- **None**— Specifies the time to start/end in the form *HH*:*mm*:*ss*. The date is calculated to be the minimum future date for that time.
- **Specific Time** — Specifies the time and date to start/end in the form *YYYY-MM-dd*T*HH*:*mm*:*ss*.
- **Relative time** — Specifies the number of hours, minutes, or seconds from the current time to start/end. Variables include:
  - Date
  - Time
  - UTC Offset — select number of hours before or after UTC time to start/end.
  - Now — select to start/end now.
  - Time only — select to use the time only.
- **Policy Counter ID** — Name of policy counter ID defined in the CMP database; or enter a string.

Description

The specified ADC rule is installed for the session, using the values specified in the associated traffic profile, and is active between the specified start and end times. See *Managing Traffic Profiles* for information on traffic profiles.

install *specified* ADC rule(s) for *select scope* active within *Time Period*

Syntax
install *adc-rule* ADC rule(s) for *adc-rule-scope-install* active within *time-period*

Parameters

adc-rule

Names of application detection control traffic profiles that are defined in the CMP database. The traffic profiles must be one of the following types:

- **ADC Rule**
- **Predefined ADC Rule**
- **Predefined ADC Rule Base**

adc-rule-scope-install

One of the following:

- **session**

time-period

Specifies the time period when the rule is active. When that time period begins the rule activates, and when the time period ends the rule deactivates. Select one of the following:

- **Time Period** — Select pre-defined time period.
- **Policy Table Field** — Select time-related field from Policy Table selected for this Policy.

Description

The specified ADC rule is installed for the session, using the values specified in the associated traffic profile, and the rule is active for the specified time period. When a time period is used in a policy, you cannot delete that time period from the CMP database. See *Managing Traffic Profiles* for information on traffic profiles.

install *specified* ADC rule(s) for *select scope* with *specified retry profile*

Syntax

install *adc-rule* ADC rule(s) for *adc-rule-scope-install* with *retry-profile*

Parameters

adc-rule

Names of application detection control traffic profiles that are defined in the CMP database. The traffic profiles must be one of the following types:

- **ADC Rule**
- **Predefined ADC Rule**
- **Predefined ADC Rule Base**

adc-rule-scope-install

One of the following:

- **session**

retry-profile

Name of a retry profile that is defined in the CMP database. (See *Managing Retry Profiles* for more information.)

Description

The specified ADC rule is installed for the session, using the values specified in the associated traffic profile and the associated retry profile. See *Managing Traffic Profiles* for information on traffic profiles.

install *specified* ADC rule(s) for *select scope* for *specified retry profile* active between *start time and end time*

Syntax

install *adc-rule* ADC rule(s) for *adc-rule-scope-install* for *retry-profile* active between *start-end-time*

Parameters

adc-rule

Names of application detection control traffic profiles that are defined in the CMP database. The traffic profiles must be one of the following types:

- **ADC Rule**
- **Predefined ADC Rule**
- **Predefined ADC Rule Base**

adc-rule-scope-install

One of the following:

- **session**

retry-profile

Name of a retry profile that is defined in the CMP database. (See *Managing Retry Profiles* for more information.)

start-end-time

Specifies the start and end time for rule to be active. If a start time is not specified, the rule becomes active immediately. If an end time is not specified, the rule never deactivates. Select either absolute time or relative time for both the start time and the end time:

- **Absolute time but no date** — Specifies the time to start/end in the form *HH*:*mm*:*ss*. The date is calculated to be the minimum future date for that time.
- **Absolute time and date** — Specifies the time and date to start/end in the form *YYYY-MM-dd*T*HH*:*mm*:*ss*.
- **Relative time** — Specifies the number of hours, minutes, or seconds from the current time to start/end. Variables include:
  - Date
  - Time
  - UTC Offset — select number of hours before or after UTC time to start/end.
  - none — ignore time.
  - Now — select to start/end now.
  - Time only — select to use the time only.

Description

The specified ADC rule is installed for the session, using the values specified in the associated traffic profile and the associated retry profile, and the rule is active for the specified time period. See *Managing Traffic Profiles* for information on traffic profiles.

install *specified* ADC rule(s) for *select scope* for *specified retry profile* active within *Time Period*

Syntax

install *adc-rule* ADC rule(s) for *adc-rule-scope-install* for *retry-profile* active within *time-period*

Parameters

adc-rule

Names of application detection control traffic profiles that are defined in the CMP database. The traffic profiles must be one of the following types:

- **ADC Rule**
- **Predefined ADC Rule**
- **Predefined ADC Rule Base**

adc-rule-scope-install

One of the following:

- **session**

retry-profile

Name of a retry profile that is defined in the CMP database. (See *Managing Retry Profiles* for more information.)

time-period

Specifies the time period when the rule is active. When that time period begins the rule activates, and when the time period ends the rule deactivates. Select one of the following:

- **Time Period** — Select pre-defined time period.
- **Policy Table Field** — Select time-related field from Policy Table selected for this Policy.

Description

The specified ADC rule is installed for the session, using the values specified in the associated traffic profile and the associated retry profile, and the rule is active for the specified time period. See *Managing Traffic Profiles* for information on traffic profiles.

install *specified* PCC rule(s) for *select scope*

Syntax

install *pcc-rule* PCC rule(s) for *pcc-rule-scope-install*

Parameters

pcc-rule

Names of policy and charging control traffic profiles that are defined in the CMP database. The PCC profiles must be one of the following types:

- **PCC Rule**
- **Predefined PCC Rule**
- **Predefined PCC Rule Base**

pcc-rule-scope-install

One of the following:

- **flow**
- **session**

Description

The specified PCC rule is installed for either the session or flow, using the values specified in the associated traffic profile. See *Managing Traffic Profiles* for information on traffic profiles.

install *specified* PCC rule(s) for *select scope* active between *start time and end time*

Syntax

install *pcc-rule* PCC rule(s) for *pcc-rule-scope-install* active between *start-and-end-time*

Parameters

pcc-rule

Names of policy and charging control traffic profiles that are defined in the CMP database. The traffic profiles must be one of the following types:

- **PCC Rule**
- **Predefined PCC Rule**
- **Predefined PCC Rule Base**

pcc-rule-scope-install

One of the following:

- **flow**
- **session**

start-and-end-time

Specifies the start and end time for rule to be active. If start time is not specified, the rule becomes active immediately. If end time is not specified, the rule never deactivates. Select either absolute time or relative time for both start-time and end-time:

- **None**— Specifies the time to start/end in the form *HH*:*mm*:*ss*. The date is calculated to be the minimum future date for that time.
- **Specific Time** — Specifies the time and date to start/end in the form *YYYY-MM-dd*T*HH*:*mm*:*ss*.
- **Relative time** — Specifies the number of hours, minutes, or seconds from the current time to start/end. Variables include:

- Date
- Time
- UTC Offset — select number of hours before or after UTC time to start/end.
- Now — select to start/end now.
- Time only — select to use the time only.

- **Policy Counter ID** — Name of policy counter ID defined in the CMP database; or enter a string.

Description

The specified PCC rule is installed for either the session or flow, using the values specified in the associated traffic profile, and is active between the specified start and end times. See *Managing Traffic Profiles* for information on traffic profiles.

install *specified* PCC rule(s) for *select scope* active within *Time Period*

Syntax
install *pcc-rule* PCC rule(s) for *pcc-rule-scope-install* active within *time-period*

Parameters
pcc-rule

Names of policy and charging control profiles that are defined in the CMP database. The traffic profiles must be one of the following types:

- **PCC Rule**
- **Predefined PCC Rule**
- **Predefined PCC Rule Base**

pcc-rule-scope-install

One of the following:

- **flow**
- **session**

time-period

Specifies the time period when the rule is active. When that time period begins the rule activates, and when the time period ends the rule deactivates. Select one of the following:

- **Time Period** — Select pre-defined time period.
- **Policy Table Field** — Select time-related field from Policy Table selected for this Policy.

Description

The specified PCC rule is installed for either the session or flow, using the values specified in the associated traffic profile, and the rule is active for the specified time period. When a time period is used in a policy, you cannot delete that time period from the CMP database. See *Managing Traffic Profiles* for information on traffic profiles.

install *specified* PCC rule(s) for *select scope* with *specified retry profile*

Syntax
install *pcc-rule* PCC rule(s) for *pcc-rule-scope-install* with *retry-profile*

Parameters
pcc-rule

Names of policy and charging control traffic profiles that are defined in the CMP database. The traffic profiles must be one of the following types:

- **PCC Rule**
- **Predefined PCC Rule**
- **Predefined PCC Rule Base**

pcc-rule-scope-install

One of the following:

- **flow**
- **session**

retry-profile

Name of a retry profile that is defined in the CMP database. (See *Managing Retry Profiles* for more information.)

Description

The specified PCC rule is installed for either the session or flow, using the values specified in the associated traffic profile and the associated retry profile. See *Managing Traffic Profiles* for information on traffic profiles.

install *specified* PCC rule(s) for *select scope* for *specified retry profile* active between *start time and end time*

Syntax
install *pcc-rule* PCC rule(s) for *pcc-rule-scope-install* for *retry-profile* active between *start-end-time*

Parameters
pcc-rule

Names of policy and charging control traffic profiles that are defined in the CMP database. The traffic profiles must be one of the following types:

- **PCC Rule**
- **Predefined PCC Rule**
- **Predefined PCC Rule Base**

pcc-rule-scope-install

One of the following:

- **flow**
- **session**

retry-profile

Name of a retry profile that is defined in the CMP database. (See *Managing Retry Profiles* for more information.)

start-end-time

Specifies the start and end time for rule to be active. If a start time is not specified, the rule becomes active immediately. If an end time is not specified, the rule never deactivates. Select either absolute time or relative time for both the start time and the end time:

- **Absolute time but no date** — Specifies the time to start/end in the form *HH*:*mm*:*ss*. The date is calculated to be the minimum future date for that time.
- **Absolute time and date** — Specifies the time and date to start/end in the form *YYYY-MM-dd*T*HH*:*mm*:*ss*.
- **Relative time** — Specifies the number of hours, minutes, or seconds from the current time to start/end. Variables include:
  - Date
  - Time
  - UTC Offset — select number of hours before or after UTC time to start/end.
  - Now — select to start/end now.
  - Time only — select to use the time only.

Description

The specified PCC rule is installed for either the session or flow, using the values specified in the associated traffic profile and the associated retry profile, and is active between the specified start and end times. See *Managing Traffic Profiles* for information on traffic profiles.

install *specified* PCC rule(s) for *select scope* for *specified retry profile* active within *Time Period*

Syntax

install *pcc-rule* PCC rule(s) for *pcc-rule-scope-install* for *retry-profile* active within *time-period*

Parameters

pcc-rule

Names of policy and charging control traffic profiles that are defined in the CMP database. The traffic profiles must be one of the following types:

- **PCC Rule**
- **Predefined PCC Rule**
- **Predefined PCC Rule Base**

pcc-rule-scope-install

One of the following:

- **flow**
- **session**

retry-profile

Name of a retry profile that is defined in the CMP database. (See *Managing Retry Profiles* for more information.)

time-period

Specifies the time period when the rule is active. When that time period begins the rule activates, and when the time period ends the rule deactivates. Select one of the following:

- **Time Period** — Select pre-defined time period.
- **Policy Table Field** — Select time-related field from policy table selected for this policy.

Description

The specified PCC rule is installed for either the session or flow, using the values specified in the associated traffic profile and the associated retry profile, and the rule is active for the specified time period. See *Managing Traffic Profiles* for information on traffic profiles.

mark request AVP *name* as failed if exists and send *always*

Syntax
mark request AVP *name* as failed if exists and send *always*

Parameters
name

String representing existing AVP name, entered in the format *AVPname*:*VendorID* or, for nested AVP names in an AVP group, entered in the format [*AVPname1*]:*VendorID*.[*AVPname2*]:*VendorID* ... for the members of the grouped AVPs. An AVP name can also be selected from an existing Policy Table. There is also the option to evaluate as an expression (click to select check box).

always

Send mode:

- **always** (the default)
- **unless rejected**
- **if rejected**
- or send mode from an existing Policy Table

quota-name

Name of quota defined in the CMP database.

Description

Marks a request AVP as failed in the reply message, and notifies the opposite peer of the failed AVP validation. This action supports both loaded base Diameter AVPs and third-party AVPs.

re-authorize all PCEF/TDF sessions associated with *select scope*

Syntax
re-authorize all PCEF/TDF sessions associated with *pcef-scope-install*

Parameters
pcef-scope-install

One of the following:

- **IP-CAN session**
- **user**

Description

Triggers reauthorization for PCEF or TDF sessions, either within the IP-CAN session associations (that is, all Gx sessions sharing the same IP address and APN) or for all the user's sessions (that is, all Gx sessions sharing the same user ID). Each reauthorization request contains the original event that triggered the reauthorization action, so information from this event can be evaluated by the Policy Engine during the evaluation of the request. For example, an event trigger received in a CCR on one interface, such as RAT_CHANGE, can be used in the evaluation of the reauthorization request triggered by this CCR. This action is valid regardless of whether Gx correlation is enabled or disabled.

release all PCEF/TDF sessions associated with *select scope*

Syntax
release all PCEF/TDF sessions associated with *pcef-scope-install*

Parameters
pcef-scope-install

One of the following:

- **IP-CAN session**
- **user**

Description

Triggers release of PCEF or TDF sessions, either within the IP-CAN session associations (that is, all Gx sessions sharing the same IP address and APN) or for all the user's sessions (that is, all Gx sessions sharing the same user ID).

release the session

Description

Releases the session.

remove ADC rule type(s) *select type(s) of rules* for *select scope*

Syntax
remove ADC rule type(s) *adc-rule-type* for *adc-rule-scope-install*

Parameters
adc-rule-type

One or more of the following:

- **none**
- **predefined**
- **predefined base**
- **dynamically provisioned**
- **all**

adc-rule-scope-install

One of the following:

- **session**

Description

Removes the application detection control rules from the current session based on their type. See *Managing Traffic Profiles* for information on ADC traffic profiles.

remove all policy context properties

Description

Removes all subscriber properties in the SPR.

remove all the *subscriber or pool* properties and save *always*

Syntax
remove all the *subscriber* properties and save *save-mode*

Parameters
subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber.
- **pool** — Name of a quota pool defined in the CMP database.

save-mode

One of the following:

- **always** (the default)
- **unless rejected**

quota-name

Name of a quota defined in the CMP database.

Description

Deletes all the properties for a subscriber or pool quota from the SPR. You can specify that the properties are not deleted if the policy rejects the message.

remove custom AVP *name* from reply *always*

Syntax
remove custom AVP *name* from reply *always*

Parameters
name

An existing AVP name and Vender ID, or an AVP name from an existing Policy Table.

always

Send mode:

- **always** (the default)
- **unless rejected**
- **if rejected**
- or send mode from an existing Policy Table

Description

Removes the custom AVP name previously set from the reply message.

remove PCC rule type(s) *select type(s) of rules* for *select scope*

Syntax
remove PCC rule type(s) *pcc-rule-type* for *pcc-rule-scope-install*

Parameters
pcc-rule-type

One or more of the following:

- **none**
- **predefined**
- **predefined base**
- **dynamically provisioned**
- **all**

pcc-rule-scope-install

One of the following:

- **flow**
- **session**
- **all**

Description

Removes the policy and charging control rules from the current flow/session based on their type. See *Managing Traffic Profiles* for information on PCC traffic profiles.

remove PCC rule for the flow

Description

Removes the policy and charging control rule from the current flow. See *Managing Traffic Profiles* for information on PCC traffic profiles.

remove policy context property *name*

Syntax
remove policy context property *property-name*

Parameters
property-name

String. May contain policy rule variables (see *Policy Rule Variables*) to perform parameter substitution within the property name.

Description

Removes a subscriber property in the SPR.

remove *specified* ADC rule(s)

Syntax
remove *adc-rule* ADC rule(s)

Parameters
adc-rule

Names of application detection control traffic profiles that are defined in the CMP database. The traffic profiles must be one of the following types:

- **ADC Rule**
- **Predefined ADC Rule**
- **Predefined ADC Rule Base**

Description

Removes the ADC rules from the current session.

remove *specified* PCC rule(s)

Syntax
remove *pcc-rule* PCC rule(s)

Parameters
pcc-rule

Names of policy and charging control traffic profiles that are defined in the CMP database. The traffic profiles must be one of the following types:

- **PCC Rule**
- **Predefined PCC Rule**
- **Predefined PCC Rule Base**

Description

Removes the PCC rules from the current flow/session. See *Managing Traffic Profiles* for information on traffic profiles.

remove the *subscriber or pool* property *name* and save *always*

Syntax
remove the *subscriber* property *property-name* and save *save-mode*

Parameters
subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

property-name

String.

save-mode

One of the following:

- **always** (the default)
- **unless rejected**

quota-name

Name of quota defined in the CMP database.

Description

Deletes a subscriber or quota pool property from the SPR. You can specify that the property is not deleted if the policy rejects the message.

Example

```
remove the FamilyPlanGold property stc-approved and save unless rejected
```

revalidate the session at *datetime* using *configured local time*

Syntax
revalidate the session at *datetime* using *time-zone*

Parameters
datetime

A policy rule variable or a timestamp in the format *yyyy-mm-dd*T*hh*:*mm*:*ss*+*UTCoffset*. If you select **Evaluate as expression**, the text in the field is evaluated as an arithmetic expression, and the result is used.

time-zone

One of the following:

- **configured local time** (the default) — Calculate the time from the location configured for this MPE device
- **system local time** — Calculate the time from the location of this MPE device
- **user local time** — Calculate the time from the location of the user equipment

Description

Revalidates the session at the specified time. If time-zone information is available from the user equipment, time can be calculated from either the MPE device or the user equipment's location.

Example

```
revalidate the session at {User.State.end-time} using configured local
time
```

send notification to syslog with `*message text*` and severity `*severity level*`

Syntax
send notification to syslog with `*message*` and severity `*level*`

Parameters
message

String. This text may contain policy parameters (described later in this section) to perform parameter substitution within the message text. If you select **Evaluate as expression**, the text in the field is evaluated as an arithmetic expression, and the result is used.

level

The sevlog severity. One of the following:

- **Emergency**
- **Alert**
- **Critical**
- **Error**

- **Warning**
- **Notice**
- **Info**
- **Debug**

Description

Sends a message to the syslog service containing the specified message text and at the specified severity level.

Note: Policies written before V7.5 that used the action **send alert with `*text*` and severity `*severity level*`** will be converted to use this action instead, which will send a notification to syslog instead of an alarm to the CMP system.

send notification to trace log with `*message text*` and severity `*severity level*`

Syntax

send notification to trace log with `*message*` and severity `*level*`

Parameters

message

String. This text may contain policy parameters (described later in this section) to perform parameter substitution within the message text. If you select **Evaluate as expression**, the text in the field is evaluated as an arithmetic expression, and the result is used.

level

One of the following:

- **Emergency** (ID 4560)
- **Alert** (ID 4561)
- **Critical** (ID 4562)
- **Error** (ID 4563)
- **Warning** (ID 4564)
- **Notice** (ID 4565)
- **Info** (ID 4566)
- **Debug** (ID 4567)

Description

Sends a message to the trace log containing the specified message text and at the specified severity level. If the configured minimum notification severity level is higher than that specified in the policy action, then the policy action does not generate the notification.

Note: Policies written before V7.5 that used the action **write `text` to the log file** will be converted to use this action instead, with the severity Info.

set alarm with severity `*severity level*`, id `*unique alarm identifier*` and message `*message text*`

Syntax
set alarm with severity `*level*`, id `*alarm-id*` and message `*message*`

Parameters
level

One of the following:

- **Critical** (ID 74000)
- **Major** (ID 74001)
- **Minor** (ID 74002)

alarm-id

The alarm ID. If you select **Evaluate as expression**, the text in the field is evaluated as an arithmetic expression, and the result is used.

message

String. This text may contain policy parameters (described later in this section) to perform parameter substitution within the message text. If you select **Evaluate as expression**, the text in the field is evaluated as an arithmetic expression, and the result is used.

Description

Sends an alarm to the CMP system containing the specified severity level and message text. This alarm is written to the Alarm History Report, and will appear in the Active Alarms display for one hour, until cleared, or unless the server fails over, whichever comes first. Alarms generated by policy actions do not affect the HA score of a server, and will not cause a failover. For more information, see *Viewing Active Alarms*.

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

Syntax
set charging server(s) for the IP-CAN session to *charging-server-name*

Parameters
charging-server-name

Names of charging servers that are defined in the CMP database.

Description

Sets the charging servers, as specified. To define a charging server, see *Managing Charging Servers*.

set CSG reporting info to *select value*

Syntax
set CSG reporting info to *value*

Parameters
value

- **CHANGE_CSG_CELL** — Indicates that the PCEF reports the user CSG information change to the charging domain when the UE enters/leaves/accesses via a CSG cell.
- **CHANGE_CSG_SUBSCRIBED_HIBRID_CELL** — Indicates that the PCEF reports the user CSG information change to the charging domain when the UE enters/leaves/accesses via a hybrid cell in which the subscriber is a CSG member
- **CHANGE_CSG_UNSUBSCRIBED_HIBRID_CELL** — Indicates that the PCEF reports the user CSG information change to the charging domain when the UE enters/leaves/accesses via a hybrid cell in which the subscriber is not a CSG member.

Description

Sent from the MPE device to the PCEF to request the PCEF to report the user CSG information change to the charging domain.

set custom AVP *name* value to the policy context property *name*

Syntax
set custom AVP *avp-name* value to the policy context property *property-name*

Parameters
avp-name

An existing AVP Name and Vender ID, or an AVP name from an existing Policy Table.

property-name

String that represents the policy context property.

Description

Makes the AVP value accessible throughout the policy context so other policies can access this AVP value as a context property. The context property variable will be set only if this AVP exists in the request and its value is not null.

set custom AVP *name* value to the user property *name* and save *always*

Syntax
set custom AVP *avp-name* value to the user property *property-name* and save *always*

Parameters

avp-name

An existing AVP Name and Vender ID, or an AVP name from an existing Policy Table.

property-name

String value of up to 255 characters that represents the user property.

always

One of the following:

- **always** (the default)
- **unless rejected**
- send mode from an existing **Policy Table**

Description

Sets an AVP value as a User object property to persist between sessions.

set *external field* to # percent of *select type* for *selected* quota

Syntax

set *field* to *value* percent of *type* for *quota-name* quota

Parameters

field

String name of field in external database.

value

String name of field in external database.

type

One of the following:

- **service-specific**
- **time**
- **total volume**
- **uplink volume**
- **downlink volume**

quota-name

Name(s) of quotas defined in the CMP database.

Description

Sets a field in an external database to a percentage of the time, total volume, or service-specific quota of one or more selected quotas. This can be an LDAP server or an SPR. The MPE device on which this policy is executed must have write access to the database, and the external field must be defined on the MPE device. For more information, see *Configuring Data Source Interfaces*. See *Managing Quotas* for information on quotas.

set *external field* to `*value*`

Syntax
set *field* to `*value*`

Parameters
field

String name of field in external database.

value

String value of field in external database. If you select **Evaluate as expression**, the text in the field is evaluated as an arithmetic expression, and the result is used.

Description

Sets the value of a field in an external database. This can be an LDAP server or an SPR. The MPE device on which this policy is executed must have write access to the database, and the external field must be defined on the MPE device. For more information, see *Configuring Data Source Interfaces*.

Examples

```
set Quota Volume to `{User.Quota.Gold.volume}`
```

```
set Last Session to `{Date(2012-10-24 19:54:01)}`
```

set policy context property *name* to *value*

Syntax
set policy context property *property-name* to *value*

Parameters
property-name

String. May contain policy rule variables (see *Policy Rule Variables*) to perform parameter substitution within the property name.

value

String.

Description

Sets and saves a subscriber property in the SPR. You can specify that the property is not saved if the policy rejects the message.

set session revalidation time to # seconds

Syntax
set session revalidation time to *seconds* seconds

Parameters
seconds

See *Table 8: Common Parameters*.

Description

Provisions the session revalidation time to the number of seconds from when the policy executes.

set session revalidation time to Policy Counter ID(s) *select name(s)*

Syntax
session revalidation time to Policy Counter ID(s) *counter -name*

Parameters
counter -name

Name of policy counter ID defined in the CMP database; or enter a string.

Description

Provisions the session revalidation time to the number of seconds from when the policy executes.

set session revalidation time to *time* on *day* using *configured local time*

Syntax
set session revalidation time to *time* on *day-of-week* using *time-zone*

Parameters
time

A time, in the format *hh*:*mm* (limited to 15-minute intervals).

day-of-week

One or more of the following:

- **Sunday**
- **Monday**
- **Tuesday**
- **Wednesday**
- **Thursday**
- **Friday**
- **Saturday**

time-zone

One of the following:

- **configured local time** (the default) — Calculate the time from the location configured for this MPE device
- **system local** — Calculate the time from the location of this MPE device
- **user local time** — Calculate the time from the location of the user equipment

Description

Sets the session revalidation time (to the quarter hour) after which the enforcement device requests revalidation from the MPE device for the requested user's service. If time-zone information is available from the user equipment, time can be calculated from either the MPE device or the user equipment's location.

set the *subscriber or pool* property *name* to *now + 0 days* rounded *up* with *same* granularity using *configured local time* and save *always*

Syntax

set the *subscriber* property *property-name* to *datetime direction duration granularity* rounded *rounding* with *same* granularity using *time-zone* and save *save-mode*

Parameters

subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

property-name

String.

datetime

Either the local date-time **now** (the default) or a timestamp in the format *yyyy-mm-dd*T*hh:mm+UTCoffset*.

direction

One of the following, indicating future or past:

- **+** (the default)
- **-**

duration

Positive integer.

granularity

The calculated date-time is expressed in this granularity:

- **same** (the default)
- **months**
- **days**
- **hours**
- **minutes**

time-zone

One of the following:

- **CONFIGURED LOCAL TIME** (the default) — Calculate the time from the location configured for this MPE device
- **SYSTEM LOCAL TIME** — Calculate the time from the location of this MPE device
- **USER LOCAL TIME** — Calculate the time from the location of the user equipment

save-mode

One of the following:

- **always** (the default)
- **unless rejected**

Description

Sets and saves a subscriber or quota pool date-time property in the SPR to either the current date and time or another date-time and an offset. If time-zone information is available from the user equipment, time can be calculated from either the MPE device or the user equipment's location. You can specify that the property is not saved if the policy rejects the message.

Example

```
set the FamilyPlanGold property promotion-end-time to now + 10 days rounded
 up with same granularity using configured local time and save always
```

set the *subscriber or pool* property *name* to `*value*` and save *always*

Syntax

set the *subscriber* property *property-name* to `*value*` and save *save-mode*

Parameters

subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

property-name

String. May contain policy rule variables (see *Policy Rule Variables*) to perform parameter substitution within the property name.

value

String. If you select **Evaluate as expression**, the text in the field is evaluated as an arithmetic expression, and the result is used.

save-mode

One of the following:

- **always** (the default)
- **unless rejected**

Description

Sets and saves a subscriber or quota pool property in the SPR. You can specify that the property is not saved if the policy rejects the message. For information on quota pools, see *Managing Quotas*.

Example

```
set the FamilyPlanGold property usage-exceeded to `true` and save always
```

set the *subscriber or pool* property *name* to property *name + multiple of 0 days* rounded *up* with *same* granularity and save *always*

Syntax

set the *subscriber* property *property-name* to property *property-name direction multiplier duration granularity* rounded *rounding* with*same* granularity and save *save-mode*

Parameters

subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

property-name

String.

direction

One of the following, indicating future or past:

- **+** (the default)
- **-**

multiplier

One of the following:

- **multiple of** (the default) — the duration is added repeatedly until the result is in the future
- **pool** — the duration is added once

duration

Positive integer.

granularity

The offset is expressed in this granularity:

- **days** (the default)
- **months**
- **hours**
- **minutes**

save-mode

One of the following:

- **always** (the default)
- **unless rejected**

Description

Offsets a subscriber date-time property, either by the number of time units necessary to move the result into the future or by a specific number of time units. If the value of the first property is in the future, either the exact offset, or one unit of the offset, is added. If the value of the first property is in the past and you specify **+ multiple of**, the duration is repeatedly added until the result is in the future. If the result of the offset is in the past (for example, if you specify **+ exactly 1 day** and the result is still in the past), the action is ignored. You can specify that the property is not saved if the policy rejects the message. If the value of the second property is null then the action is ignored.

Examples

The following example adds 30 days to the value of the property expiration-date. If the result is in the future, it is saved; if the result is in the past, it is not saved:

```
set the FamilyPlanGold property expiration-date to expiration-date + exactly
 30 days and save always
```

The following example adds 30 days to the value of the property expiration-date. If the result is in the future, it is saved; if the result is in the past, another offset of 30 days is added, and the result is evaluated again until the result is in the future, at which point the result is saved:

```
set the FamilyPlanGold property expiration-date to expiration-date +
multiple of 30 days and save always
```

set the *subscriber or pool* property *name* to `*value*` and save *always*

Syntax

set the *subscriber* property *property-name* to `*value*` and save *save-mode*

Parameters

subscriber

One of the following:

- **subscriber** (the default) — Individual subscriber
- **pool** — Name of a quota pool defined in the CMP database

property-name

String. May contain policy rule variables (see *Policy Rule Variables*) to perform parameter substitution within the property name.

value

String. If you select **Evaluate as expression**, the text in the field is evaluated as an arithmetic expression, and the result is used.

save-mode

One of the following:

- **always** (the default)
- **unless rejected**

Description

Sets and saves a subscriber property in the SPR. You can specify that the property is not saved if the policy rejects the message.

Example

```
set the FamilyPlanGold property usage-exceeded to `true` and save always
```

set the user property *name* to *Existing or New* custom AVP *name* and send *always*

Syntax

set the user property *property-name* to *exists* custom AVP *avp-name* and send *always*

Parameters

property-name

String. May contain policy rule variables (see *Policy Rule Variables*) to perform parameter substitution within the property name.

exists

One of the following:

- **Existing or New** (the default)
- **New**

avp-name

Select an existing AVP Name and Vender ID, or an AVP name from an existing Policy Table.

always

Select send mode:

- **always** (the default)
- **unless rejected**
- **if rejected**
- send mode from an existing **Policy Table**

Description

Sets the user property value for an outgoing AVP. If a user property with the corresponding name exists, the AVP will be sent in the reply message.

set *value* to *Existing or New* custom AVP *name* and send *always*

Syntax
set *value* to *exists* custom AVP *name* and send *send-mode*

Parameters
value

Enter string or select string from existing Policy Table that represents third-party non-grouped AVP. Check **Evaluate as expression** to evaluate this value as an expression.

exists

Select type of AVP name:

- **Existing or New** (the default)
- **New**

send-mode

Select send mode:

- **always** (the default)
- **unless rejected**
- **if rejected**
- or send mode from an existing **Policy Table**

Description

Adds the third-party non-grouped AVP to the current Diameter session with the specified value. If a third-party AVP value is set in the current Diameter session, it will be sent with the corresponding outgoing message. The value parameter must corresponds to the AVP data type, otherwise this AVP will not be set. If New is selected as the type of AVP name, every time this action is called a new AVP is added to the message, even if the AVP with the same name is present in the message.

Policy Rule Variables

During policy rule execution within the MPE device, some actions (for example, **`send notification`**) allow for substitution of policy rule variables with contextual information. Each time the policy rules are evaluated, the unique set of policy rule variables is referred to as the *policy context*. This section summarizes these policy rule variables.

Using Policy Rule Variables

Typically, policy rule variables are used to perform substitution of textual information into a text message that is being used for some type of logging. This is typically done in an action. To use a policy rule variable, insert the variable into the text message when you define the action.

The format of a policy rule variable is as follows:

“{” name [“:” default-value] “}”

The name can contain the characters A–Z, a–z, 0–9, underscore (_), period (.), and backslash (\).

The following are examples of policy rule variables:

```
{Bandwidth}
{Device.Name}
{Device.Name:UNKNOWN}
```

Basic Policy Rule Variables

Table 10: Basic Policy Rule Variables displays some of the basic policy rule variables that are available.

Under certain circumstances the MPE device can associate additional context information with a request. This information may be used during the policy rule execution. The availability of this information depends on:

- The mode (for example, wireless) in which the MPE device is executing
- Whether the information is provisioned on the MPE device or, if present, a Subscriber Profile Repository (SPR)
- The protocol in use and how much information is available in the request (some protocols have optional information which, if specified, can be used to associate additional information)

There are a number of policy rule variables that can be used to provide information about the device for which a policy rule is being executed. Some of these variables are only available for certain device types, while others are available for all devices.

Table 10: Basic Policy Rule Variables

Variable Name	Description	Modes, Protocols, Device Type
{Policy}	The name of the policy rule that is being executed.	--
{Date}	The date when the policy rule is executed, in the format *MMM*[*M*]/*dd* [/*yyyy*], where *MMM* is “Jan,” “Feb,” “Mar,” ..., or “Dec”, and *MM* is “01,” “02,” “03,” ..., or “12.”	--
{Time}	The time when the policy rule is executed, in the format *hh*:*mm*:*ss*.*SSS*.	--
{Conditions}	A list of (variable, value) tuples that lists the variables whose values were referenced in the conditions of the policy rule. The list is inserted with one variable per line in the format *variable=value*.	--

Variable Name	Description	Modes, Protocols, Device Type
{Device}	The name of the device for which the policy rule is being evaluated.	--
{DeviceId}	ID of the device for which the policy rule is being evaluated.	--
{QosDir}	The direction of the flow for which the policy rule is being evaluated, either “Up” or “Down.”	--
{Bandwidth}	The DOCSIS type of the flow for which the policy rule is being evaluated: “BES,” “NRTP,” “RTP,” “UGS,” or “UGSAD.”	--
{Account.AccountId}	The account ID of the account associated with the request.	Wireless
{Account.EndpointId}	The Endpoint ID of the account associated with the request.	Wireless
{Account.Entitlements}		Wireless
{Account.UpstreamLimit}	The upstream bandwidth limit of the account associated with the request.	Wireless
{Account.DownstreamLimit}	The downstream bandwidth limit of the account associated with the request.	Wireless
{Account.StaticIpAddresses}		Wireless
{Account.Tier.Name} {AccountTier.Name}	The name of the tier of the account associated with the request.	Wireless
{AccountTier.Entitlements}		Wireless
{Account.Tier.UpstreamLimit} {AccountTier.UpstreamLimit}	The upstream bandwidth limit if the tier of the account associated with the request.	Wireless
{Account.Tier.DownstreamLimit} {AccountTier.DownstreamLimit}	The downstream bandwidth limit if the tier of the account associated with the request.	Wireless
{Application.Name}	The name of the application associated with the request.	Wireless
{Application.LatencySensitivity}		Wireless
{Application.AmIds}		Wireless
{Application.IpAddresses}		Wireless

Variable Name	Description	Modes, Protocols, Device Type
{Application.Hostnames}		Wireless
{Application.SessionClassIds}		Wireless
{Application.EnforcementPt}		Wireless
{Application.HDThreshold}		Wireless
{Device.Name.}		Wireless
{Element.DownstreamCapacity}		Wireless
{Element.UpstreamCapacity}		Wireless
{Element.BackupHostname}		Wireless
{Element.CapabilitiesSet}		Wireless
{Element.Hostname}		Wireless
{Element.Name}		Wireless
{Element.Subtype}		Wireless
{Element.DiameterIdentities}		Wireless
{Element.DiameterRealm}		Wireless
{Element.NasIdentifiers}		Wireless
{Element.OfflineCharging}		Wireless
{Element.OnlineCharging}		Wireless
{Element.PrimaryOfflineChargingServer}		Wireless
{Element.PrimaryOnlineChargingServer}		Wireless
{Element.SecondaryOfflineChargingServer}		Wireless
{Element.SecondaryOnlineChargingServer}		Wireless
{Flow.Usage}		Wireless
{Flow.CurrentOriginalFlowInfo}		Wireless
{Flow.OriginalFlowInfo}		Wireless
{Flow.TranslatedFlowInfo}		Wireless
{Quota.Limit<quota_name>.Volume}		Wireless
{Quota.Limit<quota_name>.Time}		Wireless
{Quota.Limit<quota_name>.ServiceSpecific}		Wireless
{Request.CustomAvpValues}		Wireless
{Request.AdaptorContext}		Wireless
{Request.CreateTimestamp}		Wireless

Variable Name	Description	Modes, Protocols, Device Type
{Request.EndTimestamp}		Wireless
{Request.EndpointIp}		Wireless
{Request.HandlerKey}		Wireless
{Request.MSTimeZone}		Wireless
{Request.OriginalEvent}		Wireless
{Request.PolicyOutputResourceEvents}		Wireless
{Request.Primary}		Wireless
{Request.ResourceChanges}		Wireless
{Request.SubscriptionsEnabled}		Wireless
{Request.Tasks}		Wireless
{Request.TriggeredByReAuthPolicyAction}		Wireless
{Request.UserIds}		Wireless
{Request.AppId}		Wireless
{Request.DestinationHost}		Wireless
{Request.DestinationRealm}		Wireless
{Request.ExplictRoute}		Wireless
{Request.MsgType}		Wireless
{Request.PeerIdentity}		Wireless
{Request.Reason}		Wireless
{Request.ServerAction}		Wireless
{Request.SessionId}		Wireless
{Session.CreatedTimestamp}		Wireless
{Session.EndpointIp}		Wireless
{Session.LastAcceptedTransactionTime}		Wireless
{Session.MSTimeZone}		Wireless
{Session.NextBillingDate}	The next monthly billing date, in the format *MM[M]/dd/yyyy* (for example, MMM/dd/yyyy could result in Oct/24/2011). The date format can be changed by specifying the new format within parentheses; for example, {Session.NextBillingDate (MM/dd} could result in 10/24.	Wireless

Variable Name	Description	Modes, Protocols, Device Type
{Session.Resources}		Wireless
{Session.Secondary}		Wireless
{Session.ServingMcc}	The serving Mobile Country Code associated with the request.	Wireless
{Session.SessionId}		Wireless
{Session.SubscriberPool}		Wireless
{Session.UsePoolQuota}		Wireless
{User.IMSI}	The IMSI of the subscriber associated with the request.	Wireless
{User.AccountId}	The account ID of the subscriber associated with the request.	Wireless
{User.BillingDay}	The BillingDay value of the subscriber associated with the request.	Wireless
{User.BillingType}		Wireless
{User.Custom}		Wireless
{User.*customfield*}	If *customfield* is replaced with the name of a field that is imported from an external data source (such as LDAP), then this is the value of the imported field.	Wireless
{User.DownstreamGuaranteed}		Wireless
{User.DownstreamLimit}		Wireless
{User.E164}	The E.164 phone number of the subscriber associated with the request.	Wireless
{User.Entitlements}	The Entitlement value of the subscriber associated with the request.	Wireless
{User.EquipmentIds}		Wireless
{User.IP}	The IP address of the subscriber associated with the request.	Wireless
{User.IsUnknown}		Wireless
{User.MSISDN}	The mobile subscriber ISDN of the subscriber associated with the request.	Wireless
{User.Pool}		Wireless

Variable Name	Description	Modes, Protocols, Device Type
{User.PoolId}		Wireless
{User.State.*prop*}	The value of a subscriber property, obtained from the SPR, where *prop* is the property name.	Wireless
{User.SIP}	The SIP URI of the subscriber associated with the request.	Wireless
{User.Tier}	The Tier value of the subscriber associated with the request.	Wireless
{User.UpstreamGuaranteed}		Wireless
{User.UpstreamLimit}		Wireless
{User.UserIds}		Wireless
{User.Quota.<quota_name>.Volume}		Wireless
{User.Quota.<quota_name>.Time}		Wireless
{User.Quota.<quota_name>ServiceSpecific}		Wireless
{User.State.Deltas}		Wireless
{User.State.EntityStateType}		Wireless
{User.State.New}		Wireless
{User.State.SequenceNumber}		Wireless
{User.State.StateMap}		Wireless
{User.State.UpdateMode}		Wireless
{User.State.Variables}		Wireless
{Device.Name}	The name (as defined in the CMP database) of the device.	Any
{Device.UpstreamCapacity}	The upstream bandwidth capacity of the device.	Any
{Device.DownstreamCapacity}	The downstream bandwidth capacity of the device.	Any
{Device.FlowCount}	The number of active flows for the device.	Any
{Element.Name}	The name (as defined in the CMP database) of the network element associated with the current device. If the device is a network element, then this is the same as the {Device.Name}. However, if the device is contained within a	Any

Variable Name	Description	Modes, Protocols, Device Type
	network element (as is the case with Interfaces, Channels, and so forth), then this will have a different value.	
{Element.Hostname}	The hostname (or IP address) of the network element associated with the current device. If the device is a network element, then this is the same as the {Device.Name}. However, if the device is contained within a network element (as is the case with Interfaces, Channels, and so forth), then this will have a different value.	Any
{Element.BackupHostname}	The hostname (or IP address) of the backup network element associated with the current device. If the device is a network element, then this is the same as the {Device.Name}. However, if the device is contained within a network element (as is the case with Interfaces, Channels, and so forth), then this will have a different value.	Any
{Element.UpstreamCapacity}	The upstream bandwidth capacity of the network element associated with the current device. If the device is a network element, then this is the same as the {Device.Name}. However, if the device is contained within a network element (as is the case with Interfaces, Channels, and so forth), then this will have a different value.	Any
{Element.DownstreamCapacity}	The downstream bandwidth capacity of the network element associated with the current device. If the device is a network element, then this is the same as the {Device.Name}. However, if the device is contained within a network element (as is the case with Interfaces, Channels, and so forth), then this will have a different value.	Any
{Session.IMEI}	This variable expands to the IMEI of the subscriber's phone or	Any

Variable Name	Description	Modes, Protocols, Device Type
	equipment associated with the request.	
{Session.IMEISV}	This variable expands to the IMEISV of the subscriber's phone or equipment associated with the request.	Any

Chapter 23

Managing Policy Rules

Topics:

Policy rules are created and saved within the CMP database and then deployed to MPE devices. The CMP system lets you create and modify the details within policy rules, as well as edit the order in which policy rules are applied to a protocol message.

To create policy rules, see *Understanding and Creating Policy Rules*. *Managing Policy Rules* describes how to manage your library of policy rules and policy groups.

Displaying a Policy

To display a policy:

1. From the **Policy Management** section of the navigation pane, select **Policy Library.**
   The content tree displays a list of policy library groups; the initial group is **ALL**. If a policy references another policy or policy group, a gear icon (⚙) appears next to the policy name in the content tree.
2. From the content tree, select the policy.
   The policy is displayed. *Figure 18: Sample Policy Description* shows an example.

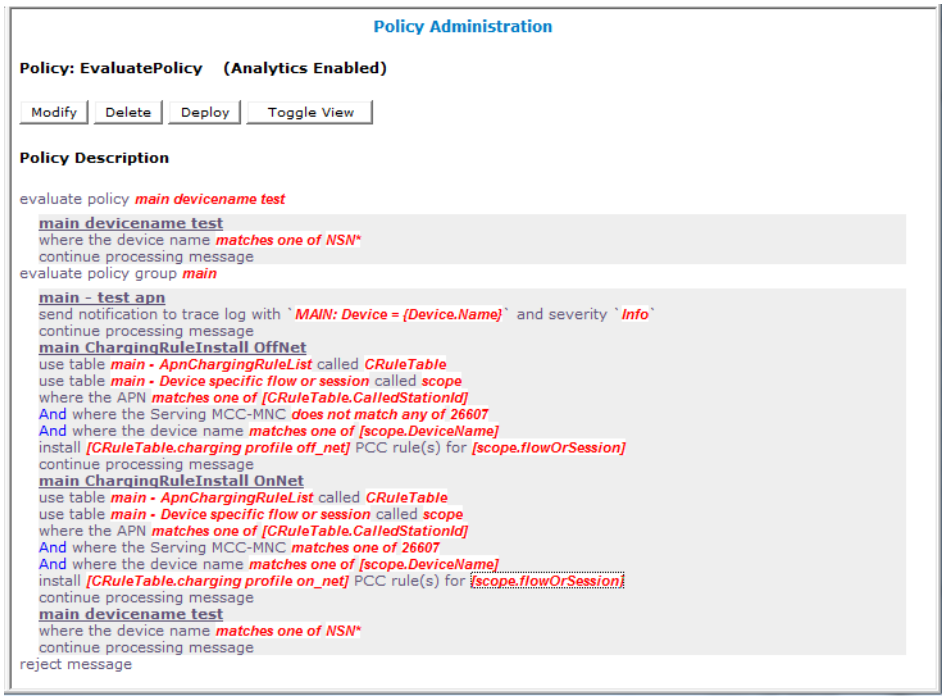


Figure 18: Sample Policy Description

You can choose from two logical views of policy conditions:

- A tree format (the default, shown)
- A Boolean expression format similar to SQL

To switch between one views, click **Toggle View**.

If the policy evaluates a policy group, the policies in the group (which are referenced policies) are displayed. Click a policy name to see details of that policy. If a referenced policy refers to other policies or groups, those policies or groups are also displayed.

Deploying Policy Rules

Deploying a policy (or policy group) is the act of transferring the policy from the CMP policy database to an MPE device. Once deployed, the policy rules defined within the policy or policy group are used as decision-making criteria by the MPE device.

Figure 19: Policy Deployment shows how policies P1 through P7 are created in the CMP database and then deployed individually to different MPE devices within the network. Each of the policies is associated individually with the MPE device where it is deployed. In the example, each policy server (MPE device) displays the policies that have been deployed to it and the order in which they are applied to policy requests, from top to bottom.

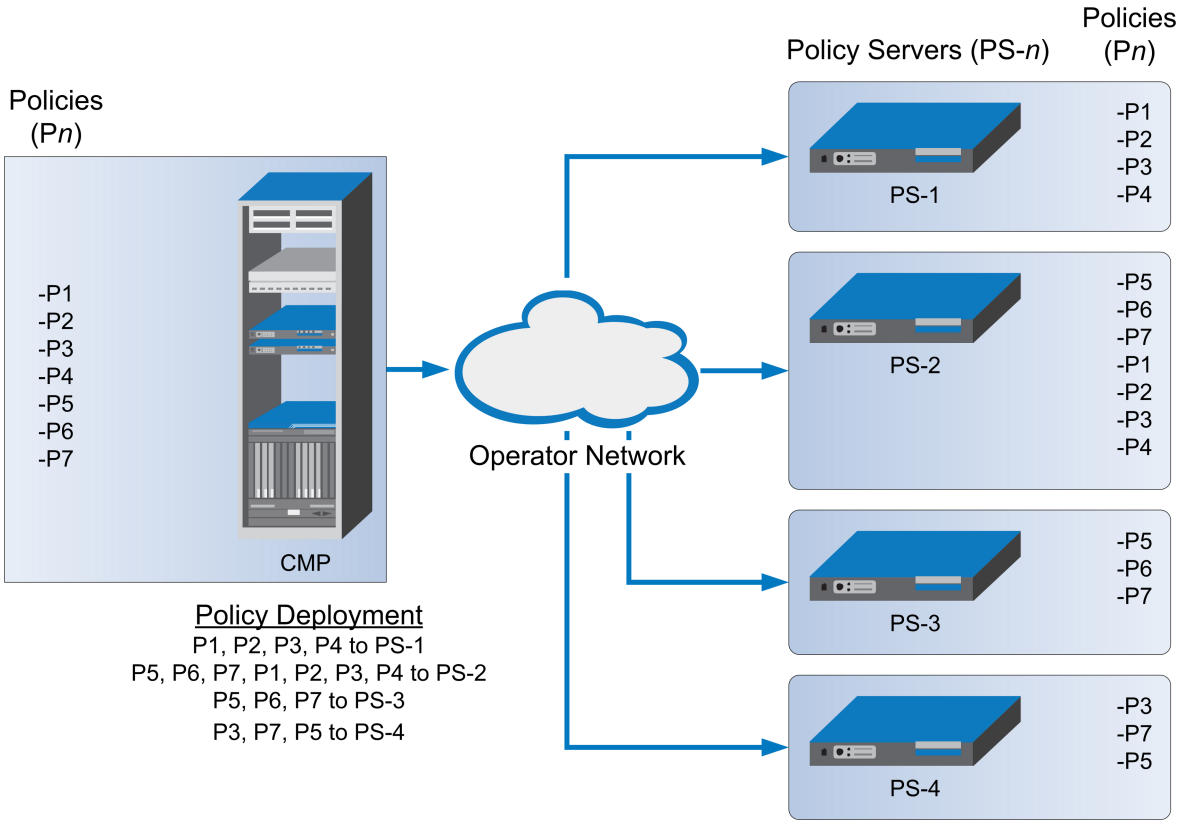


Figure 19: Policy Deployment

Figure 20: Policy Group Deployment shows how the same library of policies can be grouped first and then deployed as policy groups. When a policy group is created, the policies are arranged in the order in which they are to be evaluated. Grouping policies makes deployment of multiple policies easier and helps to ensure consistency in how policies are applied to policy requests on different MPE devices.

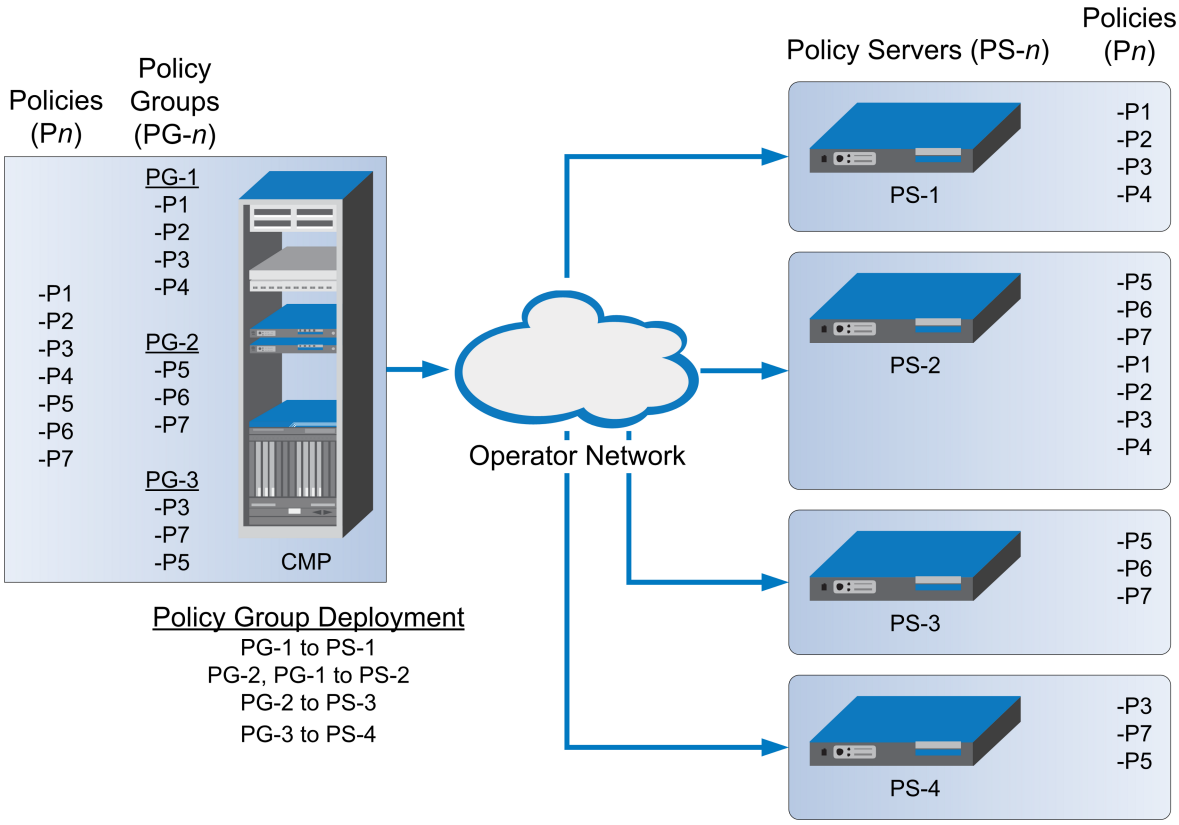


Figure 20: Policy Group Deployment

When you first create a policy rule, that rule exists only within the CMP database. Once the policy rule is deployed, any change to the policy rule is automatically redeployed when you complete your changes. Automatic redeployment also applies to policy groups as well: any change to a policy group triggers automatic redeployment. If you add a policy rule that was not previously deployed to a policy group that is deployed to one or more MPE devices, then the rule is deployed automatically to those MPE devices.

Figure 21: Policy Redeployment shows that when a policy (P3) is modified, its associated groups (PG-1 and PG-3) are redeployed automatically.

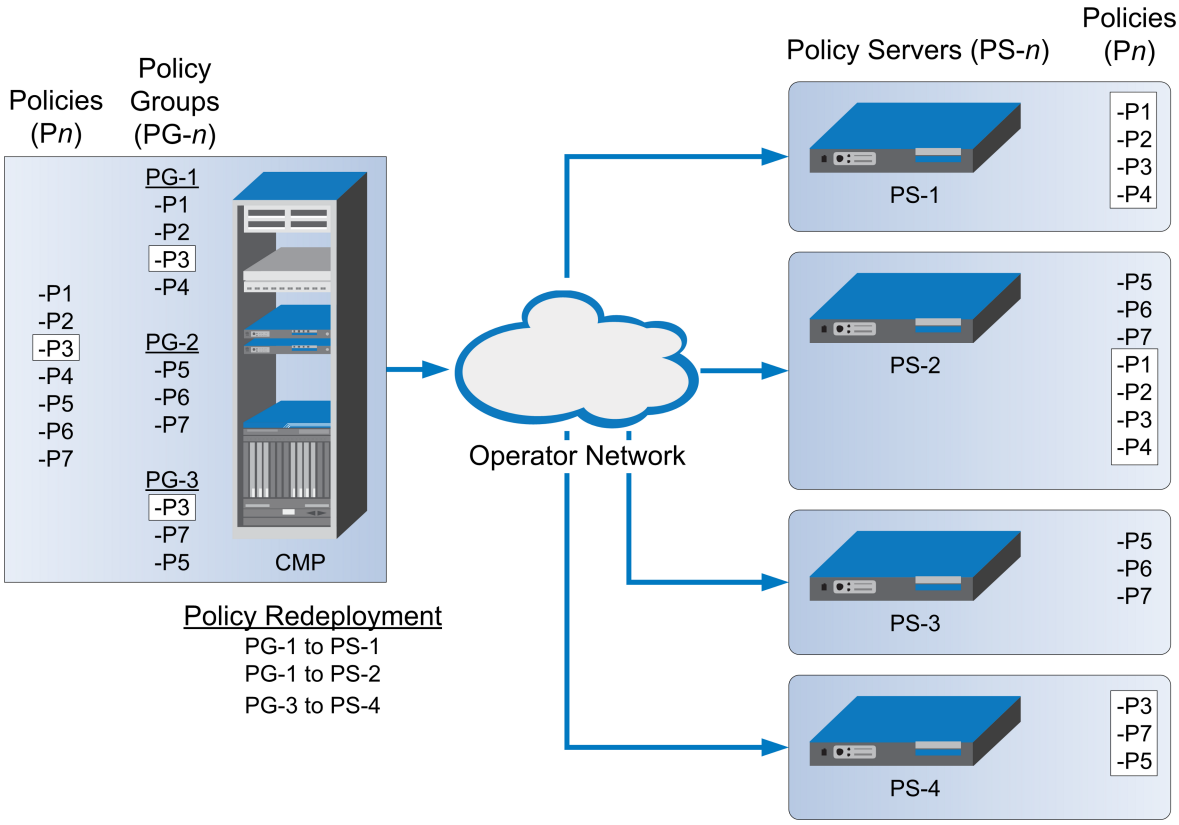


Figure 21: Policy Redeployment

When a policy rule is used as a reference policy, you do not need to deploy it; it is deployed automatically when called by a parent, or top-level, policy.

Modifying and Deleting a Policy

Policies can be modified and then redeployed to MPE devices. When a policy that resides in multiple policy groups is modified, the changes are propagated to the various groups.

Modifying a Policy

To modify an existing policy:

1. From the **Policy Management** section of the navigation pane, select **Policy Library.**
   The content tree displays a list of policy library groups; the initial group is **ALL**.
2. From the content tree, select the **ALL** group.
   The **Policy Administration** page opens in the work area, listing the available policies.
3. Select the policy you want to edit.
   The **Policy Administration** page displays information about the policy.
4. Click **Modify**.

The policy wizard opens in a **Modify Policy** tab.

5. Edit the policy information.

   See *Creating a New Policy* for details on the fields within the policy wizard.

6. When you finish, click **Finish** (or **Cancel** to discard your changes).

The policy is modified. The modified policy is now ready to be added to a policy group (see *Adding a Policy or a Policy Group to a Policy Group*), or deployed to one or more MPE devices (see *Deploying a Policy or Policy Group to MPE Devices*).

Note: Redeployment of a policy is automatically performed to those MPE devices where the policy was initially deployed.

Deleting a Policy

Policies, policies within a policy group, and entire policy groups can be removed from an MPE device when they are no longer needed. Because the policy still resides in the CMP database, it can be redeployed at a later date if needed. If a policy is no longer needed, it can be deleted from the CMP database as well.

Note: Deleting a policy from the CMP database automatically removes the policy from all associated MPE devices.

To delete a policy:

1. From the **Policy Management** section of the navigation pane, select **Policy Library**.
   The content tree displays a list of policy groups; the initial group is **ALL**.
2. From the content tree, select the **ALL** group.
   The Policy Administration page opens in the work area, displaying all defined policies.
3. Use one of the following methods to select the policy to delete:

   - From the work area, click the **Delete** icon located to the right of the policy you want to delete.
   - From the policy group tree, select the policy; the Policy Administration page opens. Click **Delete**.

   You are prompted, "Are you sure you want to delete this Policy?"

4. Click **OK** to delete the policy (or **Cancel** to cancel the request).

The policy is deleted.

To remove a deployed policy from an MPE device, see *Removing a Policy or Policy Group from an MPE Device*.

Policy Templates

The CMP system lets you create policy templates to simplify the creation of multiple policies with similar conditions and actions. A policy template is similar to a policy, except that some (or all) of the parameters in the conditions and actions are not completely defined. Those parameters are defined later, when you use the policy template to create policy rules.

The policy template wizard is used to create or modify a policy template. This wizard is similar to the policy wizard; however, the policy template wizard allows parameters to be only partially defined. For example, a template may only be configured for policy requests requiring bandwidth above a

certain value, but not define the exact bandwidth value. You can then specify a specific bandwidth value when you use the template to create the new policy rule.

Creating a Policy Template

To create a policy template:

1. From the **Policy Management** section of the navigation pane, select **Template Library**.
   The content tree displays the Template Library group.
2. Select the **Template Library** group.
   The **Template Administration** page opens in the work area.
3. On the **Template Administration** page, click **Create Template**.
   The **Create New Policy Template** window opens (*Figure 22: Create New Template Window*).
4. Select the base policy or policy template with which to begin:
   - **Blank** — No policy template attributes are pre-defined.
   - **Use Template** — Select an existing template with pre-defined attributes. Modify the template, then save the template with a new template name.
   - **Copy Existing Policy** — Select an existing policy. Modify the policy, then save the policy as a policy template.
5. Edit the policy information from one or more of the policy wizard pages.
   See *Creating a New Policy* for details on the fields within the policy wizard.
6. When you finish, click **Finish** to save the policy template (or **Cancel** to discard your changes).
   The window closes.

The policy template is created.

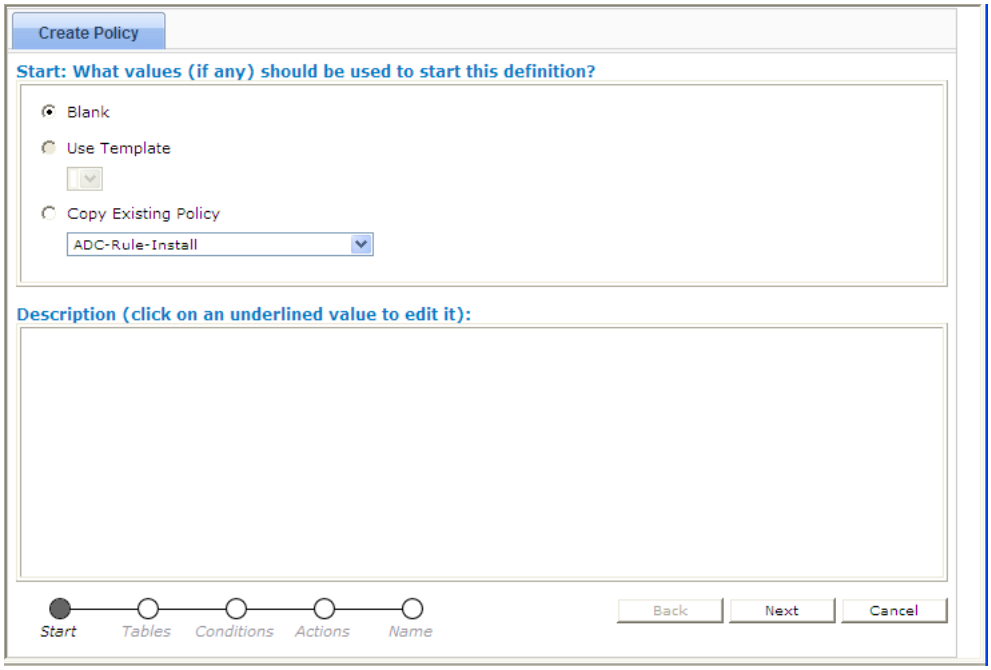


Figure 22: Create New Template Window

Modifying a Policy Template

You can edit a policy template to make changes. Modifying a policy template does not modify previously configured policies.

To modify an existing policy template:

1. From the **Policy Management** section of the navigation pane, select **Template Library**.
   The content tree displays the **Template Library** group.
2. Select the **Template Library** group.
   The **Template Administration** page opens in the work area.
3. Select the template you want to modify.
   The **Template Administration** page displays a description of the template.
4. Click **Modify**.
   The **Modify Policy** tab opens with the last step of the template creation process. *Figure 23: Modify Policy Template Window* shows an example.
5. The wizard begins at the last step of the template creation process. Click **Back** to return to where you want to edit the template and modify the information.
6. When you finish, click **Finish** to save the modified template (or **Cancel** to discard your changes).
   The window closes.

The template is modified.

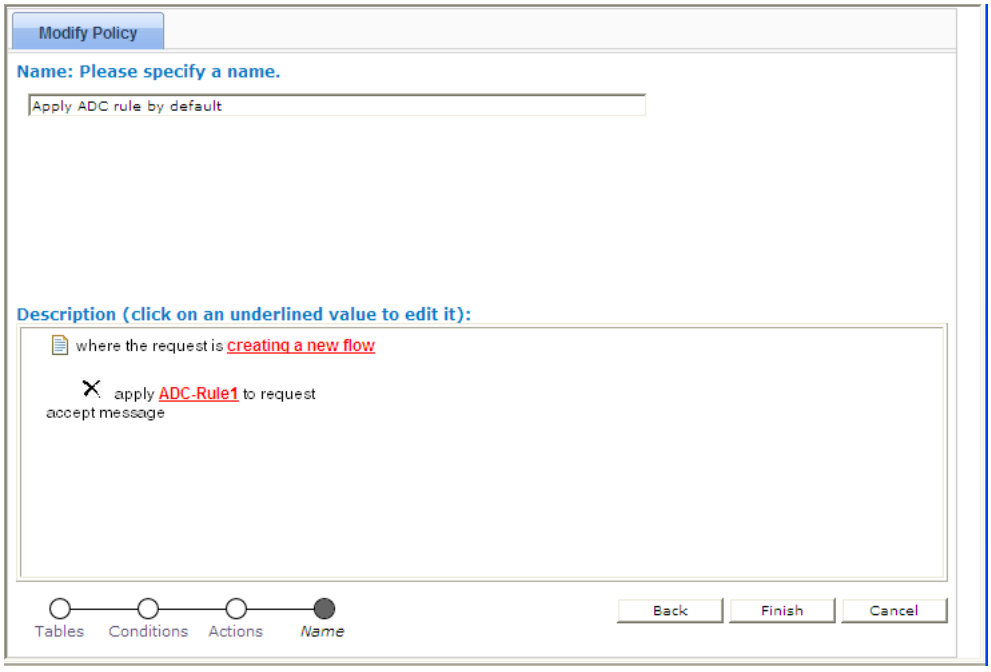


Figure 23: Modify Policy Template Window

Deleting a Policy Template

To delete a policy template:

1. From the **Policy Management** section of the navigation pane, select **Template Library**.
   The Template Administration page opens in the work area, displaying all defined policy templates.
2. Use one of the following methods to select the policy template to delete:
   - From the work area, click the **Delete** icon, located to the right of the policy template you want to delete.
   - From the template library, select the template; the Template Administration page displays the template. Click **Delete**.

   You are prompted, "Are you sure you want to delete this template?"
3. Click **OK** to delete the policy template (or **Cancel** to abandon the request).

The policy template is deleted.

Managing a Policy Group

The CMP system lets you create policy groups. Policy groups are an organizational aid that provide for flexible policy management, deployment, and execution. You save policies to a group in the order in which you want an MPE device to apply them to a policy request. If needed, you can change that order. You can save a policy to multiple policy groups and add a policy to, or remove it from, a policy group at any time. You can also group, or nest, policy groups.

Creating a Policy Group

To create a new policy group:

1. From the **Policy Management** section of the navigation pane, select **Policy Library.**
   The content tree displays a list of policy library groups; the initial group is **ALL**.
2. From the content tree, select the **ALL** group.
   The Policy Administration page opens in the work area, listing available policies.
3. On the Policy Administration page, click **Create Group**.
   The group naming field opens in the work area; for example:

4. Enter the name to assign to the new group.
   The name can be up to 64 characters long and must not contain quotation marks (") or commas (,).
5. Click **Save** (or **Cancel** to discard your changes).

The new group information is saved to the CMP database and displayed in the content tree.

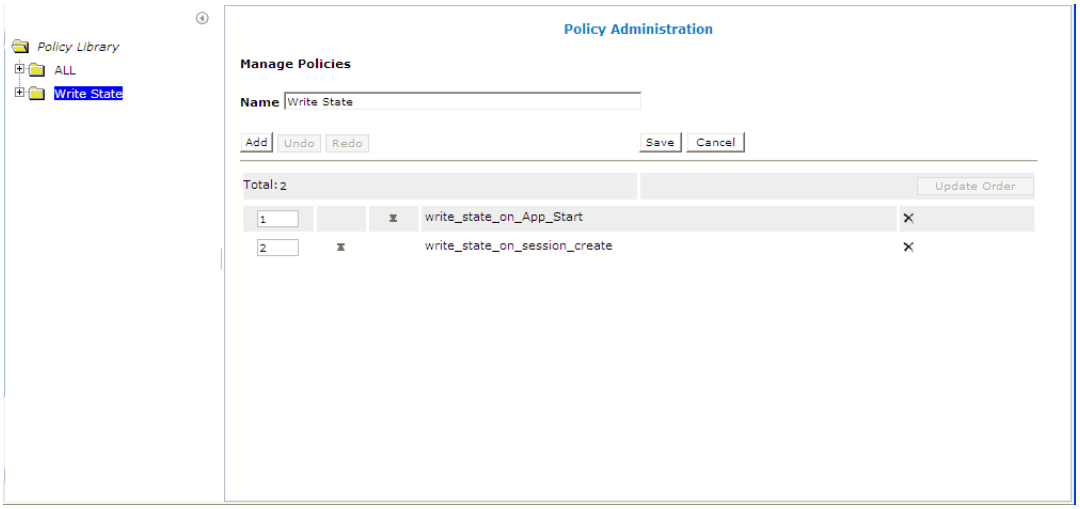
Adding a Policy or a Policy Group to a Policy Group

Once you create a policy group, you can add policies to it. You can also add policy groups to a policy group.

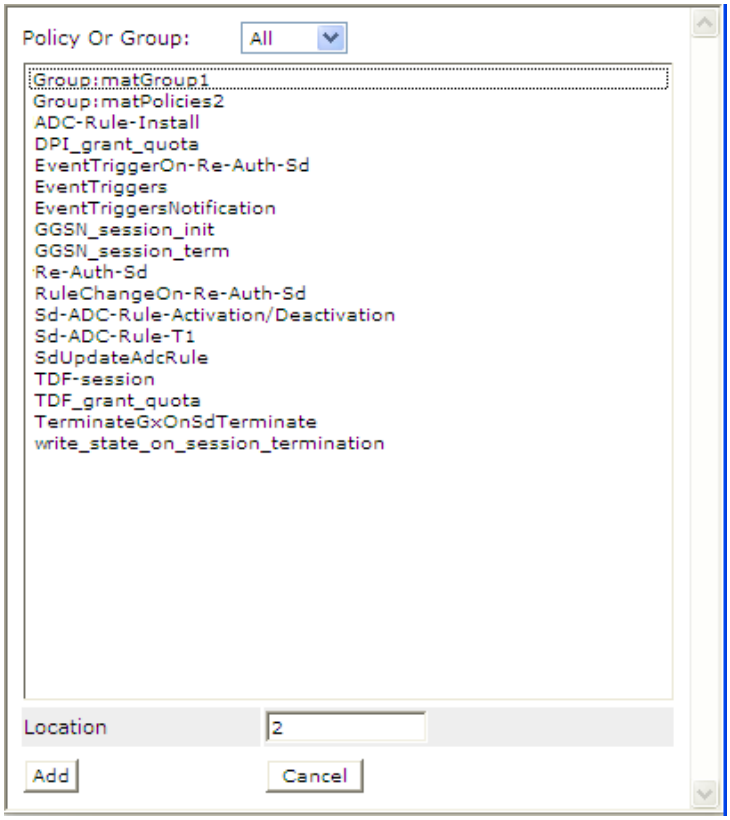
Note: It is recommends that you only nest policy groups two levels deep.

To add one or more policies or policy groups to a policy group:

1. From the **Policy Management** section of the navigation pane, select **Policy Library.**
   The content tree displays a list of policy library groups; the initial group is **ALL**.
2. From the content tree, select the policy group to which you want to add the policy or policy group.
   The **Policy Administration** page opens in the work area, listing the policies and policy groups currently in the group.
3. Click **Modify**.
   The **Policy Administration** page opens in the work area; for example:



4. Click **Add**.
   A window opens, displaying the policies and policy groups available; for example:



5. You can optionally filter the list by policies or policy groups. From the pulldown list, select **Policy** to display policies, **Group** to display policy groups, or **All** (the default) to list both policies and policy groups.
6. Select the policy or group to add to this group and click **Add** (or **Cancel** to cancel the request). Use Shift/click to select multiple policies or policy groups. By default policies and policy groups are added after the first item in the group; to change the insert position, change the value in the **Location** field.
   The policies or policy groups are added to the policy group in the specified location and the window closes.

   Note: Policies or policy groups are applied to messages in the order in which they appear in the policy group. You can change the sequential order (see *Changing the Sequence of Deployed Policies or Policy Groups*).

7. When you finish, click **Save** (or **Cancel** to discard your changes).
   The added policies and policy groups are displayed in the policy group tree.

Now you can deploy the policy group to the policy servers (see *Deploying a Policy or Policy Group to MPE Devices*).

Note: If this group had been deployed previously, it is automatically redeployed at this time, ensuring the MPE devices are resynchronized with the CMP database.

Managing Analytics Data Stream Generation for a Policy Group

You can enable or disable generation of an analytics data stream (ADS) for all policies in a group.

To enable ADS generation for all policies in a group:

1. Enable the ADS feature by configuring the **Manage Analytic Data** management option. See *CMP Modes*.
2. From the **Policy Management** section of the navigation pane, select **Policy Library**.
   The content tree displays a list of policy library groups; the initial group is **ALL**.
3. From the content tree, select the group of interest.
   The Policy Administration page opens in the work area, listing available policies.
4. On the Policy Administration page, click **Enable Analytics**.
   ADS generation is configured for all policies in the group.

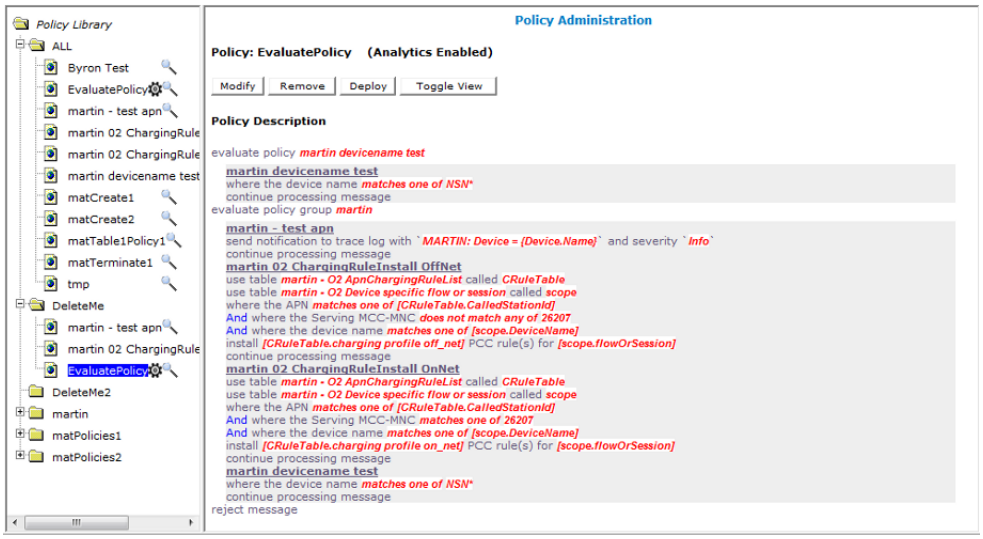
   Note: To disable ADS generation for a group, select the group and click **Disable Analytics** from the Policy Administration page. ADS generation is disabled for all policies in the group.

Removing a Policy from a Policy Group

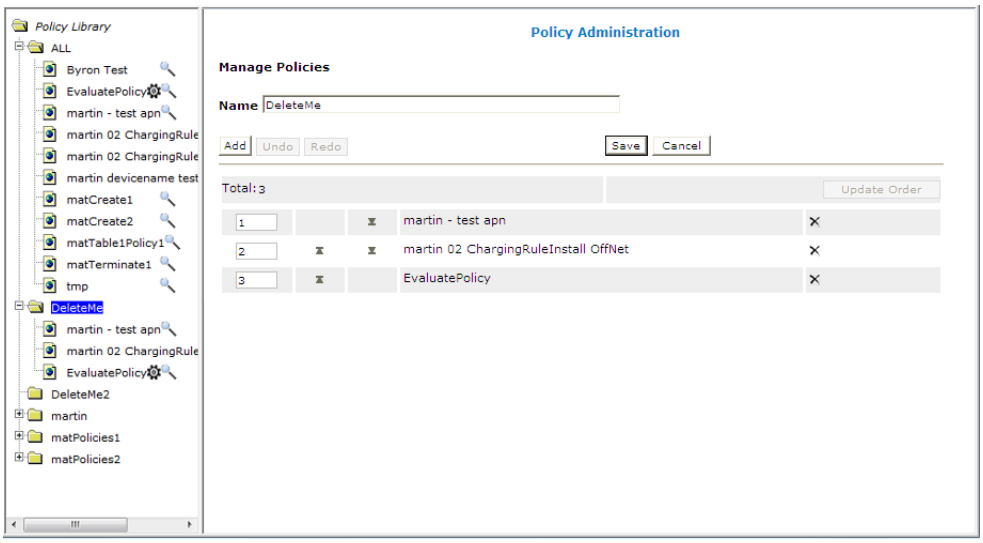
Removing a policy from a policy group that has been saved to the CMP database only removes the policy from the selected policy group. The policy itself remains in the **ALL** group, as well as any other group to which it had been added. (To remove a policy from all groups in the Policy Library, see *Removing a Policy or Policy Group from an MPE Device*.)

To remove a policy from a policy group:

1. From the **Policy Management** section of the navigation pane, select **Policy Library.**
   The content tree displays a list of policy library groups; the initial group is **ALL**.
2. From the content tree, select the policy group.
   The **Policy Administration** page opens in the work area, listing the policies it contains.
3. Remove the policy using one of the following methods:
   - From the content tree, select the policy within the policy group; its profile information is displayed. Click **Remove**.



- From the content tree, select the policy group and click **Modify**. Select the remove icon, located to the right of the policy you want to remove.



The modified policy group is redeployed, ensuring that the MPE devices are resynchronized with the CMP database.

Note: If the policy group has never been deployed, you can now deploy it to MPE devices (see *Deploying a Policy or Policy Group to MPE Devices*).

Removing a Policy Group

Removing a policy group removes the policy group from all policy groups to which it has been added.

To remove a policy group:

1. From the **Policy Management** section of the navigation pane, select **Policy Library.**

The content tree displays a list of policy library groups; the initial group is **ALL**.

2. From the content tree, select the policy group.
   The **Policy Administration** page opens in the work area, listing policies and policy groups.
3. From the content tree, select the policy group; the profile information for the group is displayed.
   Click **Delete**.
   You are prompted, `Are you sure you want to delete this Group?`
4. Click **OK** to delete the policy group (or **Cancel** to abandon the request).
   The policy group is removed from the CMP database.

Any policy groups that contained the deleted policy group are redeployed, ensuring that the MPE devices are synchronized with the CMP database.

Changing the Sequence of Policies or Policy Groups Within a Policy Group

The order in which policies or policy groups appear in a policy group is the order in which they are deployed and applied to policy requests. You can modify the order of policies or policy groups, both inside and outside of a policy group.

To change the order of the policies or policy groups within a group:

1. From the **Policy Management** section of the navigation pane, select **Policy Library.**
   The content tree displays a list of policy library groups; the initial group is **ALL**.
2. From the content tree, select the policy group.
   The **Policy Administration** page opens in the work area, displaying policies or policy groups in their current sequential order.
3. Click **Modify**.
   The **Manage Policies** page opens.
4. Use any of the following options to change the sequence of policies or policy groups within the group:
   - Use the up and down arrow icons, located to the left of policies or policy groups. The arrow icon for the top item moves it to the bottom of the list; the arrow icon for the bottom item moves it to the top of the list.
   - Drag and drop policies or policy groups to a different position in the sequence.
   - Change the sequence numbers, located to the left of policies or policy groups. Click **Update Order** to refresh the display.
   - Optionally, you can click **Undo** or **Redo** to step back and forth through your changes.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The modified policy group is redeployed, ensuring that the MPE devices are resynchronized with the CMP database.

Note: If the policy group has never been deployed, you can now deploy it to MPE devices (see *Deploying a Policy or Policy Group to MPE Devices*).

Displaying Policy Details Contained Within a Policy Group

To display the policies within a policy group:

1. From the **Policy Management** section of the navigation pane, select **Policy Library.**

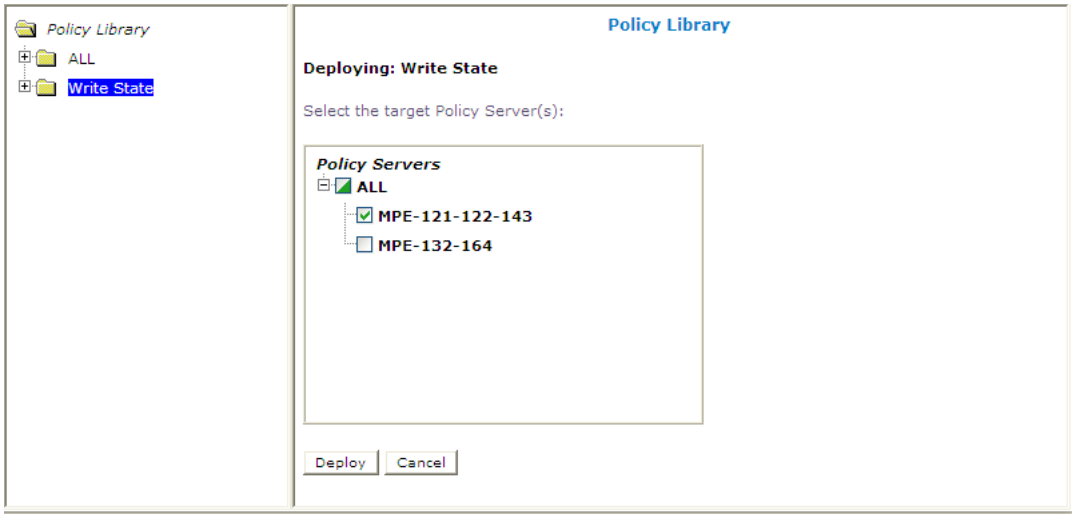
The content tree displays a list of policy library groups; the initial group is **ALL**.

2. From the content tree, select the policy group.
   The **Policy Administration** page opens in the work area, listing the policies it contains.
3. Click **Show Details**.
   The configured policies, including the configured parameters for the policies, are displayed. To switch between logical views of policy conditions, click **Toggle View**.
4. When you finish, click **Cancel**.

Deploying a Policy or Policy Group to MPE Devices

The basic procedure for deploying either a policy or a policy group to MPE devices is the same. The following procedure uses the example of deploying a policy group:

1. From the **Policy Management** section of the navigation pane, select **Policy Library.**
   The content tree displays a list of policy library groups; the initial group is **ALL**.
2. From the content tree, select the policy or policy group to deploy.
   The **Policy Administration** page opens in the work area, listing the policies it contains.
3. On the **Policy Administration** page, click **Deploy**.
   The policy server tree is displayed, listing all possible target policy servers (MPE devices) and server groups. You can expand the tree view if necessary.
4. Select the target MPE devices or policy server groups.



5. Click **Deploy** (or **Cancel** to cancel the request).
   You are prompted, `Policy Servers - Deployment Succeeded` followed by a list of MPE devices to which the policy or policy group was deployed.

The policy information is saved to each selected MPE device.

Removing a Policy or Policy Group from an MPE Device

Removing a deployed policy or policy group from an MPE device is performed from the Policy Server Administration page.

To remove a policy or policy group from an MPE device:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the MPE device.
   The Policy Server Administration page opens in the work area, displaying information about the MPE device.
3. On the Policy Server Administration page, select the **Policies** tab.
4. Click **Modify**.
   The Manage Policies page opens.
5. Click the Remove icon, located to the right of the policy or policy group that you want to remove.
   The policy or policy group is removed from the list.
6. Repeat step 5 as required.
7. When you finish, click **Save** (or **Cancel** to abandon the request).
   You are prompted, "The policies were redeployed successfully to Policy Server '*mpe*'."

The policy or policy group is redeployed to the MPE device, minus the removed policy or policy group.

Changing the Sequence of Deployed Policies or Policy Groups

Changing the sequential order of deployed policies or policy groups is performed directly on an MPE device using the Policy Server Administration page.

To change the sequential order of policies or policy groups:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **ALL**.
2. From the content tree, select the MPE device.
   The Policy Server Administration page opens in the work area, displaying information about the MPE device.
3. On the Policy Server Administration page, select the **Policies** tab.
4. Click **Modify**.
   The Manage Policies page opens in the work area.
5. Use any of the following options to change the sequential positioning of the policies or policy groups:
   - Use the up and down arrow icons, located to the left of policies or policy groups. The arrow icon for the top item moves it to the bottom of the list; the arrow icon for the bottom item moves it to the top of the list.
   - Drag and drop policies or policy groups to a different position in the sequence.
   - Change the sequence numbers, located to the left of policies or policy groups. Click **Update Order** to refresh the display.
   - Optionally, you can click **Undo** or **Redo** to step back and forth through your changes.
6. When you finish, click **Save** (or **Cancel** to cancel the request).

The policies or policy groups are redeployed to the MPE device in their new sequential order. A confirmation message displays in the work area.

Importing and Exporting Policies, Policy Groups, and Templates

Policies, policy groups, and templates can be exported from the CMP database for inspection or backup purposes. These items are exported as a whole and cannot be exported individually, as every policy, policy group, and policy template in the database is saved to a single file when performing the export function.

For information only, exported policies are marked with policy version numbers as well as the version number of the CMP software under which they were created. This does not affect importation of policies created under different versions of the CMP software.

Importing Policies

To import a policy file into the policy library:

1. From the **Policy Management** section of the navigation pane, select **Policy Import / Export**. The **Import/Export** page opens.
2. Click **Browse** to locate the policy file to import.
3. Select a collision handling option:
   - **Delete all before importing** — All policies, policy groups, and templates currently in the CMP database are deleted first; then the imported versions are saved to the MPE device.
   - **Overwrite with imported version** — All items are imported. If the CMP database currently contains any policies, policy groups, or templates using the same names as the ones being imported, they are overwritten with the imported versions.
   - **Reject any that already exist** — All items are imported except for imported versions with the same name as any policy, policy group, or template currently in the CMP database.
   - **Any collisions prevent all importing** (the default) — No items are imported if any of the imported versions has the same name as any policy, policy group, or template currently in the CMP database.
4. Click **Import**.

The policies are imported.

If you try to import an invalid file you receive a validation error: `You must correct the following error(s) before proceeding: There is a problem with the import file. The name is required, the file must be present, and the file must be in the correct format.`

Exporting Policies

To export the policies or policy templates that reside in the policy library:

1. From the **Policy Management** section of the navigation pane, select **Policy Import / Export**. The **Import/Export** page opens.
2. Select the type of export: **Policies** (the default) or **Templates.**
3. Select the policy group to export: **All** (the default) or a named group.

4. Click **Export** to export the policy group in XML format, or **Text** to export the policy group in descriptive format. Policies exported in text format cannot be reimported.
   A standard **File Download** window opens.
5. Click **Save** (or **Cancel** to close the window and cancel the request).
   A standard **Save As** window opens.
6. Assign a name to the policy file (the default is **`PolicyExport.xml`**), use the browse function to map to the location, and click **Save**.
   When the policies are successfully exported, a standard Download Complete window opens.
7. Select **Close** to close the **Download Complete** window.

The policies or templates are exported to a file.

Managing Policy Checkpoints

A policy checkpoint is a method of saving the records in the CMP database at a specific point in time. Records saved are application profiles, match lists, policies, policy counter IDs, policy groups, policy tables, policy templates, retry profiles, traffic profiles, and traffic profile groups. Records not saved are charging servers, customer AVPs, LI mediation functions, rating groups, services, serving gateways/MCC-MNC mappings, and time periods. You can save up to ten checkpoints.

Once a checkpoint is created, you can return to this set of records at any time by restoring the checkpoint.

Caution: When you restore a checkpoint, all existing data is permanently removed.

The checkpoint function is different from the export/import function in these ways:

- Checkpoints are saved on the CMP system rather than to a file.
- A checkpoint saves all records mentioned above; the import/export feature allows you to select which records to import or export.
- A checkpoint can only be used on a specific CMP system, and cannot be migrated to another CMP system.

To see this feature on the GUI menu and be able to use it, specify a value greater than 0 for the **Allow policy backup and rollback** field on the *Configuring System Settings* page. This field also controls the maximum number of checkpoints that can be saved.

Viewing and Comparing Policy Checkpoints

Use this procedure to view all checkpoints and/or compare a selected checkpoint's records to the current CMP records. You can also view the records saved for a specific checkpoint.

To view/compare policy checkpoints in the CMP database:

1. From the **Policy Management** section of the navigation pane, select **Policy Checkpoint/Restore**. The Checkpoint/Restore page opens.
2. Click **Diff** to view a report that compares the selected checkpoint's records to the current CMP records.

3. Click **More Info** to view a list of all required profile names for this checkpoint. These profiles must exist in the system before a checkpoint is restored, otherwise the restore will fail.

Creating a Policy Checkpoint

Use this procedure to create a new checkpoint. A checkpoint saves application profiles, match lists, policies, policy counter IDs, policy groups, policy tables, policy templates, retry profiles, traffic profiles, and traffic profile groups; other records are not saved.

The maximum number of checkpoints that can be created is defined on the **System Settings** page. If you create more than the number defined, the oldest checkpoint is deleted.

To create a new policy checkpoint:

1. From the **Policy Management** section of the navigation pane, select **Policy Checkpoint/Restore**. The **Checkpoint/Restore** page opens.
2. Click **Create a new checkpoint**.
   If the maximum number of checkpoints exists, you are prompted, "*n* checkpoints already exist, by creating this checkpoint the oldest one will be deleted. Continue?" (where *n* is the maximum number of checkpoints).

   To add the new checkpoint click **OK** (or **Cancel** to abandon the request).
3. Enter a name for the checkpoint in the **Input your memo** field.
4. Click **Save** (or **Cancel** to cancel your changes).

The checkpoint is created, and the message "Checkpoint successfully added" appears in green on the page.

Restoring a Policy Checkpoint

Caution: All current records are lost when a restore is performed. It is recommended that you save a checkpoint before restoring a previous checkpoint.

Use this procedure to return to a saved checkpoint.

Note: Charging servers, customer AVPs, services, LI mediation functions, rating groups, serving gateways/MCC-MNC mappings, and time periods are not saved in checkpoints, so be sure all related profile information exists in the CMP system before restoring. If related profile information is not available before you do a restore, the restore process will fail. Use the **More Info** link to view all required profile information for a checkpoint.

To restore to a checkpoint in the CMP database without autodeployment to the MPE devices:

1. From the **Policy Management** section of the navigation pane, select **Policy Checkpoint/Restore**. The Checkpoint/Restore page opens.
2. Select the checkpoint you are restoring.
3. Click **Restore** to restore the selected checkpoint.
   You are prompted, "Caution: You'd better save a checkpoint before any restoration."
4. Click **Cancel** to exit (if you need to create a checkpoint) or **OK** to continue.
   If you click **OK**, you are prompted, "Are you sure that you want to restore this checkpoint?"

5. Click **OK**.
   The selected checkpoint is restored.

A restored checkpoint message appears, listing which policies and policy groups were restored and which were removed.

Restoring a Policy Checkpoint to MPE Devices

Caution: All current records are lost when a restore is performed. It is recommended that you save a checkpoint before restoring a previous checkpoint.

Note: Charging servers, customer AVPs, services, LI mediation functions, rating groups, serving gateways/MCC-MNC mappings, and time periods are not saved in checkpoints, so be sure all related profile information exists in the CMP system before restoring. If related profile information is not available before you do a restore, the restore process will fail. Use the **More Info** link to view all required profile information for a checkpoint.

To restore to a checkpoint in the CMP and autodeploy to all MPE devices in the system:

1. From the **Policy Management** section of the navigation pane, select **Policy Checkpoint/Restore**.
   The Checkpoint/Restore page opens.
2. Select the checkpoint you are restoring.
3. Click **Restore & Deploy** to restore records to the selected checkpoint.
   You are prompted, "Caution: You'd better save a checkpoint before any restoration."
4. Click **Cancel** to exit (if you need to create a checkpoint) or **OK** to continue.
   If you click **OK**, you are prompted, "Are you sure that you want to restore this checkpoint and deploy to the MPEs?"
5. Click **OK**.
   The selected checkpoint is restored and deployed to the MPE devices.

A restored checkpoint message appears, listing which policies and policy groups were restored, which were removed, and to which MPE devices the deployment succeeded.

Deleting a Policy Checkpoint

To delete a saved checkpoint from the CMP system:

1. From the **Policy Management** section of the navigation pane, select **Policy Checkpoint/Restore**.
   The Checkpoint/Restore page opens.
2. Select the checkpoint you are deleting.
3. Click **Delete the selected checkpoint** to remove the checkpoint from the system.
   You are prompted, "Are you sure you want to delete this Checkpoint?"
4. Click **OK**.
   The message "Checkpoint deleted successfully" appears in green on the page.

The selected checkpoint is deleted from the CMP database.

Chapter 24

Managing Policy Tables

Topics:

Managing Policy Tables describes how to create, modify, delete, and view policy tables, which are independent objects that you can use to capture differences in policy structures.

You can manage multiple policies with small differences by abstracting the differences into tables. The process of modifying the policies, or creating new, similar policies then becomes a matter of modifying the policy table, which is simpler and less prone to error.

About Policy Tables

In practical use, many policies are very similar, having only small differences between them. Policy tables are an available option in the policy wizard. A policy table abstracts the differences between related policies.

Using a policy table instead of creating many similar policies makes the tasks of adding new policies, modifying existing sets of policies, and checking consistency among related policies simpler and less prone to error.

Policy tables resemble database tables, and contain the following elements:

- Table name
- Table description
- Column definitions — Every column has a definition that contains a name, data type, and indication if the column is a key column. Every entry in the column must have the same data type. Any data associated with a message, including fields (such as a quota or RAT type) and sub-fields (such as a user account ID or tier name), can be used as a key.
- Policy variable (for key columns only) — Used to obtain the value from the policy context when using the policy table to look up a row.
- Data — The contents of the table cells. (Blank cells are not allowed in a policy table.)

Each row in a policy table can be thought of as a scenario, and each row can replace a policy. Substitutions in policy condition and action parameters can include the values in a specified policy table.

Table 11: Example of a Policy Table shows an example of a simple policy table. The first column lists one or more access point names (APN), and is the key column. The second column contains a PCC rule that will be installed as part of the execution of a policy. The third column contains one or more PCC rules that will be removed as part of the execution of a policy. The second and third columns must contain names of PCC rules defined as traffic profiles in the CMP database.

Table 11: Example of a Policy Table

APN	Install	Remove
apn1.com	pcc_rule_1	pcc_default_1, pcc_basic
apn2.com	pcc_rule_2	pcc_default_2, pcc_basic
apn3.com, apn4.com	pcc_rule_1	pcc_default_1
apn5.com, apn6.com	pcc_rule_2	pcc_default_2

Each policy can have zero or more policy tables. To support the use of multiple policy tables, policies refer to a policy table using an alias. Each policy can use a different alias for the same policy table. For example, a policy table named “PCC rules to install and remove, based on APN” can be referred to in a policy as “pcc_rules.” Policies can use table cells addressed as *table_name.column_name*.

The following policy rule uses the defined policy table. The italicized text represent substitutions. The table references begin with "pcc_rules."

```
use table 'PCC rules to install and remove, based on APN' called 'pcc_rules'
where the request is modifying an existing session
     and where the session is a credit control session
     and where the requested quota is one of Bucket Exceeded,OS_no_TV_volume
     and where the quota usage reporting reason is one of validity time expired
     and where the APN matches one of pcc_rules.apn
     and where the user Custom1 matches one of 101
install pcc_rules.install PCC rule(s) for flow
remove pcc_rules.remove PCC rule(s)
send notification to syslog with
`100;{User.MSISDN};{User.AccountId};{User.IMSI};{Session.IMEI};{Date} {Time};
Info GalacTel : You have a new 500 minutes to enjoy your mobile Internet offer.
Beyond that the flow will be reduced.; {Date} {Time};{Date}
{Time};{User.Custom1};{User.BillingDay}` and severity `Emergency`

accept message
```

The use of policy tables is not required. The decision to use a policy table may arise after you have created a series of production policy rules, if you notice that the policies differ only in a few small ways.

Creating Policy Tables

When you define a policy table, it must contain at least one key column and one row, and you must populate every cell in the table.

To create a policy table:

1. From the **Policy Management** section of the navigation pane, select **Policy Table Library**.
   The content tree displays the Policy Table Library group.
2. Select the **Policy Table Library** group.
   The **Policy Table Administration** page opens in the work area.
3. Click **Create Policy Table**.
   The **Policy Table Administration** page opens.
4. Enter information as appropriate:
   a) **Name** (required) — The name you assign to the policy table.
      The name can be up to 255 characters long and must not contain quotation marks (") or commas (,).
   b) **Description/Location** (required) — Free-form text that identifies the policy table.
5. Click **Add Row** or **Add Column** (required) — You must define at least one key column.
   If you click **Add Column**, a Policy Table Column window opens. Enter the following information:
   - **Column Name** (required) — Policies will use this name as part of the address of cells in this column.
   - **Key** — If this is a key column, check the box and either select a policy variable from the pulldown list or type the name of the variable you want to use. The policy variable is used to obtain the value from the policy context when using the table to look up a row.

- **Column Type** (required) — The datatype of cells in the column. Click the folder icon; a selection window opens, displaying the Policy Wizard actions and conditions. Locate the condition or action you wish to abstract and select the variable you wish to use (displayed in red text); the datatype is taken from the variable.
- When you finish, click **Save** (or **Cancel** to abandon your changes).

If you click **Add Row**, a row is added below the current row in the table. Select each cell in the row; a window opens so you can enter the value of that cell. The data in cells must match the datatype of the column. Enter the value and click **OK** (or **Cancel** to abandon your changes). You can also enter a comma-separated list of values.

The column or row is displayed.

6. To manage a row or column, select it and click **Operations**, then select from the pulldown list:
   - **Delete Row** — Deletes the table row.
   - **Move Row Up** — Moves the table row up.
   - **Move Row Down** — Moves the table row down.
   - **Delete Column** — Deletes the column in the table.
   - **Move Column Left** — Moves the column left in the table.
   - **Move Column Right** — Moves the column right in the table.
   - **Sort Column** — Sorts the column in the table.
   - **UnSort Column** — Reverts the column to its original order.
7. When you finish defining the table, click **Validate**; the table definition is validated. Validation ensures that tables contain a key column, at least one row, and no empty cells. If the table is invalid, a diagnostic message appears.
8. When you finish, click **Save** (or **Cancel** to discard your changes).
   The policy table is validated, and if valid is displayed on the Policy Table Administration page.

You have defined a policy table. You can now use the table in a policy.

Figure 24: Sample Policy Table shows the sample policy table discussed in *Policy Table Case Study*

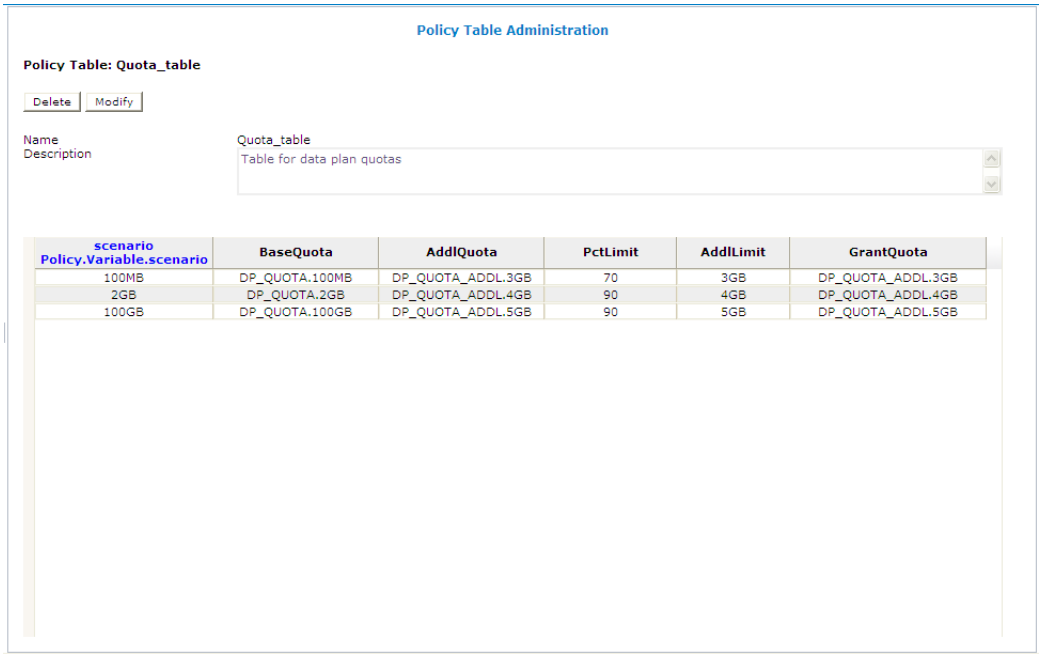


Figure 24: Sample Policy Table

Policy Table Case Study

The following case study is derived and simplified from actual carrier policies, and illustrates how a large set of policies can be consolidated using a policy table.

A wireless carrier named GalacTel offers three monthly data usage plans for its subscribers. The monthly quota levels are 100 MB, 2 GB, and 150 GB. Seven policies are used to capture the business logic for each usage plan, as follows:

- When subscribers near their monthly quota limit, the carrier (1) sends an SMS notification.
- When subscribers reach their monthly quota limit, the carrier (2) sends an SMS notification, (3) sets an additional quota (at an additional price), (4) sets a new warning threshold, and (5) sets a new limit threshold.
- When subscribers reach the additional limit, the carrier (6) sends an SMS notification and (7) throttles additional usage to 64 kbps.

The rules for each usage plan are collected in a policy group, so to support the three plans there are three policy groups. Finally, triggering policies determine which policy group to execute based on the subscriber's entitlement.

The names the carrier uses for the groups, and the names of the policies each contains, are as follows. The groups are named for the data plans (100MB, 2GB, and 100GB), and the policies are named for the data plans and the actions each policy performs.

Group Name	Policy Name
Quota 100MB	Quota 100MB send 70 percent SMS

Group Name	Policy Name
	Quota 100MB send 100 percent SMS
	Quota 100MB additional quota send 100 percent SMS
	Quota 100MB set 70 percent volume threshold
	Quota 100MB set 100 percent volume threshold
	Quota 100MB additional quota set 100 percent volume threshold
	Throttle 64kbps 100MB
Quota 2GB	Quota 2GB send 90 percent SMS
	Quota 2GB send 100 percent SMS
	Quota 2GB additional quota send 100 percent SMS
	Quota 2GB set 90 percent volume threshold
	Quota 2GB set 100 percent volume threshold
	Quota 2GB additional quota set 100 percent volume threshold
	Throttle 64kbps 2GB
Quota 100GB	Quota 100GB send 90 percent SMS
	Quota 100GB send 100 percent SMS
	Quota 100GB additional quota send 100 percent SMS
	Quota 100GB set 90 percent volume threshold
	Quota 100GB set 100 percent volume threshold
	Quota 100GB additional quota set 100 percent volume threshold
	Throttle 64kbps 100GB

Comparing the triggering policies shows that they differ only in the name of the entitlement to match and the policy group to execute (differences are italicized):

Trigger Policy: Evaluate 3G Volume Quota Group 100MB

```
where the ENTITLEMENTS is contained in Match List(s) Ent 100MB Quota
evaluate policy group Quota 100MB
```

Trigger Policy: Evaluate 3G Volume Quota Group 2GB

```
where the ENTITLEMENTS is contained in Match List(s) Ent 2GB Quota
evaluate policy group Quota 2GB
```

Trigger Policy: Evaluate 3G Volume Quota Group 100GB

```
where the ENTITLEMENTS is contained in Match List(s) Ent 100GB Quota

evaluate policy group Quota 100GB
```

Similarly, comparing the corresponding policies in different groups shows that they too are mostly the same, with only a few isolated differences (differences are italicized):

Group: Quota 100MB; Policy: Quota 100MB send 70 percent SMS

```
where the user is using greater than or equal to 70 percent and less than 100
percent of volume for DP_QUOTA.100MB quota
And where the event trigger is one of USAGE_THRESHOLD_REACHED
send SMS `You have consumed 70 % of your total quota allotted on GalacTel.` to
user. Request delivery receipt `default`.
send notification to syslog with `SMS
70%;{User.E164};{User.Custom5};{User.Custom6};GOLD;{User.Entitlement};You have
consumed 70 % of your total quota allotted on GalacTel.` and severity `Info`
Advanced: set values for QoS and Charging parameters to
Diameter IP-CAN Session Usage Monitoring  USAGE_MONITORING_ENABLED

continue processing message
```

Group: Quota 2GB; Policy: Quota 2GB send 90 percent SMS

```
where the user is using greater than or equal to 90 percent and less than 100
percent of volume for DP_QUOTA.2GB quota
And where the event trigger is one of USAGE_THRESHOLD_REACHED
send SMS `You have consumed 90 % of your total quota allotted on GalacTel.` to
user. Request delivery receipt `default`.
send notification to syslog with `SMS
90%;{User.E164};{User.Custom5};{User.Custom6};GOLD;{User.Entitlement};You have
consumed 90 % of your total quota allotted on GalacTel.` and severity `Info`
Advanced: set values for QoS and Charging parameters to
Diameter IP-CAN Session Usage Monitoring  USAGE_MONITORING_ENABLED

continue processing message
```

Group: Quota 100GB; Policy: Quota 100GB send 90 percent SMS

```
where the user is using greater than or equal to 90 percent and less than 100
percent of volume for DP_QUOTA.100GB quota
And where the event trigger is one of USAGE_THRESHOLD_REACHED
send SMS `You have consumed 90 % of your total quota allotted on GalacTel.` to
user. Request delivery receipt `default`.
send notification to syslog with `SMS
90%;{User.E164};{User.Custom5};{User.Custom6};GOLD;{User.Entitlement};You have
consumed 90 % of your total quota allotted on GalacTel.` and severity `Info`
Advanced: set values for QoS and Charging parameters to
Diameter IP-CAN Session Usage Monitoring  USAGE_MONITORING_ENABLED

continue processing message
```

Group: Quota 100MB; Policy: Quota 100MB additional quota set 100 percent volume threshold

```
where the user is using greater than or equal to 100 percent of total volume for
 DP_QUOTA.100MB quota
And where the user is using less than 100 percent of total volume for
DP_QUOTA_ADDL.3GB quota
```

```
remove PCC rule type(s) all for all
install 16Mbps_DL_5.76Mbps_UL PCC rule(s) for flow
grant total volume to 100 percent used for DP_QUOTA_ADDL.3GB
Advanced: set values for QoS and Charging parameters to
Diameter_Enforcement_Session_Event_Triggers__REVALIDATION_TIMEOUT,_
USAGE_THRESHOLD_REACHED
Diameter_IP-CAN_Session_Usage_Monitoring__USAGE_MONITORING_ENABLED

accept message
```

Group: Quota 2GB; Policy: Quota 2GB additional quota set 100 percent volume threshold

```
where the user is using greater than or equal to 100 percent of total volume for
 DP_QUOTA.2GB quota
And where the user is using less than 100 percent of total volume for
DP_QUOTA_ADDL.4GB quota
remove PCC rule type(s) all for all
install 16Mbps_DL_5.76Mbps_UL PCC rule(s) for flow
grant total volume to 100 percent used for DP_QUOTA_ADDL.4GB
Advanced: set values for QoS and Charging parameters to
Diameter_Enforcement_Session_Event_Triggers__REVALIDATION_TIMEOUT,_
USAGE_THRESHOLD_REACHED
Diameter_IP-CAN_Session_Usage_Monitoring__USAGE_MONITORING_ENABLED

accept message
```

Group: Quota 100GB; Policy: Quota 100GB additional quota set 100 percent volume threshold

```
where the user is using greater than or equal to 100 percent of total volume for
 DP_QUOTA.100GB quota
And where the user is using less than 100 percent of total volume for
DP_QUOTA_ADDL.5GB quota
remove PCC rule type(s) all for all
install 16Mbps_DL_5.76Mbps_UL PCC rule(s) for flow
grant total volume to 100 percent used for DP_QUOTA_ADDL.5GB
Advanced: set values for QoS and Charging parameters to
Diameter_Enforcement_Session_Event_Triggers__REVALIDATION_TIMEOUT,_
USAGE_THRESHOLD_REACHED
Diameter_IP-CAN_Session_Usage_Monitoring__USAGE_MONITORING_ENABLED

accept message
```

All the differences in the seven policies for the three groups can be tabulated using only six columns and three rows, as follows. Because of the similarities from group to group, these policies are good candidates for using a policy table. These three groups can be replaced by one set of policies using variables for differences and one policy table with three rows. The table's key column, representing the scenarios, is a policy context property. The table column headings become the names of the other variables used in the policies.

Policy. Variable. scenario	BaseQuota	AddlQuota	PctLmt	AddlLmt	GrantQuota
100MB	DP_QUOTA.100MB	DP_QUOTA_ADDL.3GB	70	3GB	DP_QUOTA_ADDL.3GB
2GB	DP_QUOTA.2GB	DP_QUOTA_ADDL.4GB	90	4GB	DP_QUOTA_ADDL.4GB
100GB	DP_QUOTA.100GB	DP_QUOTA_ADDL.5GB	90	5GB	DP_QUOTA_ADDL.5GB

The triggering policies are now rewritten to use the policy table and a single policy group, which in this case study is named "QUOTA," as follows, with the change italicized. A policy context property, which in this case study is named "scenario," is used as the key to locate the row in the table to use.

Table-Driven Trigger Policy: Evaluate 3G Volume Quota Group 100MB

```
where the ENTITLEMENTS is contained in Match List(s) Ent 100MB Quota
set policy context property scenario to 100MB
evaluate policy group QUOTA
```

Table-Driven Trigger Policy: Evaluate 3G Volume Quota Group 2GB

```
where the ENTITLEMENTS is contained in Match List(s) Ent 2GB Quota
set policy context property scenario to 2GB
evaluate policy group QUOTA
```

Table-Driven Trigger Policy: Evaluate 3G Volume Quota Group 100GB

```
where the ENTITLEMENTS is contained in Match List(s) Ent 100GB Quota
set policy context property scenario to 100GB
evaluate policy group QUOTA
```

The policies in the QUOTA group are now rewritten to use the policy table, which in this case study is named "Quota_table," and variables. The sample policies shown previously are rewritten as follows (with the changes italicized):

Group: QUOTA; Policy: Quota send Warning percent SMS

```
use table Quota_table called table
where the user is using greater than or equal to table.PctLmt percent and less
than 100 percent of volume for table.BaseQuota quota
And where the event trigger is one of USAGE_THRESHOLD_REACHED
send SMS `You have consumed table.PctLmt % of your total quota allotted on
GalacTel.` to user. Request delivery receipt `default`.
send notification to syslog with `SMS
table.PctLmt%;{User.E164};{User.Custom5};{User.Custom6};GOLD;{User.Entitlement};You
 have consumed table.PctLmt % of your total quota allotted on GalacTel.` and
severity `Info`
Advanced: set values for QoS and Charging parameters to
Diameter IP-CAN Session Usage Monitoring  USAGE_MONITORING_ENABLED

continue processing message
```

Group: QUOTA; Policy: Quota additional quota set 100 percent volume threshold

```
use table Quota_table called table
where the user is using greater than or equal to 100 percent of total volume for
 table.BaseQuota quota
And where the user is using less than 100 percent of total volume for table.AddlLmt
 quota
remove PCC rule type(s) all for all
install 16Mbps_DL_5.76Mbps_UL PCC rule(s) for flow
grant total volume to 100 percent used for table.AddlQuota
Advanced: set values for QoS and Charging parameters to
Diameter Enforcement Session Event Triggers  REVALIDATION_TIMEOUT,
USAGE_THRESHOLD_REACHED
Diameter IP-CAN Session Usage Monitoring  USAGE_MONITORING_ENABLED

accept message
```

Associating Policy Tables with a Policy Rule

To associate a policy table with a new or existing policy rule, the policy table must be defined. See *About Policy Tables* for more information on what a policy table is. See *Creating Policy Tables* for more information on how to define a policy table. See *Creating a New Policy* for more information on creating and modifying a policy definition.

One or more policy tables can be associated with a new or existing policy rule from the **Table Associations** page of the policy wizard using this procedure:

1. Start the Policy Wizard.
2. On the **Table Associations** page, click ○ (selection icon) next to **Use table *policy table* called *specified alias name***.
   The policy table option is added to the **Description** section of the page, where you select an existing policy table to use, and define an alias name for this policy table, if needed.
3. In the **Description** section of the page, click *policy table* to select an existing policy table.
   The **Policy Table Data** window appears.
4. Click to highlight the existing table to use, and click **OK**.
5. Click *specified alias name* to associate a unique name with this table. An alias name is required; enter a name here to specify the purpose of this policy table in this policy. You can then use the same policy table in multiple policies but define a different purpose each time with the alias name field.
   An **Input a Value** window opens.
6. Enter an alias name following the format specified in the window, and click **OK**.
7. Repeat these steps to associate another policy table with this policy rule, if needed.
8. If multiple policy tables are associated with this policy rule, use the up or down icon to move a table up or down to change the order in which it is evaluated in the rule.
9. Click **Next** to continue to the **Conditions** page.

The selected policy table(s) are associated with this policy definition.

Modifying Policy Tables

1. From the **Policy Management** section of the navigation pane, select **Policy Table Library**.
   The Policy Table Administration page opens in the work area.
2. On the Policy Table Administration page, select the policy table you want to modify.
   The Policy Table Administration page displays information about the policy table.
3. Click **Validate**. If selected, the data modified is validated. If invalid, a diagnostic message appears.
4. Click **Modify**.
   The table fields become editable. See *Creating Policy Tables* for information about the table fields.
5. When you finish, click **Save** (or **Cancel** to discard your changes).

The policy table content is modified.

Deleting Policy Tables

1. From the **Policy Management** section of the navigation pane, select **Policy Table Library**.
   The Policy Table Administration page opens in the work area.
2. Delete the Policy Table using one of the following methods:
   - From the work area, click the **Delete** icon located to the left of the policy table you wish to delete.
   - Open the policy and click **Delete**.

   You are prompted, "Are you sure you want to delete this policy table?"
3. Click **OK** (or **Cancel** to abandon the request).

The policy table is deleted.

Viewing Policy Tables

From the **Policy Management** section of the navigation pane, select **Policy Table Library**.
A tree frame view displays all existing policy tables. You will see all of the existing policy tables in the main frame when you click **ALL**.

Note: The policy table details are viewed by clicking the actual policy table name in the tree frame.

Chapter 25

Managing Subscribers

Topics:

Managing Subscribers describes how to create and manage subscriber tiers and quota usage within the CMP system.

Note: The actual options you see depend on whether or not your CMP system is configured to operate with a subscriber profile repository (SPR) system. For information about the Tekelec SPR, see the *Subscriber Data Management* documentation.

Creating a Tier

Tiers are categories that you can define and then apply to groups of subscribers. For example, you can create a series of tiers with different bandwidth limits. Once you define tiers, you can use them in policy rules.

To create a subscriber tier:

1. From the **Subscriber** section of the navigation pane, select **Tiers**.
   The content tree displays the **Tiers** folder.
2. Select the **Tiers** folder.
   The Tier Administration page opens.
3. Click **Create Tier**.
   The New Tier page opens.
4. Enter information as follows:
   a) **Name** (required) — Name of the tier.
      The name can be up to 255 characters long and must not contain quotation marks (") or commas (,).
   b) **Description/Location** — Free-form text.
      Enter up to 250 characters.
   c) **Downstream bandwidth limit (bps)** — The maximum amount of bandwidth capacity available in the downstream direction in bits per second.
      You can enter a value followed by M or G; for example, 4G for 4 gigabits per second.
   d) **Upstream bandwidth limit (bps)** — The maximum amount of bandwidth capacity available in the upstream direction in bits per second.
      You can enter a value followed by M or G; for example, 10M for 10 megabits per second.
5. When you finish, click **Save** (or **Cancel** to cancel the request).
   The tier is added to the CMP database, and the message "Tier created successfully" is displayed.

You can now use the tier in policy rules.

Deleting a Tier

To delete a tier:

1. From the **Subscriber** section of the navigation pane, select **Tiers**.
   The **Tiers** folder appears in the content tree.
2. Delete the tier using one of the following methods:
   - From the work area, click the Delete icon, located to the right of the tier you wish to delete.
   - From the content tree, select the tier and click **Delete**.

   You are prompted, "Are you sure you want to delete this Tier?"
3. Click **OK** (or **Cancel** to cancel the request).
   The message "Tier deleted successfully" is displayed in green on the page.

You have deleted the tier.

Creating an Entitlement

Entitlements are defined within a subscriber profile repository. You can define entitlement names in the CMP database. Once you define entitlements, you can use them in policy rules.

To create an entitlement:

1. From the **Subscriber** section of the navigation pane, select **Entitlements**.
   The content tree displays the **Entitlements** folder.
2. Select the **Entitlements** folder.
   The Entitlement Administration page opens.
3. Click **Create Entitlement**.
   The New Entitlement page opens.
4. Enter information as follows:
   a) **Entitlement ID** (required) — Name of the tier.
      The name can be up to 255 characters long and must not contain quotation marks (") or commas (,).
   b) **Description/Location** — Free-form text.
      Enter up to 250 characters.
5. When you finish, click **Save** (or **Cancel** to cancel the request).

The entitlement is created in the CMP database.

Deleting an Entitlement

To delete an entitlement:

1. From the **Subscriber** section of the navigation pane, select **Entitlements**.
   The **Entitlements** folder appears in the content tree, and a list of defined entitlements appears in the work area.
2. Delete the entitlement using one of the following methods:
   - From the work area, click the Delete icon, located to the right of the entitlement you wish to delete.
   - From the content tree, select the entitlement and click **Delete**.

   You are prompted, "Are you sure you want to delete this Entitlement?"
3. Click **OK** (or **Cancel** to abandon your request).

The entitlement is deleted.

Managing Sessions

You can display static session and binding data for a specific subscriber from the Policy Management device that is managing the session. Depending on how the data is indexed on the device, you can search for a subscriber by IMSI, MSISDN, IP address, or NAI. You can also delete obsolete sessions.

Note: This function is not supported by Policy Management devices before V7.5.

To view a session:

1. From the **Policy Server** section of the navigation pane, select **Configuration**.
   The content tree displays a list of policy server groups; the initial group is **All**.
2. Select the Policy Management device managing the session you are interested in.
   The **Policy Server Administration** page opens in the work area.
3. Select the **Session Viewer** tab.
   The **Session Viewer** tab opens.
4. Enter search information as follows:
   a) **Identifier type** (required) — Select **NAI** (the default), **E.164(MSISDN)**, **IMSI**, **IPv4Address**, or **IPv6Address** from the pulldown list.

      The identifier types you can specify are determined by the configuration of the Policy Management device. For example, if the IndexByNAI setting is not specified on the device, then you cannot select **NAI**.

      Note: When searching primary Gx sessions by IPv6 address, only 64-bit masks are supported.

   b) **Identifier name** — Free-form text.

      Enter up to 250 characters.
5. Click **Search**.
   If sessions are available for the subscriber, subscriber session data is displayed. *Figure 25: Session Viewer Page* shows an example. If the subscriber has correlated secondary sessions, the correlated secondary session data is also displayed.

If you are viewing subscriber data from a stateful MRA system, subscriber binding data is displayed, including an identifier for the MPE device handling sessions for that subscriber. If that MPE device is managed by this CMP system, you can click the identifier to view session data from the MPE device.

Note: If an external system generates data that, when translated to ASCII, creates illegal characters, they are displayed by the Session Viewer as question marks (?).

For each session displayed from an MPE device, you can click **Delete Session** to delete the session. For each subscriber displayed from an MPE device, you can click **Delete Subscriber's All Session** to delete all sessions for that subscriber. For each session binding displayed from an MRA device, you can click **Delete Binding** to delete the binding. This deletes the record in the appropriate database.

Caution: Only obsolete sessions should be deleted. If you delete an active session, there is no signal to any associated gateways or external network elements.

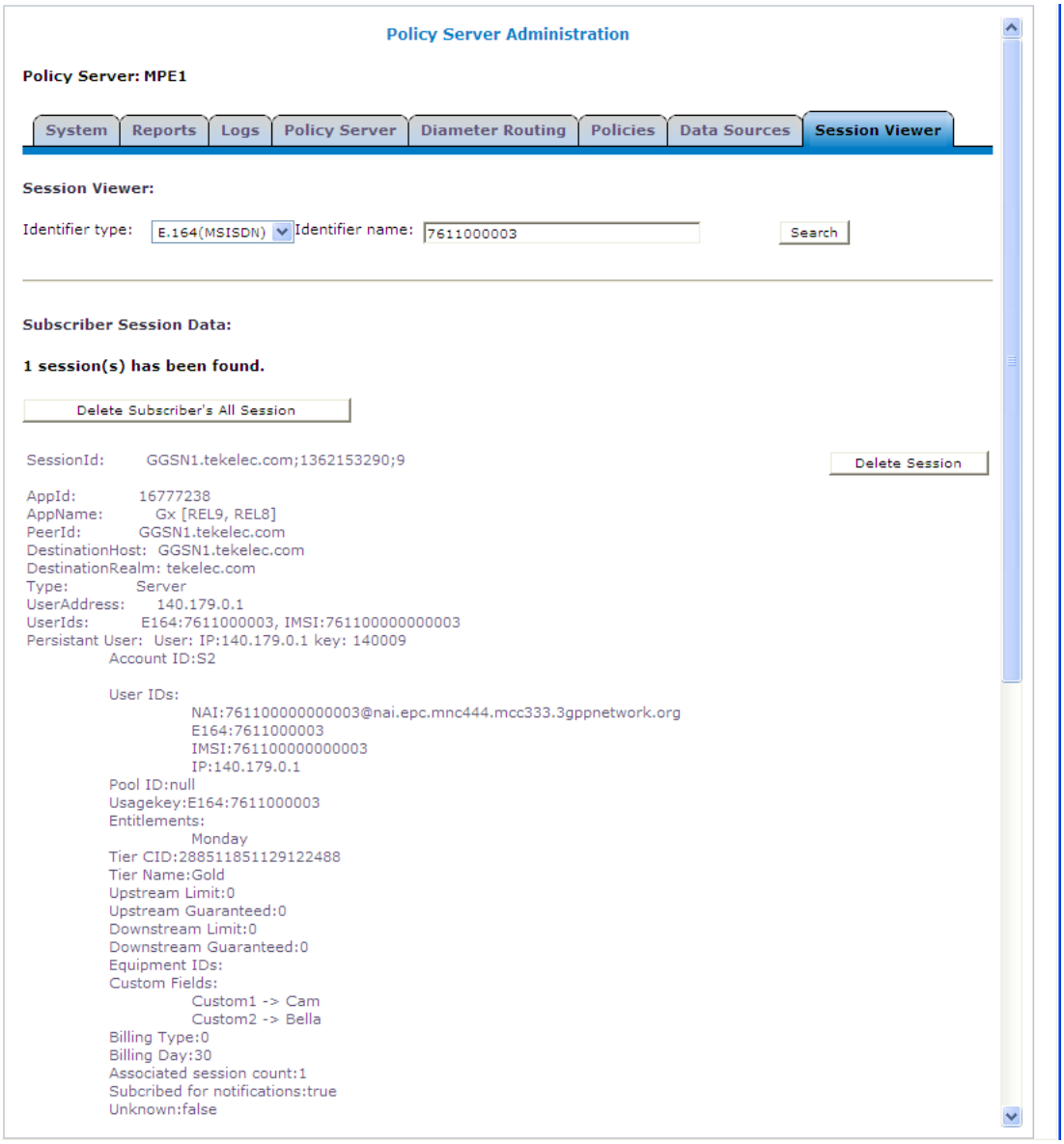


Figure 25: Session Viewer Page

Chapter 26

System-Wide Reports

Topics:

System-Wide Reports describes the reports available on the function of Policy Management systems in your network. Reports can display platform alarms, network protocol events, and Policy Management application errors.

Viewing Active Alarms

The Active Alarms report provides an aggregate view of timestamped alarm notifications for Policy Management systems. The display is refreshed every ten seconds and appears in the upper right corner of all CMP pages. Alarms remain active until they are reset.

The Active Alarms report provides details about active alarms. To view the Active Alarms report, from the **System Wide Reports** section of the navigation pane, select **Alarms**, and then select **Active Alarms**.

Figure 26: Sample Active Alarms Report shows a sample active alarm report.

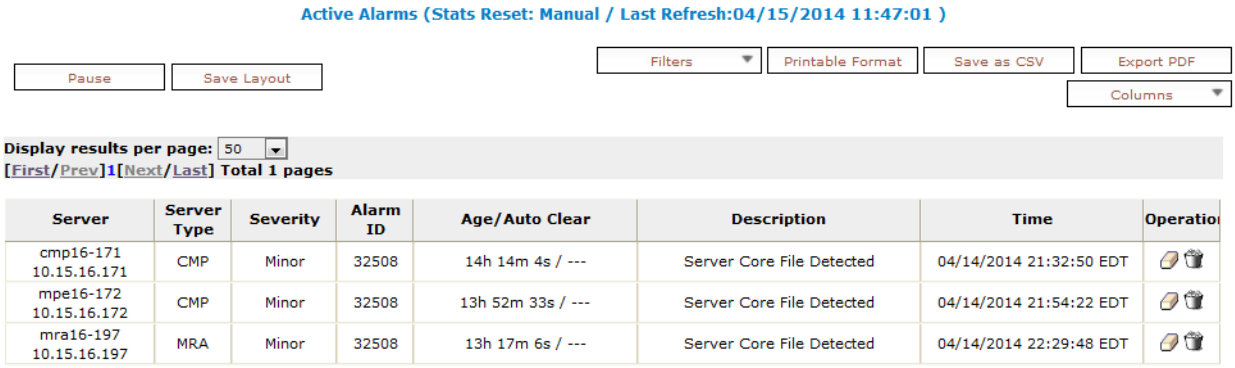


Figure 26: Sample Active Alarms Report

The alarm levels are as follows:

- **Critical** — Service is being interrupted. (Critical alarms are displayed in red.)
- **Major** — Service may be interrupted if the issue is not corrected. (Major alarms are displayed in yellow.)
- **Minor** — Non-service affecting fault.

Notifications, which have a severity of Info, are not displayed in the Active Alarms report, but are written to the trace log. For more information, see *Viewing the Trace Log*.

Note: Alarms generated by Policy Management systems running software before V7.5 are mapped to these levels as follows: Emergency or Critical map to Critical; Alert or Error map to Major; Warning or Notice map to Minor.

The Age/Auto Clear column shows how long an alarm has been active (that is, how long since it was raised) and how long the alarm will display before being automatically cleared. The Auto Clear time is shown as "---" if the alarm is not automatically cleared.

The following options are available:

- To sort the report on any column, click the column title.
- To display online help for an alarm, click the alarm ID.
- To hide an alarm, click (hide), located to the right of each row. All instances of alarms with that ID reported from that server are hidden from display (but shown in the Hidden Filter, which you can use to restore the display of those alarms).

Note: Hiding an alarm only affects the current user. Other users will see the alarm if they display the Active Alarms page.

- To manually clear an alarm, click  (trash can), located to the right of each row. You are prompted, "This alarm will be cleared. Are you sure?" Click **OK** (or **Cancel** to abandon your request).
- To pause the display of alarms, click **Pause**. To resume the display, click **Refresh**.
- To select what information is displayed, click **Columns** and select from the pulldown list.
- To control what alarms and alarm classes are displayed on the page, click **Filters** and select from the pulldown menu:
  - The **Search Filter** tab has three controls. The **Server** control lets you display alarms from all servers (the default) or a specific server. The **Server Type** control lets you display alarms from all Policy Management products (the default) or just **CMP**, **MRA**, or **MPE** systems. The **Severity** control lets you display alarms of all severities (the default), critical and major alarms, critical alarms, major alarms, or minor alarms.
  - The **Hidden Filter** tab shows alarms, by server and alarm ID, that are currently hidden from display. Click the delete icon, to the right of an entry, to remove it from the list of hidden items and display it in the page again.
- To save your formatting changes to the report page, click **Save Layout**.
- **Printable Format** — The current alarms are displayed in a separate window.
- **Save as CSV** — A comma-separated value (CSV) file named `report.csv` is generated, suitable for a spreadsheet application, and a standard **File Download** window opens, so you can save or open the file.
- **Export PDF** — A Portable Document Format (PDF) file named `report.pdf` is generated, suitable for a spreadsheet application, and a standard **File Download** window opens, so you can save or open the file.

Viewing the Alarm History Report

The Alarm History Report displays historical alarm information.

To view the alarm history report, from the **System Wide Reports** section of the navigation pane, select **Alarms** and then select **Alarm History Report**.

Note: If you are using Internet Explorer, the window appears behind the main window.

The window displays up to 50,000 alarms, sorted by age. To view older alarms, reduce the number of alarms displayed, or locate a specific alarm or group of alarms, you can define filtering criteria using the following fields:

- **Start Date** — Filter out alerts before a specific date/time. Click  (calendar icon) to specify a date/time.
- **End Date** — Filter out alerts after a specific date/time. Click  (calendar icon) to specify a date/time.
- **Severity** — Filter alerts by severity level; select a level (the default is **All**) from the list.
- **Cluster or Server** — Select the cluster or server within the cluster whose alarms you want to view.
- **Active Alarms** — Select to view only active alarms; the default is to display both active and cleared alarms.

- **Aggregate** — Select to aggregate alarms that have the same IP address, alarm ID, and severity.

After entering filtering information, click **Filter** to refresh the display with the filtering applied.

Note: If you wish to view the most recent alarms, and there are more than 50,000 alarms in the database, specify a start date/time that includes the present.

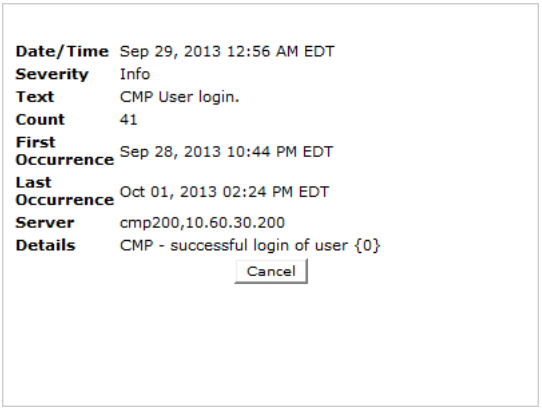
When you finish, click **Close** to close the window.

Alarms contain the following information:

- **Occurrence** — The most recent time this alert was triggered.
- **Severity** — The severity of the alert:
  - **Critical** — Service is being interrupted.
  - **Major** — Service may be interrupted if the issue is not corrected.
  - **Minor** — Non service affecting fault.
  - **Info** — Informational message only.
  - **Clear** — Alarm has been cleared.

  Note: Alarms generated by Policy Management systems running software before V7.5 are mapped to these levels as follows: Emergency or Critical map to Critical; Alert or Error map to Major; Warning or Notice map to Minor.
- **Alarm ID**— When clicked, the alarm ID provides online help information.
- **Text** — User-readable text of the alert.
- **OAM VIP** — OAM IP address or IPv4 address.
- **Server** — Name and IP address, in IPv4 or IPv6 format, or FQDN of the device from which this alarm was generated.

To view alert details, click  (binoculars icon) located to the right of the alert. A window displays additional information; for example:



Click **Cancel** to close the window.

KPI Dashboard

The KPI Dashboard provides a multi-site system-level summary of performance and operational health indicators in the CMP web-based GUI. The display includes indicators for:

- Offered load (transaction rate)
- System capacity (counters for active sessions)
- Inter-system connectivity
- Physical resource utilization (memory, CPU)
- System status
- Alarms
- Protocol errors

The KPI dashboard displays the indicators for all the systems on a single page, with each MRA KPIs in a separate table when MRA systems are managed by the CMP system or with all MPE KPIs in one table when MRA systems are not managed by the CMP system (e.g. MPE-only deployment). Each row within a table represents a single system (either an MPE or MRA server). The table cells are rendered using a color scheme to highlight areas of concern that is well adopted by the telecommunication industry. The table contents are periodically refreshed every 10 seconds; this time period is not configurable. The color changing thresholds are user configurable.

Figure 27: Example of KPI Dashboard with MRA Devices Managed by the CMP System illustrates the dashboard's contents when MRA systems are managed by the CMP system.

KPI Dashboard (Stats Reset: Interval / Last Refresh: 09/20/2013 11:59:27)

Filters | Change Thresholds

	Performance			Alarms			Protocol Errors	
	TPS	PDN	Active Subscribers	Critical	Major	Minor	Sent	Received
MRAs selected	40	6000	6000	0	0	0	0	0
MPEs selected	37	13262	13261	0	0	0	0	0

mra17-118	Performance						Connections			Alarms			Protocol Errors	
MRA	State	TPS	PDN	Active Subscribers	CPU %	Memory %	MPE	MRA	Network Elements	Critical	Major	Minor	Sent	Received
mra17-118(Server-A)	Standby				3	34								
mra17-118(Server-B)	Active	20 (0%)	3000 (0%)	3000 (0%)	4	46	3 of 4	2 of 2	1 of 4	0	0	0	0	0
MPE	State	TPS	PDN	Active Sessions	CPU %	Memory %	MRA	Data Sources		Critical	Major	Minor	Sent	Received
mpe17-111(Server-A)	Standby				4	37								
mpe17-111(Server-B)	Active	11 (0%)	3953 (0%)	3951 (0%)	4	60	2 of 2	0 of 0		0	0	0	0	0
mpe17-115(Server-A)	Active	7 (0%)	4810 (0%)	4811 (0%)	3	55	1 of 2	0 of 0		0	0	0	0	0

mra17-122	Performance						Connections			Alarms			Protocol Errors	
MRA	State	TPS	PDN	Active Subscribers	CPU %	Memory %	MPE	MRA	Network Elements	Critical	Major	Minor	Sent	Received
mra17-122(Server-A)	Standby				3	33								
mra17-122(Server-B)	Active	20 (0%)	3000 (0%)	3000 (0%)	3	46	2 of 3	2 of 2	1 of 4	0	0	0	0	0
MPE	State	TPS	PDN	Active Sessions	CPU %	Memory %	MRA	Data Sources		Critical	Major	Minor	Sent	Received
mpe17-116	Off-line	----	----	----	----	----	----	----		----	----	----	----	----
mpe17-117(Server-A)	Standby				4	39								
mpe17-117(Server-B)	Active	19 (0%)	4499 (0%)	4499 (0%)	4	60	2 of 2	0 of 0		0	0	0	0	0

Figure 27: Example of KPI Dashboard with MRA Devices Managed by the CMP System

The **MRAs selected** row displays the aggregation count for user-selected MRA devices. The **MPEs selected** row displays the aggregation count for the MPE devices that belong to the user-selected MRA devices.

The following counts are aggregated for selected MRA databases and the associated MPE devices:

- TPS
- PDNs
- Active Subscribers
- Critical Alarm Count
- Major Alarm Count
- Minor Alarm Count
- Protocol Errors Sent
- Protocol Errors Received

Note: Isolated MPE devices are not included in the aggregation counts.

When there are no MRA devices managed by the CMP system, the displayed headings are:

- Name of MPE
- Performance:
  - State
  - TPS
  - PDN
  - Active Sessions
  - CPU %
  - Memory %
- Connections
  - Data Sources
  - Network Elements
- Alarms
  - Critical
  - Major
  - Minor
- Protocol Errors
  - Sent
  - Received

In the top right corner there is a **Change Thresholds** button that allows you to change threshold settings used to determine cell coloring (discussed below). When MRA devices are managed by the CMP system, a button on the top left corner lists each of the MRA devices with a checkbox that allows the user to enable/disable the table for that MRA device.

Individual servers are identified by name and the order in which they were defined within their cluster (Server-A, Server-B, Server-C). If any of these are set to Reverse Site Preference, then an "R" will appear by the server's State. For the standby or spare server, several columns are not populated (since those servers are not active); the only columns that contain data are: Status, CPU%, and Memory%. For Connections, Alarms, and Protocol Errors, the column's information is a hyperlink that will open a more detailed report.

If a monitored system is unreachable, or if the data is unavailable for some reason, then the status is set to "Off-line" and the values in all the associated columns is cleared. In this situation, the entire

row is displayed with the error color (red). If a monitored system does not support KPI retrieval then the status is set to "N/A" and the values in all the associated columns are cleared. No coloring is applied.

The columns that display information in the form of X (Y%) (e.g. "TPS" and "PDN Connections"/"Sessions") correspond to the following: X represents the actual numeric value and Y represents the % of rated system capacity that is consumed.

The columns that display connection counts are displayed in the form "X of Y" where X is the current number of connections and Y is the configured number of connections. When X and Y are not the same, the column uses the warning color to indicate a connectivity issue, unless X is 0, in which case the error color is displayed.

The Alarm and Protocol Errors columns display the number of current events. If there are any Critical or Major alarms, then these cells will be colored red or yellow, respectively.

Note: To learn more about an alarm and how to resolve it, see the *Policy Management Troubleshooting Guide* for this release.

Click the name of an MPE or MRA device to display detailed statistics. For more information on detailed device statistics, see the description on the **Reports** tab for the device.

Mapping Display to KPIs

The following tables explain how each of the columns in the KPI dashboard are mapped to a specific statistic in the KPI statistics. On the initial KPI Dashboard window, KPIs for each MRA and MPE device are shown. Since the tables contain row entries for the active, standby and spare servers (if georedundancy is configured), the mapping is described for all three servers. *Table 12: KPI Definitions for MRA Devices* shows the mappings for MRA devices; *Table 13: KPI Definitions for MPE Devices when MRA Devices are Managed by CMP System* shows the mappings for MPE devices when the MRA devices are managed by the CMP system; and *Table 14: KPI Definitions for MPE Devices when MRA Devices are not Managed by CMP System* shows the mappings for MPE devices when the MRA devices are not managed by the CMP system.

Table 12: KPI Definitions for MRA Devices

KPI Dashboard Column	Mapping to Statistics	
	Active server	**Standby and spare server (spare only shows Status, CPU % and Memory%)**
Name	Not derived from statistics.	Not derived from statistics.
State	Label representation of the PrimaryServerStatus	Label representation of the SecondaryServerStatus
TPS	CurrentTransactionsPerSecond and CurrentTPSPercentageOfCapacity	None
PDN	CurrentPDNConnectionCount and CurrentPDNConnectionPercentageOf Capacity	None

KPI Dashboard Column	Mapping to Statistics	
Active Subscribers	CurrentMRABindingCount and CurrentMRABindingPercentageOfCapacity	None
CPU %	PrimaryCPUUtilizationPercentage	SecondaryCPUUtilizationPercentage
Memory %	PrimaryMemoryUtilizationPercentage	SecondaryMemoryUtilizationPercentage
MPE Connections	A value in the form "X of Y", where: X is CurrentMPEConnectionCount Y is ConfiguredMPEConnectionCount	None
MRA Connections	A value in the form "X of Y", where: X is CurrentMRAConnectionCount Y is ConfiguredMRAConnectionCount	None
Network Element Connections	A value in the form "X of Y", where: X is CurrentConnectedNECount Y is ConfiguredNECount	None
Critical Alarms	Not derived from statistics	Not derived from statistics
Major Alarms	Not derived from statistics	Not derived from statistics
Minor Alarms	Not derived from statistics	Not derived from statistics
Protocol Errors Sent	CurrentProtocolErrorSentCount	None
Protocol Errors Received	CurrentProtocolErrorReceivedCount	None

Table 13: KPI Definitions for MPE Devices when MRA Devices are Managed by CMP System

KPI Dashboard Column	Mapping to Statistics	
	Active server	**Standby server**
Name	Not derived from statistics.	Not derived from statistics.
Status	Label representation of the PrimaryServerStatus	Label representation of the SecondaryServerStatus

KPI Dashboard Column	Mapping to Statistics	
TPS	CurrentTransactionsPerSecond and CurrentTPSPercentageOfCapacity	None
PDN	CurrentPDNConnectionCount and CurrentPDNConnectionPercentageOf Capacity	None
Active Sessions	CurrentSessionCount and CurrentSessionPercentageOfCapacity	None
CPU %	PrimaryCPUUtilizationPercentage	SecondaryCPUUtilizationPercentage
Memory %	PrimaryMemoryUtilizationPercentage	SecondaryMemoryUtilizationPercentage
MRA Connections	A value in the form "X of Y", where: X is CurrentMRAConnectionCount Y is ConfiguredMRAConnectionCount	None
Data Sources	A value in the form "X of Y", where: X is CurrentSPRConnectionCount Y is ConfiguredSPRConnectionCount	None
Critical Alarms	Not derived from statistics	Not derived from statistics
Major Alarms	Not derived from statistics	Not derived from statistics
Minor Alarms	Not derived from statistics	Not derived from statistics
Protocol Errors Sent	CurrentProtocolErrorSentCount	None
Protocol Errors Received	CurrentProtocolErrorReceivedCount	None

Table 14: KPI Definitions for MPE Devices when MRA Devices are not Managed by CMP System

KPI Dashboard Column	Mapping to Statistics	
	Active server	**Standby server**
Name	Not derived from statistics.	Not derived from statistics.
Status	Label representation of the PrimaryServerStatus	Label representation of the SecondaryServerStatus

KPI Dashboard Column	Mapping to Statistics	
TPS	CurrentTransactionsPerSecond and CurrentTPSPercentageOfCapacity	None
Sessions	CurrentSessionCount and CurrentSessionPercentageOfCapacity	None
Active Sessions	CurrentSessionCount and CurrentSessionPercentageOfCapacity	None
CPU %	PrimaryCPUUtilizationPercentage	SecondaryCPUUtilizationPercentage
Memory %	PrimaryMemoryUtilizationPercentage	SecondaryMemoryUtilizationPercentage
SPR Connections	A value in the form "X of Y", where: X is CurrentSPRConnectionCount Y is ConfiguredSPRConnectionCount	None
Network Element Connections	A value in the form "X of Y", where: X is CurrentConnectedNECount	None
Critical Alarms	Not derived from statistics	Not derived from statistics
Major Alarms	Not derived from statistics	Not derived from statistics
Minor Alarms	Not derived from statistics	Not derived from statistics
Protocol Errors Sent	CurrentProtocolErrorSentCount	None
Protocol Errors Received	CurrentProtocolErrorReceivedCount	None

Clicking on an MRA or MPE name opens the **Reports** tab. See the **Reports** tab for the device for details on reports.

Mapping Reports Display to KPIs

From the KPI Dashboard, you can click any MPE or MRA system shown to open the Reports page. From there, a variety of statistics and measurements can be viewed. In the following tables, these statistics are mapped to their names as they appear in OSSI XML output.

For more information on the OSSI XML interface, see the *OSSI XML Interface Definitions Reference Guide*.

Table 15: Policy Statistics

Display	MPE	MRA	Name
Peg Count	Y	N	Policy Count
Evaluated	Y	N	Evaluated Count
Executed	Y	N	Executed Count
Ignored	Y	N	Ignored Count
Policy Details Stats:			
Name	Y	N	Policy Name
Evaluated	Y	N	Eval Count
Executed	Y	N	Trigger Count
Ignored	Y	N	Ignore Count
Total Execution Time (ms)	Y	N	
Max Execution Time (ms)	Y	N	
Avg Execution Time (ms)	Y	N	
Processing Time Stats	Y	N	(Data for each installed rule)

Table 16: Quota Profile Statistics Details

Display	MPE	MRA	Name
Peg Count	Y	N	Quota Count
Activated	Y	N	Quota Activated Count
Volume Threshold Reached	Y	N	Quota Volume Threshold Reached Count
Time Threshold Reached	Y	N	Quota Time Threshold Reached Count
Event Threshold Reached	Y	N	Quota Event Threshold Reached Count

Table 17: Diameter Application Function (AF) Statistics

Display	MPE	MRA	Name
Connections	Y	Y	Conn Count
Currently OK peers	Y	Y	Peer Okay Count

Display	MPE	MRA	Name
Currently down/suspect/reopened peers	Y	Y	Peer Down Count\Peer Suspect Count\Peer Reopen Count
Total messages in/out	Y	Y	Msg In Count\Msg Out Count
AAR messages received/sent	Y	Y	AAR Recv Count\AAR Send Count
AAR Initial messages received/sent	Y	Y	AAR Initial Recv Count\AAR Initial Send Count
AAR Modification messages received/sent	Y	Y	AAR Modification Recv Count\AAR Modification Send Count
AAA success messages received/sent	Y	Y	AAA Recv Success Count\AAA Send Success Count
AAA failure messages received/sent	Y	Y	AAA Recv Failure Count\AAA Send Failure Count
AAR messages timeout	Y	Y	AAR Timeout Count
ASR messages received/sent	Y	Y	ASR Recv Count\ASR Sent Count
ASR messages timeout	Y	Y	ASR Timeout Count
ASA success messages received/sent	Y	Y	ASA Recv Success Count\ASA Send Success Count
ASA failure messages received/sent	Y	Y	ASA Recv Failure Count\ASA Send Failure Count
RAR messages received/sent	Y	Y	RAR Recv Count\RAR Send Count
RAR messages timeout	Y	Y	RAR Timeout Count
RAA success messages received/sent	Y	Y	RAA Recv Success Count\RAA Send Success Count
RAA failure messages received/sent	Y	Y	RAA Recv Failure Count\RAA Send Failure Count
STR messages received/sent	Y	Y	STR Recv Count\STR Send Count
STR messages timeout	Y	Y	STR Timeout Count
STA success messages received/sent	Y	Y	STA Recv Success Count\STA Send Success Count
STA failure messages received/sent	Y	Y	STA Recv Failure Count\STA Send Failure Count
Currently active sessions	Y	N	Active Session Count
Max active sessions	Y	N	Max Active Session Count
Cleanup ASA received	Y	Y	ASA Received Count
Cleanup ASR sent	Y	Y	ASR Sent Count

Display	MPE	MRA	Name
Diameter AF Peer Stats (in Diameter AF Stats window)	N	Y	
ID	Y	Y	
IP Address: Port			
Currently active connections			
Currently active sessions			
Connect Time	N	Y	Connect Time
Disconnect Time	N	Y	Disconnect Time

Table 18: Diameter Policy Charging Enforcement Function (PCEF) Statistics

Display	MPE	MRA	Name
Connections	Y	N	Conn Count (SCTP or TCP)
Currently okay peers	Y	N	Peer Okay Count
Currently down/suspect/reopened peers	Y	N	Peer Down Count\Peer Suspect Count\Peer Reopen Count
Total messages in/out	Y	N	Msg In Count\Msg Out Count
CCR messages received/sent	Y	Y	CCR Recv Count\CCR Send Count
CCR messages timeout	Y	Y	CCR-Timeout Count
CCA success messages received/sent	Y	Y	CCA Recv Success Count\CCA Send Success Count
CCA failure messages received/sent	Y	Y	CCA Recv Failure Count\CCA Send Failure Count
CCR-I messages received/sent	Y	Y	CCR-I Recv Count\CCR-I Send Count
CCR-I messages timeout	Y	Y	CCR-I Timeout Count
CCA-I success messages received/sent	Y	Y	CCA-I Recv Success Count\CCA-I Send Success Count
CCA-I failure messages received/sent	Y	Y	CCA-I Recv Failure Count\CCA-I Send Failure Count
CCR-U messages received/sent	Y	Y	CCR-U Recv Count\CCR-U Send Count
CCR-U messages timeout	Y	Y	CCR-U Timeout Count
CCA-U success messages received/sent	Y	Y	CCA-U Recv Success Count\CCA-U Send Success Count
CCA-U failure messages received/sent	Y	Y	CCA-U Recv Failure Count\CCA-U Send Failure Count

Display	MPE	MRA	Name
CCR-T messages received/sent	Y	Y	CCR-T Recv Count\CCR-T Send Count
CCR-T messages timeout	Y	Y	CCR-T Timeout Count
CCA-T success messages received/sent	Y	Y	CCA-T Recv Success Count\CCA-T Send Success Count
CCA-T failure messages received/sent	Y	Y	CCA-T Recv Failure Count\CCA-T Send Failure Count
RAR messages received/sent	Y	Y	RAR Recv Count\RAR Send Count
RAR messages timeout	Y	Y	RAR Timeout Count
RAA success messages received/sent	Y	Y	RAA Recv Success Count\RAA Send Success Count
RAA failure messages received/sent	Y	Y	RAA Recv Failure Count\RAA Send Failure Count
Currently active sessions	Y	N	Active Session Count
Max active sessions	Y	N	Max Active Session Count

Table 19: Diameter Charging Function (CTF) Statistics

Display	MPE	MRA	Name
Connections	N	Y	Conn Count
Currently OK peers	N	Y	Peer Okay Count
Currently down/suspect/reopened peers	N	Y	Peer Down Count\Peer Suspect Count\Peer Reopen Count
Total messages in/out	N	Y	Msg In Count\Msg Out Count
CCR messages sent/received	N	Y	CCR Recv Count\CCR Send Count
CCA success messages recd/sent	N	Y	CCA Recv Success Count\CCA Send Success Count
CCA failure messages recd/sent	N	Y	CCA Recv Failure Count\CCA Send Failure Count
CCR-I messages sent/received	N	Y	CCR-I Recv Count\CCR-I Send Count
CCA-I success messages recd/sent	N	Y	CCA-I Recv Success Count\CCA-I Send Success Count
CCA-I failure messages recd/sent	N	Y	CCA-I Recv Failure Count\CCA-I Send Failure Count
CCR-U messages sent/received	N	Y	CCR-U Recv Count\CCR-U Send Count

Display	MPE	MRA	Name
CCA-U success messages recd/sent	N	Y	CCA-U Recv Success Count\CCA-U Send Success Count
CCA-U failure messages recd/sent	N	Y	CCA-U Recv Failure Count\CCA-U Send Failure Count
CCR-T messages sent/received	N	Y	CCR-T Recv Count\CCR-T Send Count
CCA-T success messages recd/sent	N	Y	CCA-T Recv Success Count\CCA-T Send Success Count
CCA-T failure messages recd/sent	N	Y	CCA-T Recv Failure Count\CCA-T Send Failure Count
RAR messages sent/received	N	Y	RAR Recv Count\RAR Send Count
RAA success messages recd/sent	N	Y	RAA Recv Success Count\RAA Send Success Count
RAA failure messages recd/sent	N	Y	RAA Recv Failure Count\RAA Send Failure Count
ASR messages sent/received	N	Y	ASR Recv Count\ASR Send Count
ASA success messages recd/sent	N	Y	ASA Recv Success Count\ASA Send Success Count
ASA failure messages recd/sent	N	Y	ASA Recv Failure Count\ASA Send Failure Count
Currently active sessions	N	Y	Active Session Count
Max active sessions	N	Y	Max Active Session Count

Table 20: Diameter Bearer Binding and Event Reporting Function (BBERF) Statistics

Display	MPE	MRA	Name
Connections	Y	Y	Conn Count
Currently OK peers	Y	Y	Peer Okay Count
Currently down/suspect/reopened peers	Y	Y	Peer Down Count\Peer Suspect Count\Peer Reopen Count
Total messages in/out	Y	Y	Msg In Count\Msg Out Count
CCR messages received/sent	Y	Y	CCR Recv Count\CCR Send Count
CCR messages timeout	Y	Y	CCR-Timeout Count
CCA success messages received/sent	Y	Y	CCA Recv Success Count\CCA Send Success Count
CCA failure messages received/sent	Y	Y	CCA Recv Failure Count\CCA Send Failure Count

Display	MPE	MRA	Name
CCR-I messages received/sent	Y	Y	CCR-I Recv Count\CCR-I Send Count
CCR-I messages timeout	Y	Y	CCR-I Timeout Count
CCA-I success messages received/sent	Y	Y	CCA-I Recv Success Count\CCA-I Send Success Count
CCA-I failure messages received/sent	Y	Y	CCA-I Recv Failure Count\CCA-I Send Failure Count
CCR-U messages received/sent	Y	Y	CCR-U Recv Count\CCR-U Send Count
CCR-U messages timeout	Y	Y	CCR-U Timeout Count
CCA-U success messages received/sent	Y	Y	CCA-U Recv Success Count\CCA-U Send Success Count
CCA-U failure messages received/sent	Y	Y	CCA-U Recv Failure Count\CCA-U Send Failure Count
CCR-T messages received/sent	Y	Y	CCR-T Recv Count\CCR-T Send Count
CCR-T messages timeout	Y	Y	CCR-T Timeout Count
CCA-T success messages received/sent	Y	Y	CCA-T Recv Success Count\CCA-T Send Success Count
CCA-T failure messages received/sent	Y	Y	CCA-T Recv Failure Count\CCA-T Send Failure Count
RAR messages received/sent	Y	Y	RAR Recv Count\RAR Send Count
RAR messages timeout	Y	Y	RAR Timeout Count
RAA success messages received/sent	Y	Y	RAA Recv Success Count\RAA Send Success Count
RAA failure messages received/sent	Y	Y	RAA Recv Failure Count\RAA Send Failure Count
Currently active sessions	Y	N	Curr Session Count
Max active sessions	Y	N	Max Active Session Count
Diameter BBERF connections	Y	Y	

Table 21: Diameter TDF Statistics

Display	MPE	MRA	Name
Connections	Y	Y	Conn Count
Currently OK peers	Y	Y	Peer Okay Count

Display	MPE	MRA	Name
Currently down/suspect/reopened peers	Y	Y	Peer Down Count\Peer Suspect Count\Peer Reopen Count
Total messages in/out	Y	Y	Msg In Count\Msg Out Count
CCR messages received/sent	Y	Y	CCR Recv Count\CCR Send Count
CCR messages timeout	Y	Y	CCR-Timeout Count
CCA success messages received/sent	Y	Y	CCA Recv Success Count\CCA Send Success Count
CCA failure messages received/sent	Y	Y	CCA Recv Failure Count\CCA Send Failure Count
CCR-U messages received/sent	Y	Y	CCR-U Recv Count\CCR-U Send Count
CCR-U messages timeout	Y	Y	CCR-U Timeout Count
CCA-U success messages received/sent	Y	Y	CCA-U Recv Success Count\CCA-U Send Success Count
CCA-U failure messages received/sent	Y	Y	CCA-U Recv Failure Count\CCA-U Send Failure Count
CCR-T messages received/sent	Y	Y	CCR-T Recv Count\CCR-T Send Count
CCR-T messages timeout	Y	Y	CCR-T Timeout Count
CCA-T success messages received/sent	Y	Y	CCA-T Recv Success Count\CCA-T Send Success Count
CCA-T failure messages received/sent	Y	Y	CCA-T Recv Failure Count\CCA-T Send Failure Count
RAR messages received/sent	Y	Y	RAR Recv Count\RAR Send Count
RAR messages timeout	Y	Y	RAR Timeout Count
RAA success messages received/sent	Y	Y	RAA Recv Success Count\RAA Send Success Count
RAA failure messages received/sent	Y	Y	RAA Recv Failure Count\RAA Send Failure Count
TSR messages received/sent	Y	Y	
TSA success messages received/sent	Y	Y	
TSA failure messages received/sent	Y	Y	
Currently active sessions	Y	N	Curr Session Count
Max active sessions	Y	N	Max Active Session Count
Diameter TDF connections	Y	Y	

Table 22: Diameter Sh Statistics

Display	MPE	MRA	Name
Connections	Y	N	Conn Count
Currently okay peers	Y	N	Peer Okay Count
Currently down/suspect/reopened peers	Y	N	Peer Down Count\Peer Suspect Count\Peer Reopen Count
Total messages in/out	Y	N	Msg In Count\Msg Out Count
Messages retried	Y	N	
UDR messages received/sent	Y	N	UDR Messages Received Count\UDR Messages Sent Count
UDR messages timeout	Y	N	UDRTimeout Count
UDR messages retried	Y	N	
UDA success messages received/sent	Y	N	UDA Success Messages Received Count\UDA Success Messages Sent Count
UDA failure messages received/sent	Y	N	UDA Failure Messages Received Count\UDA Failure Messages Sent Count
PNR messages received/sent	Y	N	PNR Messages Received Count\PNR Messages Sent Count
PNA success messages received/sent	Y	N	PNA Success Messages Received Count\PNA Success Messages Sent Count
PNA failure messages received/sent	Y	N	PNA Failure Messages Received Count\PNA Failure Messages Sent Count
PUR messages received/sent	Y	N	PUR Messages Received Count\PUR Messages Sent Count
PUR messages timeout	Y	N	PURTimeout Count
PUR messages retried	Y	N	
PUA success messages received/sent	Y	N	PUA Success Messages Received Count\PUA Success Messages Sent Count
PUA failure messages received/sent	Y	N	PUA Failure Messages Received Count\PUA Failure Messages Sent Count
SNR messages received/sent	Y	N	SNR Messages Received Count\SNR Messages Sent Count

Display	MPE	MRA	Name
SNR messages timeout	Y	N	SNRTimeout Count
SNR messages retried	Y	N	
SNA success messages received/sent	Y	N	SNA Success Messages Received Count\SNA Success Messages Sent Count
SNA failure messages received/send	Y	N	SNA Failure Messages Received Count\SNA Failure Messages Sent Count
Currently active sessions	Y	N	Active Sessions Count
Max active sessions	Y	N	Maximum Active Sessions Count
Diameter Sh connections			

Table 23: Diameter Distributed Routing and Management Application (DRMA) Statistics

Display	MPE	MRA	Name
Connections	Y	Y	Conn Count
Currently OK peers	Y	Y	Peer Okay Count
Currently down/suspect/reopened peers	Y	Y	Peer Down Count\Peer Suspect Count\Peer Reopen Count
Total messages in/out	Y	Y	Msg In Count\Msg Out Count
DBR messages received/sent	Y	Y	DBRRecv Count\DBRSend Count
DBR messages timeout	Y	Y	DBRTimeout Count
DBA success messages received/sent	Y	Y	DBARecv Success Count\DBASend Success Count
DBA failure messages received/sent	Y	Y	DBARecv Failure Count\DBASend Failure Count
DBA messages received/sent–binding found	Y	Y	Binding Found Recv Count\Binding Found Send Count
DBA messages received/sent – binding not found	Y	Y	Binding Not Found Recv Count\Binding Not Found Send Count
DBA messages received/sent – PCRF down	Y	Y	Binding Found Pcrf Down Recd Count\ Binding Found Pcrf Down Send Count
DBA messages received/sent – all PCRFs down	Y	Y	All Pcrfs Down Recv Count\ All Pcrfs Down Send Count
RUR messages received/sent	Y	Y	RURRecv Count\ RURSend Count

Display	MPE	MRA	Name
RUR messages timeout	Y	Y	RURTimeout Count
RUA success messages received/sent	Y	Y	RUARecv Success Count\ RUASend Success Count
RUA failure messages received/sent	Y	Y	RUARecv Failure Count\ RUASend Failure Count
LNR messages received/sent	Y	Y	LNRRecv Count\ LNRSend Count
LNR messages timeout	Y	Y	LNRTimeout Count
LNA success messages received/sent	Y	Y	LNARecv Success Count\ LNASend Success Count
LNA failure messages received/sent	Y	Y	LNARecv Failure Count\ LNASend Failure Count
LSR messages received/sent	Y	Y	LSRRecv Count\ LSRSend Count
LSR messages timeout	Y	Y	LSRTimeout Count
LSA success messages received/sent	Y	Y	LSARecv Success Count\ LSASend Success Count
LSA failure messages received/sent	Y	Y	LSARecv Failure Count\ LSASend Failure Count
SQR messages received/sent			
SQR messages timeout			
SQA messages received/sent			
SQA messages timeout			
Session found received/sent			
Session not found received/sent			
Diameter DRMA connections			

Note: Diameter DRA statistics apply only to MRA devices.

Table 24: Diameter DRA Statistics

Display	MPE	MRA	Name
Currently active bindings	N	Y	DRABinding Count
Max active bindings	N	Y	Max DRABinding Count
Total bindings	N	Y	DRATotal Binding Count
Suspect bindings	N	Y	Suspect Binding Count
Detected duplicate bindings	N	Y	Detected Duplicate Binding Count

Display	MPE	MRA	Name
Released duplicate bindings	N	Y	Released Duplicate Binding Count
Diameter Release Task Statistics	N	Y	
Bindings Processed	N	Y	Release Bindings Processed
Bindings Released	N	Y	Release Bindings Removed
RAR messages sent	N	Y	Release RARs Sent
RAR messages timed out	N	Y	Release RARs Timed Out
RAA success messages recd	N	Y	Release RAAs Received Success
RAA failure messages recd	N	Y	Release RAAs Received Failure
CCR-T messages processed	N	Y	Release CCRTs Received

Table 25: Diameter Sy Statistics

Display	MPE	MRA	Name
Connections	Y	N	Current Connections Count
Currently okay peers	Y	N	Peer Okay Count
Currently down/suspect/reopened peers	Y	N	Peer Down Count\Peer Suspect Count\Peer Reopen Count
Total messages in/out	Y	N	Messages In Count\Messages Out Count
SLR messages received/sent	Y	N	SLR Messages Received Count\SLR Messages Sent Count
SLR messages timeout	Y	N	SLRTimeout Count
SLA success messages received/sent	Y	N	SLA Success Messages Received Count\SLA Success Messages Sent Count
SLA failure messages received/sent	Y	N	SLA Failure Messages Received Count\SLA Failure Messages Sent Count
SNR messages received/sent	Y	N	SNR Messages Received Count\SMR Messages Sent Count
SNA success messages received/sent	Y	N	SNA Success Messages Received Count\SNA Success Messages Sent Count
SNA failure messages received/sent	Y	N	SNA Failure Messages Received Count\SNA Failure Messages Sent Count

Display	MPE	MRA	Name
STR messages received/sent	Y	N	STR Messages Received Count\STR Messages Sent Count
STR messages timeout	Y	N	STRTimeout Count
STA success messages received/sent	Y	N	STA Success Messages Received Count\STA Success Messages Sent Count
STA failure messages received/sent	Y	N	STA Failure Messages Received Count\STA Failure Messages Sent Count
Currently active sessions	Y	N	Active Sessions Count
Max active sessions	Y	N	Maximum Active Sessions Count
Diameter Sy connections			

Table 26: Diameter Latency Statistics shows information for these Diameter Statistics:

- Application Function (AF)
- Policy and Charging Enforcement Function (PCEF)
- Bearer Binding and Event Reporting (BBERF)
- Traffic Detection Function (TDF)
- Diameter Sh protocol
- Distributed Routing and Management Application (DRMA)
- Diameter Sy protocol

Table 26: Diameter Latency Statistics

Display	MPE	MRA	Name
Connections	Y	Y	Active Connection Count
Max Processing Time recd/sent (ms)	Y	Y	Max Trans In Time\ Max Trans Out Time
Avg Processing Time recd/sent (ms)	Y	Y	Avg Trans In Time\ Avg Trans Out Time
Processing Time recd/sent <time frame> (ms)	Y	Y	Processing Time [0-20] ms Processing Time [20-40] ms Processing Time [40-60] ms Processing Time [60-80] ms Processing Time [80-100] ms Processing Time [100-120] ms Processing Time [120-140] ms Processing Time [140-160] ms

Display	MPE	MRA	Name
			Processing Time [160-180] ms Processing Time [180-200] ms Processing Time [>200] ms

Table 27: Diameter Event Trigger Statistics

Display	MPE	MRA	Name
Diameter Event Trigger Stats by Code	Y	N	
Diameter Event Trigger Stats by Application:			
Diameter PCEF Application Event Trigger	Y	N	
Diameter BBERF Application Event Trigger	Y	N	

Table 28: Diameter Protocol Error Statistics

Display	MPE	MRA	Name
Total errors received	Y	Y	In Error Count
Total errors sent	Y	Y	Out Error Count
Last time for total error received	Y	Y	Last Error In Time
Last time for total error sent	Y	Y	Last Error Out Time
Diameter Protocol Errors on each error codes	Y	Y	(see specific errors listed in GUI)

Table 29: Diameter Connection Error Statistics

Display	MPE	MRA	Name
Total errors received	Y	Y	In Error Count
Total errors sent	Y	Y	Out Error Count
Last time for total error received	Y	Y	Last Error In Time
Last time for total error sent	Y	Y	Last Error Out Time
Diameter Protocol Errors on each error codes	Y	Y	(see specific errors listed in GUI)

Table 30: LDAP Data Source Statistics

Display	MPE	MRA	Name
Number of successful searches	Y	N	Search Hit Count
Number of unsuccessful searches	Y	N	Search Miss Count
Number of searches that failed because of errors	Y	N	Search Err Count
Max Time spent on successful search (ms)	Y	N	Search Max Hit Time
Max Time spent on unsuccessful search (ms)	Y	N	Search Max Miss Time
Average time spent on successful searches (ms)	Y	N	Search Avg Hit Time
Average time spent on unsuccessful searches (ms)	Y	N	Search Avg Miss Time
Number of successful updates	Y	N	Update Hit Count
Number of unsuccessful updates	Y	N	Update Miss Count
Number of updates that failed because of errors	Y	N	Update Err Count
Time spent on successful updates (ms)	Y	N	Update Total Hit Time
Time spent on unsuccessful updates (ms)	Y	N	Update Total Miss Time
Max Time spent on successful update (ms)	Y	N	Update Max Hit Time
Max Time spent on unsuccessful update (ms)	Y	N	Update Max Miss Time
Average time spent on successful update (ms)	Y	N	Update Avg Hit Time
Average time spent on unsuccessful updates (ms)	Y	N	Update Avg Miss Time

Table 31: Sh Data Source Statistics

Display	MPE	MRA	Name
Number of successful searches	Y	N	Search Hit Count
Number of unsuccessful searches	Y	N	Search Miss Count
Number of searches that failed because of errors	Y	N	Search Err Count

Display	MPE	MRA	Name
Number of search errors that triggered the retry	Y	N	
Max Time spent on successful search (ms)	Y	N	Search Max Hit Time
Max Time spent on unsuccessful search (ms)	Y	N	Search Max Miss Time
Average time spent on successful searches (ms)	Y	N	Search Avg Hit Time
Average time spent on unsuccessful searches (ms)	Y	N	Search Avg Miss Time
Number of successful updates	Y	N	Update Hit Count
Number of unsuccessful updates	Y	N	Update Miss Count
Number of updates that failed because of errors	Y	N	Update Err Count
Number of update errors that triggered the retry	Y	N	
Time spent on successful updates (ms)	Y	N	Update Total Hit Time
Time spent on unsuccessful updates (ms)	Y	N	Update Total Miss Time
Max Time spent on successful update (ms)	Y	N	Update Max Hit Time
Max Time spent on unsuccessful update (ms)	Y	N	Update Max Miss Time
Average time spent on successful updates (ms)	Y	N	Update Avg Hit Time
Average time spent on unsuccessful updates (ms)	Y	N	Update Avg Miss Time
Number of successful subscriptions	Y	N	Subscription Hit Count
Number of unsuccessful subscriptions	Y	N	Subscription Miss Count
Number of subscriptions that failed because of errors	Y	N	Subscription Err Count
Number of subscription errors that triggered the retry	Y	N	
Time spent on successful subscriptions (ms)	Y	N	Subscription Total Hit Time

Display	MPE	MRA	Name
Time spent on unsuccessful subscriptions (ms)	Y	N	Subscription Total Miss Time
Max Time spent on successful subscriptions (ms)	Y	N	Subscription Max Hit Time
Max Time spent on unsuccessful subscriptions (ms)	Y	N	Subscription Max Miss Time
Average time spent on successful subscriptions (ms)	Y	N	Subscription Avg Hit Time
Average time spent on unsuccessful subscriptions (ms)	Y	N	Subscription Avg Miss Time
Number of successful unsubscriptions	Y	N	Unsubscription Hit Count
Number of unsuccessful unsubscriptions	Y	N	Unsubscription Miss Count
Number of unsubscriptions that failed because of errors	Y	N	Unsubscription Err Count
Number of unsubscription errors that triggered the retry	Y	N	
Time spent on successful unsubscriptions (ms)	Y	N	Unsubscription Total Hit Time
Time spent on unsuccessful unsubscriptions (ms)	Y	N	Unsubscription Total Miss Time
Max Time spent on successful unsubscription (ms)	Y	N	Unsubscription Max Hit Time
Max Time spent on unsuccessful unsubscription (ms)	Y	N	Unsubscription Max Miss Time
Average time spent on successful unsubscriptions (ms)	Y	N	Unsubscription Avg Hit Time
Average time spent on unsuccessful unsubscriptions (ms)	Y	N	Unsubscription Avg Miss Time

Table 32: Sy Data Source Statistics

Display	MPE	MRA	Name
Number of successful searches	Y	N	Search Hit Count
Number of unsuccessful searches	Y	N	Search Miss Count
Number of searches that failed because of errors	Y	N	Search Err Count

Display	MPE	MRA	Name
Max Time spent on successful search (ms)	Y	N	Search Max Hit Time
Max Time spent on unsuccessful search (ms)	Y	N	Search Max Miss Time
Average time spent on successful searches (ms)	Y	N	Search Avg Hit Time
Average time spent on unsuccessful searches (ms)	Y	N	Search Avg Miss Time

Table 33: KPI Interval Statistics

Display	MPE	MRA	Name
Interval Start Time	Y	Y	Interval Start Time
Configured Length (Seconds)	Y	Y	Configured Length (Seconds)
Actual Length (Seconds)	Y	Y	Actual Length (Seconds)
Is Complete	Y	Y	Is Complete
Interval MaxTransactions Per Second	Y	Y	Interval Max Transactions Per Second
Interval MaxMRABinding Count	Y	Y	Interval Max MRABinding Count
Interval MaxSessionCount	Y	Y	Interval Max Session Count
Interval MaxPDNConnectionCount	Y	Y	Interval Max PDNConnection Count

Color Threshold Configuration

The Color Threshold Configuration popup window is brought up when you click the **Change Thresholds** button, located in the top right corner of the KPI Dashboard.

The values displayed in the dialog boxes are the current settings. The user can modify the values and click **Save** to put the new values into effect. The values is saved so the next time the dashboard is opened it uses the same values.

Note: Saving the thresholds affects other users that may be viewing the dashboard at the same time.

The **Cancel** button closes the popup dialog without any changes to the KPI dashboard display. The **Reset** button restores the values to their defaults. The TPS and session limits for the Policy Management device will be set to the officially supported rates for the current software release.

Viewing the AF Session Report

The application function (AF) session report shows information on the current and maximum number of AF sessions for each specific radio access technology type (RAT-Type) for each MPE device.

The following RAT-Types are supported:

- WLAN (0) — Wireless local area network
- VIRTUAL (1) — Virtual network
- UTRAN (1000) — Universal Terrestrial Radio Access Network
- GERAN (1001) — GSM EDGE Radio Access Network
- GAN (1002) — Generic Access Network
- HSPA_EVOLUTION (1003) — High Speed Packet Access Evolution
- EUTRAN (1004) — Evolved UTRAN
- CDMA2000_1x (2000)
- HRPD (2001) — High Rate Packet Data
- UMB (2002) — Ultra Mobile Broadband
- EHRPD (2003) — Enhanced HRPD

To view the AF session report, from the **System Wide Reports** section of the navigation pane, select **Sessions** and then select **AF Session Report**.

The display is refreshed automatically every ten seconds. To hold the current values, click **Pause**. To resume, click **Refresh**.

From the report page you can do the following:

- To sort the report on any column, click the column title.
- To pause the display of connections, click **Pause**. To resume the display, click **Refresh**.
- To display another page of the report, click the page number.

You can customize what information is displayed by controlling which table columns appear, using the **Columns** pulldown menu. The available columns are the following:

- **Associated MRA** — The MRA device managing this device, or N/A if no MRA device is managing this device. (If your CMP system is not configured to manage MRA devices, this option is not available.)
- **Server Name** — The name defined for the server.
- **Server Type** — Either MPE or MRA. All MPE devices managed by an MRA device are displayed together, followed by a row for that MRA device that represents the total counts for all MPE devices managed by that MRA device. Any MRA devices not managed by an MRA device are displayed after the last configured MRA device.
- **WLAN - Current** — The current number of WLAN connections to this device.
- **WLAN - Max** — The highest number of WLAN connections recorded to this device.
- **Virtual - Current** — The current number of Virtual connections to this device.
- **Virtual - Max** — The highest number of Virtual connections to this device.
- **UTRAN - Current** — The current number of UTRAN connections to this device.
- **UTRAN - Max** — The highest number of UTRAN connections recorded to this device.
- **GERAN - Current** — The current number of GERAN connections to this device.
- **GERAN - Max** — The highest number of GERAN connections recorded to this device.

- **GAN - Current** — The current number of GAN connections to this device.
- **GAN - Max** — The highest number of GAN connections recorded to this device.
- **HSPA_EVOLUTION - Current** — The current number of HSPA_EVOLUTION connections to this device.
- **HSPA_EVOLUTION - Max** — The highest number of HSPA_EVOLUTION connections recorded to this device.
- **EUTRAN - Current** — The current number of EUTRAN connections to this device.
- **EUTRAN - Max** — The highest number of EUTRAN connections recorded to this device.
- **CDMA2000_1X - Current** —The current number of CDMA2000_1X connections to this device.
- **CDMA2000_1X - Max** — The highest number of CDMA2000_1X connections recorded to this device.
- **HRPD - Current** — The current number of HRPD connections to this device.
- **HRPD - Max** — The highest number of HRPD connections recorded to this device.
- **UMB - Current** — The current number of UMB connections to this device.
- **UMB - Max** — The highest number of UMB connections recorded to this device.
- **EHRPD - Current** — The current number of EHRPD connections to this device.
- **EHRPD - Max** — The highest number of EHRPD connections recorded to this device.

The first row in the table displays the total for all configured MRA devices.

You can filter results by controlling which table rows appear, using the **Filters** pulldown menu. You can define filtering criteria using the following fields:

- **Server Name** — Filter in all servers (the default), server totals only, or one specific server.
- **Server Type** — Filter in all server types (the default), totals only, MPE devices only, or MRA devices only.
- **Associated MRA** — Filter in all MRA devices (the default), totals only, or one specific MRA device. (If your CMP system is not configured to manage MRA devices, this option is not available.)

You can save formatting changes to the report page. Click **Save Layout**.

You can display the report in a format suitable for printing. Click **Printable Format**; an **AF Session Report** window opens.

You can save the report in comma-separated value (CSV) format, suitable for importing into a spreadsheet application. Click **Save as CSV**. A file named `report.csv` is generated, and a standard **File Download** window opens, so you can save or open the file.

You can save the report as a Portable Document Format (PDF) file, suitable for storage or online display. Click **Export PDF**. A file named `report.pdf` is generated, and a standard **File Download** window opens, so you can save or open the file.

Viewing the PDN Connection Report

The PDN Connection Report shows information on the current and maximum number of packet data network (PDN) connections for each specific radio access technology type (RAT-Type) for each MPE device.

The following RAT-Types are supported:

- WLAN (0) — Wireless local area network

- UTRAN (1000) — Universal Terrestrial Radio Access Network
- GERAN (1001) — GSM EDGE Radio Access Network
- GAN (1002) — Generic Access Network
- HSPA_EVOLUTION (1003) — High Speed Packet Access Evolution
- EUTRAN (1004) — Evolved UTRAN
- CDMA2000_1x (2000)
- HRPD (2001) — High Rate Packet Data
- UMB (2002) — Ultra Mobile Broadband
- EHRPD (2003) — Enhanced HRPD
- UNKNOWN (-1)

To view the PDN Connection report, from the **System Wide Reports** section of the navigation pane, select **Sessions** and then select **PDN Connection Report**.

The display is refreshed automatically every ten seconds. To hold the current values, click **Pause**. To resume, click **Refresh**.

From the report page you can do the following:

- To sort the report on any column, click the column title.
- To pause the display of connections, click **Pause**. To resume the display, click **Refresh**.
- To display another page of the report, click the page number.

You can customize what information is displayed by controlling which table columns appear, using the **Columns** pulldown menu. The available columns are the following:

- **Associated MRA** — The MRA device managing this device, or N/A if no MRA device is managing this device. (If your CMP system is not configured to manage MRA devices, this option is not available.)
- **Server Name** — The name defined for the server.
- **Server Type** — Either MPE or MRA. All MPE devices managed by an MRA device are displayed together, followed by a row for that MRA device that represents the total counts for all MPE devices managed by that MRA device. Any MRA devices not managed by an MRA device are displayed after the last configured MRA device.
- **WLAN - Current** — The current number of WLAN connections to this device.
- **WLAN - Max** — The highest number of WLAN connections recorded to this device.
- **UTRAN - Current** — The current number of UTRAN connections to this device.
- **UTRAN - Max** — The highest number of UTRAN connections recorded to this device.
- **GERAN - Current** — The current number of GERAN connections to this device.
- **GERAN - Max** — The highest number of GERAN connections recorded to this device.
- **GAN - Current** — The current number of GAN connections to this device.
- **GAN - Max** — The highest number of GAN connections recorded to this device.
- **HSPA_EVOLUTION - Current** — The current number of HSPA_EVOLUTION connections to this device.
- **HSPA_EVOLUTION - Max** — The highest number of HSPA_EVOLUTION connections recorded to this device.
- **EUTRAN - Current** — The current number of EUTRAN connections to this device.
- **EUTRAN - Max** — The highest number of EUTRAN connections recorded to this device.
- **CDMA2000_1X - Current** —The current number of CDMA2000_1X connections to this device.
- **CDMA2000_1X - Max** — The highest number of CDMA2000_1X connections recorded to this device.

- **HRPD - Current** — The current number of HRPD connections to this device.
- **HRPD - Max** — The highest number of HRPD connections recorded to this device.
- **UMB - Current** — The current number of UMB connections to this device.
- **UMB - Max** — The highest number of UMB connections recorded to this device.
- **EHRPD - Current** — The current number of EHRPD connections to this device.
- **EHRPD - Max** — The highest number of EHRPD connections recorded to this device.
- **UNKNOWN - Current** — The current number of connections of unclassified type to this device.
- **UNKNOWN - Max** — The highest number of connections of unclassified type recorded to this device.

The first row in the table displays the total for all configured MRA devices.

You can filter results by controlling which table rows appear, using the **Filters** pulldown menu. You can define filtering criteria using the following fields:

- **Server Name** — Filter in all servers (the default), server totals only, or one specific server.
- **Server Type** — Filter in all server types (the default), totals only, MPE devices only, or MRA devices only.
- **Associated MRA** — Filter in all MRA devices (the default), totals only, or one specific MRA device. (If your CMP system is not configured to manage MRA devices, this option is not available.)

You can save formatting changes to the report page. Click **Save Layout**.

You can display the report in a format suitable for printing. Click **Printable Format**; a **PDN Connection Count Report** window opens.

You can save the report in comma-separated value (CSV) format, suitable for importing into a spreadsheet application. Click **Save as CSV**. A file named `report.csv` is generated, and a standard **File Download** window opens, so you can save or open the file.

You can save the report as a Portable Document Format (PDF) file, suitable for storage or online display. Click **Export PDF**. A file named `report.pdf` is generated, and a standard **File Download** window opens, so you can save or open the file.

Viewing the PDN APN Suffix Report

The PDN APN suffix report shows information on PDN connection counts per access point name (APN) suffix.

To view the PDN APN suffix report, from the **System Wide Reports** section of the navigation pane, select **Sessions** and then select **PDN APN Suffix Report**.

The display is refreshed automatically every ten seconds. To hold the current values, click **Pause**. To resume, click **Refresh**.

From the report page you can do the following:

- To sort the report on any column, click the column title.
- To pause the display of connections, click **Pause**. To resume the display, click **Refresh**.
- To display another page of the report, click the page number.

You can customize what information is displayed by controlling which table columns appear, using the **Columns** pulldown menu. The available columns are the following:

- **APN** — The access point name.
- **Server Name** — The server name.
- **Server Type** — Either MPE or MRA.
- **Current** — The current number of PDN connection counts for each suffix that have been matched on each server.
- **Max** — The highest number of PDN connection counts for each suffix that have been matched on each server.

The first row in the table displays the total values for all configured servers.

You can filter results by controlling which table rows appear, using the **Filters** pulldown menu. You can define filtering criteria using the following fields:

- **APN** — Filter in all APN suffixes (default), all PDN connections without a configured APN suffix match (OtherAPNs), or APN suffix totals only.
- **Server Name** — Filter in all servers (default), server totals only, or one specific server.

You can save formatting changes to the report page. Click **Save Layout**.

You can display the report in a format suitable for printing. Click **Printable Format**; a **PDN APN Suffix Statistics Report** window opens.

You can save the report in comma-separated value (CSV) format, suitable for importing into a spreadsheet application. Click **Save as CSV**. A file named `report.csv` is generated, and a standard **File Download** window opens, so you can save or open the file.

You can save the report as a Portable Document Format (PDF) file, suitable for storage or online display. Click **Export PDF**. A file named `report.pdf` is generated, and a standard **File Download** window opens, so you can save or open the file.

Viewing the Trending Reports

To view the trending reports, from the **System Wide Reports** section of the navigation pane, select **Trending Reports**.

The navigation pane displays the four trending reports. The reports display separate aggregate MPE and MRA statistics in graph tables:

The trending report columns display the following data:

- **PDN Connection Count** — The number of PDN connections that communicate to the diameter network elements.
- **Session Count** — The number of diameter sessions (for example, Gx or Gy) which are maintained in the MPE device.
- **MRA Binding Count** — The number of bindings (for example, UE or Policy rules and charge function MPE pairs) which are maintained in the MRA system.

  Note: A binding is the MPA routing information. The UE stores the user identity UE NAI, UE IP addresses, the selected MPE identity IP-CAN session, and APN if it is available.

- **Transaction Per Second** — The number of diameter requests and answer pairs processed in a second.

Viewing MRA Binding Count

The MRA binding count determines the number of MRA bindings between user equipment (UE) and MPE devices maintained in the MRA system. This is recorded by the counter MaxMRABindingCount.

To view the MRA Binding Count trending report:

1. From the **System Wide Reports** section of the navigation pane, select **Trending Reports**.
   The content tree displays a list of trending reports.
2. From the content tree, select **MRA Binding Count**.
   The **MRA Binding Count** page displays the MRA Binding Count graph.

The following report options are available:

- **Refresh** — You are provided with the most recently updated graph.
- **Search Filter** — You can specify which MRA devices are graphed (all or specific devices) and which counters to graph (all or binding counts for MRA devices, which for this report is the same thing). You can also specify the graph parameters:
  - **Start Date & Time** — The start date and time for the graph. Click  (calendar icon) to select or enter the year, month, day, and time. The graph uses after the set duration.
  - **Duration** — Displays the time duration of the data. A pulldown list provides the following options:
    - **24 hours** (the default)
    - **2 days**
    - **3 days**
    - **4 days**
    - **5 days**
    - **6 days**
    - **7 days**
  - **Show Aggregation** — If you check this box, the aggregated data for all MRA devices is displayed in the graph.
- **Settings** — The table parameters are displayed; click **Run** to generate the graph.
- **Printable Format** — The most recently updated graph is displayed in a separate window.
- **View Raw Data** — The interval data statistics are displayed in a separate window.
- **Export CSV** — A comma-separated value (CSV) file named `Export_MRA Binding Count.csv` is generated, suitable for a spreadsheet application, and a standard **File Download** window opens, so you can save or open the file.
- **View Summary** — The distribution of data (average, minimum, and maximum) of the interval statistics for each device are displayed in a separate window.

Viewing PDN Connection Count

This report plots the counter Interval MaxPDNConnectionCount for each managed MPE and MRA device.

To view the PDN Connection Count trending report:

1. From the **System Wide Reports** section of the navigation pane, select **Trending Reports**.

The content tree displays a list of trending reports.

2. From the content tree, select **PDN Connection Count**.
   The **PDN Connection Count** page displays the PDN Connection Count MRA and policy server (MPE device) graphs.

The following report options are available:

- **Refresh** — You are provided with the most recently updated graph table.
- **Search Filter** — You can specify which MPE and MRA devices are graphed (all or specific devices) and which counters to graph (all, PDN connections for MPE devices, or PDN connections for MRA devices). You can also specify the graph parameters:
  - **Start Date & Time** — The start date and time for the graph. Click  (calendar icon) to select or enter the year, month, day, and time. The graph uses after the set duration.
  - **Duration** — Displays the time duration of the data. A pulldown list provides the following options:
    - **24 hours** (the default)
    - **2 days**
    - **3 days**
    - **4 days**
    - **5 days**
    - **6 days**
    - **7 days**
  - **Show Aggregation** — If you check this box, the aggregated data for all selected MPE or MRA content is displayed in the graph.
- **Settings** — The table parameters are displayed; click **Run** to generate the graph.
- **Printable Format** — The most recently updated graph is displayed in a separate window.
- **View Raw Data** — The interval data statistics are displayed in a separate window.
- **Export CSV** — A comma-separated value (CSV) file named `Export_PDN Connection Count.csv` is generated, suitable for a spreadsheet application, and a standard **File Download** window opens, so you can save or open the file.
- **View Summary** — The distribution of data (average, minimum, and maximum) of the interval statistics for each device are displayed in a separate window.

Viewing Session Count

The session counts determine the number of Gx or Gy sessions maintained in the MPE device, graphed over time periods equal to the KPI interval length (by default 15 minutes). The session count is recorded by the counter MaxSessionCount.

To view the Session Count trending report:

1. From the **System Wide Reports** section of the navigation pane, select **Trending Reports**.
   The content tree displays a list of trending reports.
2. From the content tree, select **Session Count**.
   The **Session Count** page displays the Session Count for policy server (MPE) device graph.

The following report options are available:

- **Refresh** — You are provided with the most recently updated graph.

- **Search Filter** — You can specify which MPE devices are graphed (all or specific devices) and which counters to graph (all or session counters for MPE devices, which for this report is the same thing). You can also specify the graph parameters:
  - **Start Date & Time** — The start date and time for the graph. Click  (calendar icon) to select or enter the year, month, day, and time. The graph uses after the set duration.
  - **Duration** — Displays the time duration of the data. A pulldown list provides the following options:
    - **24 hours** (the default)
    - **2 days**
    - **3 days**
    - **4 days**
    - **5 days**
    - **6 days**
    - **7 days**

    Note: The durations available depend on the settings of the OM Statistics scheduled task.
  - **Show Aggregation** — If you check this box, the aggregated data of all selected MPE content is displayed in the graph.
- **Settings** — The table parameters are displayed; click **Run** to generate the graph.
- **Printable Format** — The most recently updated graph is displayed in a separate window.
- **View Raw Data** — The interval data statistics are displayed in a separate window.
- **Export CSV** — A comma-separated value (CSV) file named `Export_Session Count.csv` is generated, suitable for a spreadsheet application, and a standard **File Download** window opens, so you can save or open the file.
- **View Summary** — The distribution of data (average, minimum, and maximum) of the interval statistics for each device are displayed in a separate window.

Viewing Transaction Per Second

Transactions per second is defined as the number of Diameter request or Diameter answer pairs processed in a second, graphed over time periods equal to the KPI interval length (by default 15 minutes). Transactions are recorded by the counter MaxTransactionsPerSecond.

To view the Transaction Per Second trending report:

1. From the **System Wide Reports** section of the navigation pane, select **Trending Reports**.
   The content tree displays a list of trending reports.
2. From the content tree, select **Transaction Per Second**.
   The **Transaction Per Second** page displays the Transaction Per Second graph.

The following report options are available:

- **Refresh** — You are provided with the most recently updated graph.
- **Search Filter** — You can specify which Policy Management devices are graphed (all or specific devices) and which counters to graph (all or TPS for each class of Policy Management device). You can also specify the graph parameters:

  - **Start Date & Time** — The start date and time for the graph. Click  (calendar icon) to select or enter the year, month, day, and time. The graph uses after the set duration.
  - **Duration** — Displays the time duration of the data. A pulldown list provides the following options:
    - **24 hours** (the default)
    - **2 days**
    - **3 days**
    - **4 days**
    - **5 days**
    - **6 days**
    - **7 days**
  - **Show Aggregation** — If you check this box, the aggregated data for all selected devices is displayed in the graph.
- **Settings** — The table parameters are displayed; click **Run** to generate the graph.
- **Printable Format** — The most recently updated graph is displayed in a separate window.
- **View Raw Data** — The interval data statistics are displayed in a separate window.
- **Export CSV** — A comma-separated value (CSV) file named `Export_Transaction Per Second.csv` is generated, suitable for a spreadsheet application, and a standard **File Download** window opens, so you can save or open the file.
- **View Summary** — The distribution of data (average, minimum, and maximum) of the interval statistics for each device are displayed in a separate window.

Custom Trending Reports

Along with the four pre-configured trending reports, you can create custom trending reports based on one or more counters.

The following statistics are associated with the MPE server type:

- AFRatTypeStats
- DiameterAfLatencyStats
- DiameterBberfLatencyStats
- DiameterBberfStats
- DiameterCTFStats
- DiameterDrmaLatencyStats
- DiameterDrmaStats
- DiameterPcefLatencyStats
- DiameterPcefStats
- DiameterShLatencyStats
- DiameterShStats
- DiameterSyLatencyStats
- DiameterSyStats
- DiameterTdfLatencyStats
- DiameterTdfStats
- IntervalStats
- KpiStats

- PDNConnectionAPNStats
- PdnRatTypeStats
- PolicyStats

The following statistics are associated with the MRA server type:

- DiameterMraAfLatencyStats
- DiameterMraAfStats
- DiameterMraBberfLatencyStats
- DiameterMraBberfStats
- DiameterMraCtfStats
- DiameterMraDraStats
- DiameterMraDrmaLatencyStats
- DiameterMraDrmaStats
- DiameterMraPcefLatencyStats
- DiameterMraPcefStats
- DiameterMraTdfLatencyStats
- DiameterMraTdfStats
- IntervalMraStats
- KpiMraStats

After creation, customized trending reports appear in the **Trending Reports** list following the pre-configured Trending Reports in alphabetical order.

Creating a Custom Trending Report

To create a custom trending report:

1. From the **System Wide Reports** section of the navigation pane, select **Trending Reports**.
   The **Trending Report Definition Administration** page opens.
2. Click **Create Trending Report Definition**.
   A new **Trending Report Definition Administration** page opens, containing fields for configuring a customized trending report (*Figure 28: Trending Report Definition Configuration Page* shows a sample).

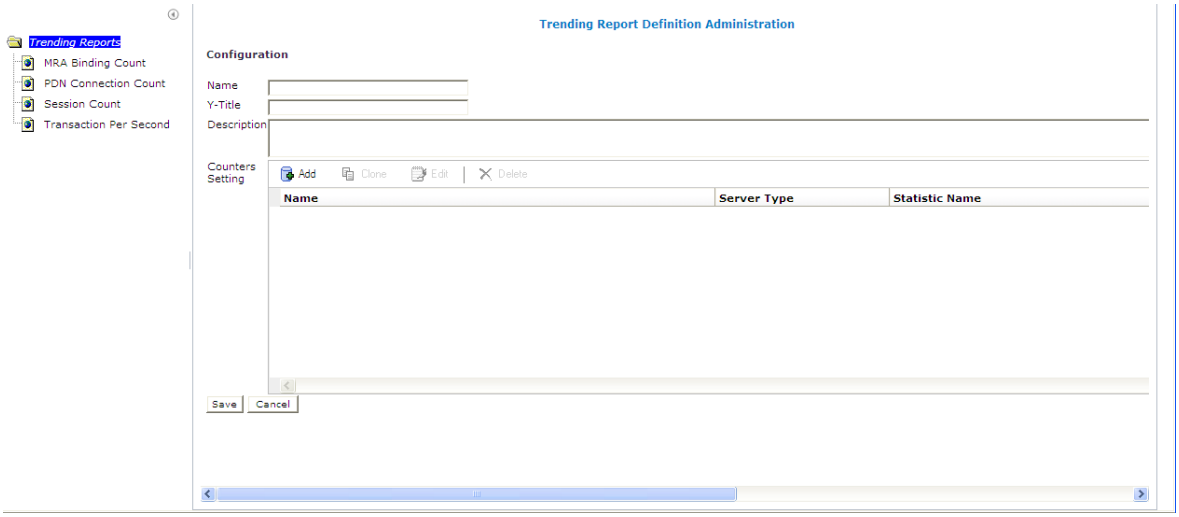


Figure 28: Trending Report Definition Configuration Page

3. Enter the following information for the new trending report:
   1. **Name** — The name of the trending report.

      The name can contain up to 255 characters, cannot contain double quotes or commas, and cannot begin or end with a space.
   2. **Y-title** — The title of the Y series.

      The title can contain up to 40 characters and cannot begin or end with a space.
   3. **Description** — The description of the trending report.

      The description can contain up to 250 characters and cannot begin or end with a space.

4. Add counters to the report:
   a) Click **Add** next to the **Counters Setting** field.
   The **Add Stats Definition** popup opens.
   b) Enter a name for the counter in the **Name** field.
   The name can contain up to 40 characters, cannot contain double quotes (") or commas (,), and cannot begin or end with a space.
   c) Select the server type from the **Server Type** list.
   d) Select a statistic from the **Statistic Name** list.
   After selecting a statistic, all counters supported by that statistic populate the **Counter Name** list.
   e) Select a counter from the **Counter Name** list.
   f) Click **Save** to add the counter to the **Counters Setting** list. Click **Cancel** to exit the popup without adding a counter.
   You have added a single counter to the trending report. You can continue to add individual counters to the report, using this step. You can also add counters by cloning an existing counter (see below).
5. After adding the first counter to the trending report, you can edit the counter information, clone the counter to create a new counter, or delete the counter.

a) To edit a counter, select the counter, and click **Edit**.
The **Edit Stats Definition** popup appears. Edit the information. Click **Save** to save the edits. Click **Cancel** to exit the popup without saving the information.
b) To add a new counter by cloning an existing counter, select the counter and click **Clone**.
The **Clone Stats Definition** popup displays, containing the information that was used to create the selected counter. Edit the information to create a counter. Click **Save** to create a counter. Click **Cancel** to exit the popup without creating a new counter.
c) To delete an existing counter, select the counter and click **Delete**. You are asked if you want to delete the counter. Click **Yes** to delete the counter. Click **No** to exit the popup without deleting the counter.

6. Click **Save** at the bottom of the **Trending Report Definition** page to save the report. Click **Cancel** to exit the **Trending Report Definition** page without saving the report.
The custom trending report appears, in alphabetical order by name, in the list of custom trending reports.

You have defined and saved a custom trending report.

Editing a Custom Trending Report

You can edit any of the configured information for an existing custom trending report. You can also add, edit, or delete the counters associated with the report.

To edit a custom trending report:

1. From the **System Wide Reports** section of the navigation pane, select **Trending Reports**.
The **Trending Report Definition Administration** page opens.
2. Select the custom trending report.
The report opens.
3. Click **Settings.**
The **Trending Report Definition Administration** page displays for the report.
4. Click **Modify**.
You can edit the Name, Y-Title, or Description of the report. You can also add, edit, or delete the counters associated with the report. See *Creating a Custom Trending Report* for additional information.

Deleting a Custom Trending Report

You can delete any of the existing custom trending reports. You cannot delete the pre-configured trending reports.

To delete a custom trending report:

1. From the **System Wide Reports** section of the navigation pane, select **Trending Reports**.
The **Trending Report Definition Administration** page opens.
2. Select the custom trending report.
The report opens.
3. Click **Settings.**
The **Trending Report Definition Administration** page displays for the report.
4. Click **Delete**.
The report is deleted.

Viewing the Connection Status Report

The connection status report provides an aggregate view of connections maintained by managed Policy Management systems. The display is refreshed every ten seconds.

To view the connection status report, from the **System Wide Reports** section of the navigation pane, select **Others** and then select **Connection Status**.

Figure 29: Sample Connection Status Report shows a sample connection status report.

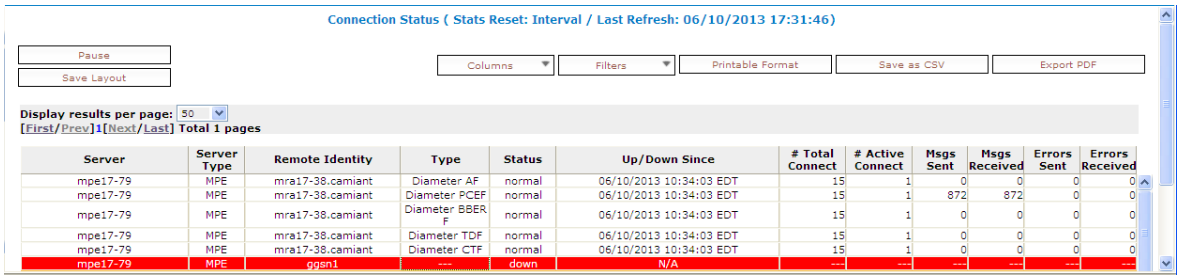


Figure 29: Sample Connection Status Report

From the report page you can do the following:

- To sort the report on any column, click the column title.
- To pause the display of connections, click **Pause**. To resume the display, click **Refresh**.
- To display another page of the report, click the page number.

You can customize what information is displayed by controlling which table columns appear, using the **Columns** pulldown menu. The available columns are the following:

- **Server** — name of the associated system
- **Server Type** — **MPE** (Multimedia Policy Engine) or **MRA** (Multi-Protocol Routing Agent)
- **Remote Identity** — the Diameter ID (if known) or IP address of the remote system
- **Type** — the type of connection
- **Status** — the status of the connection (the possible values are protocol-specific)
- **Up/Down Since** — the timestamp when the connection reached its current state (N/A if the connection has never been established)
- **# Total Connect** — the number of times that the connection has been re-established

  Note: This counter is reset if the cluster is restarted.

- **# Active Connect** — the number of active connections

  Note: This counter is reset if the cluster is restarted.

- **Msgs Sent** — the number of Diameter or RADIUS protocol messages that have been sent to the remote system
- **Msgs Received** — the number of protocol messages that have been received from the remote system
- **Errors Sent** — the number of protocol error messages that have been sent to the remote system
- **Errors Received** — the number of protocol error messages that have been received from the remote system

If a connection is in a non-functional state, the row is displayed in red; if a connection is in a transitional state between functional and non-functional (including when a connection is being established), the row is displayed in yellow.

You can filter results by controlling which table rows appear, using the **Filters** pulldown menu. You can define filtering criteria using the following fields:

- **Server** — Filter in all servers (the default) or one specific server.
- **Server Type** — Filter in all server types (the default), totals only, MPE devices only, or MRA devices only.
- **Remote Identity** — Filter in all remote devices (the default) or one specific device.
- **Type** — Filter in all remote device types (the default) or one specific device type: **Diameter AF**, **Diameter PCEF**, **Diameter BBERF**, **Diameter TDF**, **Diameter SH**, **Diameter CTF**, or **Diameter DRMA**.
- **Status** — Filter in all remote device status values (the default) or one specific status: **down**, **normal**, or **reopen**.

You can save formatting changes to the report page. Click **Save Layout**.

You can display the report in a format suitable for printing. Click **Printable Format**; a **Connection Status Report** window opens.

You can save the report in comma-separated value (CSV) format, suitable for importing into a spreadsheet application. Click **Save as CSV**. A file named `report.csv` is generated, and a standard **File Download** window opens, so you can save or open the file.

You can save the report as a Portable Document Format (PDF) file, suitable for storage or online display. Click **Export PDF**. A file named `report.pdf` is generated, and a standard **File Download** window opens, so you can save or open the file.

Viewing the Protocol Errors Report

The protocol errors report provides an aggregate view of connection errors, with one row for each distinct error code or sub-code. The display is refreshed every ten seconds.

To view the protocol errors report, from the **System Wide Reports** section of the navigation pane, select **Others** and then select **Protocol Errors**.

From the report page you can do the following:

- To sort the report on any column, click the column title.
- To pause the display, click **Pause**. To resume the display, click **Refresh**.
- To display another page of the report, click the page number.

You can customize what information is displayed by controlling which table columns appear, using the **Columns** pulldown menu. The following columns are available:

- **Server** — name of the associated system
- **Server Type** — **MPE** or **MRA**
- **Remote Identity** — the Diameter ID (if known) or IP address of the remote system
- **Error** — the protocol error
- **# Received** — the number of protocol errors received from the remote system
- **# Sent** — the number of protocol errors sent to the remote system

You can filter results by controlling which table rows appear, using the **Filters** pulldown menu. You can define filtering criteria using the following fields:

- **Server** — Filter in all servers (the default) or one specific server.
- **Server Type** — Filter in all server types (the default), totals only, MPE devices only, or MRA devices only.
- **Remote Identity** — Filter in all remote devices (the default) or one specific device.
- **Error** — Filter in all remote error types (the default) or one specific error type.

You can save formatting changes to the report page. Click **Save Layout**.

You can display the report in a format suitable for printing. Click **Printable Format**; a **Connection Status Report** window opens.

You can save the report in comma-separated value (CSV) format, suitable for importing into a spreadsheet application. Click **Save as CSV**. A file named `report.csv` is generated, and a standard **File Download** window opens, so you can save or open the file.

You can save the report as a Portable Document Format (PDF) file, suitable for storage or online display. Click **Export PDF**. A file named `report.pdf` is generated, and a standard **File Download** window opens, so you can save or open the file.

Viewing the Policy Statistics Report

The policy statistics report provides an aggregate view of policy statistics, with one row for each policy, letting you gauge the performance of individual policies. The display is refreshed every ten seconds.

To view the policy statistics report, from the **System Wide Reports** section of the navigation pane, select **Others** and then select **Policy Statistics Report**.

From the report page you can do the following:

- To sort the report on any column, click the column title.
- To pause the display, click **Pause**. To resume the display, click **Refresh**.
- To display another page of the report, click the page number.

You can customize what information is displayed by controlling which table columns appear, using the **Columns** pulldown menu. The following columns are available:

- **Server Name** — name of the associated system
- **Server Type** — **MPE** or **MRA**
- **Policy Name** — the name of each policy defined and active on the displayed server
- **Evaluated** — the number of times the displayed policy was evaluated for the displayed server
- **Executed** — the number of times the displayed policy was executed for the displayed server
- **Ignored** — the number of times the displayed policy was ignored by the displayed server
- **Total Execution Time (ms)** — the total execution time for each policy, in milliseconds
- **Average Execution Time (ms)** — the average amount of time it takes a policy to execute, in milliseconds
- **Maximum Execution Time (ms)** — the maximum execution time for each policy, in milliseconds

You can filter results by controlling which table rows appear, using the **Filters** pulldown menu. You can define filtering criteria using the following fields:

- **Server Name** — Filter in all servers (the default) or one specific server.
- **Policy Name** — Filter in all policies (the default) or one specific policy.

You can save formatting changes to the report page. Click **Save Layout**.

You can display the report in a format suitable for printing. Click **Printable Format**; a **Connection Status Report** window opens.

You can save the report in comma-separated value (CSV) format, suitable for importing into a spreadsheet application. Click **Save as CSV**. A file named `report.csv` is generated, and a standard **File Download** window opens, so you can save or open the file.

You can save the report as a Portable Document Format (PDF) file, suitable for storage or online display. Click **Export PDF**. A file named `report.pdf` is generated, and a standard **File Download** window opens, so you can save or open the file.

Viewing the MPE/MRA Replication Statistics Report

The MPE/MRA replication statistics report provides a view of database replication statistics, with one row for each replication path in an MPE or MRA cluster. The display is refreshed every ten seconds.

To view the replication statistics report, from the **System Wide Reports** section of the navigation pane, select **Others** and then select **MPE/MRA Rep Stats**.

Figure 30: Sample MPE/MRA Replication Statistics Report shows a sample replication report.

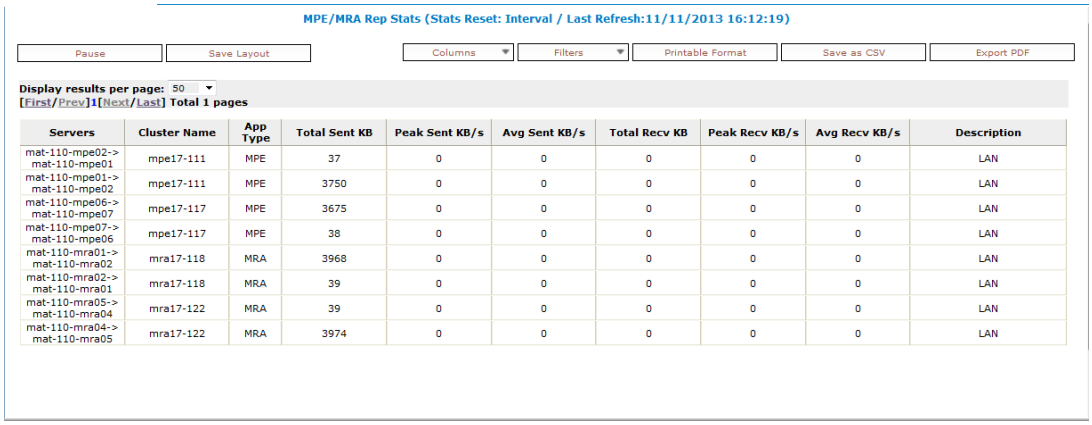


Figure 30: Sample MPE/MRA Replication Statistics Report

From the report page you can do the following:

- To sort the report on any column, click the column title.
- To pause the display, click **Pause**. To resume the display, click **Refresh**.
- To display another page of the report, click the page number.

You can customize what information is displayed by controlling which table columns appear, using the **Columns** pulldown menu. The following columns are available:

- **Server** — name of the MPE or MRA server
- **Cluster Name** — the name of the cluster associated with the server

- **App Type** — the type of application running on the server (**MPE** or **MRA**)
- **Total MB** — the total megabytes of replication traffic transferred by the server
- **Peak MB/s** — the peak replication rate in megabytes per second for the server within the last five minutes
- **Avg MB/s** — the average replication rate in megabytes per second for the server within the last five minutes
- **Description** — the following information:
  - type of connection used by the server (LAN or WAN)
  - Report if the buffer is 60, 80, or 100 percent full
  - Report if COMCOL restarted the connection within the last five minutes

You can filter results by controlling which table rows appear, using the **Filters** pulldown menu. You can define filtering criteria using the following fields:

- **App Type**— Filter in all applications (the default) or filter by **MPE** or **MRA**.
- **Server Name** — Filter in all servers (the default) or one specific server.
- **Cluster Name** — Filter in all clusters (the default) or one specific cluster.

You can save formatting changes to the report page. Click **Save Layout**.

You can display the report in a format suitable for printing. Click **Printable Format**; a **MPE/MRA Rep Status Report** window opens.

You can save the report in comma-separated value (CSV) format, suitable for importing into a spreadsheet application. Click **Save as CSV**. A file named `report.csv` is generated, and a standard **File Download** window opens, so you can save or open the file.

You can save the report as a Portable Document Format (PDF) file, suitable for storage or online display. Click **Export PDF**. A file named `report.pdf` is generated, and a standard **File Download** window opens, so you can save or open the file.

Chapter 27

Upgrade Manager

Topics:

The Upgrade Manager allows you to manage upgrade ISOs and perform software upgrades on servers in the topology. The upgrade process allows a georedundant site to be upgraded in serial order, so no data is lost and there is no down time. During the upgrade process, the **System Maintenance** page displays the upgrade status. Access to these GUI options can be affected by settings on the role setting page.

For specific steps on performing an upgrade, contact the Tekelec *Customer Care Center*.

About ISO Files on Servers

Policy Management software upgrades are distributed and stored for use as ISO files, which are archive files of optical (DVD) discs.

Use the **ISO Maintenance** option to show the current Policy Management software version executing on servers, and determine what ISO files are available to use for upgrades. Operations performed from here include distributing ISO files to servers, deleting ISO files from servers, and pushing the upgrade script to servers. An audit log is generated for each operation that occurs on this page.

ISO Maintenance Elements

On the **Upgrade Manager** menu, **ISO Maintenance** is an option. All servers in the topology appear in the server table on this page. Servers display in groups by cluster; clusters can be collapsed or expanded by clicking the [-] or [+] icons in the first column of the table. Server information is updated every ten seconds.

There are three types of elements that appear on the **ISO Maintenance** GUI page: Checkboxes to select servers on which to perform operations, the table of filtered servers, and pulldown menus (**Columns**, **Filters**, and **Operations**) for changing what displays in the table and for performing operations. The following list describes all of these elements.

Table 34: ISO Maintenance Elements

Element	Description
☐ (checkbox)	Use the ☐ (checkbox) column to select the servers on which an operation is to be performed. If you select a main cluster server, all servers in that cluster are selected. **Note:** At least one server must be selected before you can select an operation from the **Operations** menu.
Name	Displays the server names of all filtered servers. When a server is downloading an ISO file, a special download icon appears next to the name.
Appl Type	Displays the type of application running on each server. The **Filters** menu lets you select **CMP Site1 Cluster**, **CMP Site2 Cluster**, **MPE**, **MRA**, or **All** servers.
Site	Displays the georedundant site name, if any, that is associated with each server. The **Filters** pulldown menu also lets you display **Unspecified** or **All** servers.
IP	Displays the OAM server IP address of each server. The **Filters** pulldown menu lets you select only a server with a specific IP address or **All** servers.
Running Release	Displays the current Policy Management software release of each server. The **Filters** pulldown menu lets you display a specific release only or **All** releases.

ISO	Displays the ISOs or CD-ROM on each server. Use the checkbox to select the ISO to delete during the Delete ISO operation.
Columns	Use the **Columns** pulldown menu to change the columns that appear in this table. By default, all columns appear. To change which columns appear, uncheck the columns to be removed from the page. The Name column is mandatory.
Filters	Use the **Filters** pulldown menu to select a subset of servers to appear on this page. On this menu are the following pulldown filter submenus: **Appl Type**, **Site**, **IP**, and **Running Release**. These filters are set to **All** by default, so all servers appear initially. Selecting another option from one or more of these filters reduces the number of servers displayed.
Operations	Use the **Operations** pulldown menu to select an ISO operation to perform. **Note:** The servers on which the operation is being performed must be selected (in the first column of the table) before that or any operation can be selected. The operations that appear in the pulldown menu depend on the state of the servers that are selected; that is, when more than one server is selected, only the operations that are available on all of these servers appear. Possible operations are **Push Script**, **Upload ISO**, and **Delete ISO**. As a protective feature, when a command is executed, a warning message pops up, asking if you are sure you want to execute this operation (click **OK** or **Cancel**). When **OK** is clicked, a progress bar displays the status of the command completion in a pop-up window. **Note:** Once the operation is confirmed, it cannot be cancelled.

Viewing ISO Status of Servers

Use this procedure to view the status of in-service servers before, during, and after a software upgrade.

1. From the **Upgrade Manager** section of the navigation pane, select **ISO Maintenance**.

   The **ISO Maintenance** page appears.

2. (Optional) Use the filter criteria as needed, accessed from the **Filters** menu, to customize the list of servers that display in the table.
3. (Optional) Use the **Columns** menu as needed, to check and uncheck columns, to customize the data that displays in the table.

All in-service servers that meet the filter criteria are listed. Server information is updated every ten seconds.

Pushing a Script to a Server

Before starting this procedure, you must have mount the ISO file manually and copied two upgrade scripts manually to `/opt/camiant/bin` on the CMP system.

Use this procedure to push upgrade scripts to the remote servers receiving a software upgrade. This procedure is required before a software upgrade can occur on a server. An error message displays in the Upgrade Status column until this procedure is complete.

1. From the **Upgrade Manager** section of the navigation pane, select **ISO Maintenance**.
   The **ISO Maintenance** page appears.
2. Select the server(s) receiving the upgrade script.
3. Click **Operations** and select **Push Script**.
   You are prompted, "Are you sure you want to execute Push Script?"
4. Click **OK** (or **Cancel** to abandon your request).
   A progress bar displays the progress of the operation.

The upgrade scripts are downloaded to the selected servers.

Adding an ISO File to a Server

Use this procedure to download an upgrade ISO file to a remote server in preparation for a software upgrade.

1. From the **Upgrade Manager** section of the navigation pane, select **ISO Maintenance**.
   The **ISO Maintenance** page appears.
2. Select the server(s) to receive the ISO file.
3. Click the Operations pulldown menu and select **Upload ISO**.
   An Upload/Add ISO window appears.
4. Enter the ISO Server Hostname or IP address, User, Password, and ISO file full path for the ISO file being added.

Option	Description
Mode	Mode used to transfer file to remote servers. Currently, SCP is available.
ISO Server Hostname/IP	Enter the name or address of the server receiving the ISO file. This field is required.
User	Enter your user name. This field is required.
Password	Enter your password. This field is required.
ISO file full path	Enter the location where the ISO file is to be stored on the remote server. This field is required.

5. Click **Add** (or **Back** to abandon your request).
   The transfer process begins to the selected servers. A download icon appears in the Name column for the servers receiving the ISO file during the file transfer process. A progress bar displays during the operation. Once the process completes, the icon disappears.

The ISO file is distributed to the server(s).

Deleting an ISO File from a Server

Use this procedure to delete an ISO file from a remote server.

1. From the **Upgrade Manager** section of the navigation pane, select **ISO Maintenance**.
   The **ISO Maintenance** page appears.
2. Select the server(s) from which the ISO file is being removed.
3. Select the ISO file on the server that is being removed.
4. Click the Operations pulldown menu and select **Delete ISO**.
   You are prompted, "Are you sure you want to execute Delete ISO?"
5. Click **OK** (or **Cancel** to cancel the request).
   A progress bar displays the progress of this operation.

The selected ISO file(s) are deleted from the selected remote server(s).

About Performing an Upgrade

Upgrading a server requires a large amount of preparation. The information in this section is a general overview of the Upgrade Manager steps you take to upgrade an individual server. Specific details, including the order in which systems are upgraded, are provided by the Tekelec *Customer Care Center*.

Warning: Contact the Customer Care Center and inform them of your upgrade plans prior to beginning this or any upgrade procedure.

Caution: Use only the upgrade procedure provided by the Tekelec Customer Care Center. Before upgrading any system, please go to the Tekelec Customer Support website and review any Technical Service Bulletins (TSBs) that relate to this upgrade. Once you begin an upgrade, any changes you make to the configuration during the process (such as creating or editing network elements or policies) may be lost.

A server must display **Forced Standby** in the Server State column on the **System Maintenance** page before a software upgrade can be performed on that server.

Before upgrading any server in any cluster of the Policy Management network:

1. Use **Upload ISO** to obtain upgrade files.
2. Use **Push Script** to distribute upgrade files to each server.

You must upgrade the primary-site CMP cluster first. To upgrade a primary-site CMP cluster:

1. On the active server of the primary-site cluster, execute the command **`policyUpgrade.pl --prepareUpgrade`**. (For details of this script and how to execute it, contact the Tekelec *Customer Care Center*.)
2. Select the standby server of the secondary-site cluster and apply **Force Standby**.
3. Select the forced standby server of the primary-site cluster and apply **Start Upgrade** to begin the upgrade process on that server.
4. Select the primary site and apply **Switch ForceStandby** to make the standby server active and the active server standby. You are logged out of the CMP system.
5. Log in to the CMP system, select the forced standby server, and apply **Start Upgrade** to begin the upgrade process on that server.
6. Select the forced standby server and apply **Cancel Force Standby** to make it active (and the active server standby).

Once you upgrade the primary-site CMP cluster, you can upgrade a secondary-site CMP cluster. To upgrade a secondary-site CMP cluster:

1. Select the forced standby server of the secondary-site cluster and apply **Start Upgrade** to begin the upgrade process on that server.
2. Select the secondary site and apply **Switch ForceStandby** to make the standby server active and the active server standby.
3. Select the forced standby server and apply **Start Upgrade** to begin the upgrade process on that server.
4. Select the forced standby server and apply **Cancel Force Standby** to make it active (and the active server standby).

To upgrade an MPE or MRA cluster:

1. Select the active server of the cluster and apply **Turn Off Replication** to stop replication traffic.
2. Select the standby server of the cluster and apply **Force Standby**.
3. Select the forced standby server of the cluster and apply **Start Upgrade** to begin the upgrade process on that server.
4. Select the cluster and apply **Switch ForceStandby** to make the standby server active and the active server standby.
5. Select the cluster and apply **Reapply Configuration** (see *Reapplying the Configuration to Policy Management Devices*) to distribute configuration information to it.
6. Select the forced standby server and apply **Start Upgrade** to begin the upgrade process on that server.
7. Select the active server of the cluster and apply **Turn On Replication** to restart replication traffic.
8. Select the standby server and apply **Cancel Force Standby** to make it active (and the active server standby).

Once all servers in all clusters of the Policy Management network are upgraded, select each server and apply **Upgrade Completion**.

System Maintenance Elements

On the **Upgrade Manager** menu, **System Maintenance** is an option. All servers in the topology appear in the server table on this page. Servers display in groups by cluster; clusters can be collapsed or expanded by clicking the [-] or [+] icons in the first column of the table. Server information is updated every ten seconds.

There are three types of elements that appear on the **Upgrade Manager** GUI page: ☐ (checkboxes) to select servers/ISOs on which to perform operations, the table of filtered servers, and pulldown menus (**Columns**, **Filters**, and **Operations**) for changing what displays in the table and for performing operations. The following list describes all of these elements.

Table 35: System Maintenance Elements

Element	Description

☐ (checkbox)	Use the ☐ (checkbox) column to select the servers on which an operation is to be performed. If you select a main cluster server, all servers in that cluster are selected. **Note:** At least one server must be selected before you can select an operation from the **Operations** menu.
Name	Displays the server name of each server. When a server is in the process of being upgraded, a special upgrade icon appears next to the name. Likewise, if a server upgrade has failed, a special failed icon appears next to the name.
Appl Type	Displays the type of application running on each server. The **Filters** menu allows you to display CMP Site1 Cluster only, CMP Site2 Cluster only, MPE only, MRA only, or All servers.
Site	Displays the georedundant site name, if any, that is associated with each server. The **Filters** menu allows you to display Unspecified only or All servers.
IP	Displays the IP address of each server. The **Filters** menu allows you to display only the server with a specific IP address or All servers.
Server State	Displays the state of each server. The server state can appear in different colors, depending on the state displayed. The **Filters** menu allows you to display Active only, Standby only, Out-Of-Service only, Force Standby only, or All servers.
ISO	Displays the ISOs or CD-ROM on each server. Use the checkbox to select an ISO to use during an upgrade on that server.
Prev Release	Displays the previous Policy software release of each server, if known. The **Filters** menu allows you to display a specific release only or All releases.
Running Release	Displays the current Policy software release of each server. The **Filters** menu allows you to display a specific release only or All releases.
Upgrade Status	Displays details of last upgrade performed on each server.
Columns	Use the **Columns** menu to change the columns that appear on this page. By default, all columns appear. To change which columns appear, uncheck the columns to be removed from the page. The Name column is mandatory.
Filters	Use the **Filters** menu to select a subset of servers to appear on this page. On this menu are the following filter submenus: Appl Type, Site, IP, State, Replication, Compatible Replication, Legacy Sync, Prev Release, and Running Release. These filters are set to All by default, so all servers appear initially. Selecting another option from one or more of these filters reduces the number of servers displayed.
Operations	Use the **Operations** menu to select an upgrade operation to perform. **Note:** The servers on which the operation is being performed must be selected (in first column of table) before that or any operation can be selected. The operations that appear in the pulldown menu depend on

	the state of the servers that are selected, i.e., when more than one server is selected, only the Operations that are available on all of these servers appear. As a protective feature, when a command is executed, a warning message pops up, asking if you are sure you want to execute this operation (you can click **OK** or **Cancel**). If you click **OK**, a progress bar displays the status of the command completion in a pop-up window. Once an operation is confirmed, it cannot be cancelled.

The operations available depend on the devices selected, their current state, and their upgrade status.

Operation	**Effect**
Push Script	Pushes script to remote server. Upgrade Manager uses the script to communicate with the remote server and to perform the upgrade or backout.
Upload ISO	Adds ISO to the specified Policy Management products (CMP/MPE/MRA).
Force Standby	Forces server to standby status.  **Caution:** Setting Force Standby for all servers in a cluster effectively removes the cluster from service. **Note:** You cannot force both servers of a CMP cluster into standby status.
Turn Off Replication	Turns off replication to a server.
Turn On Replication	Turns on replication to a server.
Prepare Upgrade	Configures exclusion tables.
Upgrade Completion	Turns off legacy replication.
Undo Upgrade Completion	Prepare for a backout of a software upgrade. This process turns on legacy replication for all the clusters.
Switch ForceStandby	Switches the upgraded server of a cluster to active and the previously active server of a cluster to forced standby in order to upgrade it.
Cancel Force Standby	Cancels the Force Standby status of a server.
Start Upgrade	Begins the upgrade with selected ISO on each server.
Export SSD	Exports subscriber state data. The selected server must be an MPE or MRA device in Active status, running a version of Policy Management not less than the standby server(s) in the cluster. You are prompted to confirm this operation. **Note:** If this operation fails, the update status displays an error message and details are written to a log file. Once the errors are resolved, you can retry the export operation.

Import SSD	Transfers and imports subscriber state data. The selected server must be an MPE or MRA device in Force Standby status, running a version of Policy Management less than the standby server(s) in the cluster. You are prompted to confirm this operation.
Backout	Initiates a backout.

Viewing Upgrade Status of Servers

Use this procedure to view the status of in-service servers before, during, and after a software upgrade.

1. From the **Upgrade Manager** section of the navigation pane, select **System Maintenance**.

   The **System Maintenance** page appears.

2. Use the filter criteria as needed, accessed from the **Filters** menu, to customize the list of servers that display in the table.
3. Use the **Columns** menu as needed, to check and uncheck columns, to customize the data that displays in the table.

All in-service servers that meet the filter criteria are listed. Server information is updated every ten seconds.

About Rolling Back an Upgrade

It is possible to roll back, or back out, the Policy Management software to the previous version in a production environment.

Caution: Before beginning a rollback, contact the Tekelec Customer Care Center and inform them of your plans.

A server must display **Forced Standby** in the Server State column on the **System Maintenance** page before a rollback can be performed on that server.

The Upgrade Manager includes functions to preserve the current state of in-memory subscriber data, including sessions stored on MPE devices and bindings stored on MRA devices, that existed when the rollback began.

To roll back an MPE or MRA cluster:

1. Select the standby server of the cluster and apply **Force Standby**.
2. Select the forced standby server of the cluster and apply **Turn Off Replication** to turn off replication on that server.
3. Select the forced standby server of the cluster and apply **Backout** to begin the rollback process on that server.

Caution: Subscriber state data accumulated from this point until Step 5 is completed is lost.

4. Select the active server of the cluster and apply **Export SSD** to preserve subscriber state data. (The forced standby server restarts.)
5. Select the forced standby server of the cluster and apply **Import SSD** to restore subscriber state data.
6. Select the cluster and apply **Switch ForceStandby** to make the standby server active and the active server standby.
7. Select the forced standby server and apply **Backout** to begin the rollback process on that server.
8. Select the forced standby server of the cluster and apply **Turn On Replication** to turn on replication for that server.
9. Select the forced standby server and apply **Cancel Force Standby** to make it active (and the active server standby).

Chapter 28

System Administration

Topics:

System Administration describes functions reserved for CMP system administrators.

Note: Some options are visible only when you are logged in with administrative rights to the CMP system. However, the Change Password option is available to all users.

Configuring System Settings

Within the CMP system you can define the settings that control system behavior.

To define system settings:

1. From the **System Administration** section of the navigation pane, select **System Settings**.
   The **System Settings** page opens in the work area, displaying the current system settings.
2. Click **Modify**.
   The **System Settings** page opens.
3. In the **Configuration** section, define the following:
   a) **Idle Timeout (minutes; 0=never)** — The interval of time, in minutes, that a session is kept alive.
      The default value is 30 minutes; a value of zero indicates the session remains active indefinitely.
   b) **Account Inactivity Lockout (days; 0=never)** — The maximum number of days since the last successful login after which a user is locked out.
      If the user fails to log in for the defined number of days, the user is locked out and cannot gain access to the system until an administrator resets the account. The default value is 21 days; a value of zero indicates no limit (the user is never locked out for inactivity).
   c) **Maximum Concurrent Sessions Per User Account (0=unlimited)** — The maximum number of times a defined user can be logged in simultaneously. A value of zero indicates no limit.
      If more than the configured number of concurrent users try to log in (for example, a second user if this value is set to 1), they are blocked at the login page with the message "Your account already has the maximum number of concurrent sessions."
   d) **Password Expiration Period (days; 0=never)** — The number of days a password can be used before it expires. Enter a value from 7 to 365, or 0 to indicate that the password never expires.
   e) **Password Expiration Warning Period (days; default=3)** — The number of days before a password expires to begin displaying a window to users after login warning that their password is expiring.
   f) **Admin User Password Expiration** — By default, the password for the admin user never expires.
      If you select this option, the **admin** user is subject to the same password expiration policies as other users.
   g) **Block users when password expires** — By default, once a password expires, the user must immediately change it at the next login.
      If you select this option, if their password expires, users cannot log in at all. (If you select **Admin User Password Expiration** and the **admin** user's password expires, the user can still log in but must immediately select a new password.)
   h) **EMS Shared Secret**— Field provided to support third-party single sign-on architectures.
   i) **Minimum Password Length** — The minimum allowable length in characters for a password, from 6 to 64 characters.
      The default is six characters.
   j) **Login Banner Title** — The title that displays at the top of the login page. The default is "Welcome." You can enter up to ten characters.
   k) **Login Banner Text** — The text that displays on the login page. You can enter up to 10,000 characters.

l) **Top Banner Text** — The text that displays in the banner at the top of the GUI page. You can enter up to 50 characters. You can select the font, size, and color of the text.

m) **Allow policy checkpoint and restore (copies; 0=disallow)** — The number of checkpoints allowed in the system. Valid value range is 0 to 10. If set to 0, the Policy Checkpoint/Restore option is turned off and is no longer visible under the Policy Management heading on the GUI menu. Default value is 0.

4. In the **Invalid Login Threshold** settings section, define the following:

   a) **Enable** — Enables login threshold control.

   By default, this feature is enabled; clear the check box to disable this feature.

   b) **Invalid Login Threshold Value** — Defines the maximum number of consecutive failed logins after which action is taken.

   Enter a value from 1 through 500; the default is 3 attempts.

   c) **Action(s) upon Crossing Threshold** — The system action to take if a user reaches the invalid login threshold:

   - **Lock user** — prevents users from logging in if they reach the invalid login threshold.
   - **Send trace log message** — If a user account reaches the threshold, an incident is written to the trace log, including the username and the IP address (in IPv4 or IPv6 format) from which the login attempts were made. The default level is **Warning**; to change the event level, select a different level from the list.

5. The **Password Strength Settings** section lists four character categories: lowercase letters, uppercase letters, numerals, and non-alphabetic characters. You can specify a password strength policy that requires users to create passwords by drawing from these categories:

   - **Require at least categories below** — By default, this setting is 0 (disabled). Select it to require users to include password characters from between one to four of the categories.
   - **Require at least lower-case letter(s) (1-64)** — By default, this setting is 0 (disabled). Select it to require users to include from 1 to 64 lowercase letters in their passwords.
   - **Require at least upper-case letter(s) (1-64)** — By default, this setting is 0 (disabled). Select it to require users to include from 1 to 64 uppercase letters in their passwords.
   - **Require at least numeral(s) (1-64)** — By default, this setting is 0 (disabled). Select it to require users to include from 1 to 64 numerals in their passwords.
   - **Require at least non-alphabetic character(s) (1-64)** — By default, this setting is 0 (disabled). Select it to require users to include from 1 to 64 nonalphabetic characters in their passwords.
   - **Force users with weak password to change password at their next login** — By default, this setting is 0 (disabled). Select it to require users to conform to a new password policy effective the next time they log in.

6. When you finish, click **Save** (or **Cancel** to discard your changes).

The system settings are configured.

Figure 31: Sample Password Strength Policy shows an example of settings that establish a password strength policy requiring user passwords to contain at least one uppercase letter, four numerals, and one non-alphabetic character. (A password that would satisfy this policy is P@ssword1357.) Users whose passwords do not meet these requirements will be forced to change their passwords the next time they log in.

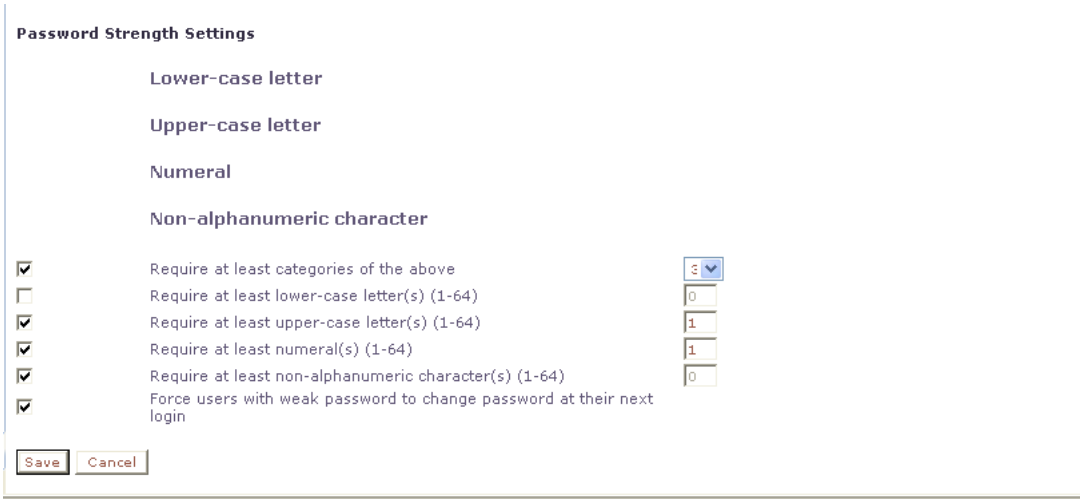


Figure 31: Sample Password Strength Policy

Importing to and Exporting from the CMP Database

In addition to defining manageable objects manually, you can add them to the CMP database using the OSSI XML Interface or by importing them from an XML file. You can also export a list of objects of various types to an XML output file. This section describes the OSSI XML interface and the XML bulk import and export processes.

Using the OSSI XML Interface

The OSSI XML interface provides access to raw data in the system directly via HTTP. The system data is entered and returned as XML documents in accordance with a defined schema. The schema for the input XML is provided to specify exactly which attributes of a manageable object are permitted on import, as well as the formatting for those attributes.

You can also define object groups as part of the XML file and import them within the same file. Groups let you define a logical organization of objects within the CMP database at the time of import. Group structures include not only group attributes, but also relationships between groups, subgroups, and objects.

The OSSI XML interface includes the following:

- **Topology Interface** — Allows you to query and manage network elements within the system
- **Operational Measurements (OM) Interface** — Allows you to retrieve statistical data from the system
- **AVP definitions** — Allows you to define, save, and restore 3rd party AVP definitions within the system
- **Policy Tables** — Allows you to export policy tables, and import them to add, edit, replace or delete a table

For detailed information, see the document *OSSI XML Interface Definitions Reference Guide*.

Importing an XML File to Input Objects

During the import process, object definitions are read one at a time from the user-specified XML file. Each object is then validated and checked against the existing database for collisions (duplications). Collisions are detected based on the object name, which is a unique database key. If the object already exists within the system, the existing object's attributes are updated (overwritten) by the attributes specified in the XML file being imported. If the object does not exist within the system, the object is created and imported as a new object. A blank element value is replaced with a default or null value, as appropriate.

An XML import is limited to 20,000,000 bytes. If you try to import a file larger than that the import will fail with a result code of 102 (input stream error).

Tekelec recommends that you export the existing database of objects before starting an importation operation to ensure that you can recreate the previous state if necessary (see *Exporting an XML File*).

To use an XML file to input defined objects:

1. From the **System Administration** section of the navigation pane, select **Import/Export**.
   The Import/Export page opens in the work area.

   Note: Do not select **Policy Import/Export**, in the **Policy Management** section; that is a different function.

2. On the Import/Export page, enter the file name of the XML import file, or click **Browse** and, from the standard file open window that appears, locate it.
3. Select the type of import: * (specifies import all types), **Network Elements**, **Tiers**, **Serving Gateway/MCC-MNC Mapping**, **Traffic Profiles**, **Retry Profiles**, **Quotas**, **Services, Charging Servers**, **Time Periods**, **Quota Conventions**, **Match Lists**, **Monitoring key**, **Custom AVP Definition**, **Policy Table**, **Applications**, **Policy Counter ID**,**Roles**, **Scopes**, or **Users**. * is the default value.
   If you select **Network Elements**, additional filtering fields appear to help you manage the volume of data being imported; you can filter by network element name or Diameter identifier. Each additional field accepts a string that can include the wildcard characters * (to represent any string) and ? (to represent any character). By default, all elements matching the filter are included. For each field you can select the operators **AND**, **OR**, **AND NOT**, or **OR NOT**; if you select an operator, an additional statement field appears. You can specify up to six logical combinations of filtering statements.

   Note: The concatenation of all filters is left associative. For example, C1 AND C2 OR C3 equals (C1 AND C2) OR C3. The NOT operator affects the succeeding statement(s); for example, C1 AND NOT C2 AND C3 equals C1 AND (NOT C2) AND C3.

4. Click **Import**.
   Data from the XML file is imported. If the operation takes more than five seconds, a progress bar appears.

Following the import, status messages provide the total counts of all successful imports, updates, and failures. Click **Details** (the button is below the status messages) to open a window containing detailed warnings and errors for each object. The error messages contain identifying information for the XML structure that caused the error, allowing you to pinpoint and fix problems in the XML file.

For each User element, ensure that Role and Scope data is also defined. Tekelec recommends that the sequence of elements in the XML import file is Network Element, Role, Scope, and then User.

If an imported user password does not satisfy the current password rules, the user will have to change passwords on first login. Password expiration timestamps are imported, so the passwords will expire on the schedule of the CMP system from which they were exported.

When traffic profiles are imported, they are imported regardless of their configured precedence values. The CMP system displays a message reminding you to check the precedence values of the imported traffic profiles. See *Setting the Precedence Range* for more information.

Exporting an XML File

The Export feature creates an XML file containing definitions for objects within the CMP database, in the same schema used on import. You can back up data by exporting it to an XML file, and restore it by importing the same file. The export file can also be transferred to a third-party system. To export an XML file:

1. From the **System Administration** section of the navigation pane, select **Import/Export**.
   The Import/Export page opens in the work area.

   Note: Do not select **Policy Import/Export**, in the **Policy Management** section; that is a different function.

2. Select the type of export: **Network Elements** (the default), **Tiers**, **Serving Gateway/MCC-MNC Mapping**, **Traffic Profiles**, **Retry Profiles**, **Quotas**, **Quota Conventions**, **Match Lists**, **Charging Servers**, **Time Periods**, **Monitoring key**, **Custom AVP Definition**, **Policy Table**, **Applications**, **Policy Counter ID Roles**, **Scopes**, or **Users**.
   If you select **Network Elements**, additional filtering fields appear to help you manage the volume of data being exported; you can filter by network element name or Diameter identifier. Each additional field accepts a string that can include the wildcard characters * (to represent any string) and ? (to represent any character). By default, all elements matching the filter are included. For each field you can select the operators **AND**, **OR**, **AND NOT**, or **OR NOT**; if you select an operator, an additional statement field appears. You can specify up to six logical combinations of filtering statements.

   Note: The concatenation of all filters is left associative. For example, C1 AND C2 OR C3 equals (C1 AND C2) OR C3. The NOT operator affects the succeeding statement(s); for example, C1 AND NOT C2 AND C3 equals C1 AND (NOT C2) AND C3.

3. Click **Export**.
   A standard file download window opens, and you are prompted, "Do you want to open or save this file?"
4. Click **Save** to save the file (or **Cancel** to abandon the request).
   Data exported to an XML file. If the operation takes more than five seconds, a progress bar appears.

The user accounts LIadmin, datacollector, and _policy_server cannot be exported.

User passwords are exported in encrypted text. Password expiration timestamps are retained, so the passwords will expire on the schedule of the CMP system from which they were exported.

The role LIadmin cannot be exported.

The Manager Report

The Manager Report provides information about the CMP cluster itself. This information is similar to the Cluster Information Report for MPE and MRA clusters. The display is refreshed every ten seconds.

To view the Manager Report, select **Reports** from the **System Administration** section of the navigation pane.

The fields that are displayed in the Manager Report section include the following:

- **Cluster Name and Designation** — The name of the cluster, and also whether it is the primary (P) or secondary (S) site.
- **Cluster Mode** — The status of the cluster:
  - **Active**: The cluster is managing the Policy Management network.
  - **Standby**: The cluster is not currently managing the Policy Management network.

  To pause refreshing the display, click **Pause**. To resume refreshing, click **Resume**. To reset the display counters, click **Reset All Counters**.
- **Cluster Status** — The status of the servers within the cluster:
  - **On-line**: If one server, it is active; if two servers, one is active and one is standby.
  - **Degraded**: One server is active, but the other server is not available.
  - **Out-Of-Service**: Neither server is active.
  - **No Data**: The CMP system cannot reach the server.

Also within the Manager Report is a listing of the servers (blades) contained within the cluster. A symbol () indicates which server currently has the external connection (the active server). The report also lists the following server-specific information:

- **Overall** — Displays the current topology state (Active, Standby, or Forced-Standby), number of server (blade) failures, and total uptime (time providing active or standby GUI service). For the definitions of these states, see *Server Status*.
- **Utilization** — Displays the percentage utilization of disk (of the /var/camiant filesystem), average value for the CPU utilization, and memory.

The **Actions** buttons let you restart the CMP software on the server or restart the server itself.

The Trace Log

The Trace Log is part of system administration records notifications for management activity on the CMP system. You can configure the severity level of messages written to the Trace Log; for information, see *Configuring Log Settings*.

To view log information using the Trace Log Viewer:

1. From the **System Administration** section of the navigation pane, select **Trace Log**.
   The Trace Log page opens in the work area.
2. Click **View Trace Log**.

The Trace Log Viewer window opens. While data is being retrieved, the in-progress message "Scanning Trace Logs" appears.

3. When you finish, click **Close**.
   The Trace Log Viewer window closes.

Viewing the Audit Log

You can track and view configuration changes within the CMP system. Using the audit log, you can track and monitor each configuration event, affording you better system control. The audit log is stored in the database, so it is backed up and can be restored.

To display the audit log:

1. From the **System Administration** section of the navigation pane, select **Audit Log**.
   The Audit Log page opens in the work area.
2. On the Audit Log page, click **Show All**.
   The Audit Log opens. (*Figure 32: Audit Log* shows an example.)

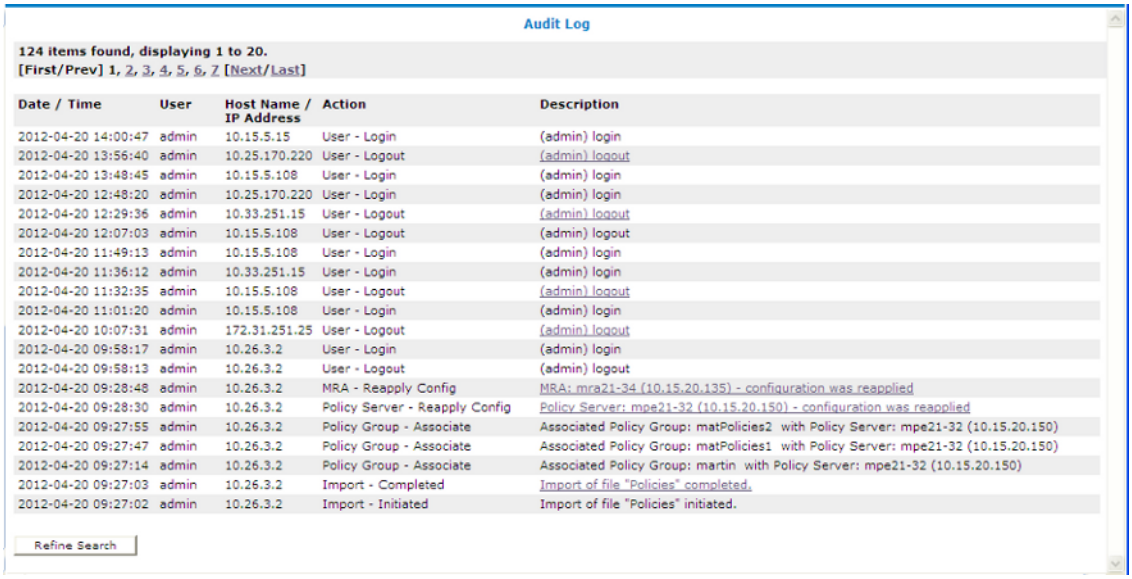


Figure 32: Audit Log

For a detailed description of an item, click the underlined description. The details of the event display. (*Figure 33: Audit Log Details* shows an example.)

To filter search results, click **Refine Search**, located at the bottom of the page. (See *Searching for Audit Log Entries*.)

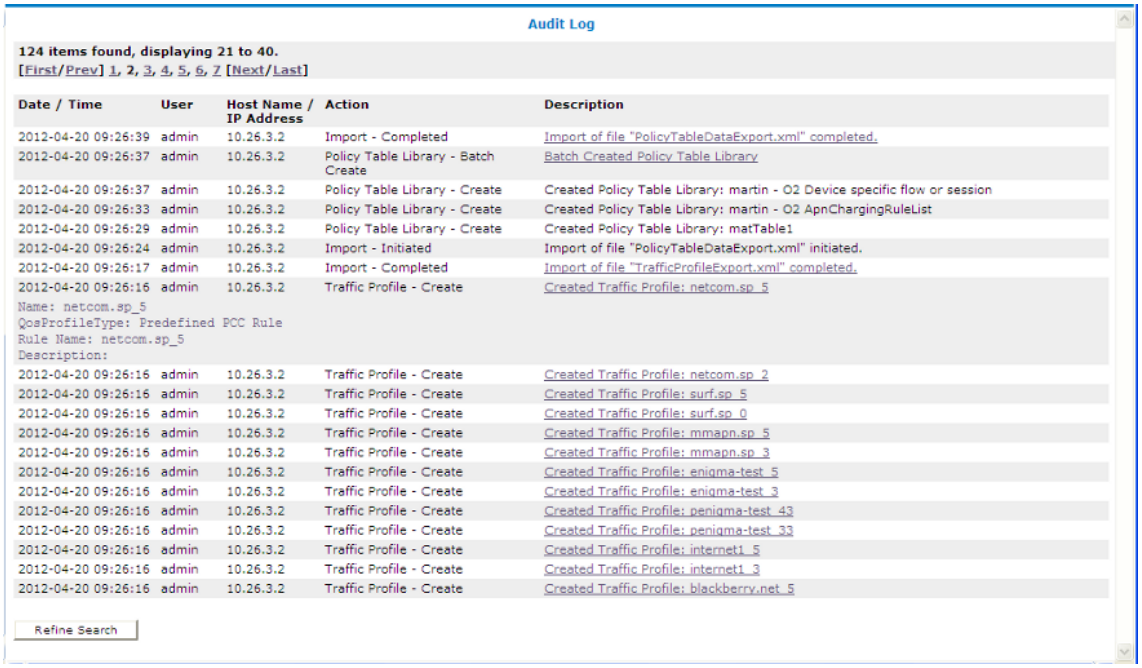


Figure 33: Audit Log Details

Searching for Audit Log Entries

To search for entries in the Audit Log:

1. From the **System Administration** section of the navigation pane, select **Audit Log**.
   The Audit Log page opens in the work area.
2. On the Audit Log page, click **Search**.
   The Audit Log Search Restrictions Page opens.
3. Define the following items, depending on how restrictive you want the audit log search to be:

   - **From/To** — Enter the start and end dates and times for this search.
   - **Action by User Name(s)** — Enter the name of the user or users to audit.
   - **Action on Policy Server(s) / MRA(s)** — Enter the name of the Policy Management device to audit.
   - **Audit Log Items to Show** — Specifies a category of items to audit for display (depending on the CMP mode): **Policy Server**, **Network Element**, **Network Element Group**, **Network Element Link**, **Application**, **MRA**, **Policy**, **Policy Group**, **Account**, **Tier**, **Path**, **Entitlement**, **Alert**, **User**, **Audit**, **Alarm**, **OM Statistics**, **Quota**, **Quota Convention**,**Charging Server**, **Service**, **Rating Group**, **Time Period**, **MPE Manager**, **Upgrade Manager**, **Topology Setting**, **Global Configuration Settings**, **Trending Report**, or **User layout**. When you select some categories, a **Name** field appears, which lets you enter a search string; leave the field blank to include all items. When you select any category, an **Action(s)** link appears, which lets you select individual audit log items within the category. By default all items in the category are selected, but you can select individual items instead. By default you can specify three item categories; click **More Lines** to add an additional item category.

- **Results Forms** — Specifies the number of items per page to display, along with which data to display (most recent or oldest items).

4. When you finish defining the search parameters, click **Search**.
   The Audit Log displays search results.

Exporting or Purging Audit Log Data

You can export the audit log to a text file; the default filename is `AuditLogExport.txt`.

Exporting Audit Log Data

You can export audit log data to a text file. The filename is `AuditLogExport.txt`.

To export data from the audit logs:

1. From the **System Administration** section of the navigation pane, select **Audit Log**.
   The **Audit Log** page opens in the work area.
2. Click **Export/Purge**.
   The **Export and Purge Audit Log Items** page opens.
3. In the **Items to Export** section, select one of the following options:
   a) **Export All Items** — Writes all audit log entries.
   b) **Export Through Date** — Click  (calendar icon), and select a date.
4. When you finish, click **Export**.
   A standard File Download window opens; you can open or save the export file.

The audit log is exported.

Purging Audit Log Data

To purge data from the audit log:

1. From the **System Administration** section of the navigation pane, select **Audit Log**.
   The **Audit Log** page opens in the work area.
2. Click **Export/Purge**.
   The **Export and Purge Audit Log Items** page opens.
3. In the **Items to Purge** section, click  (calendar icon) and select a date.
4. When you finish, click **Purge**.
   You are prompted, "Click 'OK' to purge all audit log items through: *mm/dd/yyyy*."
5. Click **OK** (or **Cancel** to abandon the request).

The data is purged from the audit log.

Managing Scheduled Tasks

The CMP system runs batch jobs to complete certain operations. These tasks are scheduled to run at regular intervals, with some tasks scheduled to run in a certain order. You can change the scheduling of these tasks to better manage network load or to propagate a network element change to the Policy Management devices on demand. You can also abort a running task.

Caution: Tekelec strongly recommends that you perform these tasks in the order in which they are listed, or serious system problems can occur. Consult Tekelec Technical Support before changing the order of any task.

The tasks include:

- **Stats Files Synchronization #1, 2, 3, 4** — Synchronizes stats files to defined remote server. Up to four synchronization tasks can be defined, and they are scheduled independently. Statistics files are generated and synchronized to external systems only from the active CMP system. This task retries when the remote server is unreachable. The default number of retries is three times in each one minute interval. The maximum number of retries in one minute is five times. If a transfer period is missed, the next time the remote server is reached any files from the missed transfer periods are transferred. Remote server information that must be defined before this task runs is: Host Name/IP address, Remote repository path, and SSH user login and password.

  Note: An external system must be configured before beginning this task. If no external system is configured in any of the Stats File Synchronization tasks, no stats files are generated.

  Note: If access to configuration is restricted to Read-Only, you will not be able to configure this task.

- **Health Checker** — Periodically checks the MPE devices to ensure that they are online.
- **OM Statistics** — Periodically retrieves Operational Measurement (OM) statistics from all MPE devices.

  The Operational Measurements XML interface retrieves operational counters from the system. The OM interface requires that the OM Statistics scheduled task be running on the CMP system. This task collects the operational counters from the Policy Management devices in the network and records them in the CMP database; the data is then available for query via the OM XML interface. You can configure the task to poll at intervals between 5 minutes and 24 hours, with a default value of 15 minutes; the system keeps the data available for query for 1 to 30 days, with a default value of 7 days. The recommended settings for this task vary depending on the volume of data you are collecting.

  When you request OM statistics, the data for the response is taken from the information that has been collected by this task. You must gather data using the OM Statistics scheduled task if you want data available for subsequent OM queries.

  Most values returned as part of the response are presented as the positive change between the start time and end time. To calculate a response, you must have a minimum of two recorded values available; thus you must run the OM Statistics task at least twice in a given time period in order to provide any data through the OM XML interface. The *OSSI XML Interface Definitions Guide* describes the OM Interface and the OM Statistics in detail.

  - **Stats File Generator** — Generates statistics files by extracting the data from the CMP database using the OSSI API. This task is also responsible for cleaning up the statistics files. This task

must be enabled and configured with which stats to collect before statistics files can be synchronized with a remote host. The available settings for this task are: Local Repository directory (the default is `/var/camiant/stats_export`); Maximum age to keep files, in hours (the default is 72 hours); File Format, either XML (the default) or CSV; and Stats Type, which lets you select the statistics group(s) to extract. For information on the individual statistics in each available group, see the *OSSI XML Interface Definitions Guide*.

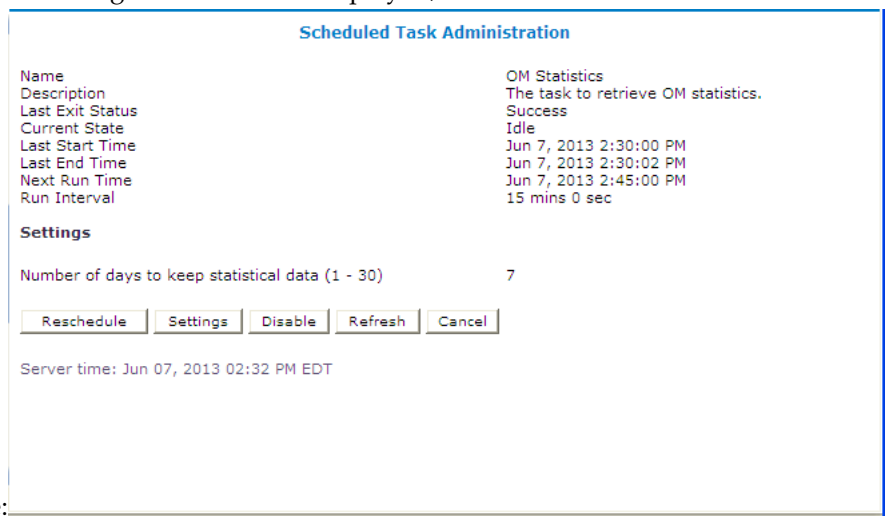
- **Replication Statistics** — Generates replication statistics for MPE and MRA servers.

  Note: The run interval should be the same as the Stats Collection Period. For more information, see *Setting Stats Settings*.

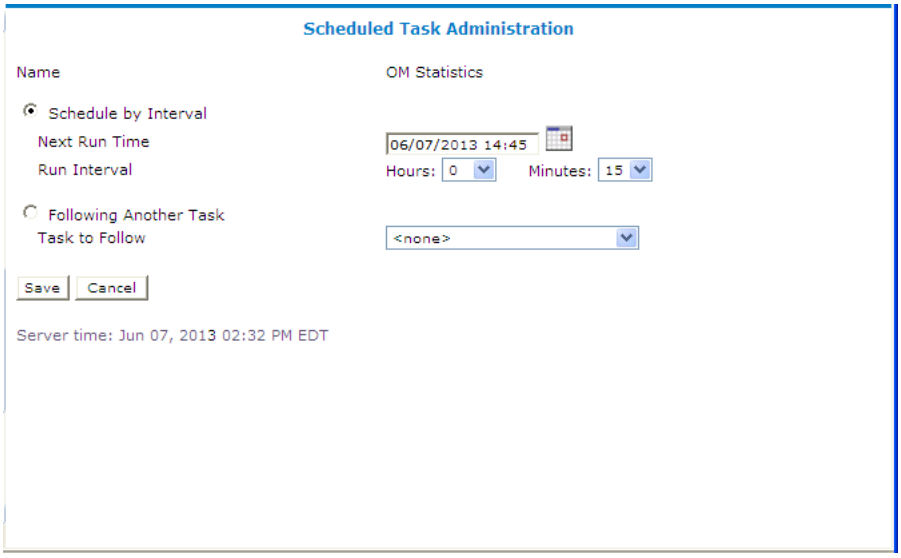
Configuring a Task

To configure an individual task:

1. From the **System Administration** section of the navigation pane, select **Scheduled Tasks**.
   The **Scheduled Task Administration** page opens in the work area.
2. To display details about a task, click the task name.
   The current settings and status are displayed; for example:



3. The options for this task are as follows:
   - **Reschedule** — Click to reschedule the time that this task is performed on the Policy Management device:



  - **Schedule by Interval** (**Next Run Time** or **Run Interval**) — Defines the run interval for the task to follow.

    Valid run intervals are from 0 to 24 hours in 5-minute increments.

  - **Following Another Task** — Defines the run time as following the completion of another scheduled task that you select from the list.

- **Settings** — Number of days to keep data; the default is seven days.
- **Run Now** — Runs the process immediately.

  You are prompted, "Click 'OK' to run this task now." Click **OK** to run the task (or **Cancel** to cancel the request).

- **Disable** or **Enable** — Disables or enables the next scheduled execution of this process.

  If you click **Disable**, you are prompted, "Click 'OK' to disable this task." Click **OK** (or **Cancel** to cancel the request); the task is disabled and will not run at its next scheduled time, and the button changes to **Enable**.

- **Refresh** — Refreshes the page.
- **Cancel** — Returns to the previous page.

User Management

The CMP system lets you configure the following user attributes:

- **Roles** — What a user can do within the CMP system.
- **Scopes** — What network element groups and Policy Management device groups a user can control, which provides a context for a role.
- **Users** — Once you define roles and scopes, you can apply them to user profiles.
- **RADIUS Authentication** — Lets the CMP system authenticate users using RADIUS Authentication. These users must match the RADIUS Server account information before access is permitted.

Configuring Roles

Assigning roles to the various users that access the CMP system lets you control who can configure and access what within the CMP system. The default roles are:

- **Viewer** — Permits read-only access to functions associated with Policy Management device management and configuration. Access is also permitted to limited system administration functions, such as Change Password.
- **Operator** — Permits full read/write access to all Policy Management device management and configuration functions. Access is also permitted to all system administration functions except user administration.
- **Administrator** — Permits full read/write access to all functions. You cannot delete the Administrator role.

Creating a New Role

To create a new role:

1. From the **System Administration** section of the navigation pane, select **User Management**.
   The content tree displays the **User Management** group.
2. From the content tree, select the **Roles** group.
   The **Role Administration** page opens in the work area, displaying existing roles.
3. Click **Create Role**.
   The **New Role** page opens. By default, all privileges are set to **Hide** (that is, the functions do not appear to users of the role, so access must be explicitly granted) or **Read-Only**.
4. Enter the following information:
   a) **Name** — The name for the new role (up to 64 characters long)
   b) **Description/Location** (optional) — Free-form text
   c) **Policy Server Privileges** — Defines access to the following MPE device management functions (assigning each the privilege **Hide**, **Read-Only**, or **Read-Write**):

      Configuration

      Application

      Match Lists

      Services & Rating Groups

      Policy Counter ID

      Traffic Profiles

      Retry Profiles

      Charging Server

      Time Period

      Monitoring Key

      AVP Definition

      Global Configuration Settings

      Bulk Operation

   d) **Subscriber Privileges** — Defines access to the subscriber functions (assigning the privilege **Hide**, **Read-Only**, or **Read-Write**):

Entitlement

Subscriber Tier

Quota Usage

e) **SPR Privileges** — Defines access to the SPR functions (assigning the privilege **Hide**, **Read-Only**, or **Read-Write**):

Subscriber Data

f) **Network Privileges** — Defines access to the network management Paths function (assigning the privilege **Hide**, **Read-Only**, or **Read-Write**):

Network Element

g) **MRA Privileges** — Defines access to the MRA Configuration functions:

Configuration (with the privileges **Hide**, **Read-Only**, or **Read-Write**)

Bulk Operations (with the privileges **Hide** or **Show**)

h) **Policy Management Privileges** — Defines access to the Policy Management functions:

Policy Library (with the privileges **Hide**, **Read-Only**, **Read and Deploy**, or **Read, Deploy, and Write**)

Template Library (with the privileges **Hide**, **Read-Only**, or **Read-Write**)

Policy Table Library (with the privileges **Hide**, **Read-Only**, or **Read-Write**)

Policy Import/Export (with the privileges **Hide**, **Read-Only**, or **Read-Write**)

i) **System Wide Reports Privileges** — Defines access to the system-wide reports functions:

System Wide Reports Configuration (with the privileges **Hide**, **Read-Only**, or **Read-Write**)

j) **Platform Setting Privileges** — Defines access to the platform setting functions:

Topology Configuration (with the privileges **Hide**, **Read-Only**, or **Read-Write**)

Server Operation (with the privileges **Hide** or **Read-Write**)

k) **Upgrade Manager Privileges** — Defines access to software upgrade functions:

ISO Maintenance (with the privileges **Hide**, **Read-Only**, or **Read-Write**)

System Maintenance (with the privileges **Hide**, **Read-Only**, or **Read-Write**)

l) **System Administration Privileges** — Defines access to system administration functions:

XML Import/Export (with the privileges **Hide** or **Show**)

Operational Measurements (with the privileges **Hide** or **Read-Only**)

User Management (with the privileges **Hide**, **Read-Only**, or **Read-Write**)

Scheduled Tasks (with the privileges **Hide** or **Read-Write**)

Event Log, Audit Log, & Alerts of Policy Server (with the privileges **Hide**, **Read-Only**, or **Read-Write**)

Event Log (with the privileges **Hide**, **Read-Only**, or **Read-Write**)

Audit Log (with the privileges **Hide**, **Read-Only**, or **Read-Write**)

Audit Log User Info (with the privileges **Hide** or **Show**)

Alarms (with the privileges **Hide**, **Read-Only**, or **Read-Write**)

Password Strength (with the privileges **Read-Only** or **Read-Write**)

Push Method for Statistics (with the privileges **Read-Only** or **Read-Write**)

If set to **Read-Only**, the following fields are displayed for the Stats File Generator setting:

- **Name**
- **Description**
- **Last Exit Status**
- **Current State**
- **Last Start Time**
- **Last End Time**
- **Follows Task**

Task Settings

- **Local Repository**— Root directory of the local repository.
- **Maximum age to keep files (hours)**— Stats file retention period. Defaults to 72 hours.
- **File Format**— Any format can be selected. Defaults to XML.
- **Stats Type**— Any stats type can be selected to generate stats. Defaults to No one. If you do not select a stats type, the task will not run normally.

New tasks are created to synchronize stats files. These tasks will retry if a remote server is unreachable. The following fields are displayed for the Stats Files Synchronization setting:

Remove Server Information

1. Host Name/IP Address
2. Password
3. Path of Remote Repository

- **Retry Limit**— You have a limit of three retries in one-minute intervals.

Note: There are a total of four synchronized tasks which are supported but cannot be edited.

5. When you finish, click **Save** (or **Cancel** to discard your changes).

Privileges are assigned to the role.

Modifying a Role

To modify a role:

1. From the **System Administration** section of the navigation pane, select **User Management**.
   The content tree displays the User Management group.
2. From the content tree, select the **Roles** group.
   The Role Administration page opens in the work area, displaying existing roles.
3. Select the role to modify.
   The Role page opens.
4. On the Role page, click **Modify**.
   The Modify Role page opens.
5. Modify role information as necessary.
   See *Creating a New Role* for a description of the fields contained within this page.
6. When you finish, click **Save** (or **Cancel** to discard your changes).

The role is modified.

Deleting a Role

You can delete any role except the Administrator role. You cannot delete a role that is in use.

To delete a role:

1. From the **System Administration** section of the navigation pane, select **User Management**.
   The content tree displays the User Management group.
2. From the content tree, select the **Roles** group.
   The Role Administration page opens in the work area, displaying existing roles.
3. Delete the role using one of the following methods:
   - From the work area, click the Delete icon located next to the role to delete.
   - From the content tree, select the role to delete (role information displays in the work area), then click **Delete**.

   You are prompted, "Are you sure you want to delete this Role?"
4. Click **OK** (or **Cancel** to abandon the request).

The role's information is deleted from the CMP database.

Creating a New Scope

You can configure scopes that contain selections of network element groups and Policy Management device groups that provide a context for a role. This lets you control what areas or devices in a network a user can manage. The default scope, **Global**, contains all items defined within the CMP database. Once you define a scope you can apply it to a user.

To configure a new scope:

1. From the **System Administration** section of the navigation pane, select **User Management**.
   The content tree displays the User Management group.
2. In the content tree, click **Scopes**.
   The **Scope Administration** page opens in the work area, displaying existing scopes. The default scope is **Global**.
3. Click **Create Scope**.
   The **New Scope** page opens.
4. Enter the following information:
   a) **Name** — The name for the scope. The name can be up to 64 characters long.
   b) **Description/Location** (optional) — Free-form text.
5. Select the policy server groups included in this scope.
6. Select the network element groups included in this scope.
7. Select the MRA groups included in this scope.
8. When you finish, click **Save** to create the scope (or **Cancel** to discard your changes).

The scope is created.

Modifying a Scope

To modify a scope:

1. From the **System Administration** section of the navigation pane, select **User Management**.
   The content tree displays the User Management group.
2. In the content tree, click **Scopes**.
   The Scope Administration page opens in the work area, displaying existing scopes. The default scope is **Global**.
3. On the Scope Administration page, select the scope you want to modify.
   The scope description opens.
4. Click **Modify**.
   The Modify Scope page opens. *Creating a New Scope* describes the fields on this page.
5. Modify scope information as necessary.
6. When you finish, click **Save** (or **Cancel** to discard the request).

The scope is modified.

Deleting a Scope

You can delete any scope except **Global**. To delete a scope:

1. From the **System Administration** section of the navigation pane, select **User Management**.
   The content tree displays the User Management group.
2. From the content tree, click **Scopes**.
   The Scope Administration page opens in the work area, displaying existing scopes. (*Figure 34: Deleting a Scope* shows an example.)
3. Delete the role using one of the following methods:
   - From the work area, click the Delete icon, located to the right of the role to delete.
   - From the content tree, select the role to delete (role information displays in the work area), then click **Delete**.

   You are prompted, "Are you sure you want to delete this Scope?"
4. Click **OK** (or **Cancel** to cancel the request).

The scope is deleted.

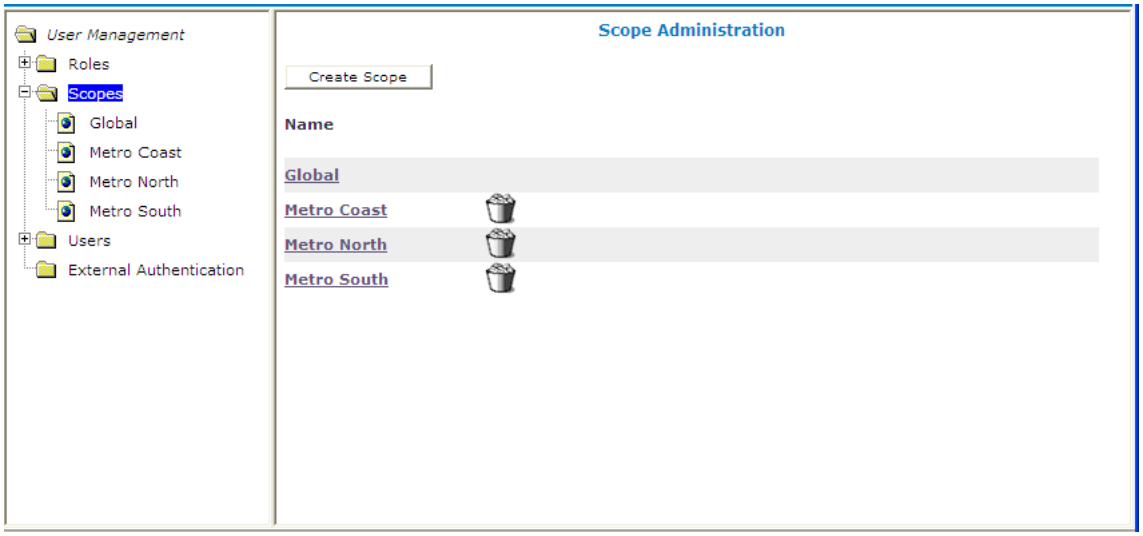


Figure 34: Deleting a Scope

Creating a User Profile

The User Management functions include the tools necessary to create, modify, or delete system user profiles.

The CMP system is configured initially with the following default user profiles and passwords:

- admin/policies (you cannot delete this profile)
- operator/policies
- viewer/policies

Each default user profile has an associated role assigned to it. The **admin** user is the only profile that cannot be deleted or have its username modified. Also, the **admin** user is the only user who can create, modify, or delete other users. The password assigned to the **admin** user can be changed. For security reasons, Tekelec recommends changing this value from its default value as soon as the system is installed.

Note: When logging in, the username is not case sensitive; however, the password is case sensitive.

To create a new user profile:

1. Log in to the CMP system as **admin**.
2. From the **System Administration** section of the navigation pane, select **User Management**.
   The content tree displays the User Management group.
3. In the content tree, click **Users**.
   The User Administration page opens in the work area, displaying existing users.

   Note: The **Log Out All Users** button is visible only to the **admin** user.

4. Click **Create User**.
   The New User page opens.
5. Define the following attributes:
   a) **Username** — Assign a name to the user profile of up to 64 characters (this value is not case sensitive).

b) **Description/Location** (optional) — Free-form text.
c) **Password** — Assign a password to the user profile.
This value is case sensitive and must contain at least six characters; alphabetic, numeric, and special characters are allowed). This value must conform to the password strength rules.
d) **Confirm Password** — Re-enter the password to confirm the value entered above.
e) **Password Expiration Period(days; 0=never)** — The number of days a password can be used before it expires. (This overrides the system setting.)

Enter a value from 7 to 365, or 0 to indicate that the password never expires. The default is the system setting.

f) **Force to Change Password** — If selected, this user must change passwords when he or she next logs in.
g) **Role** — Select a role from the pulldown list to assign to the user profile.
h) **Scopes** — Select one or more scopes to assign to the user profile.

6. When you finish, click **Save** (or **Cancel** to discard your changes).

The user profile is created and stored in the **Users** group.

Modifying a User Profile

To modify a user profile:

1. Log in to the CMP system as **admin**.
2. From the **System Administration** section of the navigation pane, select **User Management**.
The content tree displays the User Management group.
3. In the content tree, click **Users**.
The **User Administration** page opens in the work area, displaying existing users.
4. Select the user profile from the content tree.
The profile information page opens.
5. Click **Modify**.
The **Modify User** page opens. (*Figure 35: Modify User Page* shows an example.)
6. Modify the user profile.
(For field descriptions, see *Creating a User Profile*.)
7. When you finish, click **Save** (or **Cancel** to discard your changes).

The user profile is modified.

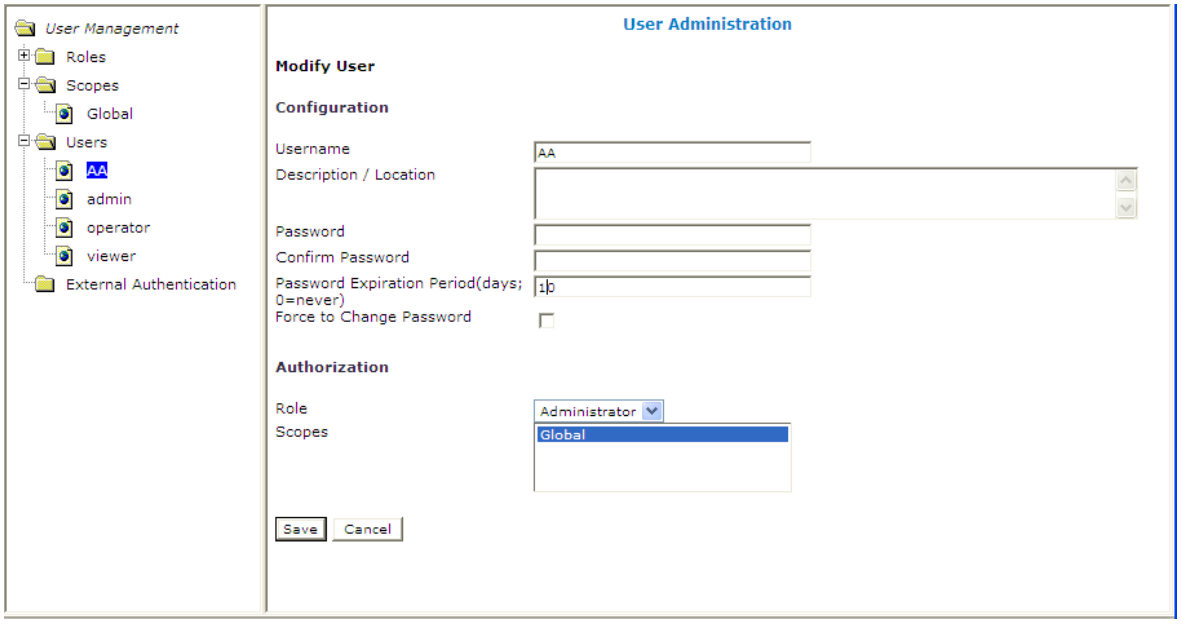
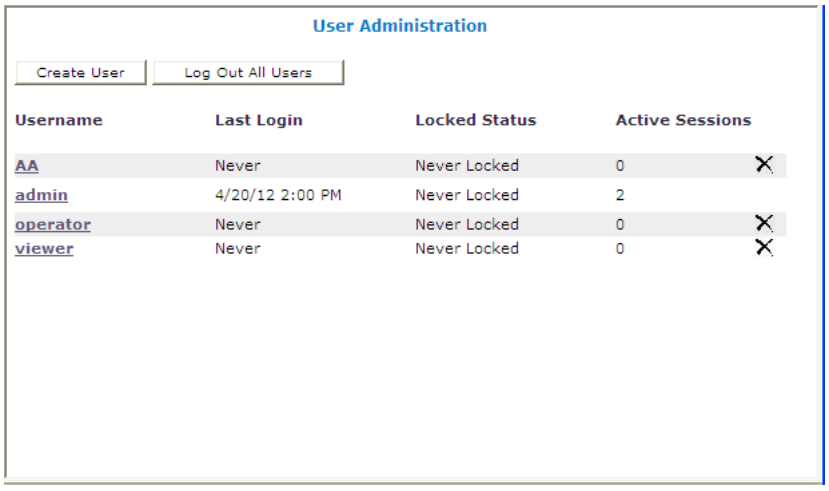


Figure 35: Modify User Page

Deleting a User Profile

You can delete any user profile except **admin**. To delete a user profile:

1. Log in to the CMP system as **admin**.
2. From the **System Administration** section of the navigation pane, select **User Management**. The content tree displays the User Management group.
3. In the content tree, click **Users**.
   The **User Administration** page opens in the work area, displaying existing users; for example:



4. Delete the user profile using one of the following methods:
   - From the work area, select the **Delete** icon, located to the right of the profile you want to delete.

- From the content tree, select the user profile that you want to delete (profile information displays in the work area), then click **Delete**.

You are prompted, `Are you sure you want to delete this user?`

5. Click **OK** to delete the user profile (or **Cancel** to abandon the request).

The user profile is deleted.

Locking and Unlocking User Accounts

A user is locked out after exceeding the login failure threshold, or if the **admin** user locks the user out. A locked-out user sees the following message on the login page when attempting to log in: "Your account is locked. Please contact the Administrator."

Note: The **admin** account cannot lock itself.

Locking an Account

To lock a user account:

1. Log in to the CMP system as **admin**.
2. From the **System Administration** section of the navigation pane, select **User Management**. The content tree displays the User Management group.
3. In the content tree, click **Users**. The **User Administration** page opens in the work area, displaying existing users.
4. Select the user profile from the content tree. The **User Administration** page opens.
5. Click **Lock**. You are prompted, `Are you sure you want to lock out this user?`
6. Click **OK** (or **Cancel** to cancel the request). The account is locked. The page displays the message `User account locked successfully`. The **Lock** button becomes an **Unlock** button. On the **User Administration** page, the Locked Status for the user changes to **Locked**.

Unlocking an Account

To unlock a user account:

1. Log in to the CMP system as **admin**.
2. From the **System Administration** section of the navigation pane, select **User Management**. The content tree displays the User Management group.
3. Select the user profile from the content tree. The **User Administration** page opens.
4. Click **Unlock**. You are prompted, `Are you sure you want to unlock this user?`
5. Click **OK** (or **Cancel** to cancel the request). The account is unlocked. The page displays the message `User account unlocked successfully`. The **Unlock** button becomes a **Lock** button. On the **User Administration** page, the Locked Status for the user changes to `Unlocked by Admin`.

Changing a Password

The Change Password option lets users change their password. This system administration function is available to all users.

Note: The **admin** user can change any user's password.

If a system administrator has configured your account for password expiration, you will receive a warning when you log in that you will need to change your password.

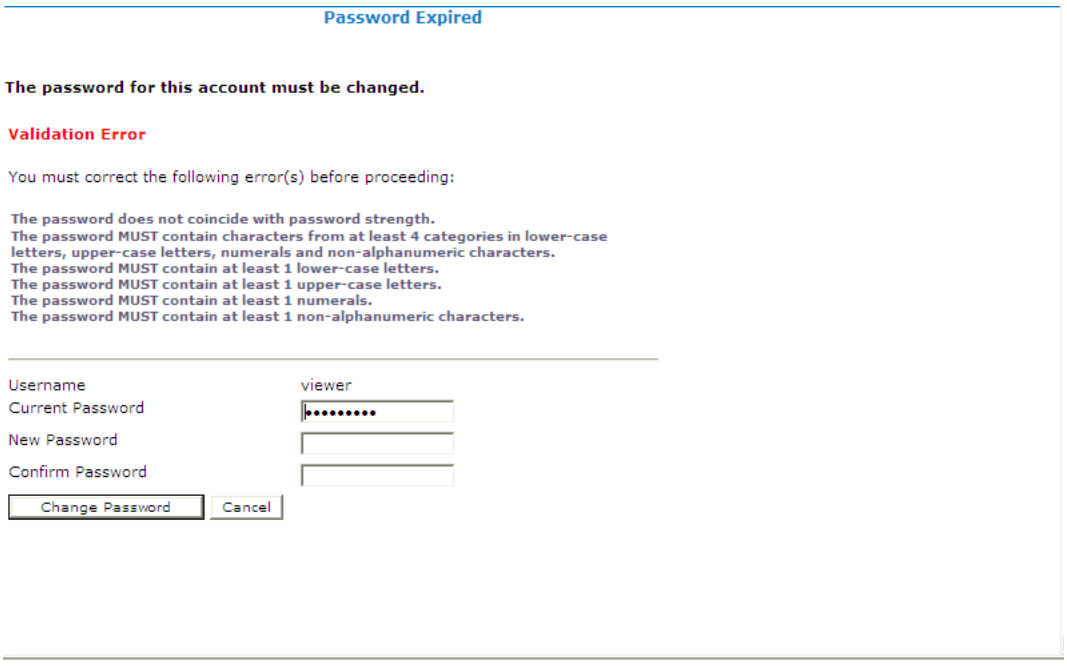
To change your password:

1. From the **System Administration** section of the navigation pane, select **Change Password**. The Change Password page opens. If your account is set up with a password expiration period, the expiration date is displayed.
2. Enter the following information:
   a) **Current Password** — The present value of the password.
   b) **New Password** — The value of the new password.

      This value is case sensitive and must conform to the password strength rules. The password cannot contain the user name.

   c) **Confirm Password** — Retype the new password.

      If your new password does not conform to the password strength rules, a validation error message appears; for example:



      Enter and confirm another password that conforms to the rules.

3. When you finish, click **Change Password**.

Your password is changed.

RADIUS Authentication and Accounting

The CMP system supports RADIUS authentication and accounting. You can configure the CMP system to operate in a network environment including multiple authentication servers, one authentication server, or no servers. If both primary and secondary authentication servers are defined, the authentication process is as follows:

1. The CMP system contacts the primary RADIUS server.
   If it responds with Accept or Reject, that action is followed.
2. If the primary server does not respond within a specified number of retries or before a timeout value, the CMP system contacts the secondary RADIUS server (if defined).
   If it responds with Accept or Reject, that action is followed.
3. If the secondary server does not respond, the CMP system authenticates against its local database (if enabled).
4. If local authentication is not enabled, authentication fails.
5. The user **admin** is always authenticated locally, regardless of configuration settings.

This process provides a fail-safe mechanism for accessing the CMP system even in the face of misconfiguration or network problems that cause the RADIUS servers to become inaccessible.

RADIUS configuration involves three steps:

1. Configuring the RADIUS server to accept authentication (and accounting, if used)
2. Associating user roles and scopes on the CMP system
3. Configuring the CMP system to work with RADIUS

Configuring the RADIUS Server

The RADIUS server must be configured to authenticate clients and users on the CMP system. Some of the configuration values must be consistent with configuration parameters on the CMP system. (The RADIUS administrator will be aware of the names and locations of the configuration files.)

Defining the CMP System as a RADIUS Client

The client file identifies the systems that use the RADIUS server to authenticate user access. A client should be defined as a single device; for example:

```
client 10.0.10.22 {
        secret = camiant
        shortname = MPE5
}
client 10.0.10.23 {
        secret = camiant
        shortname = CMP56
}
```

The best practice is to define IP addresses rather than FQDNs. If no netmask is given, the default is /32. The shared secret (in this example, "**`camiant`**") must be both defined on the RADIUS server and

entered into the CMP configuration (see *Enabling RADIUS on the CMP System*). The shortname is used as an alias.

If multiple IP addresses are configured on the CMP system (such as SIG-A and SIG-B), use the IP address that would be used as the Source IP address of RADIUS requests sent to the RADIUS server.

Defining CMP Users to the RADIUS Server

RADIUS can use either a database or a simple flat file as its repository of user information. The following example uses a flat file to demonstrate a minimum user configuration. The **users** file contains authentication and configuration information for each user. It begins with the username and the authentication (password) that is required from the user. The user/password line is followed by indented lines that are attributes to be passed back to the requesting server.

When RADIUS has authenticated a user, it sends back various attributes with the authentication acceptance message. The CMP system uses these attributes to determine what the user can do. The best practice is to use a vendor-specific attribute (VSA) dictionary file to define what attributes to send back to the client. *Figure 36: Sample VSA Dictionary File For RADIUS* shows a sample file. The local RADIUS administrator is responsible for incorporating the VSA dictionary file onto the RADIUS server.

```
========== dictionary.camiant ===================
# Camiant Inc VSA's, from RFC 2548
# The filename given here should be an absolute path.
#
# Place additional attributes or $INCLUDEs here.

VENDOR Camiant 21274
BEGIN-VENDOR Camiant
ATTRIBUTE Camiant-MI-role 1 string
ATTRIBUTE Camiant-MI-scope 3 string
END-VENDOR Camiant
======================
```

Figure 36: Sample VSA Dictionary File For RADIUS

The attributes **Camiant-MI-role** and **Camiant-MI-scope** are for access to the CMP system. Both a scope and a role are associated with a user. The responses sent back from the RADIUS server should match what is configured in the CMP system. The defaults for the role, in ascending order of capability, are **Viewer**, **Operator**, and **Administrator**, but the system administrator can create other roles or remove any role except that of **Administrator**.

The default scope is **Global**, and the administrator can create other scopes within the CMP system.

Incorporating the dictionary.camiant File

To incorporate the dictionary.camiant file on the RADIUS server:

1. Create the file **camiant.dictionary**.
2. Copy the file **camiant.dictionary** to the RADIUS server directory **/usr/local/etc/raddb**.
3. Edit the file **dictionary** to add an INCLUDE statement for the **camiant.dictionary** file; for example:

```
#
```

```
# Include vendor dictionaries after the standard ones.
#
$INCLUDE dictionary.3com
$INCLUDE dictionary.3gpp
$INCLUDE dictionary.3gpp2
.
.
.
$INCLUDE dictionary.camiant
$INCLUDE dictionary.cablelabs
.
.
.
$INCLUDE dictionary.cisco
```

4. Close the dictionary file and restart the radius process.
   The appropriate VSAs are now included.

Associating Roles and Scopes

The CMP system assigns two attributes to a user, a role and a scope. Users that authenticate against a RADIUS server are assigned roles and scopes by matching against the attribute values returned by the RADIUS server.

It is easiest to provide role and scope values using the VSA dictionary, by defining the attributes **Camiant-MI-role** and **Camiant-MI-scope**. The flexibility of roles and scopes can be supported by RADIUS if the VSA dictionary is integrated.

The following example defines users who have access at different role levels:

```
Jeff      Password == "garbage"
          Class="Administrator",
          Camiant-MI-role="Administrator",
          Camiant-MI-scope="Global"

Paul      Password == "apr6279"
          Class="Viewer",
          Camiant-MI-role="Viewer",
          Camiant-MI-scope="Global"
```

However, if Tekelec VSAs are not included in the RADIUS dictionary, then they cannot be defined in the user file, and only a **Class** attribute can be returned on a RADIUS authentication. The CMP system can use the Class attribute for RADIUS authentication.

To accept the Class attribute for CMP login, define a scope and a role that matches what the RADIUS server returns as the Class attribute. The CMP system uses the Class attribute for both required credentials. For example, consider this user defined in RADIUS:

```
Dawn      Password == "kkmk4813"
          Class="Viewer"
```

Dawn can get access to the CMP system if you have defined both a role named Viewer and a scope named Viewer; the GUI matches the one returned value to both of the required credentials.

Enabling RADIUS on the CMP System

By default, RADIUS Authentication is disabled in the CMP system. Enabling authentication requires admin privileges. The user **admin** is always authenticated against the local database account; thus, the admin user is best suited to setting up RADIUS authentication (see *Creating a User Profile*).

Two configuration parameters must match with the configuration that was put on the RADIUS server:

- **Source of User Credentials** must match up with the user configuration in the RADIUS server, but this will also depend on what is configured in the next parameter.
- If **Action if missing credentials** is set to **Use following defaults**, then a user will be authenticated as long as the password is correct. This user could log in even though the class is not valid:

```
test      Password == "2931txy"
          Class = "noone"
```

If **Action if missing credentials** is set to **Reject**, then the configuration of the user will depend on the configuration of **Source of user credentials**.

To enable RADIUS authentication and accounting:

1. Log in to the CMP system as **admin**.
2. From the **System Administration** section of the navigation pane, select **User Management**.
   The content tree displays the User Management group.
3. From the content tree, select **External Authentication**.
   The External Authentication page opens, displaying the current configuration information. By default, external authentication is disabled.
4. Click **Modify**.
   The modify page opens.
5. In the **Configuration** section, select **Enable RADIUS Authentication**.
   Additional fields appear (*Figure 37: External Authentication Configuration Page*).
6. Edit the following fields:
   a) **Enable RADIUS Accounting** — Enables RADIUS accounting on the CMP system.
   This feature is disabled by default. When enabled, the CMP system sends an Accounting-Start message to the accounting server when a user logs in, and an Accounting-Stop message when the user logs out. These messages contain a session ID attribute that uniquely identifies the user session so that it can be matched between Start and Stop.
   b) **Destination for Accounting Messages** — Choose the following from the list:
      - **Both Primary and Secondary** (the default) — Specifies that accounting messages generated for each user session are sent to both the primary and (when configured) secondary RADIUS servers.
      - **Primary (Secondary on error)** — Accounting messages are sent only to the primary server, as long as it is reachable. If the primary accounting server is unreachable, messages are sent to the secondary accounting server.

   c) **NAS IP Address** (required) — IP address, in IPv4 or IPv6 format, of the network access server. By default, this is the local host address.
   d) **Use local authentication** — Choose when to use local authentication:
      - **When RADIUS servers timeout**

- **When both RADIUS servers timeout or reject**
- **Never** — Fallback to local authentication is never used (however, the user **admin** is always authenticated locally)

e) **Source of User Credentials** — Choose the following from the list:

- **RADIUS Class** — The value of the Class attribute returned by the server determines both the role and scope.
- **Camiant VSAs —** The value of Camiant VSAs returned by the server determines the role and scope.

f) **Action if Missing Credentials:**

- **Reject** — If you select this option, a user whose login credentials are missing is not logged in.
- **Use following defaults**:

  1. **Default Role** — Role assigned if the user credentials are missing or mismatched. The default is **Viewer**.
  2. **Default Scope** — Scope assigned if the user credentials are missing or mismatched. The default is **Global**.

7. In the **RADIUS Servers** section, edit the following fields:

a) **Primary RADIUS Authentication Server**

- **Server** — FQDN or IP address (in IPv4 or IPv6 format) assigned to the primary authentication server.

  Note: To disable the primary server, delete its IP address.

- **Port** — IP port number of the primary server. The default is port 1812.
- **Timeout (seconds)** — How long the CMP system waits for a response from the server. The default is 3 seconds.
- **Retries** — How many times the CMP system tries to send a message to the server. The default is 3.
- **Shared Secret** — A password-like string that must exactly match between the CMP system and the secret configured in the entry for this CMP system in the clients.conf file in the RADIUS server. If it does not match, the server ignores all messages from the CMP system.

b) **Secondary RADIUS Authentication Server**

If configured, the secondary authentication server uses the same fields as the primary server.

c) **Primary RADIUS Accounting Server**

- **Server** — FQDN or IP address (in IPv4 or IPv6 format) assigned to the primary accounting server.
- **Port** — IP port number of the primary server. The default is port 1813.
- **Timeout (seconds)** — How long the CMP system waits for a response from the server. The default is 3 seconds.
- **Retries** — How many times the CMP system tries to send a message to the server. The default is 3.
- **Shared Secret** — A password-like string that must exactly match between the CMP system and the secret configured in the entry for this CMP system in the clients.conf file in the RADIUS server. If it does not match, the server ignores all messages from the CMP system.

d) **Secondary RADIUS Accounting Server**

If configured, the secondary accounting server uses the same fields as the primary server.

8. When you finish, click **Save** (or **Cancel** to discard your changes).
   The window closes.

RADIUS Authentication and Accounting is configured.

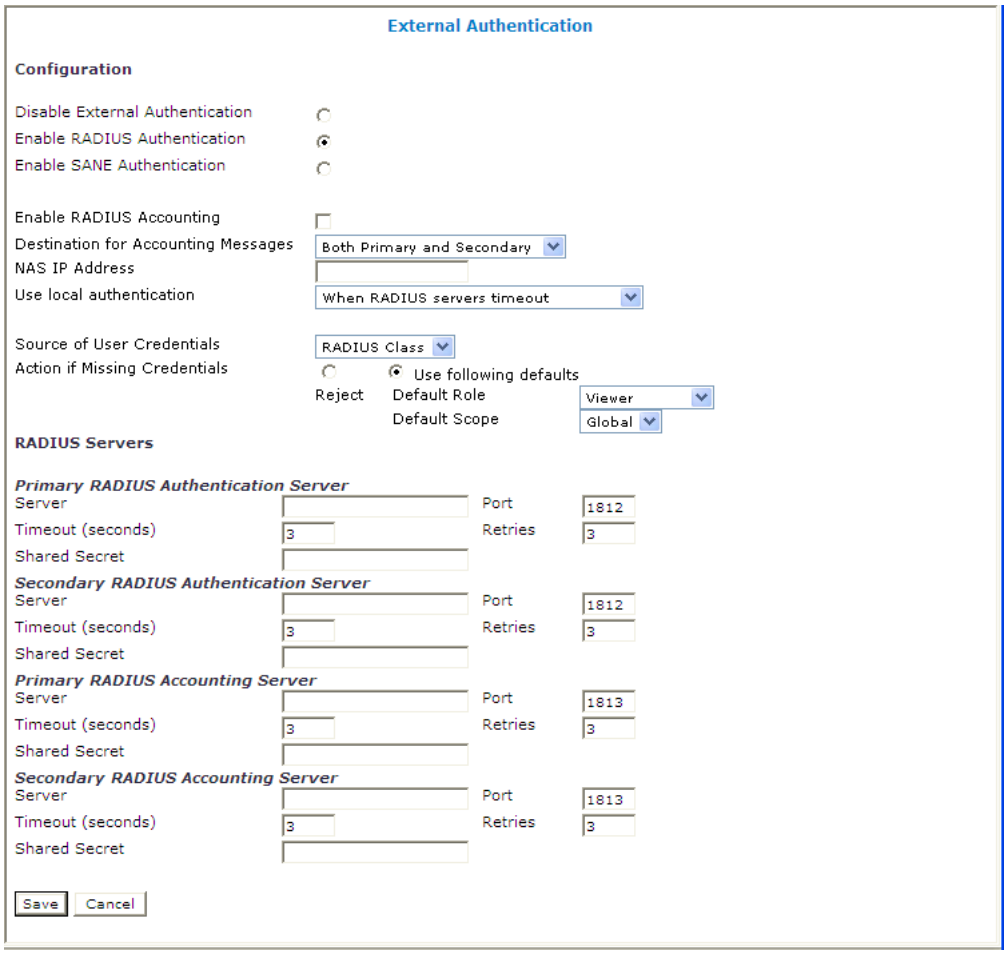


Figure 37: External Authentication Configuration Page

SANE Authentication

The CMP system supports Secure Access to Network Elements (SANE) authentication and authorization. You can configure the CMP system to operate in a SANE network environment such that a user elsewhere in the network can gain single-signon access. When the CMP system is configured to authenticate using SANE, users can log in using a SANE client. (Usage of a SANE client is outside the scope of this document.)

The **admin** account is treated separately. An admin user enters the CMP URL in any supported browser to log in.

The authentication process is as follows:

1. From a SANE client GUI, the user selects the CMP system. A web browser session is launched. An encrypted SANE authentication artifact is sent to the CMP system through the browser.
2. The CMP system forwards the artifact to a SANE server (the SANE responder).
3. If the SANE server verifies the artifact, it returns an assigned role and scope for the user, and the CMP system allows the user to log in accordingly. Otherwise, the CMP system rejects the login request.
4. The user **admin** is always authenticated locally, regardless of configuration settings. (That user clicks on the **Login** link.)

Enabling SANE Authentication on the CMP System

By default, SANE Authentication is disabled in the CMP system. Enabling authentication requires admin privileges. The user **admin** is always authenticated against the local database account; thus, the admin user is best suited to setting up SANE authentication (see *Creating a User Profile*).

To enable SANE authentication:

1. Log in to the CMP system as **admin**.
2. From the **System Administration** section of the navigation pane, select **User Management**.
   The content tree displays the User Management group.
3. From the content tree, select **External Authentication**.
   The External Authentication page opens, displaying the current configuration information. By default, external authentication is disabled.
4. Click **Modify**.
   The modify page opens.
5. In the **Configuration** section, select **Enable SANE Authentication**.
   Additional fields appear.
6. Edit the following fields:
   a) **Artifact Parameter Name** — Name of the artifact parameter. Enter an alphanumeric string. The default is **artifact**.
   b) **Verification for Account** — Choose the following from the list:
      - **On login only** (the default) — The CMP system authenticates the user once, on login. The user is considered authenticated until logout.
      - **On each request** — The CMP system authenticates the user on login, and then again for each HTTP or HTTPS request. If any request is not authenticated, the user is immediately logged out.
   c) **Action if Missing Credentials:**
      - **Reject** — If you select this option, a user login is rejected even if the authentication is successful.
      - **Use following defaults** — If you select this option, a user with missing credentials is allowed to log in, but the system assigns a default role and scope:
        1. **Default Role** — Default role assigned to the user. The default role is **Viewer**.
        2. **Default Scope** — Default scope assigned to the user. The default scope is **Global**.

7. In the **SANE Servers** section, edit the following fields:
   a) **SAML Service Name** — Name of the Security Assertion Markup Language service registered with the UDDI server. Enter an alphanumeric string.
   b) **UDDI Inquiry URL** — Universal Description, Discovery and Integration URL, in HTTP or HTTPS format, for the inquiry.
8. When you finish, click **Save** (or **Cancel** to discard your changes).
   The window closes.

SANE authentication is configured on the CMP system.

Creating a Customer User Management System Profile

To support identity management (IDM), the CMP system can accept HTTP or HTTPS connection requests from an external Customer User Management system to create, update, query, and delete user accounts. Requests and responses consist of XML documents. You must define a user profile for the external system. The profile is a regular CMP user profile with specific roles and scope.

Assign the profile a role that includes the following privileges:

- Show privilege for XML Import/Export
- Read-Write privilege for User Management

For information on creating a user profile, see *Creating a User Profile*. For more information on the XML application programming interface, see the *OSSI XML Interface Definitions Guide*.

Appendix A

CMP Modes

Topics:

The functions available in the CMP system are determined by the operating modes and sub-modes selected when the software is installed. Functions that can change include:

- Items on the navigation pane
- Tabs on the Policy Server Administration page
- Protocols supported
- Configuration options
- Policy options available in the policy wizard
- Reports available

Normally, Tekelec pre-configures servers delivered to customers. However, if it becomes necessary to replace a server or reinstall the software in the field, the mode selection screen becomes visible, and you must reset the operational modes as appropriate for your environment before you can use the product.

This appendix briefly describes the modes and sub-modes available.

Caution: CMP modes should only be set in consultation with Tekelec Technical Support. Setting modes inappropriately could result in the loss of network element connectivity, policy function, statistical data, and cluster redundancy.

The Mode Settings Page

When you use a web browser to connect to a CMP system after the software is first installed, the Mode Settings page opens (*Figure 38: Mode Settings Page*). Select modes, sub-modes, and management options, and then click **OK**. The browser page closes and you are automatically logged out. When you next log in, the CMP system reopens in the selected mode.

Table 36: CMP Modes and Sub-Modes briefly describes each mode and sub-mode.

The management options are as follows:

- **Manage Policy Servers** — Manage MPE devices
- **Manage SIP-AM Servers** — Manage Session Initiation Protocol Application Manager (SIP-AM) servers
- **Manage CD-AM Servers** — Manage Content Distribution Network servers
- **Manage MA Servers** — Manage Management Agent servers
- **Manage Policies** — Enable the policy wizard
- **Manage MRAs** — Manage Multi-Protocol Routing Agent servers
- **Manage SPR Subscriber Data** — Manage Subscriber Profile Repository servers
- **Manage Geo-Redundant MPE/MRA** — Manage georedundant MPE or MRA clusters
- **Manager is HA (clustered)** — Enable High Availability features
- **Manage Analytic Data** — Enable output of policy event records

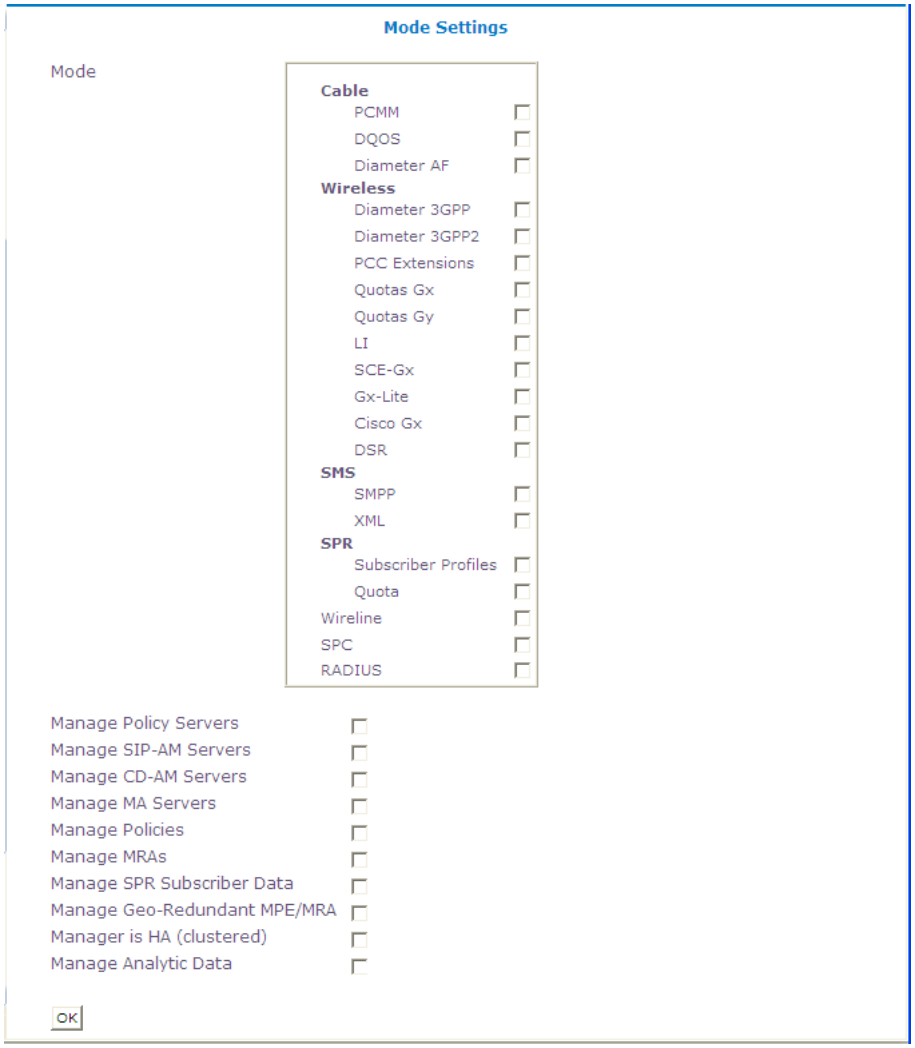


Figure 38: Mode Settings Page

Table 36: CMP Modes and Sub-Modes

Mode	Sub-Mode	Description
Cable Mode	Enables support of a cable carrier environment. Functions are described in the *Configuration Management Platform Cable User's Guide*.	
	PCMM	Supports PacketCable MultiMedia functions.
	DQOS	Supports Dynamic Quality of Service functions.
	Diameter AF	Supports Diameter AF functions.

Mode	Sub-Mode	Description
Wireless Mode	Enables support of a wireless carrier environment. Functions are described in the *Configuration Management Platform Wireless User's Guide*.	
	Diameter 3GPP	Supports Diameter 3GPP protocol.
	Diameter 3GPP2	Supports Diameter 3GPP2 protocol.
	PCC Extensions	Supports Policy and Charging Control functions.
	Quotas Gx	Supports a subscriber quota environment using the Diameter Gx protocol. The Gx protocol supports deep packet inspection (DPI) devices.
	Quotas Gy	Supports a subscriber quota environment using the Diameter Gy protocol
	LI	Supports Lawful Intercept functions. Described in the *Configuring Lawful Intercept Application Note*.
	SCE-Gx	Supports the Cisco Service Control Engine Gx protocol. If this mode is selected, Diameter 3GPP and RADIUS must also be selected, and other Gx sub-modes must not be selected.
	Gx-Lite	Supports the Gx-Lite protocol, a simplified version of 3GPP Gx for use by non-GGSN PCEF vendors that do not have access to network-level information.
	Cisco Gx	Supports the Cisco Gx protocol.
	DSR	Supports Policy Management network segmentation using a Diameter Signaling Router.
SMS Mode	Enables support of SMS servers. Functions are described in the *Configuration Management Platform Wireless User's Guide*.	
	SMPP	Supports SMS using SMPP protocol.
	XML	Supports SMS using XML.

Mode	Sub-Mode	Description
SPR Mode	Enables support of subscriber database management. Select only one sub-mode. Functions are described in the Subscriber Data Management documentation.	
	Subscriber Profiles	Supports subscriber profile functions.
	Quota	Supports subscriber quotas.
Wireline Mode	Enables support of a wireline carrier environment. Functions are described in the *Configuration Management Platform Wireline User's Guide*.	
SPC Mode	Enables the COPS Application Manager product, which accepts service provisioning requests from a Session Border Controller over the Common Open Policy Service (COPS) protocol. Functions are described in the *Service Provisioning over COPS Application Manager User's Guide*.	
RADIUS Mode	Enables support of RADIUS AAA.	

Glossary

#

3GPP	3rd Generation Partnership Project. The standards body for wireless communications. 3rd Generation Partnership Project
3GPP2	3rd Generation Partnership Project 2

A

AAA	Authentication, Authorization, and Accounting (Rx Diameter command)
APN	Access Point Name The name identifying a general packet radio service (GPRS) bearer service in a GSM mobile network. See also GSM.
application	The telecommunications software that is hosted on the platform. A service provided to subscribers to a network; for example, voice over IP (VoIP), video on demand (VoD), video conferencing, or gaming.
AVP	Attribute-Value Pair The Diameter protocol consists of a header followed by one or more attribute-value pairs (AVPs). An AVP includes a header and is used to encapsulate protocol-specific data (e.g., routing information) as well as authentication,

A

	authorization or accounting information.

C

CCA	Credit Control Answer The Diameter message that is received from the prepaid rating engine to acknowledge a CCR command.
CCR	Credit Control Request A Diameter message to be sent to a prepaid rating engine to request credit authorization for an SMS.
charging server	An application that calculates billing charges for a wireless subscriber
CMP	Configuration Management Platform A centralized management interface to create policies, maintain policy libraries, configure, provision, and manage multiple distributed MPE policy server devices, and deploy policy rules to MPE devices. The CMP has a web-based interface.
CPU	Central Processing Unit

D

Diameter	Diameter can also be used as a signaling protocol for mobility management which is typically associated with an IMS or wireless type of environment. Diameter is the successor to the RADIUS protocol. The MPE device supports

D

	a range of Diameter interfaces, including Rx, Gx, Gy, and Ty. Protocol that provides an Authentication, Authorization, and Accounting (AAA) framework for applications such as network access or IP mobility. Diameter works in both local and roaming AAA situations. Diameter can also be used as a signaling protocol for mobility management which is typically associated with an IMS or wireless type of environment.
Distinguished Name	A unique name for an entry in a directory service.
DNS	Domain Name System A system for converting Internet host and domain names into IP addresses.
DPI	Deep Packet Inspection is a form of packet filtering that examines the data and/or header part of a packet as it passes an inspection point. The MPE device uses DPI to recognize the application for establishing QoS or managing quota. See also packet inspection.
DSCP	Differentiated Service Code Point Differentiated Services Code Point: Provides a framework and building blocks to enable deployment of scalable service discrimination in the internet. The differentiated services are realized by mapping the code point contained in a field in the IP packet header to a particular forwarding treatment or per-hop behavior (PHB). Differentiated services or DiffServ

D

	is a computer networking architecture that specifies a simple, scalable and coarse-grained mechanism for classifying and managing network traffic and providing quality of service (QoS) on modern IP networks.
DSR	Data Set Ready Diameter Signaling Router A set of co-located Message Processors which share common Diameter routing tables and are supported by a pair of OAM servers. A DSR Network Element may consist of one or more Diameter nodes. Delete Subscriber Data Request

E

E.164	The international public telecommunication numbering plan developed by the International Telecommunication Union.
event	In Policy Management, an expected incident that is logged. Events can be used for debugging purposes.

F

FABR	Full Address Based Resolution Provides an enhanced DSR routing capability to enable network operators to resolve the designated Diameter server addresses based on individual user identity addresses in the incoming Diameter request messages.
FQDN	Fully qualified domain name

F

	The complete domain name for a specific computer on the Internet (for example, www.tekelec.com). A domain name that specifies its exact location in the tree hierarchy of the DNS.

G

GPRS	General Packet Radio Service A mobile data service for users of GSM mobile phones.
GUI	Graphical User Interface The term given to that set of items and facilities which provide the user with a graphic means for manipulating screen data rather than being limited to character based commands.
Gx	The Diameter credit control based interface between a PCRF and a PCEF as defined by 3GPP. The interface is used to convey session information from the PCEF to the PCRF, and in reply the PCRF provides rule information for the PCEF to enforce.

I

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

I

IMSI	International Mobile Subscriber Identity A unique internal network ID identifying a mobile subscriber. International Mobile Station Identity
IP	Internet Protocol IP specifies the format of packets, also called datagrams, and the addressing scheme. The network layer for the TCP/IP protocol suite widely used on Ethernet networks, defined in STD 5, RFC 791. IP is a connectionless, best-effort packet switching protocol. It provides packet routing, fragmentation and re-assembly through the data link layer.
IP-CAN	Internet Protocol Connectivity Access Network Collection of network entities and interfaces that provide the underlying IP transport connectivity between the user equipment (UE) and the core network or backbone entities. An example IP-CAN is GPRS. An IP-CAN session can incorporate one or more IP-CAN bearers.

L

LDAP	Lightweight Directory Access Protocol A protocol for providing and receiving directory information in a TCP/IP network.
Lightweight Directory Access Protocol	See LDAP.

M

MAC	Media Access Control Address The unique serial number burned into the Ethernet adapter that identifies that network card from all others.
MCC	Mobile Country Code A three-digit number that uniquely identifies a country served by wireless telephone networks. The MCC is part of the International Mobile Subscriber Identity (IMSI) number, which uniquely identifies a particular subscriber. See also MNC, IMSI.
MNC	Mobile Network Code A number that identifies a mobile phone carrier. Used in combination with a Mobile Country Code (MCC) to uniquely identify a mobile phone operator/carrier. See also MCC.
Multimedia Policy Engine	See MPE.

N

NAI	Network Access Identifier The user identity submitted by the client during network authentication.
network device	A physical piece of equipment or a logical (software) entity connected to a network; for example, CMTS, video distribution router, gateway router, or a link. This may also include sub-components of network elements (such as an interface) or

N

	lower-level devices such as cable modems or CPEs.
network topology	A map of physical equipment or logical entities in a network.

O

OSSI	Operation Support System Interface An interface to a “back-end” (office) system. The Configuration Management Platform includes an OSSI XML interface.

P

packet inspection	Packet inspection (or shallow packet inspection) is a form of packet filtering that checks the header portion of a packet. See also deep packet inspection.
pass	A quota profile that provides a one-time override of a subscriber's default plan.
PCC	Policy and Charging Control
PCEF	Policy and Charging Enforcement Function Maintains rules regarding a subscriber’s use of network resources. Responds to CCR and AAR messages. Periodically sends RAR messages. All policy sessions for a given subscriber, originating anywhere in the network, must be processed by the same PCRF.

P

PCRF	Policy and Charging Rules Function. The ability to dynamically control access, services, network capacity, and charges in a network. Maintains rules regarding a subscriber's use of network resources. Responds to CCR and AAR messages. Periodically sends RAR messages. All policy sessions for a given subscriber, originating anywhere in the network, must be processed by the same PCRF.
PDN	Packet Data Network A digital network technology that divides a message into packets for transmission.
plan	A quota profile that consists of a subscriber's basic, recurring service.
PLMN	Public Land Mobile Network
policy and charging rules function	See PCRF.
policy group	An ordered group of policies, organized for ease of administration or deployment.

Q

QoS	Quality of Service Control mechanisms that guarantee a certain level of performance to a data flow.
quota	Specifies restrictions on the amount of data volume, active session time,

Q

	or service-specific events that a subscriber can consume.
quota convention	Specifies the default values for rollovers and enables top-ups. A quota convention is associated with a plan.
quota profile	Defines how quotas are implemented and specifies the default values. Quota profiles consist of passes and plans.

R

RAA	Re-Authorization Answer (Gx or Rx Diameter command)
RADIUS	Remote Authentication Dial-In User Service A client/server protocol and associated software that enables remote access servers to communicate with a central server to authorize their access to the requested service. The MPE device functions with RADIUS servers to authenticate messages received from remote gateways. See also Diameter.
RAR	Re-Authorization Request (Gx or Rx Diameter command)
rollover	A quota convention that allows a subscriber to carry forward unused units from one billing cycle to another.

S

S

SCTP	Stream Control Transmission Protocol An IETF transport layer protocol, similar to TCP that sends a message in one operation. The transport layer for all standard IETF-SIGTRAN protocols. SCTP is a reliable transport protocol that operates on top of a connectionless packet network such as IP and is functionally equivalent to TCP. It establishes a connection between two endpoints (called an association; in TCP, these are sockets) for transmission of user messages.
server	In Policy Management, a computer running Policy Management software, or a computer providing data to a Policy Management system.
session	A Diameter session between the MPE and an external device (e.g., a Gx, Gxa, Gx-Lite or Rx session). Subscribers can maintain multiple sessions at any given time.
SGSN	Serving GPRS Support Node
SMPP	Short Message Peer-to-Peer Protocol An open, industry standard protocol that provides a flexible data communications interface for transfer of short message data.
SMTP	Simple Mail Transfer Protocol

S

SNMP	Simple Network Management Protocol. An industry-wide standard protocol used for network management. The SNMP agent maintains data variables that represent aspects of the network. These variables are called managed objects and are stored in a management information base (MIB). The SNMP protocol arranges managed objects into groups.
SPR	Subscriber Profile Repository A logical entity that may be a standalone database or integrated into an existing subscriber database such as a Home Subscriber Server (HSS). It includes information such as entitlements, rate plans, etc. The PCRF and SPR functionality is provided through an ecosystem of partnerships.
Subscriber Profile Repository	See SPR.

T

top-up	A quota convention that allows a subscriber to obtain additional units for an existing plan.

U

UE	User Equipment

V

VoIP	Voice Over Internet Protocol Voice communication based on the IP protocol competes with legacy voice networks, but also with Voice over Frame Relay and Voice and

V

Telephony over ATM. Realtime response, which is characterized by minimizing frame loss and latency, is vital to voice communication. Users are only prepared to accept minimal delays in voice transmissions.

W

whitelist

Provisioning whitelist.

X

XML

eXtensible Markup Language

A version of the Standard Generalized Markup Language (SGML) that allows Web developers to create customized tags for additional functionality.