Oracle® Communications Policy Management

Policy Front End User's Guide

Release 11.1

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Oracle® Communications Policy Front End User's Guide, Release 11.1

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Chapter 1

About This Guide

Topics:

This guide describes how to use the Policy Front End in the Policy Management system.

How This Guide is Organized

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

- *About This Guide* contains general information about this guide, the organization of this guide, and how to get technical assistance.
- *Introduction* contains an overview of the guide, the Distributed Routing and Management Application (DRMA) protocol, and the Graphical User Interface (GUI).
- *CMP, MRA, and MPE Configuration* describes how to configure the CMP to manage the MRA, how to associate an MPE to the MRA, and how to configure an MRA.
- *Monitoring the MRA* describes how to monitor cluster and blade information, DRMA information, and event logs.

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

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

Conventions

Your view of the product may vary from the figures used as examples in this guide; the pages, tabs, fields, and functions that you see depend on your configuration or application.

The MPE device is the Oracle policy server. The terms *policy server* and *MPE device* are synonymous.

The following conventions are used throughout this guide to emphasize certain information, such as user input, page options and output, and menu selections.

Italics — Indicates book titles and user input variables.

```
Monospace — Symbol program output
```

Monospace bold — Indicates user input.

```
Monospace italics — Indicates variables in commands.
```

Note: This icon indicates helpful suggestions or references to other documents.

⚠ CAUTION **Caution:** This icon notifies you to proceed carefully to avoid damaging equipment or losing data.

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*

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

Introduction

Topics:

This chapter describes the Oracle Policy Front End product (referred to in this document as the Multi-Protocol Routing Agent [MRA]), which is used to scale the Policy Management infrastructure by distributing the PCRF load across multiple MPE devices in the network.

Policy Front End Overview

The Policy Front End product (referred to in this document as the Multi-Protocol Routing Agent [MRA]) is a product deployed in a Policy Management network that maintains bindings that link subscribers to the Multimedia Policy Engine (MPE) devices. The MPE is a Policy Charging and Rules Function (PCRF) device. The MRA ensures that all of a subscriber's Diameter sessions established over the Gx, Gxx, Gx Lite, and Rx reference points reach the same MPE device when multiple and separately addressable MPE clusters are deployed in a Diameter realm.

The MRA product implements the proxy (PA1 variant) DRA functionality defined in the 3GP TS 29.203 [1] and 3GPP TS 29.213 [2] specifications, whereby all Diameter Policy and Charging Control (PCC) application messages are proxied through the MRA device.

When an MRA device receives a request for a subscriber for which it has a binding to an MPE device, it routes that request to the MPE device. If the MRA device does not have a binding, it queries other MRA devices in the Policy Management network, using the proprietary Distributed Routing and Management Application (DRMA) protocol, for a binding. If another MRA device has the binding, the MRA device routes the request to it. If no other MRA device has a binding, the MRA device that received the request creates one.

The MRA product can route requests across multiple MRA clusters within the Policy Management network. Up to four MRA clusters can be deployed in the same domain or realm, interconnected as Diameter peers. Each MRA cluster is responsible for a set, or pool, of up to 10 MPE clusters as a domain of responsibility. Each MRA cluster is a peer with the MPE clusters in its domain of responsibility. The following diagram shows a typical MRA configuration.

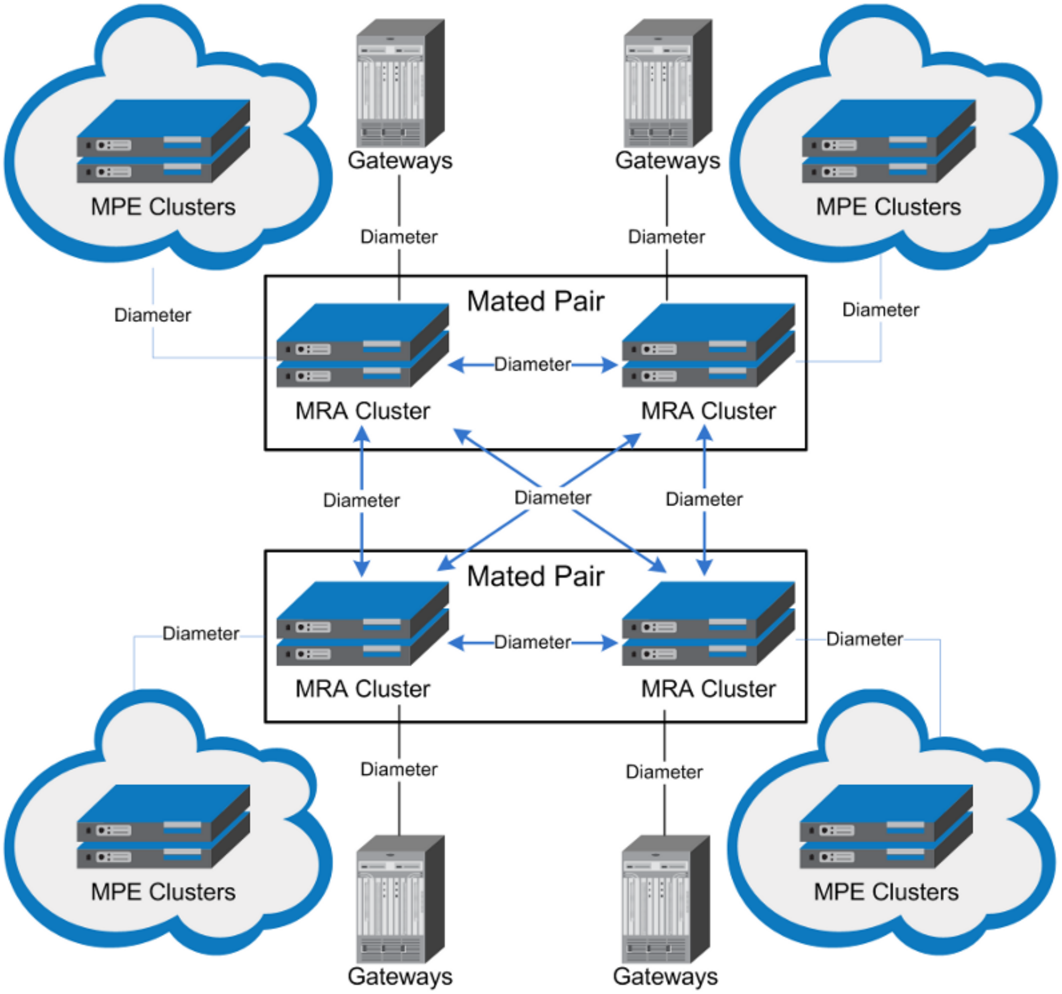


Figure 1: Typical Front End (MRA) Network

Distributed Routing and Management Application (DRMA) Protocol

The DRMA protocol is an Oracle proprietary Diameter based protocol that allows multiple MRA clusters in the network to communicate and share DRA binding information to ensure all the Diameter sessions for a subscriber are served by the same MPE device. An MRA device may query another MRA device for binding information by sending a DRA-Binding-Request (DBR) command and receiving a DRA-Binding-Answer (DBA) in response.

Backup MRAs, Associated MRAs, and Mated Pairs

A backup MRA cluster is one with which an MRA cluster shares the same pool of MPE devices. All of the MPE devices in the pool of a given MRA cluster will have backup connections to the backup MRA cluster. An MRA cluster and its backup are considered a mated pair.

An associated MRA cluster is one that is not the backup MRA cluster, but with which there is a connection and to which external binding lookups are done.

An MRA cluster can simultaneously be a backup to one MRA cluster and an associate of another. However, an MRA cluster cannot use the same MRA cluster as both a backup and an associate. *Figure 2: Backup and Associated MRA Clusters and Mated Pairs* shows a valid configuration of four MRA clusters, in two mated pairs, and how each cluster views its relationships with the other three. The four MRA clusters form a mesh network.

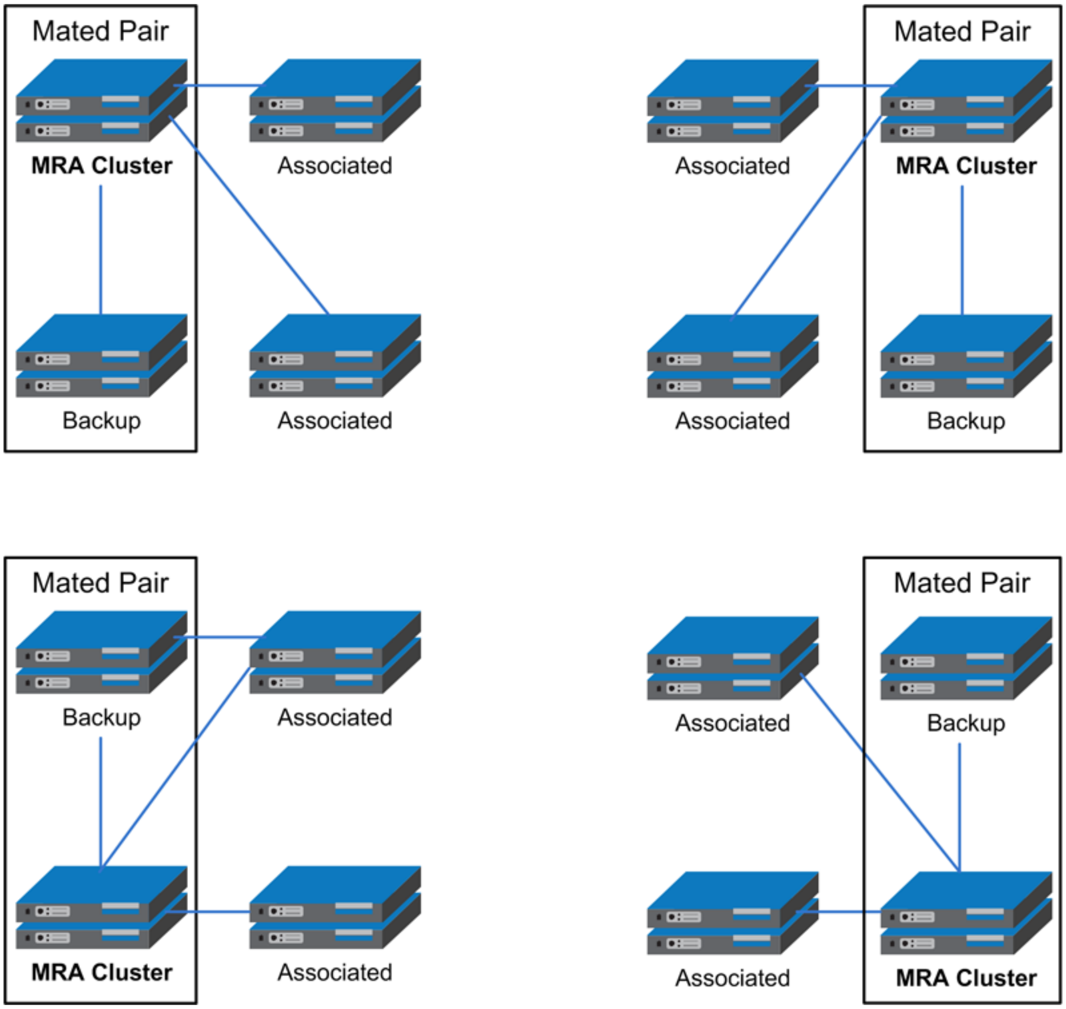
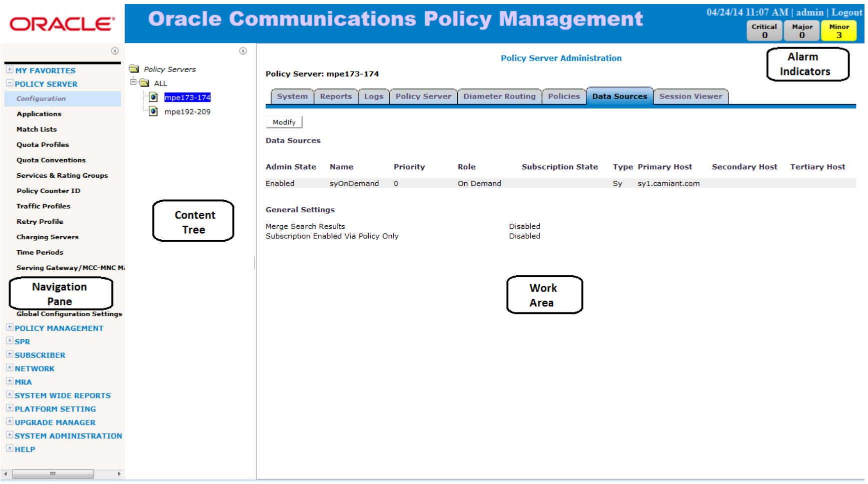


Figure 2: Backup and Associated MRA Clusters and Mated Pairs

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.



Policy Server: mpe173-174

Data Sources

Admin State	Name	Priority	Role	Subscription State	Type	Primary Host	Secondary Host	Tertiary Host
Enabled	syOnDemand	0	On Demand		Sy	sy1.camiant.com		

General Settings

Merge Search Results Disabled
Subscription Enabled Via Policy Only Disabled

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.

Chapter 3

CMP, MRA, and MPE Configuration

Topics:

The MRA is a standalone entity that uses the Configuration Management Platform (CMP) and the Multimedia Policy Engine (MPE).

This chapter describes how to:

- Configure the CMP to manage the MRA
- Associate an MPE with the MRA
- Configure MRA backup and monitoring capabilities

Note: This document assumes that all CMP, MRA, and MPE devices are operational. Also, the procedures used in this guide are MRA specific; for additional CMP and MPE configuration information, refer to the *Configuration Management Platform User's Guide*.

Configuring the CMP to Manage the MRA

The CMP is used to manage all MRA functions. Before this can occur, the CMP must be configured to:

- Access and manage the MRA
- Add the MRA to the CMP

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

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.

Setting Up an MRA Cluster

To define an MRA cluster:

1. From the **Platform Setting** section of the navigation pane, select **Topology Setting**.
The Topology Configuration page opens.
2. Click **Add MPE/MRA Cluster**.
The Cluster Settings Page opens.
3. Enter the following information (*Figure 4: Cluster Settings Page for MRA Cluster* shows an example):

a) **Name** (required) — Name of the cluster. Enter up to 255 characters, excluding quotation marks (") and commas (,).

b) **Appl Type** — Select **MRA**.

c) **Site Preference** — Select **Normal** (the default) or **Reverse**.

This field only appears on the page if the CMP system supports georedundancy.

d) **Primary Site** — Select **Unspecified** (the default) or the name of a previously defined site. If you select **Unspecified** you create a non-georedundant site, and you cannot subsequently add a secondary site. You can assign multiple clusters to the same site.

e) **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).

f) **Network VLAN IDs** (appears if you selected **C-Class** or **C-Class(Segregated Traffic)**) — Enter the Operation, Administration, and Management (OAM), SIG-A, and SIG-B virtual LAN IDs, in the range 1–4095. The defaults are 3 for the OAM VIP and server IP, 5 for the SIG-A VIP, and 6 for the SIG-B VIP.

The VLAN ID must be part of the device name. For example, if a VIP is on a VLAN with ID=230, the device name for this VIP must be "bond0.230." Enter a VLAN ID for each VIP.

g) **OAM VIP** — Enter the IPv4 address and mask of the OAM virtual IP (VIP) address. The OAM VIP is the IP address the CMP uses to communicate with the 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.

h) **Signaling VIP 1** through **Signaling VIP 4** — 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. The Signaling VIP is the IP address a PCEF device uses to communicate with an MRA cluster. (To support redundant communication channels, an MRA cluster uses both **SIG-A** and **SIG-B**.) You must enter a Signaling VIP value if you specify either SIG-A or SIG-B. The IPv6 address subnetwork must be same as the configured IPv6 SIG-A or SIG-B VIP. 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.

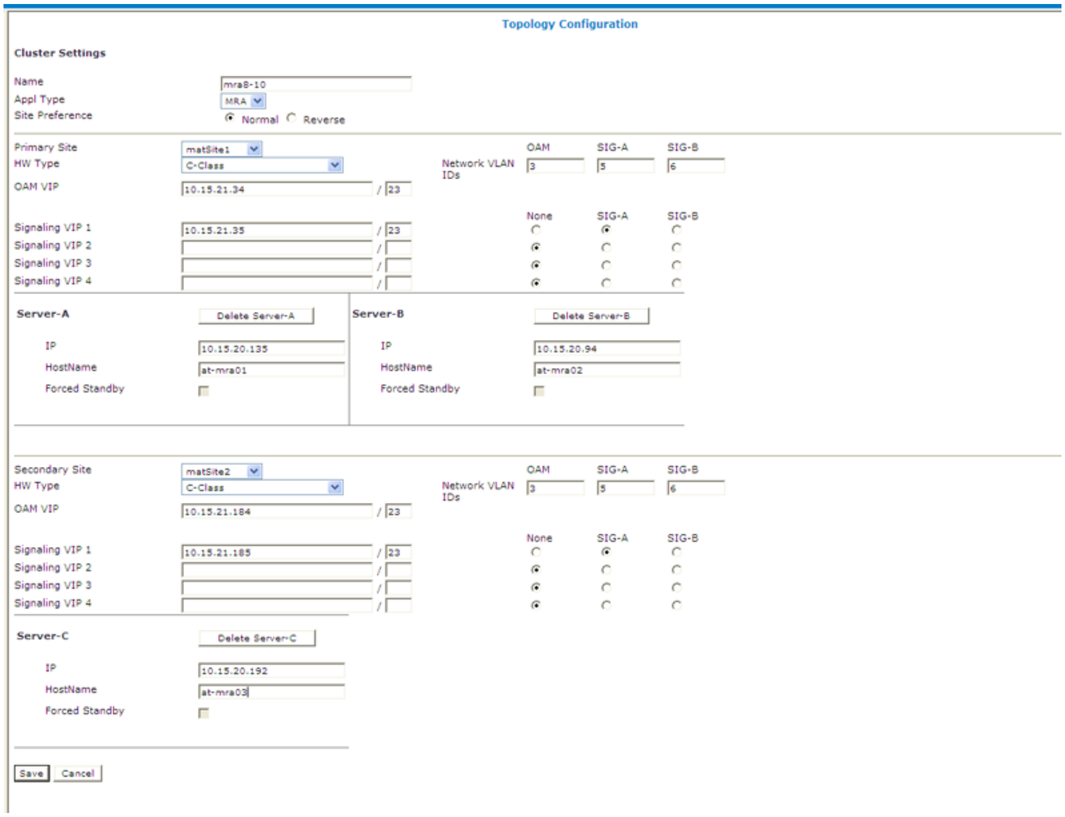
4. Select **Server-A** and enter the following information for the first server of the cluster:
   a) **IP** (required) — The IPv4 address of the server. Enter the standard dot-formatted IPv4 address string.
   b) **HostName** (required) — The name of the server. This must exactly match the host name provisioned for this server (is, the output of the Linux command `uname -n`).
5. Once you define Server A, you can optionally click **Add Server-B** and enter the appropriate information for the second server of the cluster.
6. (Optional) **Secondary Site** — For a georedundant cluster, select the name of a previously defined site. The secondary site name must be different from the primary site name.

   This section only appears on the page if the CMP system supports georedundancy.
7. (Optional) For a georedundant cluster, click **Add Server-C** and enter the appropriate information for the spare server of the cluster.

   This section only appears on the page if the CMP system supports georedundancy. If you define a secondary site, you must define a spare server.
8. When you finish, click **Save** (or **Cancel** to discard your changes).

The MRA cluster is defined. If you are setting up multiple MRA clusters, repeat the above steps as often as necessary.

Once the topology is defined, use the Topology column, on the Reports tab, to determine if there are any topology mismatches.



Topology Configuration

Cluster Settings

Name: mra8-10
Appl Type: MRA
Site Preference: ● Normal ○ Reverse

Primary Site: matSite1
HW Type: C-Class
OAM VIP: 10.15.21.34 / 23

	OAM	SIG-A	SIG-B
Network VLAN IDs	3	5	6

			None	SIG-A	SIG-B
Signaling VIP 1	10.15.21.35	/ 23	○	●	○
Signaling VIP 2		/	●	○	○
Signaling VIP 3		/	●	○	○
Signaling VIP 4		/	●	○	○

Server-A Delete Server-A
IP: 10.15.20.135
HostName: at-mra01
Forced Standby: □

Server-B Delete Server-B
IP: 10.15.20.94
HostName: at-mra02
Forced Standby: □

Secondary Site: matSite2
HW Type: C-Class
OAM VIP: 10.15.21.184 / 23

	OAM	SIG-A	SIG-B
Network VLAN IDs	3	5	6

			None	SIG-A	SIG-B
Signaling VIP 1	10.15.21.185	/ 23	○	●	○
Signaling VIP 2		/	●	○	○
Signaling VIP 3		/	●	○	○
Signaling VIP 4		/	●	○	○

Server-C Delete Server-C
IP: 10.15.20.192
HostName: at-mra03
Forced Standby: □

Figure 4: Cluster Settings Page for MRA Cluster

Modifying MRA System Settings, Grouping or deleting MRA devices

Once an MRA has been created you can change the system settings, group the MRA devices, or delete an MRA device from the CMP.

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.

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).

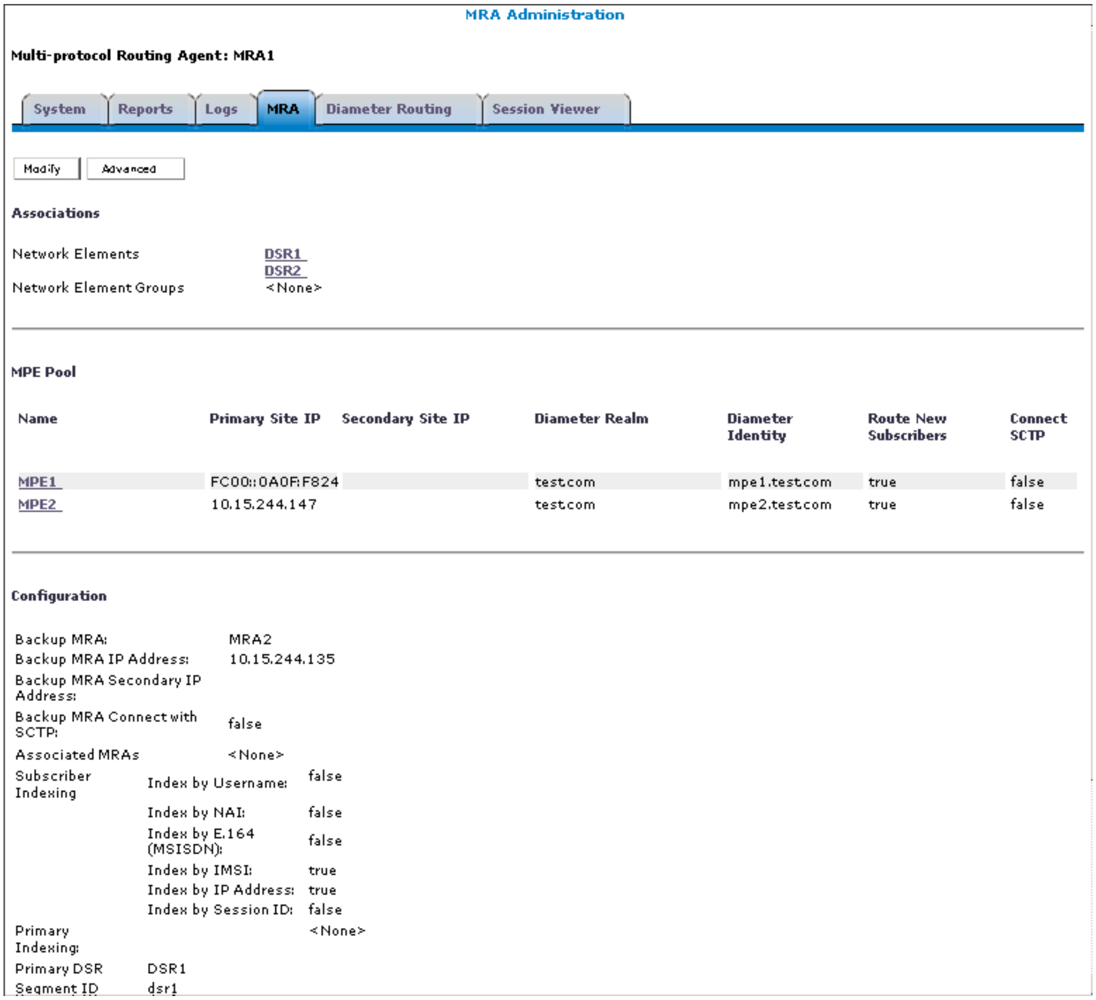
The MRA group is deleted.

Configuring and Modifying MRA Associated Network Elements, Backup MRAs, and MRA Diameter Settings

The **MRA** tab on the **MRA Configuration** page displays a list of network elements associated with the MRA device, the associated MPE pool, configuration settings for the MRA device, Diameter-related configuration information, and if load shedding is configured. *Figure 5: MRA Tab* shows an example.

Use the MRA tab to:

- Configure and modify MRA device associated network elements
- Define a backup MRA device
- Define associated MRA devices
- Associate MPE device with an MRA device and add to MPE pool
- Define georedundant MRA devices
- Configure subscriber indexing
- Associate a DSR network element with an MRA device
- Configure MRA Diameter settings
- Configure load shedding



MRA Administration

Multi-protocol Routing Agent: MRA1

Associations

Network Elements	DSR1 DSR2
Network Element Groups	<None>

MPE Pool

Name	Primary Site IP	Secondary Site IP	Diameter Realm	Diameter Identity	Route New Subscribers	Connect SCTP
MPE1	FC00::0A0F:F824		test.com	mpe1.test.com	true	false
MPE2	10.15.244.147		test.com	mpe2.test.com	true	false

Configuration

Backup MRA:	MRA2	
Backup MRA IP Address:	10.15.244.135	
Backup MRA Secondary IP Address:		
Backup MRA Connect with SCTP:	false	
Associated MRAs	<None>	
Subscriber Indexing	Index by Username:	false
	Index by NAI:	false
	Index by E.164 (MSISDN):	false
	Index by IMSI:	true
	Index by IP Address:	true
	Index by Session ID:	false
Primary Indexing:		<None>
Primary DSR	DSR1	
Segment ID	dsr1	

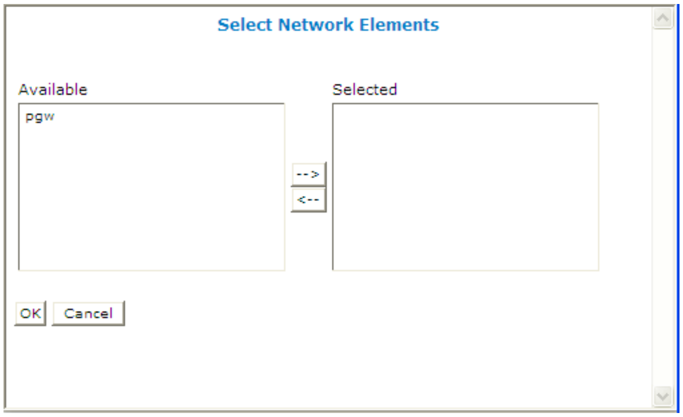
Figure 5: MRA Tab

Associating Network Elements with an MRA

Adding network elements to an MRA device is similar to how network elements are added to an MPE device: a list of supported network elements, which are pre-entered into the system (refer to the *CMP User's Guide* to add network elements), is available for selection.

To add a network element to an MRA, complete the following:

1. From within the **MRA** tab, click **Modify**.
   The **MRA Administration Modify** page opens.
2. In the **Associations** section of the **MRA Administration Modify** page, click **Manage**.
   A list of network elements is displayed. For example:



Select Network Elements

Figure 6: Select Network Elements

3. Select a network element in the **Available** list, click the right arrow to move the network element to the **Selected** list, and click **OK**.

The network element is added to the MRA.

Configuring the MRA/MPE Pool and Diameter Peer Routing Table

Note: Each MRA cluster can support a pool of 10 MPE clusters.

The MPE can have dual roles within the MRA. It can be associated with a MRA as an element in the MPE pool of the MRA so that it participates in the load balancing operation of the MRA and it can serve as a Diameter peer for Diameter routing.

The MPE can function in the following roles:

1. The MPE is associated with an MRA and participates in the load balancing action of the MRA.
2. The MPE is added as a simple Diameter peer for Diameter routing and it does not participate in the load balancing of the MRA.
3. The MPE serves both roles.

If there are explicit Diameter routes, the routes take precedence over the load balancing action of the MRA. To allow maximum flexibility, you can associate an MPE with an MRA to cover roles 1 and 3. When you associate an MPE with the MRA, the MPE automatically becomes a Diameter routing peer available in the Diameter routing table. In addition, you can add a new MPE as a simple Diameter peer to cover role 2. In this case, the MPE only serves as a simple Diameter peer and does not participate in the load balancing operation at all.

Note: An MPE cannot be present in both the MPE pool and Diameter routing table at the same time. If you try to do this, an error message is returned indicating that an MPE entry already exists in either the MPE pool or the Diameter peer routing table. If an MPE is in the peer table and you want to add it to the MPE pool, you need to delete it from the peer table first and then add it to the MPE pool. Also, if you try to remove an MPE from the MPE pool and the MPE is also in the Diameter peer routing table, a warning message is displayed informing you that the selected MPE cannot be removed until it is first deleted from the Diameter peer routing table.

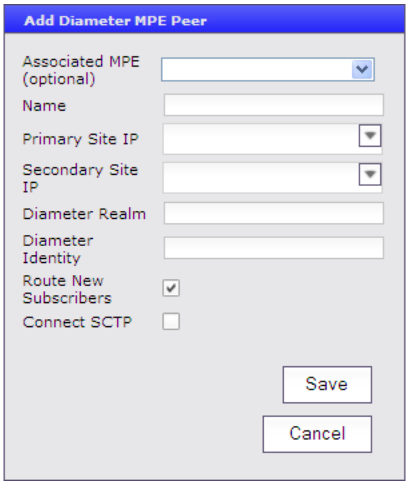
Associating an MPE with an MRA

When adding an MPE device to the MPE Pool, the IP Address must be from the application network and not from the management network.

Note: When specifying an associated MPE device, it is not necessary that the MPE device is under the same CMP. The CMP does not verify if it is an MPE device and if it is online or not.

To associate an MPE device with an MRA and add it to the MPE pool, complete the following steps:

1. From within the **MRA** tab, click **Modify**.
2. In the **MPE Pool** section, click **Add**.

   Add Diameter MPE Peer

   Associated MPE (optional)
   Name
   Primary Site IP
   Secondary Site IP
   Diameter Realm
   Diameter Identity
   Route New Subscribers ☑
   Connect SCTP ☐

   Figure 7: Adding a Diameter MPE Peer

   The **Add Diameter MPE Peer** window opens.
3. Enter the following information:
   a) **Associated MPE** — Select an MPE device.
   b) **Name** — Name of the MPE device.
   c) **Primary Site IP** — Enter the IP address of the primary site.
   d) **Secondary Site IP** (for georedundant configurations only) — Enter the IP address of the secondary site.
   e) **Diameter Realm** — Enter the domain of responsibility for the peer (for example, galactelEU.com).
   f) **Diameter Identity** — Enter a fully qualified domain name (FQDN) or the peer device (for example, MRA10-24.galactel.com).
   g) **Route New Subscribers** — Select if the MPE should be routed requests for new subscribers (that is, no existing binding). If it is unselected, the MPE slowly bleeds off sessions.
   h) **Connect SCTP** — Select if the MRA should connect to the MPE using SCTP (instead of TCP).
4. When you finish, click **Save** (or **Cancel** to abandon your changes).
   The **Add Diameter MPE Peer** window closes.
5. In the **Configuration** section of the page, select the identification system to use for **Primary Indexing**. This is the primary index for subscribers. This field should never be changed on a running system without contacting Tekelec customer service.
6. Click **Save**.

The MPE device is added to the MPE pool. If you are setting up multiple MRA clusters, repeat the above steps for each MRA in each cluster.

Cloning, Modifying, or Deleting an MPE

To clone, modify, or delete an MPE from the MPE pool of an MRA, complete the following steps:

1. From the **MRA** tab, click **Modify**.
2. In the **MPE Pool** section of the page, select the MPE.
3. Click **Clone**, **Edit**, or **Delete**.
   a) If deleting, click **Delete**.
   b) If cloning or modifying, enter the required information and click **Save**.

Adding a Backup MRA

The **Backup MRA** field, located within the **MRA** tab, provides a drop-down list with all qualified backup MRA candidates. All MRA devices in this list should be managed by the same CMP.

To qualify as a backup MRA device, an MRA cannot already serve as a backup for another MRA device. For example, if MRA-C has already been selected to back up MRA-B, MRA-C cannot be qualified as the backup MRA for any other MRA device. Also, if an MRA already exists as a Diameter peer in the Diameter peer routing table, that MRA cannot be used as the backup MRA.

Once the backup MRA is selected, the backup relationship is mutual, and the two MRA devices back up each other. As a result, if the configuration of an MRA is changed, the CMP updates the backup with the corresponding configuration change (including an MPE pool change).

To configure a backup MRA, complete the following:

1. On the **MRA** tab, click **Modify**.
   The **Modify MRA** page opens.
2. In the **Configuration** section of the page, select a backup MRA from the **Backup MRA** drop-down list.
3. Enter the following information for the backup MRA:
   a) **Backup MRA IP Address —** An IP address, in IPv4 or IPv6 format, used to establish the Diameter connection from the MRA to its backup.

      The CMP does not validate if the specified IP address is correct, only that it is compliant with IPv4 or IPv6 address format.
   b) **Backup MRA Secondary IP Address —** An IP address, in IPv4 or IPv6 format, used to establish the Diameter connection from the MRA to the secondary backup.

      The CMP does not validate if the specified IP address is correct, only that it is compliant with IPv4 or IPv6 address format.
   c) **Backup MRA Connect with SCTP —** Select if the MRA should connect to the backup MRA using SCTP (instead of TCP).
4. When you finish, click **Save** (or **Cancel** to abandon your changes).
   The backup MRA is configured.

Adding Associated MRAs

Each MRA cluster can have a backup MRA and up to two associated MRA clusters.

To configure an associated MRA device, complete the following:

1. From within the **MRA** tab, click **Modify**.
   The **Modify MRA** page opens.
2. In the Configuration section of the page, select one or two MRA clusters as associated MRA devices.

Do not select the existing backup MRA as an associated MRA; if you try, you will get an error message.

3. Enter an IP address for each selected MRA. The IP address is used to establish the Diameter connection from the MRA to the associated MRA.

   The CMP does not validate if the specified IP address is correct, only that it is in either IPv4 or IPv6 address format.
4. For a georedundant configuration only, enter the secondary IP address for each selected MRA. The IP address is used to establish the Diameter connection to the spare MRA server at the secondary site.

   The CMP does not validate if the specified IP address is correct, only that it is in either IPv4 or IPv6 address format.
5. When you finish, click **Save** (or **Cancel** to abandon your changes).
   If one of the selected MRA devices does not have a reciprocal association relationship with the target MRA, you are prompted, "Please make sure MRA 1 is also associated with MRA 2". If this message appears, use the procedure in *Adding a Backup MRA* to establish the second associated MRA as the backup for the first associated MRA.

The selected MRA clusters are configured as associated MRA devices.

Setting Up a Georedundant MRA Configuration

You can set up georedundant primary and secondary sites when configuring MRA servers.

A primary site contains the preferred site or connection, and a secondary site contains a non-preferred (optional) spare server. The spare server, though located elsewhere, is still part of the cluster, and prepared to take over if an active server and its secondary backup fails. You must associate a primary and secondary site with a cluster.

To set up a georedundant configuration for a primary MRA site:

1. From the **MRA** section of the navigation pane, select **Configuration**.
   The **MRA Administration** page opens.
2. Select an MRA server.
3. On the **MRA** tab, click **Modify**.
   The **Modify MRA** page opens.
4. From the Configuration section of the page, configure the following fields:

   - **Backup MRA**: Select an MRA server.

     Note: The MRA server is configured as the backup. You can have more than one MRA configuration as a pair.
   - **Backup MRA IP Address**: Enter the connected backup MRA signaling address.
   - **Backup MRA Secondary IP Address**: Enter the georedundancy site 2 signaling address for the backup MRA server.
   - **Backup MRA Connect with SCTP**: Select to enable an SCTP connection to the backup MRA server. By default, TCP is used instead of SCTP.

   Note: Any live traffic is disrupted temporarily when a change is made.
5. **Associated MRA**: Select the associated MRA server(s) to be configured as the second backup pair.
6. **Subscriber Indexing**: Select how subscriber data is indexed.

7. When you finish, click **Save** (or **Cancel** to abandon the request).
   Your backup site is created.

   Note: You cannot have more than two associated MRA servers with only one backup MRA. While adding an association, the CMP verifies the selected MRA to validate an existing reciprocal relationship. If it is not, you are prompted, `Please make sure MRA1 is also associated MRA2`.

Modifying Backup and Associated MRA devices

Once you have defined backup and associated MRA devices, they are listed in an Associated MRA table. The table indicates whether an MRA is a backup, the primary IP address, and, in a georedundant configuration, the secondary IP address. Using this table you can add, modify, or delete MRA devices from the list.

To modify backup and associated MRA devices:

1. From within the MRA tab, click **Modify**.
   The **Modify MRA** page opens.
2. The functions available from the table are as follows:
   - **To add an MRA to the table —** Click **Add**; the **Select MRA** window opens. Select an MRA device. If this is a backup MRA, select **Is Backup**. Enter the **Primary IP Address**, and for a georedundant configuration, the **Secondary IP Address**.
   - **To clone an MRA in the table —** Select an MRA and click **Clone**; the **Clone MRA** window opens with the information for the MRA device. Make changes as required.
   - **To edit an MRA in the table —** Select the MRA and click **Edit**; the **Edit MRA** window opens with the information for the MRA device. Make changes as required.
   - **To delete an MRA from the table —** Select the MRA and click **Delete**; you are prompted, `Are you sure you want to delete the selected MRA?` Click **Delete** to remove the MRA (or **Cancel** to cancel your request).

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

Configuring Subscriber Indexing

Use this procedure to specify which subscriber data to use for associating subscribers with an MRA device.

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 an MRA device.
   The **MRA Administration** page opens.
3. On the **MRA Administration** page, select the **MRA** tab.
   The current MRA configuration settings are displayed.
4. From within the **MRA** tab, click **Modify**.
   The **Modify MRA** page opens.
5. In the **Subscriber Indexing** section, select the indexing methods to use on this MRA device.
6. Click **Save** (or **Cancel** to abandon your changes).

The specified Subscriber Indexing settings are saved for this MRA device.

Associating a DSR Network Element with an MRA

Use this procedure to associate a DSR with an MRA device. If the MRA device gets an MPE-initiated message and the MRA device has a DSR configured, the MRA device will forward the message to the Primary DSR. If the connection to the primary DSR is not available, the MRA device forwards the message to another DSR (if configured). Note that the primary DSR Network Element (NE) should be configured in the Associated NEs list first.

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 an MRA device.
   The **MRA Administration** page opens.
3. On the **MRA Administration** page, select the **MRA** tab.
   The current MRA configuration settings are displayed.
4. From within the **MRA** tab, click **Modify**.
   The **Modify MRA** page opens.
5. Select a **Primary DSR** to associate with this MRA from the pulldown menu.
6. Enter a string value into **Segment ID**, if needed. If the MRA receives a message with a Destination-Host equal to the Segment ID, the MRA removes the Destination-Host AVP from the message.
7. Click **Save** (or **Cancel** to abandon your changes).

The specified DSR information is associated with this MRA device.

Configuring Load Shedding

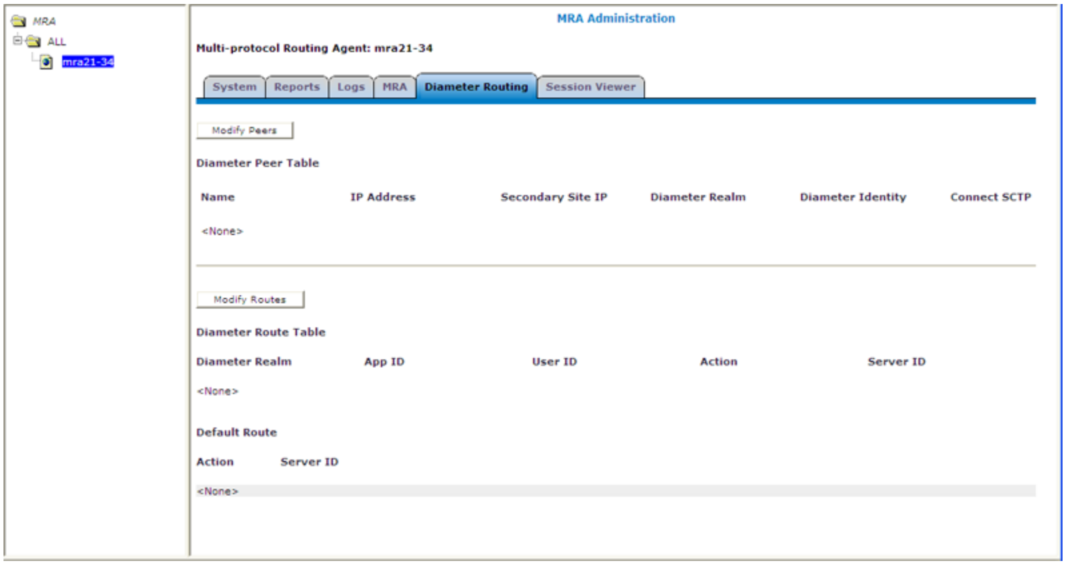
Use this procedure to enable or disable load shedding on the specified MRA. Load shedding is used to reduce latency and to keep the MRA stable and reliable in overload situations. When enabled, certain requests are rejected by the MRA when it or its MRA pool becomes too heavily loaded to process them.

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 device.
   The **MRA Administration** page opens.
3. On the **MRA Administration** page, select the **MRA** tab.
   The current MRA configuration settings are displayed.
4. From within the **MRA** tab, click **Modify**.
   The **Modify MRA** page opens.
5. In the **Enable Load Shedding** section, check mark to turn load shedding on for this MRA device, or remove the check mark by clicking the box to turn load shedding off.
6. Click **Save** (or **Cancel** to abandon your changes).

The specified Load Shedding setting is saved for this MRA device. When load shedding is enabled, if the busy threshold is exceeded, an alarm is generated to notify you that the MRA is in a busy state. When either the clear threshold or the busy time limit is met, another alarm is generated to notify you that the MRA is once more processing requests.

Configuring Diameter Routing

The **Diameter Routing** tab is used to configure the MRA so that the MPE will continue to be available for the MRA. In addition to the entries in the peer table, the MPE devices listed in the MPE pool for the MRA device should also be available to participate in Diameter peer routing. Therefore, the entries in the Diameter Peer Table can be added from either the Diameter routing page or from the MPE association page. However, the same MPE can only appear in either the peer table or the pool and cannot appear in both.



Multi-protocol Routing Agent: mra21-34

Diameter Peer Table

Name	IP Address	Secondary Site IP	Diameter Realm	Diameter Identity	Connect SCTP
<None>					

Diameter Route Table

Diameter Realm	App ID	User ID	Action	Server ID
<None>				

Default Route

Action	Server ID
<None>	

Figure 8: Diameter Routing Tab

To add a Diameter peer:

1. From the **Diameter Routing** tab, click **Modify Peers**.
   The **Add Diameter Peer** window opens.
2. Select a configured MRA or MPE from the drop-down list.
3. Enter the following:

   - **Name** — Enter the name of the peer device (which must be unique in the CMP database).
   - **Primary Site IP** — Enter the IP address, in IPv4 or IPv6 format, of the primary site.
   - **Secondary Site IP** — For georedundant configurations, enter the IP address, in IPv4 or IPv6 format, of the server at the secondary site.
   - **Diameter Realm** — Enter the domain of responsibility for the peer (for example, `galactelEU.com`).
   - **Diameter Identity** — Enter a fully qualified domain name (FQDN) or the peer device (for example, `MRA10-24.galactel.com`).

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

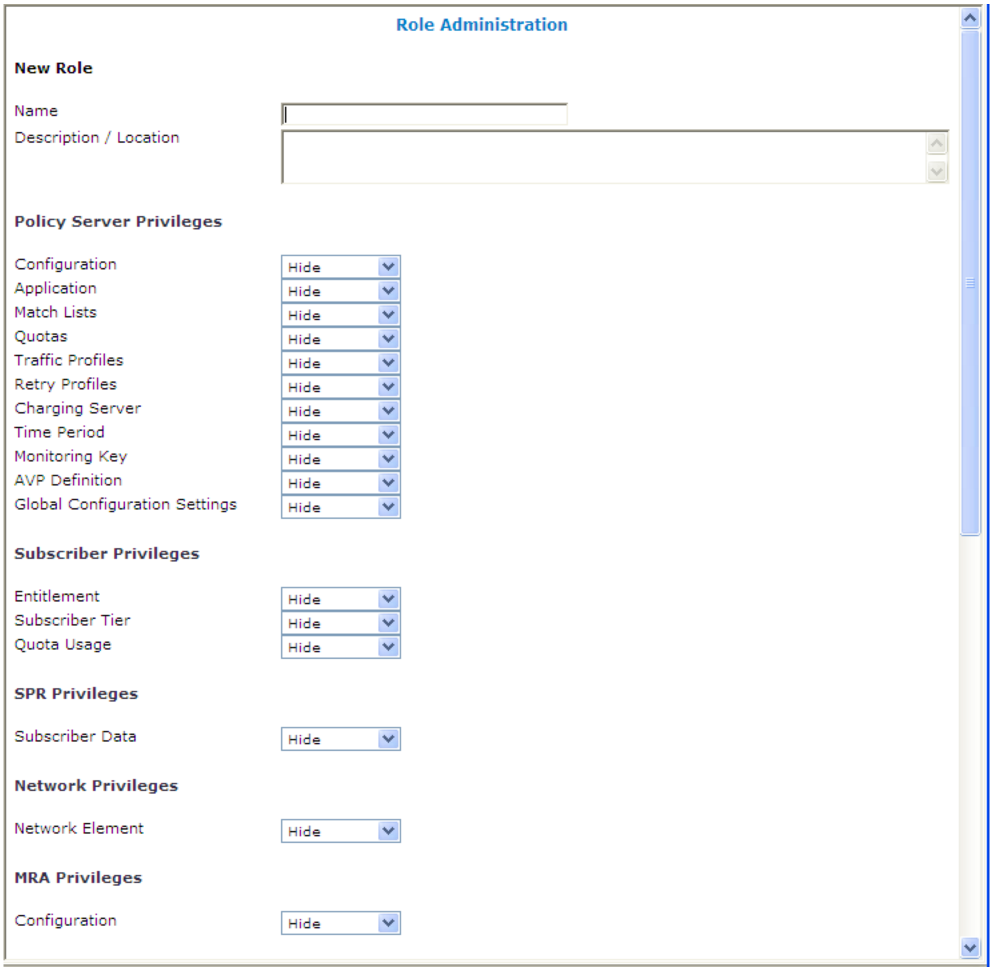
Role and Scope Configuration

When configured in MRA mode, the CMP system defines default user accounts with roles and scopes that allow for control of MRA devices. If you want to define additional users to control MRA devices, you need to add appropriate roles and scopes.

MRA Role Configuration

MRA configuration also provides the functionality for privilege control through Role Administration. The **Role Administration** page includes a section named **MRA Privileges** that contains a privilege setting option named **Configuration**. To access this option:

1. In the **System Administration** section of the navigation pane, click **User Management** and then click **Roles**.
   The **Role Administration** page opens.
2. Click **Create Role**.



Role Administration

New Role

Name	
Description / Location	

Policy Server Privileges

Configuration	Hide
Application	Hide
Match Lists	Hide
Quotas	Hide
Traffic Profiles	Hide
Retry Profiles	Hide
Charging Server	Hide
Time Period	Hide
Monitoring Key	Hide
AVP Definition	Hide
Global Configuration Settings	Hide

Subscriber Privileges

Entitlement	Hide
Subscriber Tier	Hide
Quota Usage	Hide

SPR Privileges

Subscriber Data	Hide

Network Privileges

Network Element	Hide

MRA Privileges

Configuration	Hide

Figure 9: New Role Page

3. Enter the following information:
   a) **Name** — The name for the new role.
   b) **Description/Location** (optional) — Free-form text.
   c) **MRA Privileges** — There are three types of privileges for MRA configuration: Hide, Read-Only and Read-Write.

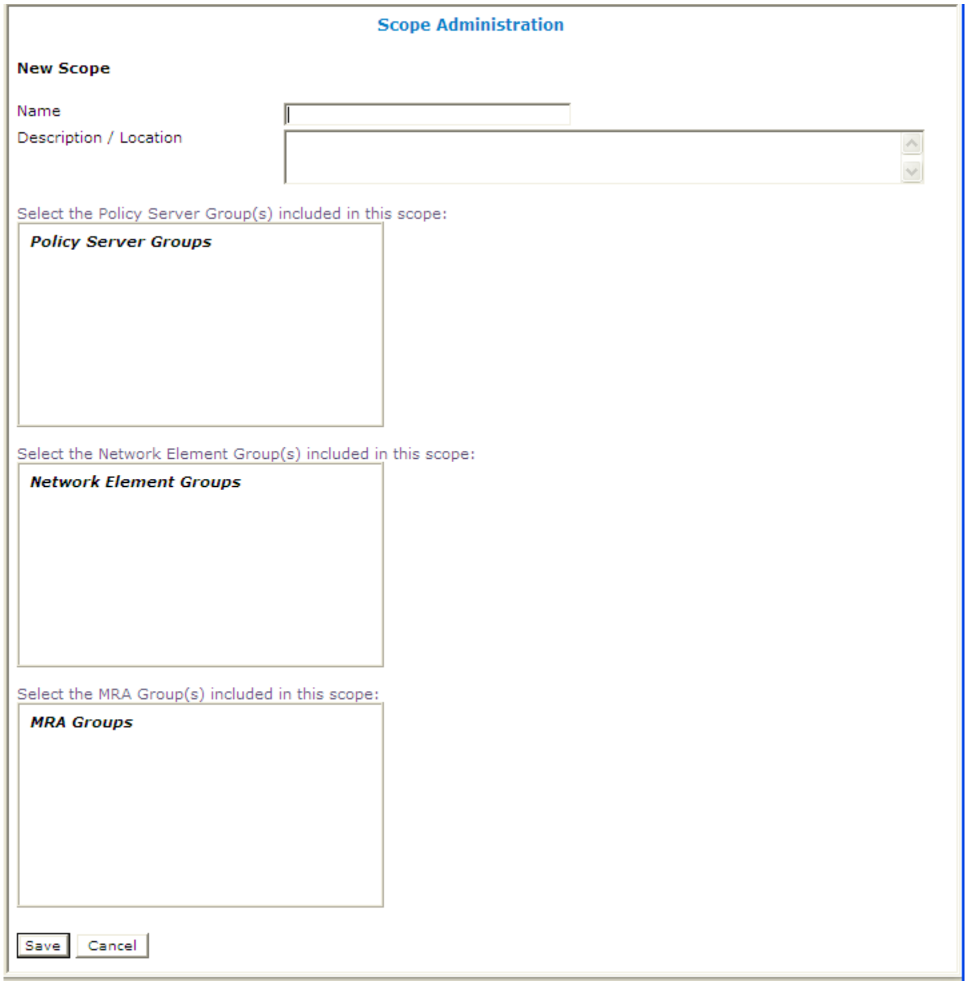
   - **Hide** — No operation can be done on MRA configuration.
   - **Read-Only** — Only read operations can be done on MRA configuration (that is, settings can be viewed but not changed).
   - **Read-Write** — Both read and write operations can be done on MRA configuration (that is, settings can be viewed and changed).

4. When you finish, click **Save** (or **Cancel** to discard your changes).
   Privileges are assigned to the role.

MRA Scope Configuration

MRA configuration provides scope functionality which allows the administrator to configure scopes for MRA groups, which provides the context for a role. The default scope of Global contains all items defined within the CMP. Once a scope is defined, the administrator can apply it to a user. A user can only manage the MRA devices in the user defined scope. To configure a scope, complete the following:

1. In the **System Administration** section of the navigation pane, click **User Management** and then click **Scopes**.
   The Scope Administration page opens.
2. Click **Create Scope**.


Scope Administration

New Scope

Name

Description / Location

Select the Policy Server Group(s) included in this scope:

Policy Server Groups

Select the Network Element Group(s) included in this scope:

Network Element Groups

Select the MRA Group(s) included in this scope:

MRA Groups

Figure 10: Create Scope Page

3. Enter the following information:
   a) **Name** — The name for the new scope.
   b) **Description/Location** (optional) — Free-form text.
   c) Select the MRA group(s) this scope can control.
4. When you finish, click **Save** (or **Cancel** to discard your changes).
   The scope is defined.

Configuring Stateless Routing

Stateless routing allows the MRA to route diameter messages to MPE devices or other devices, without the need to maintain state. Typically, the MRA selects an MPE device for a user, and continues to use the same MPE for the user by maintaining session state. Using stateless routing, static routes are configured ahead of time, so the state does not need to be maintained.

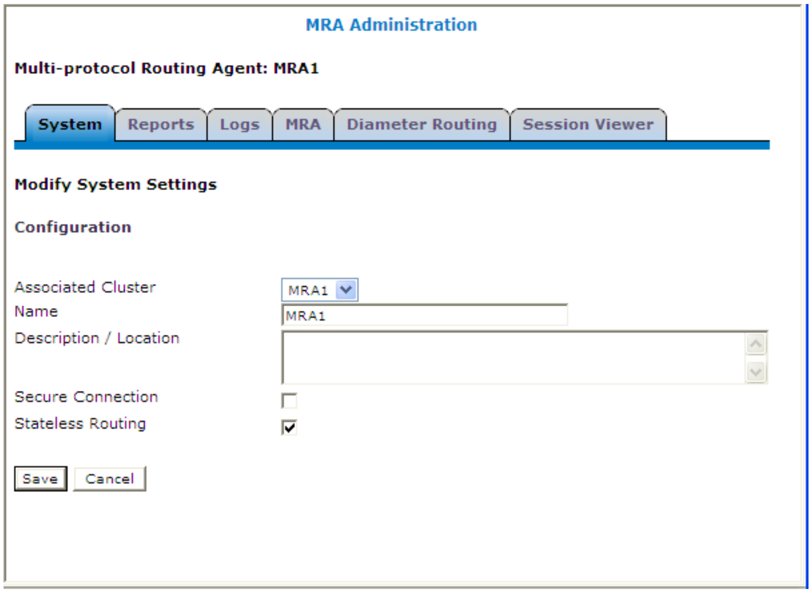
Using stateless routing, the MRA establishes a diameter connection with every peer that is defined in the Diameter Peer Table, where a peer consists of a name, IP address, diameter realm, diameter identity, and port. A route consists of a diameter realm, application ID, user ID, action, and server ID. The Action can be either proxy or relay.

Stateless routing uses routing based on FramedIPAddress and FramedIPv6Prefix, with wildcard pattern matching. The IP address must be configured in either dotted decimal notation for IPv4 or expanded notation for IPv6 excluding the prefix length.

The MRA processes routes in the order of their configured priority, which is based on the order in which they were configured in the route. If the destination of a route is unreachable, the route with the next highest priority is used. If no available routes are found, the MRA returns a DIAMETER_UNABLE_TO_DELIVER error message. If a destination is currently up when the route is chosen but the forwarded request times out, the MRA returns a DIAMETER_UNABLE_TO_DELIVER error message and does not try the next route.

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 11: Enabling Stateless Routing* shows an example).



Multi-protocol Routing Agent: MRA1

Modify System Settings

Configuration

Associated Cluster MRA1
Name MRA1
Description / Location
Secure Connection □
Stateless Routing ☑

Figure 11: Enabling Stateless Routing

Enabling and Disabling Migration Mode

Enabling the migration mode setting permits the MRA device to use static routes to transition to a stateful mode. You can also disable the migration mode setting.

To enable and disable the migration mode setting:

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 device from the content tree.

The **MRA Administration** page opens, displaying information about the selected MRA device.

3. Select the **MRA** tab.
4. Click **Advanced**.
5. In the **Stateful MRA Settings** section of the page, select **Enable Stateless Migration Mode** (or leave the box unchecked if you do not want to enable the migration mode).
   The stateless migration mode is enabled.
6. Click **Save** (or **Cancel** to abandon your change).

The MRA device is put into migration mode.

Loading MPE/MRA Configuration Data when Adding Diameter Peer

When adding a diameter peer one must be selected from the list contained within the Diameter Routing tab. Once selected, the peer configuration fields are auto populated.

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.

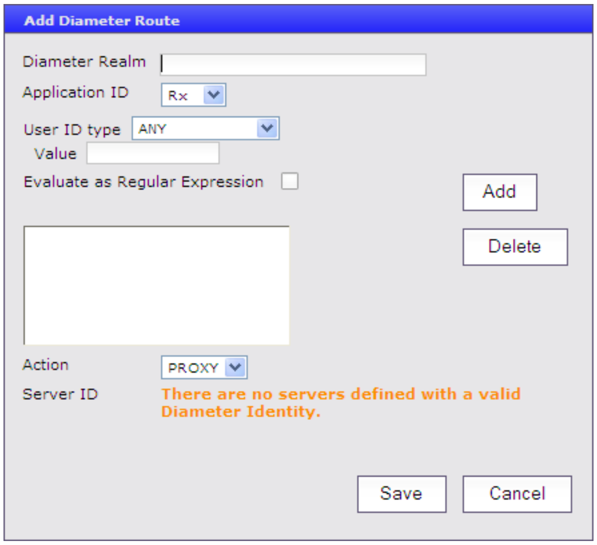
To configure the **Diameter route** table:

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:



Add Diameter Route

Diameter Realm

Application ID: Rx

User ID type: ANY

Value

Evaluate as Regular Expression □

Action: PROXY

Server ID: There are no servers defined with a valid Diameter Identity.

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.

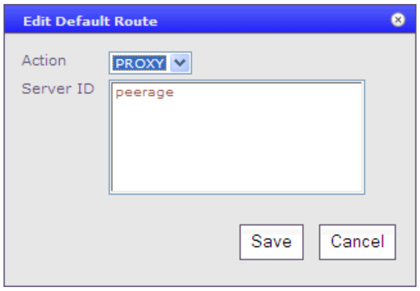
- **User ID type** — Select **ANY** (the default), **E.164(MSISDN)**, **IMSI**, **IP**, **NAI**, **PRIVATE**, **SIP_URI**, or **USERNAME**.
- **Value** — Enter the user ID to be routed (for example, an NAI or E.164 number). Separate user IDs using a comma (,); use an asterisk (*) as a wildcard character. 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:

   Action: PROXY
   Server ID: peerage

   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.

MRA Advanced Configuration Settings

The advanced configuration settings provide access to attributes that are not normally configured, including session cleanup settings, stateful MRA settings, and defining configuration keys.

Configuring MRA Session Clean Up Settings

Normally, a binding for a subscriber is maintained on only one MRA device. However, due to server or communication disruptions, it is possible for multiple MRA devices to create duplicate bindings. When a query returns duplicate bindings, the oldest is used.

The MRA device periodically runs a cleanup task to check for and remove stale and suspect bindings and sessions, which are defined as follows:

- A session is stale if its timestamp is greater than the Session Validity Time value for the MRA device.
- A binding is stale if its timestamp is greater than the Binding Validity Time value for the MRA device.
- A binding is suspect if it was created while one or more MRA devices were not reachable.

To customize stale session cleanup:

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 an MRA device.
   The **MRA Administration** page opens.
3. On the **MRA Administration** page, select the **MRA** tab.
   The current MRA configuration settings are displayed.
4. Click **Advanced**.

Session Clean Up settings are displayed and can be edited.

Table 2: Session Clean Up Settings

Attribute	Description
Check for Stale Sessions in Binding	Select to check for stale sessions in bindings during the cleanup cycle. If not selected, then the system only checks to see if the entire binding is stale. The default is selected (check for stale sessions).
Check for Stale Bindings	Select to check for stale bindings during the cleanup cycle. If not selected, then the system will not check if the binding is stale. If **Check For Stale Sessions in Binding** is selected, then the system still iterates through the enclosed session information to detect and clean up stale sessions. The default is deselected (do not check for stale bindings).
Check for Suspect Bindings	Select to check for suspect bindings during the cleanup cycle. If not selected, the system checks if the entire binding is stale. If **Check for Stale Sessions In Binding** is selected, stale sessions enclosed in the suspect binding are cleaned up as well. The default is selected (check for suspect bindings).
Session Cleanup Start Time	Defines the time of day when the cleanup task occurs. Specify either **Start Time** or **Interval** by clicking the associated radio button and entering or selecting a value. You can specify a time in 24-hour format from the drop-down menu. No default value is defined.
Binding Cleanup Interval (hour)	Defines the interval, in hours, at which the cleanup task runs. Specify either **Start Time** or **Interval** by clicking the associated radio button and entering or selecting a value from 0 to 24 hours. A value of 0 disables cleanup. The default is 24 hours. **Note:** Do not modify this setting without consulting Oracle Customer Service.
Max Duration For Binding Iteration (hour)	Defines the maximum duration, in hours, to iterate through the bindings. The default is 2 hours. The valid range is 1 to 2 hours. **Note:** Do not modify this setting without consulting Oracle Customer Service.
Binding Validity Time (hours)	Defines the number of hours after which the binding is declared stale. The default is 240 hours. The valid range is 1 to 240 hours.
Max Binding Cleanup Rate (bindings/sec)	Defines the rate, in bindings per second, at which the cleanup task attempts to clean stale bindings. The default is 50 sessions/sec. The valid range is 1 to 50 sessions/sec. **Note:** Do not modify this setting without consulting Oracle Customer Service.

Max Binding Iteration Rate (bindings/sec)	Defines the maximum rate, in bindings per second, at which the cleanup task iterates through the bindings database. The default is 1000 bindings/sec. The valid range is 1 to 1000 bindings/sec. **Note:** Do not modify this setting without consulting Oracle Customer Service.
Max Iteration Burst Size	Define the number of iterations which can be processed before the rate is limited. This is the Token Bucket size. The default is 1000 iterations. The valid range is 1 to 1000 iterations. **Note:** Do not modify this setting without consulting Oracle Customer Service.
Scheduler Granularity (sec)	Defines the adaptor scheduler's granularity in seconds. The default is 1 second. The valid range is 1-5 seconds.
Scheduler Thread Count	Defines the number of threads used by the cleanup scheduler to schedule jobs. The default is 2 threads. the valid range is 1 to 4 threads.
Cleanup Session Validity Time (hours)	Defines the number of hours after which a session in a binding is declared stale. the default is 120 hours. The valid range is 1 to 120 hours.

5. Click **Save** (or **Cancel** to discard changes).
   The settings are applied to the MRA.

Working with Stateful MRAs

Stateful MRAs let you view the session and track its destination prior to sending multiple sessions to the same MPE device. An MRA is placed into migration mode in order to render a stateful MRA.

Enabling and Disabling Migration Mode

Enabling the migration mode setting permits the MRA device to use static routes to transition to a stateful mode. You can also disable the migration mode setting.

To enable and disable the migration mode setting:

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 device from the content tree.
   The **MRA Administration** page opens, displaying information about the selected MRA device.
3. Select the **MRA** tab.
4. Click **Advanced**.
5. In the **Stateful MRA Settings** section of the page, select **Enable Stateless Migration Mode** (or leave the box unchecked if you do not want to enable the migration mode).
   The stateless migration mode is enabled.
6. Click **Save** (or **Cancel** to abandon your change).

The MRA device is put into migration mode.

Redirecting Traffic to Upgrade or Remove an MRA

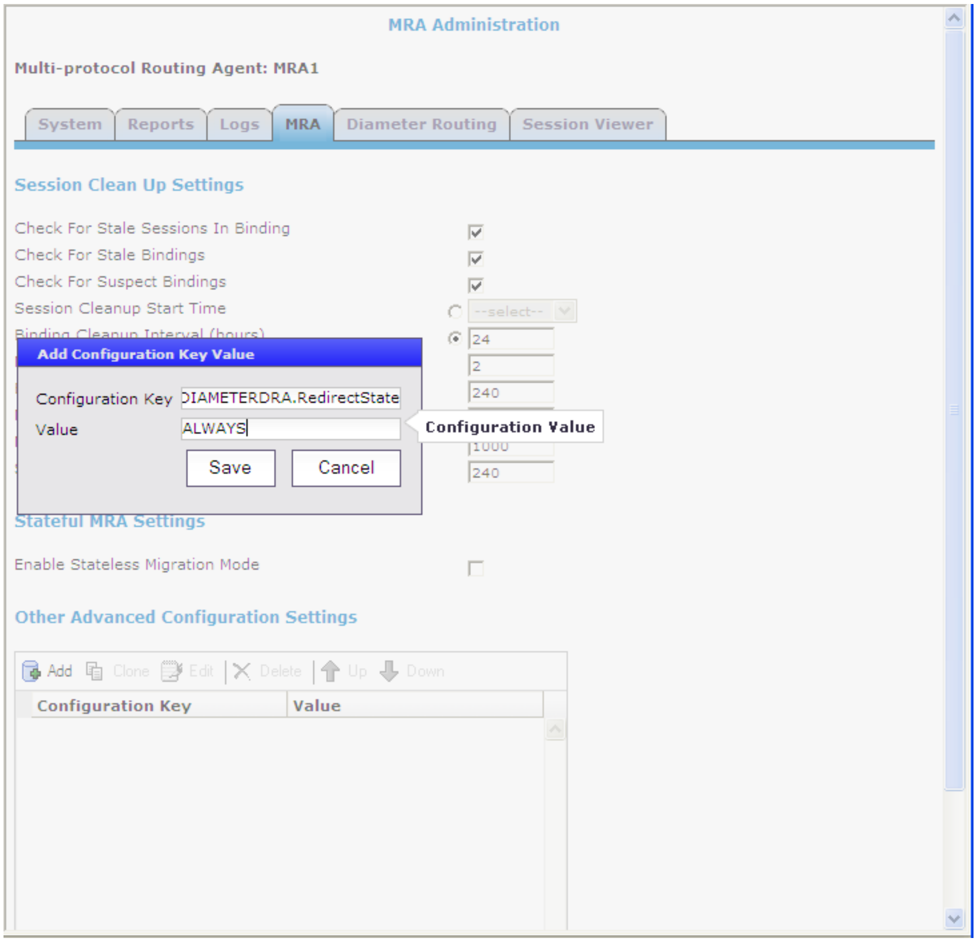
When the software for an MRA needs to be upgraded or an MRA needs to be removed from an MRA cluster, the traffic or potential traffic must be redirected to the other MRA within the cluster, and the current sessions released. To do this, traffic on clustered MRAs is redirected on to another MRA, allowing the traffic-free MRA to be replaced in the cluster or to have its software upgraded. During this process, the MRA that is to be replaced or updated is placed in a redirect state of ALWAYS, where it does not take on new subscribers but redirects them to the other MRA. Once all traffic has been removed or redirected, existing traffic is released from the MRA and it is shut down. Once the MRA is replaced or upgraded, the same process can be used on the other MRA, and then returned to the cluster.

Note: For detailed directions on performing a migration using the redirect states, please contact Oracle.

Changing Redirect States

To change the redirect state of an MRA device:

1. In the **MRA** section of the navigation bar, click **Configuration**.
2. Select an MRA. The **MRA Administration** page displays information about the selected MRA.
3. On the **MRA** tab, click **Advanced**.
4. In the **Other Advanced Configuration Settings** section, click the **Add** icon in the table. The **Add Configuration Key Value** window opens (*Figure 12: Add Configuration Key Value Window*).



Multi-protocol Routing Agent: MRA1

Session Clean Up Settings

Check For Stale Sessions In Binding ☑
Check For Stale Bindings ☑
Check For Suspect Bindings ☑
Session Cleanup Start Time ○ --select--
Binding Cleanup Interval (hours) ● 24
2
240
1000
240

Add Configuration Key Value

Configuration Key DIAMETERDRA.RedirectState
Value ALWAYS
Configuration Value

Save Cancel

Stateful MRA Settings

Enable Stateless Migration Mode □

Other Advanced Configuration Settings

Configuration Key	Value

Figure 12: Add Configuration Key Value Window

The redirect configurable variable is DIAMETERDRA.RedirectState, which indicates the redirect state of the MRA. Changing this variable to NORMAL will stop the release process. Valid values are:

- **NORMAL** (the default) — The MRA redirects CCR-I messages only when the DRMA link between the clustered MRAs is down and the subscriber does not have an existing binding on the MRA that first receives the CCR-I.
- **ALWAYS** — The MRA always redirects CCR-I messages to the MRA it is clustered with for subscribers that do not have existing bindings, whether the DRMA link is active or not. An MRA in this state is not able to create new bindings.
- **NEVER** — The MRA never redirects messages to the MRA it is clustered to, whether the DRMA link is active or not.

Note: In all redirect states, the MRA devices continue to handle DRMA traffic and process traffic normally for subscribers with existing bindings.

Releasing Active Sessions

Release configuration settings allow the MRA to release active subscribers and remove their bindings. These settings allow a task to be started that iterates through the bindings in the database and sends

RARs for each session contained in each binding. These RARs indicate a session release cause, triggering the PGW/HSGW to terminate the corresponding sessions. Upon receiving a message to terminate the session, the MRA removes the session from the binding, and once the binding no longer has any sessions associated with it, it is removed. Any new sessions are redirected to the active MRA.

The release configurable variables are:

- DIAMETERDRA.Release.Enabled: Indicates whether the binding release task is started. Valid values are **TRUE** or **FALSE**; the default is **FALSE**. Setting this to **FALSE** stops the release process.
- DIAMETERDRA.Release.MaxRARsRate: The rate (in RARs/sec) at which the release task queues RAR messages to be sent; they will be evenly spread across the entire second. Valid values are a positive integer; default is **250**. Setting this to a negative integer stops the release process.
- DIAMETERDRA.Release.UnconditionallyRemoveSessions: Indicates if the release task removes the session information from the binding as soon as it is processed by the release task, or if it waits until it receives a CCR-T before updating the binding. Valid values are **TRUE** or **FALSE**; the default is **FALSE**.
- DIAMETERDRA.Release.ReleaseTaskDone: Internal flag used by the release task to indicate if it has completed. Values are **TRUE** or **FALSE**; the default is FALSE.
- DIAMETERDRA.Release.OriginHost: This value indicates the origin host to use when sending RARs initiated by the release task. Valid values are **MPE** or **MRA**; the default is **MPE**.

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.

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

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 Topology Hiding for the Gx Application

When topology hiding is enabled, Gx CCA and RAR messages forwarded by the MRA to the network are modified to include the MRA Origin-Host instead of the MPE Origin-Host. Route-Record in RARs are not removed.

If a Gx CCR-U/T message does not contain a Destination-Host, or contains a Destination-Host set to the MRA identity, a binding lookup is performed based on the available and indexed keys to find the corresponding MPE device. The message is then forwarded to the MPE device with no Destination-Host. If the message contains a Destination-Host set to an identity other than the MRA, the message is routed based on the Destination-Host only.

When the Origin-Host is replaced on a forwarded message, the original Origin-Host is logged at the end of a message when logging the message details.

To configure topology hiding:

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 an MRA device.
   The **MRA Administration** page opens.
3. On the **MRA Administration** page, select the **MRA** tab.
   The current MRA configuration settings are displayed.
4. On the **MRA** tab, click **Modify**.
   The **Modify MRA** page opens.

5. In the **Subscriber Indexing** section, ensure that the **Index by Session ID** option is enabled.
6. Click **Save** (or **Cancel** to discard changes).
7. On the **MRA** tab, click **Advanced**.
8. In the **Other Advanced Configuration Settings** section, click the **Add** icon in the table. The **Add Configuration Key Value** window opens (see *Figure 12: Add Configuration Key Value Window*).
   Add the following configuration keys to the **Add Configuration Key Value** window:

   Table 3: Topology Hiding Configuration Keys

Configuration Key	Value
DIAMETERDRA.TopologyHiding.Apps	**Gx**
DIAMETERDRA.TopologyHiding.Enabled	**true**

9. Click **Save** (or **Cancel** to discard changes).
   The topology hiding settings are applied to the MRA.

Chapter 4

Monitoring the MRA

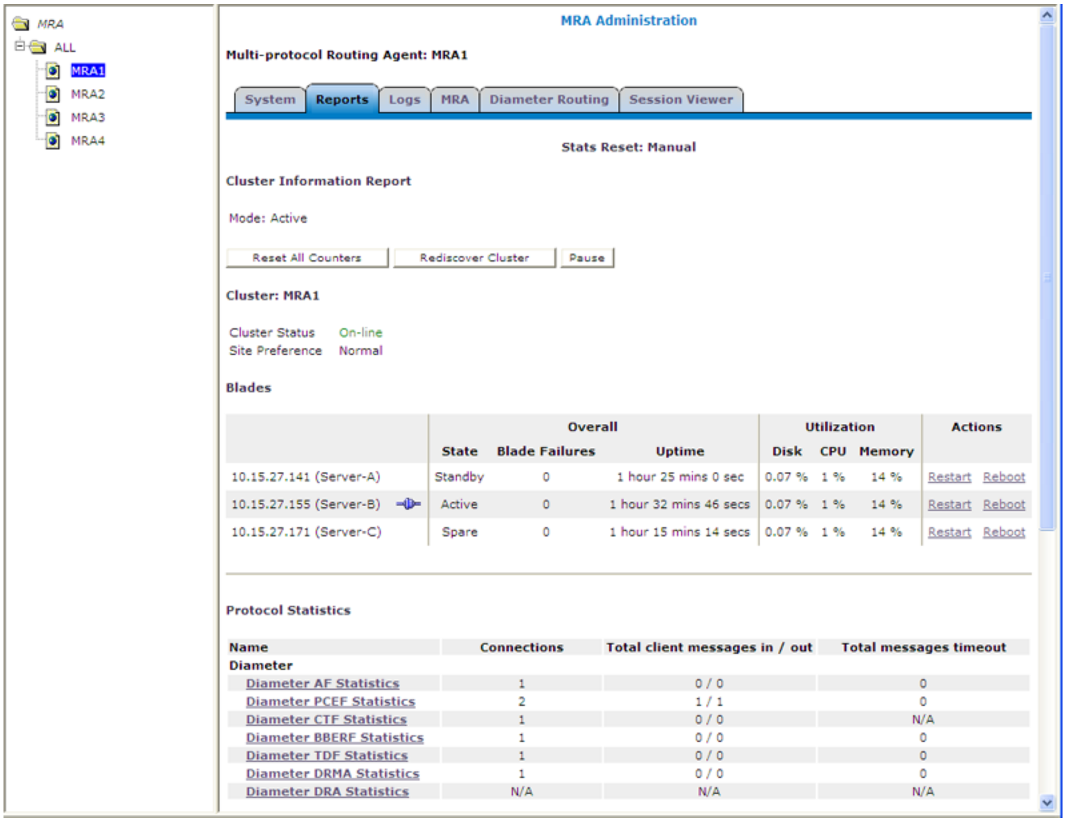
Topics:

Monitoring MRA is similar to monitoring the MPE devices. The MRA uses the Reports page, the Logs page, and the Debug page to provide the MRA status information. Specifically:

- Cluster and blade information
- DRMA information
- Event logs

Displaying Cluster and Blade Information

The report page is used to display the cluster and blade status, in addition to the Diameter protocol related statistics. The following figure shows cluster, blade information, and the Diameter statistics.



Multi-protocol Routing Agent: MRA1

Stats Reset: Manual

Cluster Information Report

Mode: Active

Cluster: MRA1

Cluster Status On-line
Site Preference Normal

Blades

	Overall			Utilization			Actions
	State	Blade Failures	Uptime	Disk	CPU	Memory	
10.15.27.141 (Server-A)	Standby	0	1 hour 25 mins 0 sec	0.07 %	1 %	14 %	Restart Reboot
10.15.27.155 (Server-B)	Active	0	1 hour 32 mins 46 secs	0.07 %	1 %	14 %	Restart Reboot
10.15.27.171 (Server-C)	Spare	0	1 hour 15 mins 14 secs	0.07 %	1 %	14 %	Restart Reboot

Protocol Statistics

Name	Connections	Total client messages in / out	Total messages timeout
Diameter			
Diameter AF Statistics	1	0 / 0	0
Diameter PCEF Statistics	2	1 / 1	0
Diameter CTF Statistics	1	0 / 0	N/A
Diameter BBERF Statistics	1	0 / 0	0
Diameter TDF Statistics	1	0 / 0	0
Diameter DRMA Statistics	1	0 / 0	0
Diameter DRA Statistics	N/A	N/A	N/A

Figure 13: Cluster, Blade, and Diameter Information

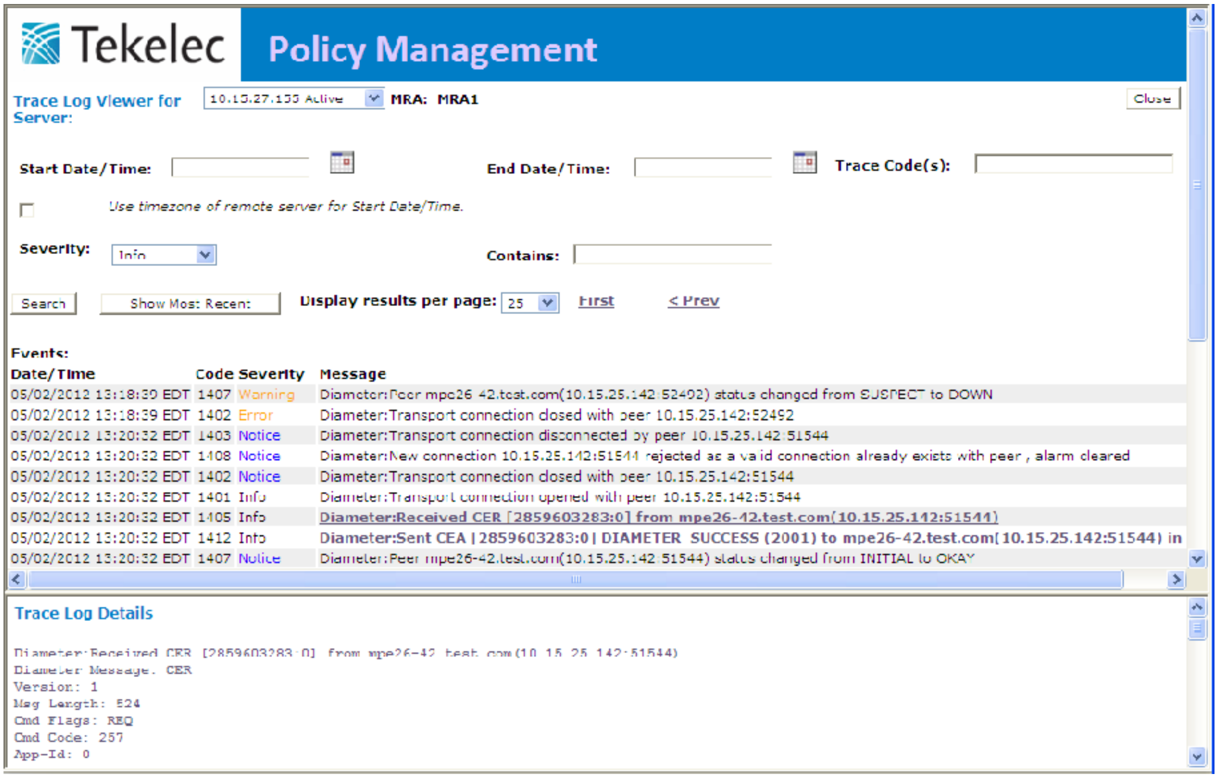
The following is a list of Diameter statistics:

- Diameter AF (Application Function) Statistics
- Diameter PCEF (Policy and Charging Enforcement Function) Statistics
- Diameter CTF (Charging Trigger Function) Statistics
- Diameter BBERF (Bearer Binding and Event Reporting) Statistics
- Diameter TDF (Traffic Detection Function) Statistics
- Diameter DRMA (Distributed Routing and Management Application) Statistics
- Diameter DRA (Distributed Routing Application) Statistics

For a detailed breakdown of a statistic, click the statistic. For descriptions of the statistics available for display, refer to *Mapping Reports Display to KPIs*.

Viewing Trace Logs

The trace logs page displays MRA related messages. The page also has functionality to configure these logs and provides a log viewer to search and browse the log entries.



Trace Log Viewer for Server: 10.15.27.155 Active MRA: MRA1

Start Date/Time:

End Date/Time:

Trace Code(s):

□ *Use timezone of remote server for Start Date/Time.*

Severity: Info

Contains:

Display results per page: 25

Events:

```
Date/Time               Code Severity Message
05/02/2012 13:18:39 EDT 1407 Warning  Diameter:Peer mpe26 42.test.com(10.15.25.142:52492) status changed from SUSPECT to DOWN
05/02/2012 13:18:39 EDT 1402 Error    Diameter:Transport connection closed with peer 10.15.25.142:52492
05/02/2012 13:20:32 EDT 1403 Notice   Diameter:Transport connection disconnected by peer 10.15.25.142:51544
05/02/2012 13:20:32 EDT 1408 Notice   Diameter:New connection 10.15.25.142:51544 rejected as a valid connection already exists with peer , alarm cleared
05/02/2012 13:20:32 EDT 1402 Notice   Diameter:Transport connection closed with peer 10.15.25.142:51544
05/02/2012 13:20:32 EDT 1401 Info     Diameter:Transport connection opened with peer 10.15.25.142:51544
05/02/2012 13:20:32 EDT 1405 Info     Diameter:Received CER [2859603283:0] from mpe26-42.test.com(10.15.25.142:51544)
05/02/2012 13:20:32 EDT 1412 Info     Diameter:Sent CEA | 2859603283:0 | DIAMETER  SUCCESS (2001) to mpe26-42.test.com( 10.15.25.142:51544) in
05/02/2012 13:20:32 EDT 1407 Notice   Diameter:Peer mpe26-42.test.com(10.15.25.142:51544) status changed from INITIAL to OKAY
```

Trace Log Details

```
Diameter:Received CER [2859603283:0] from mpe26-42.test.com(10.15.25.142:51544)
Diameter Message: CER
Version: 1
Msg Length: 524
Cmd Flags: REQ
Cmd Code: 257
App-Id: 0
```

Figure 14: MRA Trace Log

KPI Dashboard

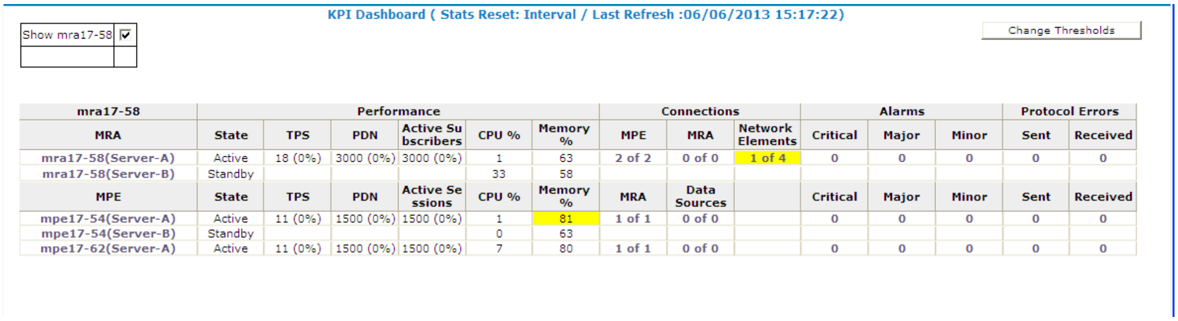
The KPI dashboard provides a multi-site, system-level, summary of performance and operational health indicators in the CMP web based GUI. The display includes indicators for:

- Offered load (transaction rate)
- System capacity (counters for active sessions)
- Inter-system connectivity
- Physical resource utilization (memory, CPU)
- System status

To display the KPI dashboard, from the main menu click KPI Dashboard. The dashboard opens in the work area.

The KPI dashboard displays the indicators for all the systems on a single page, with the KPIS for each MRA in a separate table. Each row within a table represents a single system (either an MRA blade or an MPE blade that is being managed by that MRA). The table cells are rendered using a color scheme to highlight areas of concern that is well adapted by the telecommunication industry. The table contents are periodically refreshed. The color changing thresholds are user configurable. The refresh rate is set to 10 seconds and is not configurable.

The following figure is an example illustrating the dashboard's contents.



KPI Dashboard (Stats Reset: Interval / Last Refresh :06/06/2013 15:17:22)

Show mra17-58 ☑

mra17-58	Performance						Connections			Alarms			Protocol Errors	
MRA	State	TPS	PDN	Active Subscribers	CPU %	Memory %	MPE	MRA	Network Elements	Critical	Major	Minor	Sent	Received
mra17-58(Server-A)	Active	18 (0%)	3000 (0%)	3000 (0%)	1	63	2 of 2	0 of 0	1 of 4	0	0	0	0	0
mra17-58(Server-B)	Standby				33	58								
MPE	State	TPS	PDN	Active Sessions	CPU %	Memory %	MRA	Data Sources		Critical	Major	Minor	Sent	Received
mpe17-54(Server-A)	Active	11 (0%)	1500 (0%)	1500 (0%)	1	81	1 of 1	0 of 0		0	0	0	0	0
mpe17-54(Server-B)	Standby				0	63								
mpe17-62(Server-A)	Active	11 (0%)	1500 (0%)	1500 (0%)	7	80	1 of 1	0 of 0		0	0	0	0	0

Figure 15: KPI Dashboard

The top left corner lists each MRA with a checkbox that allows you to enable/disable the table for that MRA. 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).

Each MRA or MPE system has two rows in the table. The first row displays data for the primary (active) blade in the cluster. The second row displays data for the secondary (backup) blade in the cluster. Several of the KPI columns are not populated for the secondary blade (since the blade is not active). The only columns that contain data are: Status, CPU%, and Memory%.

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 is cleared. No coloring is applied.

The columns that display "TPS" (on the MPE - the number of Diameter Requests (per second) received from the Clients) and "PDN Connections" information is displayed in the form X (Y%) where X represents the actual numeric value and Y represents the % of rated system capacity that is consumed.

The columns that display connection counts is 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.

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 the OSSI XML output.

For more information on the OSSI XML interface, see the *OSSI XML Interface Definitions Reference Guide*.

[1] On the MPE - the number of Diameter Requests (per second) received from the Clients). On the MRA - The number of Diameter Requests per second received from either MRA and the number of Diameter Requests per second sent to the HSS.

Table 4: Policy Statistics

Display	**MPE**	**MRA**	**Name**
Peg Count	Y	N	
Evaluated	Y	N	
Executed	Y	N	
Ignored	Y	N	
Policy Details Stats:			
Policy TDF session	Y	N	
Name	Y	N	
Evaluated	Y	N	Eval Count
Executed	Y	N	Trigger Count
Ignored	Y	N	
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 5: Quota Profile Statistics Details

Display	**MPE**	**MRA**	**Name**
Peg Count	Y	N	
Application	Y	N	
Session	Y	N	
Total	Y	N	

Table 6: Diameter Application Function (AF) 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

Display	**MPE**	**MRA**	**Name**
AAR messages sent/received	Y	Y	AAR Recv Count\AAR Send Count
AAR initial messages recd /sent	Y	Y	AAR Initial Recv Count\AAR Initial Send Count
AAR modification messages recd/sent	Y	Y	AAR Modification Recv Count\AAR Modification Send Count
AAA success messages recd/sent	Y	Y	AAA Recv Success Count\AAA Send Success Count
AAA failure messages recd/sent	Y	Y	AAA Recv Failure Count\AAA Send Failure Count
AAR messages timeout	Y	Y	AAR Timeout Count
ASR messages recd/sent	Y	Y	ASR Recv Count\ASR Sent Count
ASR messages timeout	Y	Y	ASR Timeout Count
ASA success messages recd/sent	Y	Y	ASA Recv Success Count\ASA Send Success Count
ASA failure messages recd/sent	Y	Y	ASA Recv Failure Count\ASA Send Failure Count
RAR messages recd/sent	Y	Y	RAR Recv Count\RAR Send Count
RAR messages timeout	Y	Y	RAR Timeout Count
RAA success messages recd/sent	Y	Y	RAA Recv Success Count\RAA Send Success Count
RAA failure messages recd /sent	Y	Y	RAA Recv Failure Count\RAA Send Failure Count
STR messages recd/sent	Y	Y	STR Recv Count\STR Send Count
STR messages timeout	Y	Y	STR Timeout Count
STA success messages recd /sent	Y	Y	STA Recv Success Count\STA Send Success Count
STA failure messages recd/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
Diameter AF Peer Stats (in Diameter AF Stats window)	N	Y	
Connect Time	N	Y	Connect Time
Disconnect Time	N	Y	Disconnect Time
Connection Type			

Display	MPE	MRA	Name
IP Address: Port			
Total messages in/out	N	Y	Msg In Count\Msg Out Count
Total error messages in/out			
AAR messages sent/received	N	Y	AAR Recv Count\AAR Send Count
AAR initial messages recd/sent	N	Y	AAR Initial Recv Count\AAR Initial Send Count
AAR modification messages recd/sent	N	Y	AAR Modification Recv Count\AAR Modification Send Count
AAA success messages recd/sent	N	Y	AAA Recv Success Count\AAA Send Success Count
AAA failure messages recd/sent	N	Y	AAA Recv Failure Count\AAA Send Failure Count
AAR messages timeout	N	Y	AAR Timeout Count
ASR messages recd/sent	N	Y	ASR Recv Count\ASR Sent Count
ASR messages timeout	N	Y	ASR Timeout 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
RAR messages recd/sent	N	Y	RAR Recv Count\RAR Send Count
RAR messages timeout	N	Y	RAR Timeout Count
RAA success messages recd/sent	N	Y	RAA Recv Success Count\RAA Send Success Count
RAA failure messages rec/sent	N	Y	RAA Recv Failure Count\RAA Send Failure Count
STR messages recd/sent	N	Y	STR Recv Count\STR Send Count
STR messages timeout	N	Y	STR Timeout Count
STA success messages rec/sent	N	Y	STA Recv Success Count\STA Send Success Count
STA failure messages recd/sent	N	Y	STA Recv Failure Count\STA Send Failure Count

Table 7: Diameter Policy Charging Enforcement Function (PCEF) Statistics

Display	MPE	MRA	Name
Connections	Y	N	Conn Count (SCTP or TCP)

Display	MPE	MRA	Name
Currently okay peers	Y	N	Peer Okay Count
Currently down/suspect/reopned 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 recd/sent	Y	Y	CCR Recv Count\CCR Send Count
CCR messages timeout	Y	Y	CCR-Timeout Count
CCA success messages recd/sent	Y	Y	CCA Recv Success Count\CCA Send Success Count
CCA failure messages recd/sent	Y	Y	CCA Recv Failure Count\CCA Send Failure Count
CCR-I messages recd/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 recd/sent	Y	Y	CCA-I Recv Success Count\CCA-I Send Success Count
CCA-I failure messages recd/sent	Y	Y	CCA-I Recv Failure Count\CCA-I Send Failure Count
CCR-U messages recd/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 recd/sent	Y	Y	CCA-U Recv Success Count\CCA-U Send Success Count
CCA-U failure messages recd/sent	Y	Y	CCA-U Recv Failure Count\CCA-U Send Failure Count
CCR-T messages recd/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 recd/sent	Y	Y	CCA-T Recv Success Count\CCA-T Send Success Count
CCA-T failure messages recd/sent	Y	Y	CCA-T Recv Failure Count\CCA-T Send Failure Count
RAR messages recd/sent	Y	Y	RAR Recv Count\RAR Send Count
RAR messages timeout	Y	Y	RAR Timeout Count
RAA success messages recd/sent	Y	Y	RAA Recv Success Count\RAA Send Success Count
RAA failure messages recd/sent	Y	Y	RAA Recv Failure Count\RAA Send Failure Count

Display	MPE	MRA	Name
Currently active sessions	Y	N	Active Session Count
Max active sessions	Y	N	Max Active Session Count

Table 8: 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
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

Display	MPE	MRA	Name
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 9: 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 sent/received	Y	Y	CCR Recv Count\CCR Send Count
CCR messages Timeout	Y	Y	CCR-Timeout Count
CCA success messages recd/sent	Y	Y	CCA Recv Success Count\CCA Send Success Count
CCA failure messages recd/sent	Y	Y	CCA Recv Failure Count\CCA Send Failure Count
CCR-I messages sent/received	Y	Y	CCR-I Recv Count\CCR-I Send Count
CCR-I messages Timeout	Y	Y	CCR-I Timeout Count
CCA-I success messages recd/sent	Y	Y	CCA-I Recv Success Count\CCA-I Send Success Count
CCA-I failure messages recd/sent	Y	Y	CCA-I Recv Failure Count\CCA-I Send Failure Count
CCR-U messages sent/received	Y	Y	CCR-U Recv Count\CCR-U Send Count
CCR-U messages Timeout	Y	Y	CCR-U Timeout Count
CCA-U success messages recd/sent	Y	Y	CCA-U Recv Success Count\CCA-U Send Success Count

Display	MPE	MRA	Name
CCA-U failure messages recd/sent	Y	Y	CCA-U Recv Failure Count\CCA-U Send Failure Count
CCR-T messages sent/received	Y	Y	CCR-T Recv Count\CCR-T Send Count
CCR-T messages Timeout	Y	Y	CCR-T Timeout Count
CCA-T success messages recd/sent	Y	Y	CCA-T Recv Success Count\CCA-T Send Success Count
CCA-T failure messages recd/sent	Y	Y	CCA-T Recv Failure Count\CCA-T Send Failure Count
RAR messages sent/received	Y	Y	RAR Recv Count\RAR Send Count
RAR messages Timeout	Y	Y	RAR Timeout Count
RAA success messages recd/sent	Y	Y	RAA Recv Success Count\RAA Send Success Count
RAA failure messages recd/sent	Y	Y	RAA Recv Failure Count\RAA Send Failure Count
Diameter BBERF connections	Y	Y	
Currently active sessions	Y	N	Curr Session Count
Max active sessions	Y	N	Max Active Session Count

Table 10: Diameter TDF 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 sent/received	Y	Y	CCR Recv Count\CCR Send Count
CCR messages Timeout	Y	Y	CCR-Timeout Count
CCA success messages recd/sent	Y	Y	CCA Recv Success Count\CCA Send Success Count
CCA failure messages recd/sent	Y	Y	CCA Recv Failure Count\CCA Send Failure Count
CCR-U messages sent/received	Y	Y	CCR-U Recv Count\CCR-U Send Count
CCR-U messages Timeout	Y	Y	CCR-U Timeout Count

Display	MPE	MRA	Name
CCA-U success messages recd/sent	Y	Y	CCA-U Recv Success Count\CCA-U Send Success Count
CCA-U failure messages recd/sent	Y	Y	CCA-U Recv Failure Count\CCA-U Send Failure Count
CCR-T messages sent/received	Y	Y	CCR-T Recv Count\CCR-T Send Count
CCR-T messages Timeout	Y	Y	CCR-T Timeout Count
CCA-T success messages recd/sent	Y	Y	CCA-T Recv Success Count\CCA-T Send Success Count
CCA-T failure messages recd/sent	Y	Y	CCA-T Recv Failure Count\CCA-T Send Failure Count
RAR messages sent/received	Y	Y	RAR Recv Count\RAR Send Count
RAR messages Timeout	Y	Y	RAR Timeout Count
RAA success messages recd/sent	Y	Y	RAA Recv Success Count\RAA Send Success Count
RAA failure messages recd/sent	Y	Y	RAA Recv Failure Count\RAA Send Failure Count
TSR messages sent/received	Y	Y	
TSA success messages recd/sent	Y	Y	
TSA failure messages recd/sent	Y	Y	
Diameter TDF connections	Y	Y	
Currently active sessions	Y	N	Curr Session Count
Max active sessions	Y	N	Max Active Session Count

Table 11: 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 retried	Y	N	

Display	MPE	MRA	Name
UDR messages timeout	Y	N	UDRTimeout Count
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
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

Table 12: 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 recd/sent	Y	Y	DBRRecv Count\DBRSend Count
DBR messages timeout	Y	Y	DBRTimeout Count
DBA success messages recd/sent	Y	Y	DBARecv Success Count\DBASend Success Count
DBA failure messages recd/sent	Y	Y	DBARecv Failure Count\DBASend Failure Count
DBA messages recd/sent – binding found	Y	Y	Binding Found Recv Count\Binding Found Send Count
DBA messages recd/sent – binding not found	Y	Y	Binding Not Found Recv Count\Binding Not Found Send Count
DBA messages recd/sent – PCRF down	Y	Y	Binding Found Pcrf Down Recd Count\ Binding Found Pcrf Down Send Count
DBA messages recd/sent – all PCRFs down	Y	Y	All Pcrfs Down Recv Count\ All Pcrfs Down Send Count
RUR messages recd/sent	Y	Y	RURRecv Count\ RURSend Count
RUR messages timeout	Y	Y	RURTimeout Count
RUA success messages recd/sent	Y	Y	RUARecv Success Count\ RUASend Success Count
RUA failure messages recd/sent	Y	Y	RUARecv Failure Count\ RUASend Failure Count
LNR messages recd/sent	Y	Y	LNRRecv Count\ LNRSend Count
LNR messages timeout	Y	Y	LNRTimeout Count
LNA success messages recd/sent	Y	Y	LNARecv Success Count\ LNASend Success Count
LNA failure messages recd/sent	Y	Y	LNARecv Failure Count\ LNASend Failure Count
LSR messages recd/sent	Y	Y	LSRRecv Count\ LSRSend Count
LSR messages timeout	Y	Y	LSRTimeout Count

Display	MPE	MRA	Name
LSA success messages recd/sent	Y	Y	LSARecv Success Count\ LSASend Success Count
LSA failure messages recd/send	Y	Y	LSARecv Failure Count\ LSASend Failure Count

Note: Diameter DRA statistics apply only to MRA devices.

Table 13: 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
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 14: 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

Display	MPE	MRA	Name
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
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

Table 15: 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 15: Diameter Latency Statistics

Display	MPE	MRA	Name
Connections	Y	Y	Active Connection Count

Display	MPE	MRA	Name
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 Processing Time [160-180] ms Processing Time [180-200] ms Processing Time [>200] ms

Table 16: Diameter Event Trigger Statistics

Display	MPE	MRA	Name
Diameter Event Trigger Stats by Code	Y	N	
Diameter Event Trigger Stats by Remote Entity:			
Diameter PCEF Application Event Trigger	Y	N	
Diameter BBERF Application Event Trigger	Y	N	

Table 17: 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 18: 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 19: 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

Display	MPE	MRA	Name
Average time spent on unsuccessful updates (ms)	Y	N	Update Avg Miss Time

Table 20: 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
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

Display	MPE	MRA	Name
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
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

Display	MPE	MRA	Name
Average time spent on unsuccessful unsubscriptions (ms)	Y	N	Unsubscription Avg Miss Time

Table 21: 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
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

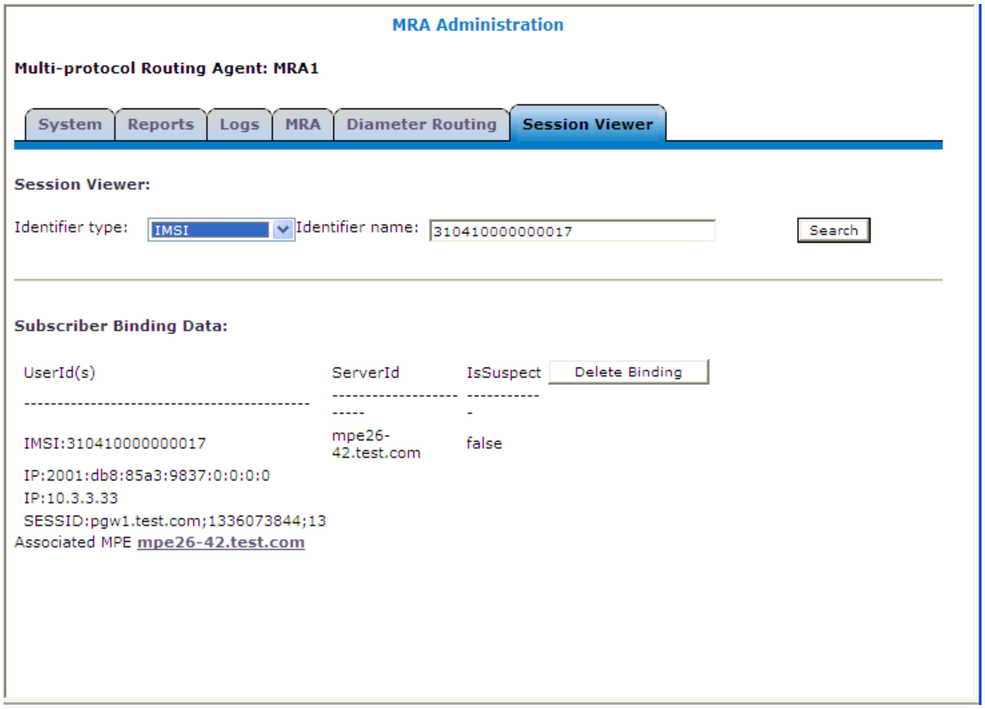
Table 22: KPI Interval Statistics

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

The Subscriber Session Viewer

The Session Viewer displays detailed session information for a specific subscriber. This information is contained on the **Session Viewer** tab, located under the configuration page for both MRA and MPE devices. You can view the same subscriber session from an MRA device or its associated MPE device.

Within the session viewer, you can enter query parameters to render session data for a specific subscriber. For example:



Multi-protocol Routing Agent: MRA1

Session Viewer:

Identifier type: IMSI

Identifier name: 310410000000017

Subscriber Binding Data:

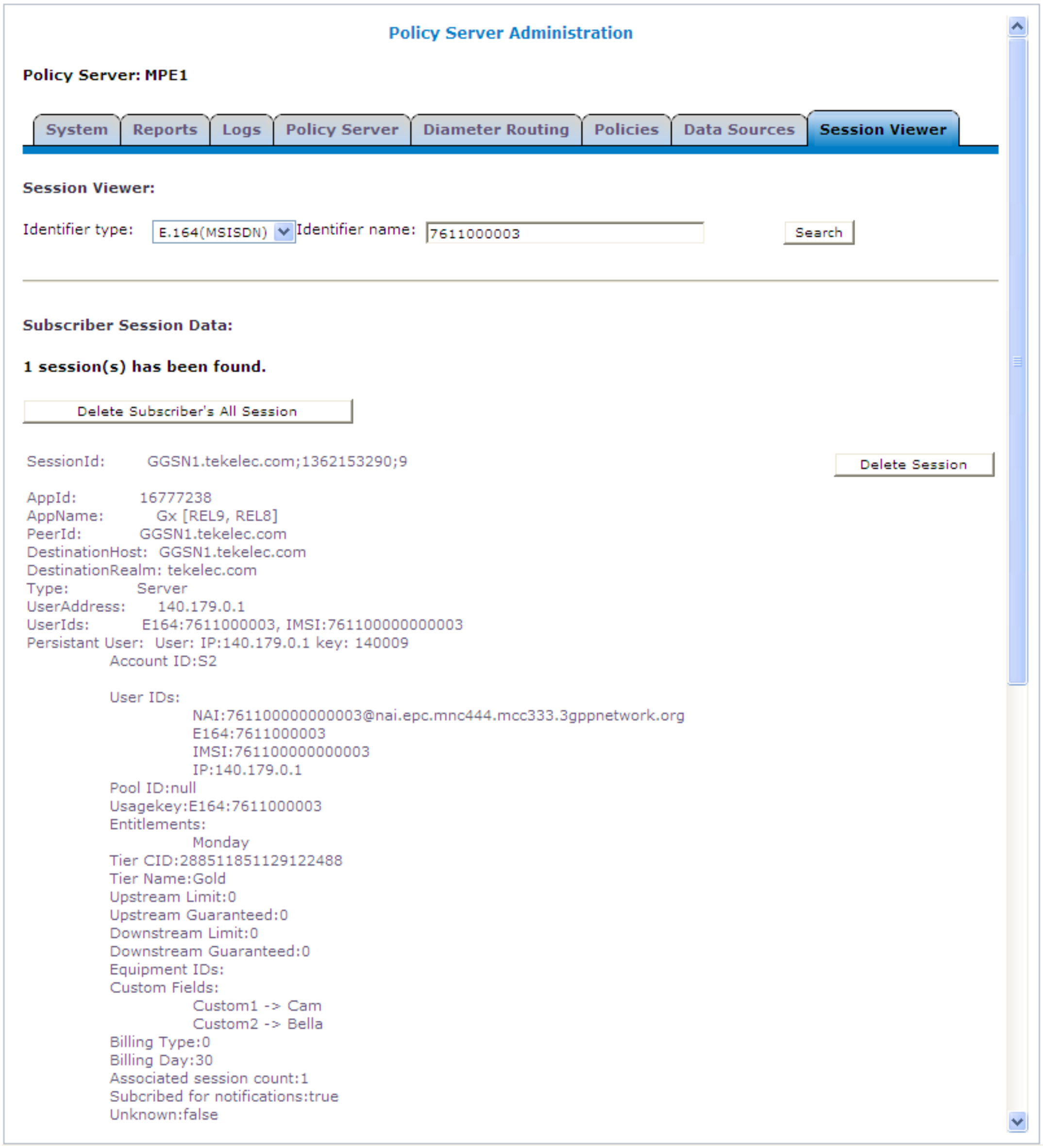
UserId(s)	ServerId	IsSuspect
IMSI:310410000000017 IP:2001:db8:85a3:9837:0:0:0:0 IP:10.3.3.33 SESSID:pgw1.test.com;1336073844;13	mpe26-42.test.com	false

Associated MPE mpe26-42.test.com

Viewing Session Data from the MPE

You can view the same subscriber session from an MRA device or its associated MPE device. To view session data from the MPE:

1. From the Policy Server section of the navigation pane, select **Configuration**.
2. Select the MPE device from the content tree.
3. On the **Session Viewer** tab, select the identifier type (**NAI**, **E.164(MSISDN)**, **IMSI**, **IPv4Address**, or **IPv6Address**), enter the identifier name, and click **Search**. Information about the subscriber session(s) is displayed.



Policy Server: MPE1

Session Viewer:

Identifier type: E.164(MSISDN) Identifier name: 7611000003

Subscriber Session Data:

1 session(s) has been found.

```
SessionId:       GGSN1.tekelec.com;1362153290;9

AppId:          16777238
AppName:          Gx [REL9, REL8]
PeerId:         GGSN1.tekelec.com
DestinationHost:  GGSN1.tekelec.com
DestinationRealm: tekelec.com
Type:           Server
UserAddress:      140.179.0.1
UserIds:         E164:7611000003, IMSI:761100000000003
Persistant User:  User: IP:140.179.0.1 key: 140009
            Account ID:S2

            User IDs:
                        NAI:761100000000003@nai.epc.mnc444.mcc333.3gppnetwork.org
                        E164:7611000003
                        IMSI:761100000000003
                        IP:140.179.0.1
            Pool ID:null
            Usagekey:E164:7611000003
            Entitlements:
                        Monday
            Tier CID:288511851129122488
            Tier Name:Gold
            Upstream Limit:0
            Upstream Guaranteed:0
            Downstream Limit:0
            Downstream Guaranteed:0
            Equipment IDs:
            Custom Fields:
                        Custom1 -> Cam
                        Custom2 -> Bella
            Billing Type:0
            Billing Day:30
            Associated session count:1
            Subcribed for notifications:true
            Unknown:false
```

The MRA device is listed by peer ID.

If no session data is available, the CMP returns the following message:

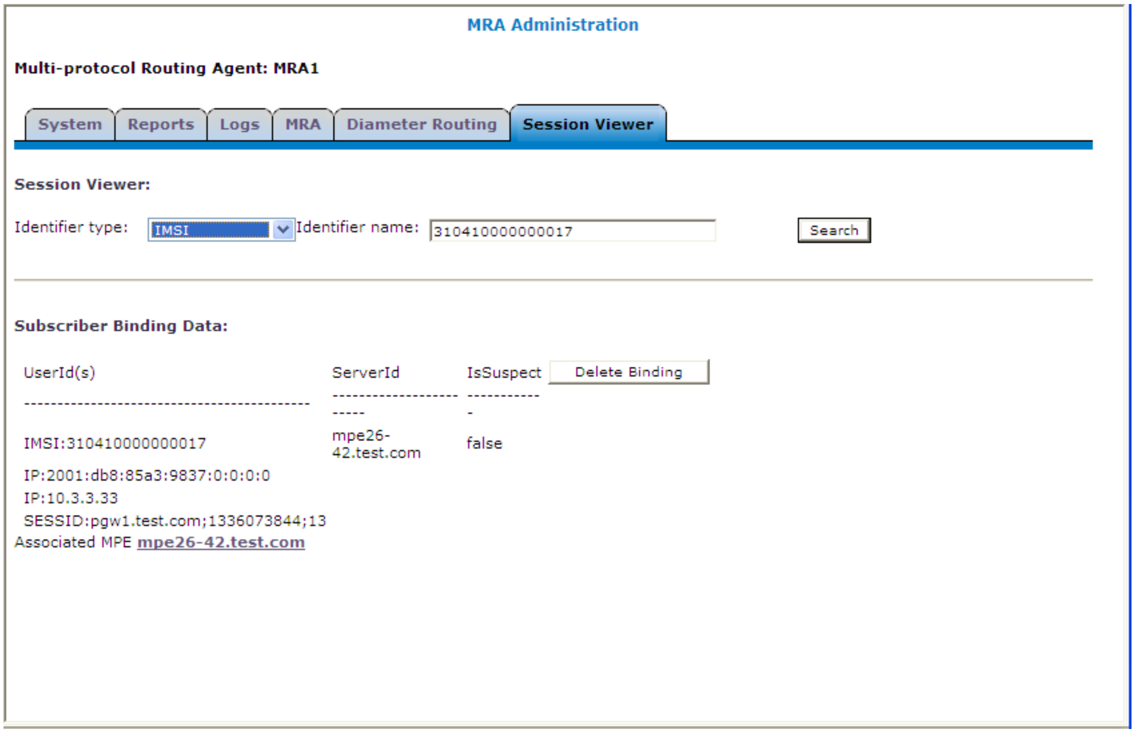
> There are no sessions available for the subscriber.

Viewing Session Data from the MRA

You can view the same subscriber session from an MRA device or its associated MPE device. To view session data from the MRA device:

1. From the **MRA** section of the navigation pane, select **Configuration**.
2. Select the MRA device from the content tree.

3. On the **Session Viewer** tab, select the Identifier Type (**NAI**, **E.164(MSISDN)**, **IMSI**, **IPv4Address**, or **IPv6Address**), enter the **Identifier name**, and click **Search**. Information about the subscriber binding data is displayed; for example:



MRA Administration

Multi-protocol Routing Agent: MRA1

Session Viewer:

Identifier type: IMSI Identifier name: 310410000000017

Subscriber Binding Data:

```
UserId(s)                                   ServerId            IsSuspect
------------------------------------------  ------------------  ----------
                                            -----               -
IMSI:310410000000017                        mpe26-              false
                                            42.test.com
IP:2001:db8:85a3:9837:0:0:0:0
IP:10.3.3.33
SESSID:pgw1.test.com;1336073844;13
Associated MPE mpe26-42.test.com
```

The MPE device that is handling sessions for the subscriber is listed by its server ID.

If no session data is available, the CMP returns, "There are no bindings available for the subscriber."

Deleting a Session from the Session Viewer Page

The Session Viewer page includes a **Delete** button that lets you delete the session (or binding data) that is being displayed. After you have clicked **Delete** and confirmed the delete operation, the CMP sends the delete request to the MRAgent/MIAgent and returns to the Session Viewer data page, displaying the delete result and the remaining session data.

CAUTION

Caution: This is an administrative action that deletes the associated record in the database and should only be used for obsolete sessions. If the session is in fact active it will not trigger any signaling to associated gateways or other external network elements.

Glossary

B

BBERF

Bearer Binding and Event Reporting Function: A type of Policy Client used to control access to the bearer network (AN).

C

CPU

Central Processing Unit

CTF

Charging Trigger Function

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 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.

G

GUI

Graphical User Interface

The term given to that set of items and facilities which provide the user with a graphic means for

G

	manipulating screen data rather than being limited to character based commands.

H

HSS	Home Subscriber Server A central database for subscriber information.

K

KPI	Key Performance Indicator

P

PCC	Policy and Charging Control
PDN	Packet Data Network A digital network technology that divides a message into packets for transmission.

R

realm	A fundamental element in Diameter is the realm, which is loosely referred to as domain. Realm IDs are owned by service providers and are used by Diameter nodes for message routing.

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.