

Chapter 25

Managing Tiered and Premium Services with QoS on JUNOSe Routers with the C-Web Interface

This chapter describes how to use the C-Web interface to manage QoS services that are available on JUNOSe routers.

You can also use the SRC CLI to manage QoS services. For more information, see *SRC-PE Solutions Guide, Chapter 1, Managing Tiered and Premium Services with QoS on JUNOSe Routers with the SRC CLI*.

Topics include:

- Overview of QoS on JUNOSe Routers on page 267
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Overview of QoS on JUNOSe Routers

Tiered Internet access and premium services such as video on demand, gaming, or videoconferencing require QoS profiles to be running on the subscriber interface on the JUNOSe router. The router allows only one QoS profile to be attached to an interface at one time. Therefore, as a subscriber activates and deactivates different services, the QoS profile running on the interface needs to change. Also, as subscribers activate services, they may have multiple QoS services running at the same time; for example, internet-gold with videoconferencing.

With the SRC software, you can:

- Dynamically manage QoS profiles on the JUNOSe router to control a combination of services that require QoS.
- Update the directory and SDX Admin with a list of QoS profiles that are currently configured on a JUNOSe router.
- Search the directory for QoS policy information.

Dynamically Managing QoS Profiles

The SAE provides a QoS-tracking plug-in (QTP) that you can use to ensure that, as a subscriber activates and deactivates services, the required QoS profile is attached to the subscriber interface. With the QTP, the QoS profile selected is based on the activation state of an aggregation of services, not just one service.

For example, a subscriber activates a QoS service on a subscriber interface that requires a QoS profile that supports 512 best effort. The subscriber then activates a faster service (for example, 1024 best effort), as well as video on demand, and now has two QoS services running on an interface. The subscriber now needs a QoS profile to be attached to the interface that supports both video on demand and 1024 best-effort service. The QTP can determine which QoS profile the subscriber needs, and can cause the existing QoS profile to be removed from the subscriber interface and the new QoS profile to be attached to the interface.

Note that if a profile is installed on a subscriber interface and the QTP installs a new profile, the new profile is based on QoS services that are currently active. The new profile does not combine the functionality of the previous profile with the new profile. For example, if a subscriber has a default policy with QoS profile be-512 installed on the subscriber interface, and the subscriber activates a video-on-demand service, the QTP does not combine the functionality of be-512 with the profile that supports video on demand.

How QoS Profile Tracking Works

The SAE manages policies on router interfaces through service sessions. Service session configurations contain the policy that needs to be installed on an interface when a service is activated. The policy definition can include the name of a QoS profile to attach to the interface when the policy is installed.

When you set up the QTP, you create a QoS profile attachment service. The purpose of this service is to attach the required QoS profile to an interface. This service is hidden from subscribers and is under only QTP control.

Because profiles need to be changed only when QoS services are activated or deactivated, the QTP tracks services and reacts to service state changes by adjusting the QoS profile attachment as needed by deactivating and activating the QoS profile attachment service.

Subscribers who need their services managed by the QTP are subscribed to the QoS profile attachment service.

Identifying QoS Services

When you set up a service, you identify the service as a QoS service in one of the fields in the service definition. For example, you can assign a service name or category to indicate that the service is a QoS service, or you could assign the QTP instance name in the Tracking Plugin field.

When the SAE notifies the QTP that a service has been activated or deactivated, the QTP determines whether it is a QoS service by searching attributes in the service object. The QTP uses a search filter that you set up to search an attribute for the information that you assigned to the service to indicate that it is a QoS service.

For example, suppose you enter `myqtp` in the tracking plug-in field of QoS services to indicate that the service is a QoS service. You would set up the search filter to search tracking plug-in attributes for any service that contains `myqtp`:

```
(attribute.trackPlug=*myqtp*)
```

Or you might configure the category to indicate that a service is a QoS service. The following filter searches service category attributes for any entry that contains `ultra`, `video on demand`, or `video telephony`:

```
((serviceCategory=*ultra*)((serviceCategory=*video on demand*)(serviceCategory=*video telephony*)))
```

To obtain a list of attribute names for the `sspService` object class, see the LDAP schema documentation in the SRC software distribution in the folder `SDK/doc/ldap` or on the Juniper Networks Web site at

<http://www.juniper.net/techpubs/software/management/sdx>

Determining the QoS Profile

After the QTP determines that a service is a QoS service, it needs to obtain the name of the QoS profile for the service. The QTP generates a QoS profile name based on active QoS services as follows:

1. Obtains QoS profile input values.

The QTP obtains these values by taking the value of an attribute in the service definition. You specify which attribute that you want the QTP to use as the input value. For example, you can specify the service name, the category, or the contents of the design and graphics attribute.

2. Compiles a list of the QoS profile input values.
3. Removes duplicate values from the list.
4. Sorts the remaining list by using a case-sensitive alphanumeric comparison.
5. Concatenates the values with a separator. The default value for the separator is a hyphen (-). You can specify a different separator.

Table 11 shows how lists of QoS profile input values are sorted and then concatenated.

Table 11: Examples of Concatenated QoS Profile Input Values

Input – QoS Profile Input Values	Output – Concatenated Name
be512, vod	be512-vod
game, be1024, vod	be1024-game-vod
be128	be128

6. Adds a prefix to the resulting name. The default prefix is qos-profile. (You can specify a different value.) The output from our examples in Table 11 now looks like this:

- qos-profile-be512-vod
- qos-profile-be1024-game-vod
- qos-profile-be128

The names that result from this process are the QoS profile names.

As you can see from this process, you need to design services and configure the QTP so that the resulting QoS profile names match the names of the QoS profiles configured on the JUNOSe router.

Typically, a QoS designer creates a number of QoS profiles that support all the services that are expected to be used. This design results in various QoS profiles that need to be configured on each router. If a required QoS profile is not configured on the router, the hidden QoS profile attachment service cannot be activated. Services are still activated for the subscriber, but the services will not provide the expected traffic requirements. When this happens, the SAE logs the error but does not send an error message to the subscriber.

Setting Up Policy Groups

You need to create two types of policy groups in your QTP configuration. The QoS profile attachment service needs a policy group that attaches the required QoS profile to the subscriber interface when the attachment service is activated. QoS services need policy groups that classify traffic and specify the action to take on traffic that matches the classifier. (You can set up traffic classifiers to match any traffic.)

Policy Group for QoS Profile Attachment Service

The policy group for the hidden QoS profile attachment service must have an egress policy list with only one policy rule that contains a QoS profile attachment action. The QoS profile attachment action must have a variable parameter in the QoS profile field.



NOTE: The policy group for the QoS profile attachment service must contain only one egress policy list and must contain one and only one QoS profile attachment action. Otherwise, the SRC software will require a license for the hidden service.

When the profile attachment service is activated, the QTP substitutes the QoS profile attribute in the policy with the QoS profile name that it determined, as described in *Determining the QoS Profile* on page 269. The service then loads the policy.

The following example creates a policy group for the QoS profile attachment service. This policy group does not match any traffic.

1. Create a policy group called Pg-qos-attach, and add an egress policy list.
2. In the egress policy list, create a policy rule that has a classify-traffic condition that will not match any real traffic. For example, set both the source and destination addresses to 0.0.0.0/32.
3. In the egress policy list, create a policy rule that has a QoS profile attachment action with QoS profile qpName.

By default, the QTP looks for qpName as the variable parameter.

When the QTP determines the required QoS profile name, it substitutes qpName with the value that it acquired.

Setting Up Services

You need to set up a QoS profile attachment service and QoS services. Both types of services are value-added (SSP) services.

In the QoS profile attachment service, assign the policy group that you configured for the service. For example, policyGroupName = Pg-qos-attach, ou = ent, o = Policies, o = umc.

In QoS services, assign the policy group that you configured for the service.

Subscribe subscribers to the QoS profile attachment service and to the appropriate QoS services.

Reestablishing Default QoS Profile

A default QoS profile may be installed on the subscriber interface before the QTP installs QoS profiles in response to the activation of QoS services. For example, a profile may have been attached to the subscriber interface when the default policy was installed. Once QoS services are no longer active on the interface, the QTP can reestablish the QoS profile that was installed on the interface before the QTP began tracking services and installing profiles on the interface.

Example: How QTP Activates a QoS Service

The following example shows the process that QTP uses when a subscriber activates a QoS service. In this example, QoS profile input values are taken from the service name attribute. The hidden QoS profile attachment service is named svc-qos-attach. The svc-qos-attach service contains a policy that has the variable parameter qpName assigned as the QoS profile name.

1. The subscriber does not have any active services.
2. The subscriber activates service be512, which is a QoS service.
 - a. The SAE sends a Service Session Start event to the QTP.
 - b. The QTP searches an attribute in the service definition and determines that the service is a QoS service.
 - c. Using the SAE Common Object Request Broker Architecture (CORBA) remote application programming interface (API), the QTP gets a list of the subscriber's active QoS services.

The list contains only service be512 because that is the only service that the subscriber has activated.
 - d. The QTP adds the default prefix to the QoS profile input value to obtain the QoS profile name. The result is:

qos-profile-be512
 - e. The QTP deactivates the hidden svc-qos-attach service. Because this svc-qos-attach service was not active before, this operation does not have any effect.
 - f. The QTP activates the hidden svc-qos-attach service, and it substitutes variable parameter qpName with '\$qos-profile-be512' as the QoS profile name in the policy.
 - g. The policy loads qos-profile-be512 on the subscriber interface.
3. The subscriber activates service vod, which is a QoS service.
 - a. The SAE sends a Service Session Start event to the QTP.
 - b. QTP searches attributes in active service definitions and determines that the service is a QoS service.
 - c. The QTP gets a list of the subscriber's active QoS services. The result is:

be512, vod
 - d. The QTP sorts the list and concatenates the QoS profile input values with the separator. The result is:

be512-vod
 - e. The QTP adds the default prefix to the concatenated name to obtain the QoS profile name. The result is:

qos-profile-be512-vod.
 - f. The QTP deactivates the hidden svc-qos-attach service.

- g. The QTP activates the hidden svc-qos-attach service, and it substitutes variable parameter qpName with '\$qos-profile-be512-vod' as the QoS profile name in the policy.
 - h. The policy loads qos-profile-be512-vod.
4. The subscriber deactivates service vod.
 - a. The QTP follows the same procedure as in Step 2 above and determines that the QoS profile name is qos-profile-vod.
 - b. The QTP deactivates the hidden svc-qos-attach service.
 - c. The QTP reactivates the hidden svc-qos-attach service, and it substitutes variable parameter qpName with '\$qos-profile-be512' as the QoS profile name in the policy.
 - d. The policy loads qos-profile-be512.

Configuring QoS Profile-Tracking Plug-Ins with the C-Web Interface

To configure the QoS profile-tracking plug-in with the C-Web interface:

1. Click **Configure**, expand **Shared > SAE**, and then expand the SAE group for which you want to configure a QoS tracking plug-in.
2. From the side pane, click **Configuration > Plug Ins**.
3. Click the plug-in for which you want to configure QoS tracking, and then click **QoS Profile Tracking**.

The QoS Profile Tracking pane appears.

4. Click **Create**, enter information as described in the Help text in the main pane, and then click **Apply**.

For additional information, see the following sources:

- For information about setting up SAE groups, see *Chapter 8, Setting Up an SAE with the C-Web Interface*.
- For information about creating a plug-in instance for a group, see *Chapter 27, Configuring Internal, External, and Synchronization Plug-Ins with the C-Web Interface*.

Configuring Search Filters for QoS Profile-Tracking Plug-Ins

The SAE uses a search filter to search service objects in the directory to find QoS services. You can set up the filter to search the values of any attribute in the service object, such as service name, category, or tracking plug-in. The search is successful when a value matches the filter.

For information about obtaining a list of attribute names for the sspService object class, see the documentation for the LDAP schema in the SRC software distribution in the folder *SDK/doc/ldap* or on the Juniper Networks Web site at

<http://www.juniper.net/techpubs/software/management/sdx>

Configure the search filter in a format similar to the LDAP search filter. Table 12 lists the values that you can use for filters. Each filter string <filter> contains a simplified LDAP query.

Table 12: Settings for Filter Strings

Filter String	Action
()	Matches no objects
(*)	Matches all objects
List of <attribute> = <value> pairs <attribute> —Name of a property or attribute <ldapAttributeName> <value> —One of the following <ul style="list-style-type: none"> ■ * (asterisk) ■ Explicit string ■ String that contains an * Note: To define a special character (* & , ! \) in a string, precede it with the backslash symbol (\).	<ul style="list-style-type: none"> ■ If <value> is *, checks for any value. ■ If <value> is an explicit string, checks whether any value of the property matches the string, regardless of case. ■ If <value> is a string that contains a *, checks whether any value of the property contains the string, regardless of case.
(&& <filter> <filter> ...)	True if all filters match
(<filter> <filter> ...)	True if at least one filter matches
(! <filter>)	True if the filter does not match

- Default—(attribute.trackPlug =); note that you need to add a search value after the equal sign
- Examples
 - To search tracking plug-in attributes for any entry that contains qtp:
(attribute.trackPlug=*qtp*)
 - To search service category attributes for any entry that contains ultra, video on demand, or video telephony:
(|(serviceCategory=*ultra*)|(serviceCategory=*video on demand*)(serviceCategory=*video telephony*))

Updating QoS Profile Data in the Directory

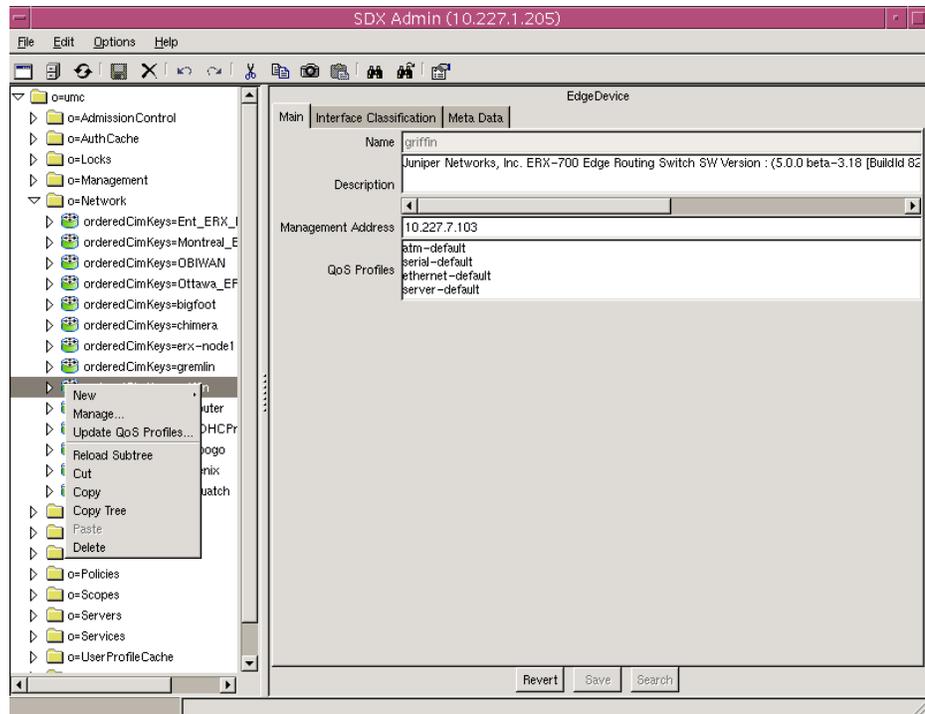
You can update the directory and SDX Admin with a list of QoS profiles that are currently configured on a JUNOS router. You can do so by using either SDX Admin or a program called qosProfilePublish.

Note that this feature is not supported on the C-series Controllers.

Using SDX Admin to Update QoS Profile Data

To update the directory with SDX Admin:

1. In the navigation pane, expand the object *o = Network*.
2. Select the router for which you want to update QoS profiles, and right-click.



3. Select Update QoS Profiles.

The SDX Admin dialog box appears.

4. Enter the IP address for the router; enter the SNMP community if the default value is incorrect; and click **OK**.

SDX Admin updates the QoS profiles for the router in the directory and displays the information in the QoS Profiles field of the Main tab in the EdgeDevice pane.

Using qosProfilePublish to Update QoS Profile Data

Because QoS profiles are part of the global configuration of JUNOSe routers, when a QoS profile is configured on the router, all virtual routers (VRs) can use that profile. Therefore, you update QoS profiles per router, not per VR as you do with IP pools. However, when you run `qosProfilePublish`, you still must define a VR using the `-v` option.

The syntax for qosProfilePublish is:

```
qosProfilePublish { { -v <vrName> @ <routerName> -i <ipAddress> }*
-h <host> -b <baseDn> -D <bindDN> -w <password>
-c <readCommunity> ] | -H }
```

To update QoS profile data using the **qosProfilePublish** command:

1. On the SAE host, access the folder */opt/UMC/sae/etc*.

```
cd /opt/UMC/sae/etc
```

2. Run the command.

```
./qosProfile -v vr1@erx1 -i 192.0.2.1 -v vr2@erx2 -i 192.0.2.3 -h 192.0.2.5 -w
admin123 -D cn=umcAdmin,o=umc -b o=Network,o=umc -c public
```

<vrName>

- Name of the VR.
- Value—Text string (value is case sensitive and must match the name in the JUNOS configuration)
- Example—vr-boston

<routerName>

- Name of the JUNOS router from which you want to update QoS profiles.
- Value—Text string (value is case sensitive and must match the name in the JUNOS configuration)
- Example—erx1

<ipAddress>

- JUNOS router IP address.
- Value—IP address or text string
- Example—192.0.2.1

<host>

- IP address or name of the host that supports the directory.
- Value—IP address or text string
- Example—192.0.2.2 or ottawa

<baseDn>

- DN of the root of the tree in the directory.
- Value—DN
- Example—o = Network,o = umc

<bindDn>

- DN of the username for authentication with the directory server.
- Value—DN
- Example—*cn = umcAdmin,o = umc*

<password>

- Password for authentication with the directory server.
- Value—Text string
- Example—*admin123*

<readCommunity>

- Name of the SNMP read community for a VR. If the SNMP read community for a VR is defined in the directory, you do not need to specify this value.
- Value—Text string
- Example—*Public*

-H

- Online help for this tool.

To update QoS profiles with qosProfilePublish:

1. Access the folder in which qosProfilePublish is installed.

```
cd /opt/UMC/sae/etc
```

2. Run qosProfilePublish.

The program accesses QoS profiles for the router that you specify and updates the information in the specified directory.

```
# ./qosProfilePublish -v default@erx1 -i 10.10.7.28 -h 10.10.227.7 -w admin123
-D cn=umcAdmin,o=umc -b o=Network,o=umc -c public
erx1 profiles are: ['atm-default', 'serial-default',
'ethernet-default', 'server-default']
```

Searching for QoS Policy Data in the Directory

Note that this feature is not supported on the C-series Controllers.

You can run queries of the directory data to find:

- QoS profiles configured on a JUNOSe router.
- QoS profiles in a policy group.
- Policy groups that contain a particular QoS profile.
- JUNOSe routers that have a QoS profile configured.

- Policy groups supported on a router. For a policy group to be supported on a router, both the policy group and the router must contain the same QoS profile.
- Routers that can be supported by a policy group. The query provides a list of routers that contain QoS profile(s) that are also in the specified policy group.

You can run these queries by using either Policy Editor or Policy Web Admin.

Using Policy Editor to Search for QoS Policy Information

Before using Policy Editor to run a query, you need to:

- Connect Policy Editor to a directory server. See *Starting Policy Editor* in *SRC-PE Services and Policies Guide, Chapter 7, Using Policy Editor*.
- Update the directory with a list of QoS profiles that are on the router(s) that you want to search. See *Updating QoS Profile Data in the Directory* on page 274.

Running Queries from Policy Editor

To run queries with Policy Editor:

1. In the Policy Editor window, click Tools in the menu bar; then click Query.

The Router Query window appears.

The screenshot shows a window titled "Router Query" with a light gray background. At the top, there are standard window controls (minimize, maximize, close). Below the title bar, there are five rows of controls:

- Aspect:** A text box containing "QoS Profile Configuration".
- Condition Type:** A dropdown menu with a downward arrow.
- Condition Value:** A dropdown menu with a downward arrow.
- Find:** A dropdown menu with a downward arrow.
- Supported:** A checkbox that is checked.

Below these controls is a large, empty rectangular area for displaying results. At the bottom of the window, there are three buttons: "Query", "Clear", and "Close".

2. Fill in the fields, and click **Query**.

To erase query results from the screen, click **Clear**.

Condition Type

- Object to be searched.
- Value—router, QoS profile, or policy group
- Default—No value

Condition Value

- Name of the QoS profile, router, or policy group that you want to search.
- Value—Name of the router, QoS profile, or policy group. If you selected router or policy group as a condition type, you can select a name from the drop-down menu. If the condition type is QoS profile, continue selecting entries in the drop-down menu until you reach the name of a policy group.
- Default—No value

Find

- Object that you want to find. The software searches for this object on the QoS profile, router, or policy group defined in condition type and condition value.
- Value—router, QoS profile, or policy group
- Default—No value

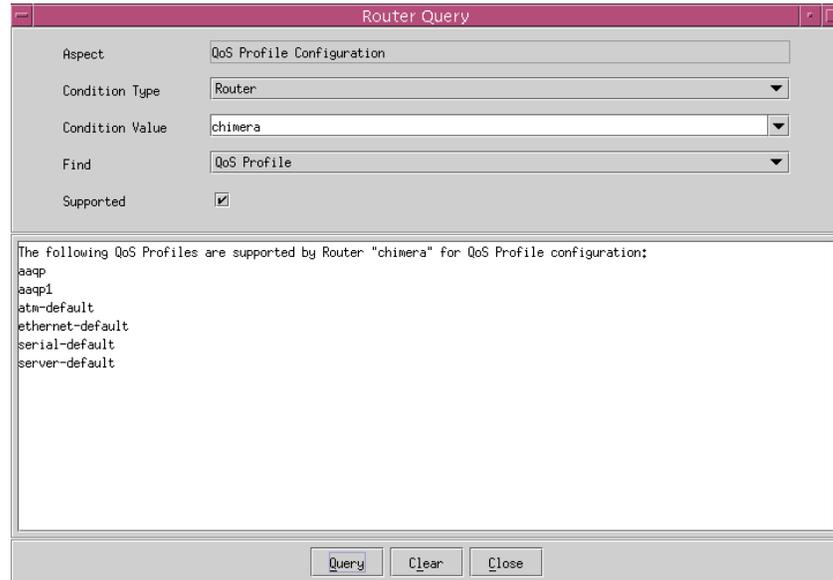
Supported

- Whether or not to search for the condition type that exists or does not exist on the router, QoS profile, or policy group.
- Value—Checked or unchecked
 - Checked—Searches for the condition type that is on the router, QoS profile, or policy group
 - Unchecked—Searches for the condition type that is not on the router, QoS profile, or policy group
- Default—No value

Examples

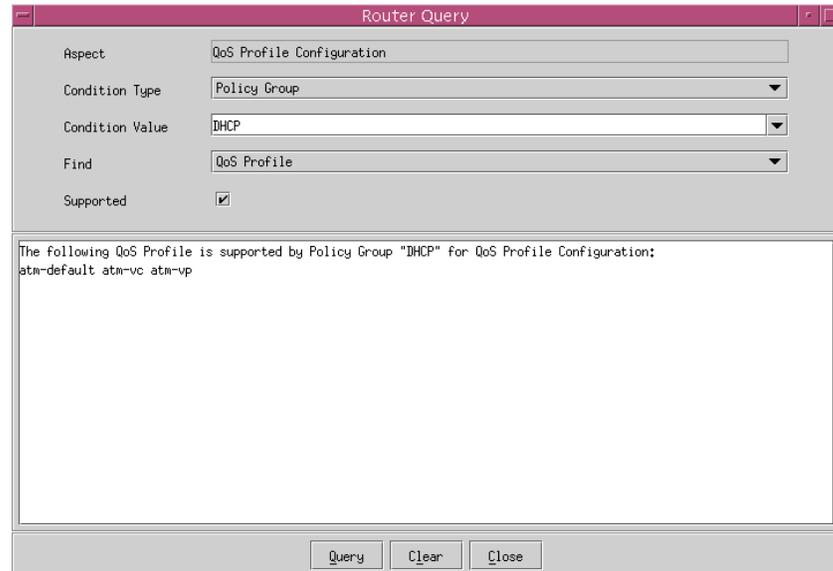
The query example in Figure 5 searches for all QoS profiles on router chimera.

Figure 5: Searching for All QoS Profiles on a Router



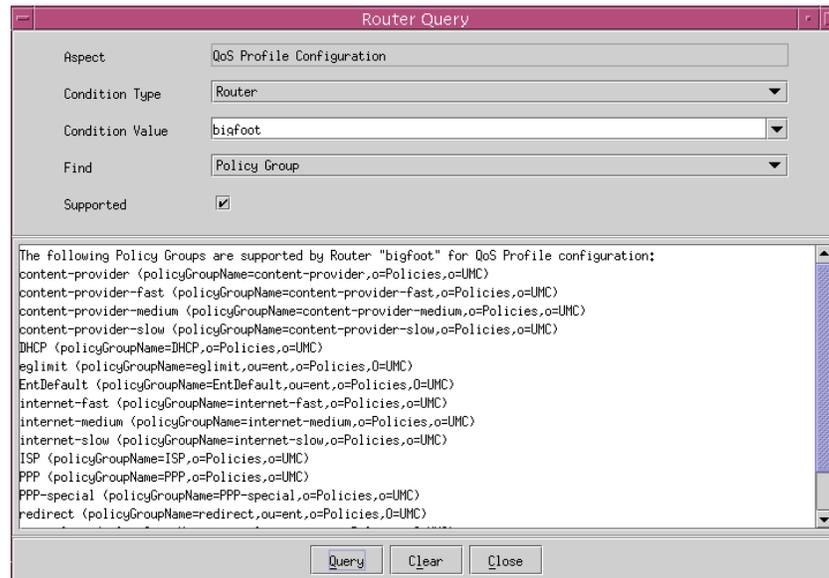
The query in Figure 6 searches for QoS profiles in policy group DHCP.

Figure 6: Searching for QoS Profiles in a Policy Group



The query in Figure 7 searches for all policy groups that router bigfoot supports. For a policy group to be supported on a router, both the policy group and the router must contain the same QoS profile.

Figure 7: Searching for All Policy Groups on a Router



Using Policy Web Admin to Search for QoS Policy Information

Before you use Policy Web Admin, deploy the WAR file for the Policy Web Admin in the Web application server. You can find this file, *pomAdmin.war*, in the folder *webapp* on the SRC software distribution. Refer to the documentation for the Web application server for information about deploying applications.

To deploy Policy Web Admin inside JBoss:

- Copy the file to the JBoss *server/default/deploy* directory.

```
cp /cdrom/cdrom0/webapp/pomAdmin.war
/opt/UMC/jboss/server/default/deploy
```

JBoss automatically starts the application when a WAR file is copied into the deploy directory.

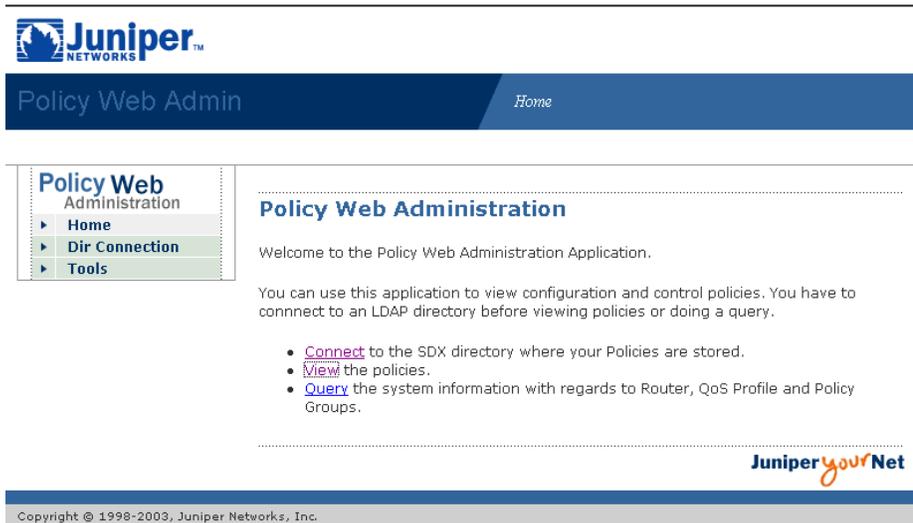
Launching Policy Web Admin

To launch Policy Web Admin:

1. Start your Web browser.
2. Enter the location of Policy Web Admin in the following format:

https://<web-server-name or ip-address>:<port>/pomAdmin

The Policy Web Admin page appears.



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NETWORKS

Policy Web Admin *Home*

Policy Web Administration

Administration

- ▶ Home
- ▶ **Dir Connection**
- ▶ Tools

Policy Web Administration

Welcome to the Policy Web Administration Application.

You can use this application to view configuration and control policies. You have to connect to an LDAP directory before viewing policies or doing a query.

- [Connect](#) to the SDX directory where your Policies are stored.
- [View](#) the policies.
- [Query](#) the system information with regards to Router, QoS Profile and Policy Groups.

Juniper yourNet

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Connecting to a Directory

Before you run queries, you need to connect to the directory where policies are stored. To connect to the directory:

1. From the Policy Web Admin main window, click **Dir Connection**.

The Directory Connection page appears.

2. Enter the connection information for the directory that contains the policies, and click **Connect**.

The Tools page appears.

Querying the Directory for QoS Information

To search the directory for QoS information:

1. In the Tools page, click **Query**.

The Query page appears.

The screenshot shows the Juniper Policy Web Admin interface. The top navigation bar includes the Juniper logo and 'Policy Web Admin' with a 'Query' link. A left-hand navigation menu lists 'Home', 'Dir Connection', 'Tools', and 'Query'. The main content area is titled 'Query' and contains a 'Query Information' section. This section includes the following fields:

- Aspect:** QoS Profile Configuration (dropdown)
- Condition Type:** QoS Profile (dropdown)
- Condition Value:** best-effort (text input)
- Find:** Router (dropdown)
- Supported:**

Below these fields is a large 'Response' field, which is currently empty. At the bottom of the form are 'Clear' and 'Query' buttons. The footer of the page includes the Juniper logo and the text 'Copyright © 1998-2003, Juniper Networks, Inc.'

2. Fill in the parameters, and click **Query**.

The results appear in the Response field.

For examples of queries, see *Examples* on page 280.