

## Chapter 24

# Configuring a QoS Parameter

This chapter provides information for configuring quality of service (QoS) parameters on E-series routers.

QoS parameters are discussed in the following sections:

- Parameter Definition Attributes for QoS Administrators Overview on page 225
- Scheduler Profiles and Parameter Expressions for QoS Administrators on page 231
- Configuring a Basic Parameter Definition for QoS Administrators on page 234
- Parameter Instances for QoS Clients Overview on page 236
- Creating Parameter Instances on page 238
- Example: QoS Parameter Configuration for Controlling Subscriber Bandwidth on page 240

### Parameter Definition Attributes for QoS Administrators Overview

As the QoS administrator, you can create a parameter definition that constrains how a QoS client can create a parameter instance. When QoS clients create a parameter instance, they work within the attributes that you have defined.

Table 23 lists the parameter attributes that you can define for a parameter definition.

**Table 23: Attributes in Parameter Definitions**

Parameter Data Setting	Description
Name	Name for the parameter.
Instance-interface type	Interface types to which the QoS client can apply a parameter instance. The QoS administrator can specify up to eight instance-interface types for each parameter definition.
Controlled-interface type	Interface types that specify resources that the parameter instance can control. The QoS administrator can specify up to four controlled-interface types for each parameter definition.

**Table 23: Attributes in Parameter Definitions (continued)**

Parameter Data Setting	Description
Subscriber-interface type	Subscriber interfaces to which QoS clients can apply parameters obtained through RADIUS or profiles. The QoS administrator can specify up to four subscriber-interface types for each parameter definition.
Range	Valid range of values that a QoS client can specify.
Expression	Boolean that indicates whether the parameter uses implicit parameter instances, which are the sum of explicit instances of the parameter on all scheduler nodes or queues above them in the scheduler hierarchy.
Application	Application that binds parameter instance to a specific application, such as IP multicast bandwidth adjustment.

### Naming Guidelines for QoS Parameters

You define the parameter name by issuing the **qos-parameter-define** command to enter QoS Parameter Definition Configuration mode.

The naming guidelines for parameters differ from other QoS features such as QoS profiles and scheduler profiles.

Parameter names must begin with a letter to avoid confusion with numbers and operators. Because QoS clients reference this parameter name to create a parameter instance, we recommend that you use a name that is descriptive.

Table 24 lists some sample parameter names and descriptions.

**Table 24: Sample Parameter Names**

Parameter Name	Description
max-subscriber-bandwidth	Total bandwidth for a subscriber (average of all services)
max-voice-bandwidth	Shaping rate for a subscriber voice queue
min-data-bw	Assured rate for a priority-data service queue
max-data-bw	Shaping rate for the same priority data service queue as min-data-sw

In addition, parameter names cannot be the same as an arithmetic operator. Table 25 lists examples of valid and invalid parameter names that use operators.

**Table 25: Valid and Invalid Parameter Names**

Valid Names	Invalid Names
n1	1
f+	1n
-	+

**Table 25: Valid and Invalid Parameter Names (continued)**

Valid Names	Invalid Names
–	+ foo
–	min
–	max

Parameter names are case-sensitive. For example, max-subscriber-bw and max-Subscriber-bw are different parameter names.

Because the shaping rate and shared-shaping rates determine the maximum scheduler rates, and the assured rate determines minimum scheduler rates, we recommend that you use min or max operands in the parameter name.

## Interface Types and QoS Parameters

You can specify the following attributes in a parameter definition to control the scope of a parameter on interfaces:

- Controlled-interface types
- Instance-interface types
- Subscriber-interface types

### Controlled-Interface Types

Controlled-interface types specify interface types for queues and scheduler nodes that a parameter instance can control. You can define up to four controlled-interface types for each parameter definition by issuing the **controlled-interface-type** command in QoS Parameter Definition Configuration mode. Examples of controlled interface types include atm-vp (ATM virtual paths), atm-vc (ATM virtual circuits), and VLAN (virtual LANs).

For example, if you specify controlled-interface types of atm-vc and vlan, then you can use the parameter instance to shape or weight an ATM VC or VLAN node. However, because you did not specify ip, the system does not allow this parameter in a scheduler profile that was referenced in a QoS profile with an ip node (for example, ip node scheduler-profile test1).

### Controlled-Interface Type Example

In this example, you configure a parameter definition for a scheduler hierarchy in which a VLAN represents a subscriber. The parameter definition specifies that the parameter controls VLAN nodes and queues and sets the maximum rate for any parameter instance.

```
host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#exit
```

Then you reference the parameter definition within a scheduler profile.

```
host1(config)#scheduler-profile subscriber
host1(config-scheduler-profile)#shared-shaping-rate max-subscriber-bandwidth
auto
host1(config-scheduler-profile)#exit
```

This scheduler profile can be referenced only by QoS profile VLAN rules. When a user attempts to reference the scheduler profile using rules other than VLAN, an error message is displayed. For example, a QoS profile rule cannot associate the scheduler profile with an atm-vc rule, as shown in the following example:

```
host1(config-qos-profile)#atm-vc queue traffic-class best-effort scheduler-profile
subscriber
% scheduler-profile parameter's controlled-interface-types(s) do not control this
atm-vc qos-profile rule type
```

After you reference the parameter in a scheduler profile, you can reference the scheduler profile from a QoS profile. In this example, you configure a vlan node for each subscriber with a shared-shaping rate specified by the parameter max-subscriber-bandwidth.

```
host1(config)#qos-profile subscriber-triple-play
host1(config-qos-profile)#vlan queue traffic-class best-effort scheduler-profile
subscriber
```

## Instance-Interface Types

After you configure at least one controlled-interface type, you configure one or more instance-interface types that specify the types of logical interfaces to which the QoS client can apply the parameter. You can define up to eight instance-interface types for each parameter definition by issuing the **instance-interface-type** command in QoS Parameter Definition Configuration mode.

QoS clients cannot create a *downreference* for a parameter instance for instance-interface types that is above the lowest controlled-interface type of the same family in the interface stack.



**NOTE:** The guidelines are different for using instance-interface types with hierarchical parameters. For more information, see *Scheduler Profiles and Parameter Expressions for QoS Administrators* on page 231.

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### Instance-Interface Type Example

In the following example, you configure a parameter definition with a controlled-interface type of VLAN. You then enable QoS clients to create a parameter instances at VLAN, SVLAN, and Ethernet interfaces by configuring instance-interface types of vlan, svlan, and ethernet.

```

host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#instance-interface-type vlan
host1(config-qos-parameter-define)#instance-interface-type svlan
host1(config-qos-parameter-define)#instance-interface-type ethernet

```

In the scheduler hierarchy, IP is above VLANs. If you attempt to configure an instance-interface type for ip, an error message indicates that you cannot downreference IP from VLANs.

```

host1(config-qos-parameter-define)#instance-interface-type ip
% instance-interface-type ip cannot stack above the lowest controlled-interface-type

```

## Subscriber-Interface Types

Subscriber-interface types represent subscriber interfaces to which you can apply QoS parameters obtained through RADIUS or SRC. You can define up to four subscriber-interface types for each parameter definition by issuing the **subscriber-interface-type** command in QoS Parameter Definition Configuration mode.

The following interface types are supported:

- ip
- l2tp-session
- atm-vc
- vlan

QoS clients cannot create a parameter instance for subscriber-interface types that is above the lowest controlled-interface type of the same family in the interface stack.

If an interface profile contains a QoS parameter instance rule of max-subscriber-bandwidth 1000000, the system searches the logical interface column, starting at the top, and associates the parameter instance with the first interface with the subscriber-interface type that it locates.

A RADIUS administrator can enter multiple QoS parameter name and value pairs when configuring the RADIUS server with the Juniper Networks VSA [26-82]. This means that the RADIUS can return multiple instances of the same VSA in a single request. For more information about Juniper Networks VSA [26-82], see *Juniper Networks VSAs in JUNOS Broadband Access Configuration Guide, Chapter 6, RADIUS Attribute Descriptions*.

## Subscriber-Interface Type Example

In the following example, you configure a parameter definition with a controlled-interface type and a subscriber-interface type of IP. These settings enable you to create QoS parameter VSAs on an IP interface.

```

host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#controlled-interface-type ip
host1(config-qos-parameter-define)#instance-interface-type ip
host1(config-qos-parameter-define)#subscriber-interface-type ip

```

## Range of QoS Parameters

You can specify the range of values that the QoS client can enter for a parameter instance by issuing the **range** command in QoS Parameter Definition Configuration mode.

In the following example, you specify that a QoS client can enter a value for the parameter from 512 Kbps to 8 Mbps. The system does not accept values outside of this range.

```

host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#instance-interface-type vlan
host1(config-qos-parameter-define)#range 512000 8192000
host1(config-qos-parameter-define)#exit

```

If the QoS client attempts to configure values outside of this range, a message is displayed.

```

host1(config)#interface fastEthernet 9/0.1
host1(config-subif)#qos-parameter max-subscriber-bandwidth 1000000
host1(config-subif)#exit
host1(config)#interface fastEthernet 9/0.1
host1(config-subif)#qos-parameter max-subscriber-bandwidth 200000
% parameter instance is out of range

```

You cannot create or modify an existing range if the change causes any explicit parameter instance values to be outside the valid range. For example:

```

host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#instance-interface-type vlan
host1(config-qos-parameter-define)#range 512000 8192000
host1(config-qos-parameter-define)#exit
host1(config)#interface fastEthernet 9/0.1
host1(config-subif)# ! This parameter instance is within the range of 512Kbps to 8Mbps.
host1(config-subif)#qos-parameter max-subscriber-bandwidth 1000000
host1(config-subif)#exit
host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#range 2048000 8192000
% cannot modify a range when parameter instances exist with values outside the new range

```

However, you can remove ranges by using the **no range** command.



**NOTE:** You can also define a range in parameter expressions when referencing a parameter within a scheduler profile. For more information, see *Specifying a Range in Expressions* on page 233.

## Applications and QoS Parameters

You can associate a parameter definition with an application in the system by issuing the **application** keyword with the **qos-parameter-define** command. The applications that you can configure include:

- IP Multicast Bandwidth Adjustment
- QoS Cell Mode
- Byte Adjustment (Cell and Frame)
- QoS Downstream Rate

## Related Topics

- Configuring a Basic Parameter Definition for QoS Administrators on page 234
- IP Multicast Bandwidth Adjustment for QoS Overview on page 265
- Cell Shaping Mode Using QoS Parameters Overview on page 277
- Byte Adjustment for ADSL and VDSL Traffic Overview on page 289
- QoS Downstream Rate Application Overview on page 297

## Scheduler Profiles and Parameter Expressions for QoS Administrators

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After you have created the parameter definition, you reference the parameter within a scheduler profile. You can choose to use parameter expressions in the scheduler profile.

### Referencing a Parameter Definition in a Scheduler Profile

You can reference a parameter in a scheduler profile as long as all parameters in the scheduler profile share at least one controlled-interface type. Otherwise, a QoS profile rule cannot reference the scheduler profile.

For example:

```
host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#exit
host1(config)#scheduler-profile subscriber
host1(config-scheduler-profile)#shared-shaping-rate max-subscriber-bandwidth
auto
```

When a scheduler profile references a parameter, the system implicitly assigns controlled-interface types to the scheduler profile that are the same as the controlled-interface types of all referenced parameters. The system validates scheduler profile types using the QoS profile rules that refer to those scheduler profiles. For example, if the parameter definition max-sub-bw has the controlled-interface types atm-vc and ip, the scheduler profile cannot be referenced in QoS profile rules that have a type other than atm-vc or ip.

## Removing or Modifying a Scheduler Profile

You can modify a scheduler profile as long as the QoS profile rules that use the scheduler profile are of the same type. All nodes and queues controlled by the scheduler profile are adjusted to the new rate.

You can also remove a parameter reference from a scheduler profile. The system modifies the nodes and queues that are controlled by the scheduler profile with the new rate.

## Using Expressions for QoS Parameters

Expressions are combinations of parameter names, constants, and operators. You can specify some scheduler profile attributes using an expression, such as the shaping rate. All operations within expressions are performed using 64 bit unsigned math, resulting in a 32 bit, signed integer value.

Expressions consist of both operators and operand values. Operators are arithmetic functions, and operand values are the inputs for the mathematical function. Operand values can be a parameter name or an integer. You specify an expression consisting of an operand, followed by zero or more [ operator, operand ] pairs.

Simple parameter expressions are displayed in the following example. Simple parameter expressions usually contain a constant rate or a single parameter name.

```
host1(config-scheduler-profile)#shaping-rate 10000000
host1(config-scheduler-profile)#shared-shaping-rate max-sub-bw auto
host1(config-scheduler-profile)#shaping-rate max-sub-be-bw
host1(config-scheduler-profile)#assured-rate assured-bw
```

More complicated parameter expressions are displayed in the following example. Complicated parameter expressions contain combinations of constant rates, parameter names, and operators.

```
host1(config-scheduler-profile)#shaping-rate max-sub-bw % 90
host1(config-scheduler-profile)#shared-shaping-rate max-data-bw + max-voice-bw
+ max-video-bw auto
host1(config-scheduler-profile)#assured-rate min-data-bw % oversubscription-rate
+ min-video-bw % oversubscription-rate
host1(config-scheduler-profile)#shared-shaping-rate 400000 -
multicast-adjustment burst 100 milliseconds auto
```

## Operators and Precedence

Table 26 lists the operators that QoS parameters support and the precedence of the operator within the expression.

**Table 26: Operators for Parameter Expressions**

Operator	Description	Precedence	Examples
%	Percent in the range 1–100	1	<b>max-subscriber-bw % 100</b> <b>max-subscriber-bw % 10</b>
*	Multiplication	1	<b>5 * maxBandwidth</b>
/	Division	1	<b>maxBandwidth / 64000</b>



**Table 26: Operators for Parameter Expressions (continued)**

Operator	Description	Precedence	Examples
+	Addition	2	<code>max-subscriber-bw + 50000</code> <code>max-subscriber-bw + l2c-rate</code>
-	Subtraction	2	<code>max-subscriber-bw - 50000</code> <code>max-subscriber-bw - l2c-rate</code>
min	Minimum	3	<code>max-subscriber-bw min 50000</code> <code>max-subscriber-bw min l2c-rate</code>
max	Maximum	3	<code>max-subscriber-bw max 50000</code> <code>max-subscriber-bw max l2c-rate</code>

### Specifying a Range in Expressions

You can use the min and max operators to specify the allowable range of an expression result.

For example, to specify a shaping rate at a minimum of 1 Mbps and a maximum of 5 Mbps, use the following expression:

```
host1(config)#scheduler-profile subscriber-rate
host1(config-scheduler-profile)#shaping-rate (( subscriber-rate max 1000000 ) min
5000000 )
```

#### Operations Using This Expression

1. Take the max of the subscriber-rate scheduler profile, or 1 Mbps, and name it x.
2. Take the min of x and 5 Mbps.

**Example 1** The value of the subscriber-rate scheduler profile is less than 1 Mbps, specifically 500,000.

- The max of 500K and 1 Mbps is 1 Mbps
- The min of 1 Mbps and 5 Mbps is 1 Mbps

Result—Made the subscriber-rate a minimum of 1 Mbps.

**Example 2** The value of the subscriber-rate scheduler profile is greater than 5 Mbps, specifically 6 Mbps.

- The max of 6 Mbps and 1 Mbps is 6 Mbps
- The min of 6 Mbps and 5 Mbps is 5 Mbps

Result—Made the subscriber-rate a maximum of 5 Mbps.

**Example 3** The value of the subscriber-rate scheduler profile is within the range of 1–5 Mbps, specifically 3 Mbps.

- The max of 3 Mbps and 1 Mbps is 3 Mbps
- The min of 3 Mbps and 5 Mbps is 3 Mbps

Result—Maintained the subscriber-rate within the range of 1–5 Mbps.

### Related Topics

- Using Expressions for Bandwidth and Burst Values in a Scheduler Profile on page 51
- Configuring a Basic Parameter Definition for QoS Administrators on page 234

## Configuring a Basic Parameter Definition for QoS Administrators

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This section describes how to configure an individual parameter definition and how to associate it with an application.

Several of the following tasks are optional. Perform the required tasks and also any optional tasks that you need for your QoS parameter configuration.

To configure a parameter definition:

1. Create traffic classes.

```
host1(config)#traffic-class business-data
host1(config-traffic-class)#exit
host1(config)#traffic-class voice
host1(config-traffic-class)#exit
host1(config)#traffic-class video
```

2. Create a parameter definition.

- a. Specify the parameter definition name.

```
host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#
```

- b. Specify the logical interface types for the nodes and queues controlled by this parameter.

```
host1(config-qos-parameter-define)#controlled-interface-type atm-vc
host1(config-qos-parameter-define)#controlled-interface-type vlan
```

You can specify up to four of the following controlled-interface types per parameter definition: atm, atm-vc, atm-vp, bridge, ethernet, fr-vc, ip, ip-tunnel, ipv6, l2tp-session, l2tp-tunnel, lsp, pppoe, serial, server-port, vlan.

- c. Specify the set of logical interfaces types upon which a QoS client can create instances of the parameter.

```
host1(config-qos-parameter-define)#instance-interface-type atm-vc
host1(config-qos-parameter-define)#instance-interface-type ip
```

You can specify up to four of the following controlled-interface types per parameter definition: atm, atm-vc, atm-vp, bridge, ethernet, fr-vc, ip, ip-tunnel, ipv6, lag, l2tp-session, l2tp-tunnel, lsp, pppoe, serial, server-port, svlan, vlan.

- d. (Optional) Specify the set of interface types that a QoS client can assign to a parameter instance to represent subscribers.

```
host1(config-qos-parameter-define)#subscriber-interface-type ip
```

You can specify up to four of the following subscriber-interface types: atm-vc, ip, ipv6, l2tp-session, vlan.

- e. (Optional) Define the range of values that a QoS client can assign to a parameter instance.

```
host1(config-qos-parameter-define)#range 64000 8000000
```

- 3. Reference the parameter within a scheduler profile parameter expression and configure an assured rate, shaping rate, shared-shaping rate, or weight.

```
host1(config)#scheduler-profile business-data
host1(config-scheduler-profile)#shaping-rate max-subscriber-bandwidth % 25
```

- 4. Add the scheduler profile to a QoS profile and configure the QoS profile.

```
host1(config)#qos-profile subscriber
host1(config-qos-profile)#atm-vc queue traffic-class business-data
scheduler-profile business-data
host1(config-qos-profile)#atm-vc queue traffic-class video scheduler-profile voice
host1(config-qos-profile)#atm-vc queue traffic-class voice scheduler-profile video
```

## Related Topics

- Parameter Definition Attributes for QoS Administrators Overview on page 225
- Example: QoS Parameter Configuration for Controlling Subscriber Bandwidth on page 240
- For more information about configuring a scheduler hierarchy with rates and weights, see *Configuring a Scheduler Hierarchy* on page 49
- For more information about configuring a QoS profile, see *Configuring a QoS Profile* on page 138
- **assured-rate** command
- **controlled-interface-type** command
- **instance-interface-type** command

- **node** command
- **qos-parameter-define** command
- **qos-profile** command
- **queue** command
- **range** command
- **scheduler-profile** command
- **shaping-rate** command
- **shared-shaping-rate** command
- **subscriber-interface-type** command
- **traffic-class** command
- **weight** command

## Parameter Instances for QoS Clients Overview

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The QoS administrator implements a QoS architecture for the provider based on QoS profiles and parameter definitions. The QoS client creates the parameter instances and attaches QoS profiles to logical interfaces. The QoS client can be a user accessing parameters through CLI or through client software such as RADIUS or SRC.

As a QoS client, you can use QoS parameter instances to set the following attributes of a node or queue:

- Assured rate
- Shaping rate
- Shared-shaping rate
- Scheduler weight

### Global QoS Parameter Instance Overview

In the following example, a parameter instance is created in Global Configuration mode.

```
host1(config)#qos-parameter max-subscriber-bandwidth 8000000
```

When you create a parameter instance in Global Configuration mode, the value that you set for a rate becomes the default value for the router. We recommend that you create a global default value for a parameter instance to provide a minimal level of service by default for the router.

## QoS Parameters for Interfaces Overview

When you attach a parameter instance to an interface in Interface Configuration mode, the default value for the chassis overrides the default value for the router. When attached to subinterfaces, parameter instances override both interface and global configurations.

In the following example, a parameter instance is created on a Fast Ethernet interface in Interface Configuration mode.

```
host1(config)#interface fastEthernet 9/0.2
host1(config-if)#qos-parameter max-subscriber-bandwidth 8000000
```

Parameter instances have hierarchical scope. The scope of a parameter instance is the set of logical interfaces stacked above the interface upon which you create it. Any interface stacked above the instance that is one of the controlled-interface types that are configured in the parameter definition can have its nodes or queues controlled by that instance. For example, a parameter named max-sub-bw might have logical interface types of IP and l2tp-session; therefore, it controls rates only for nodes and queues associated with those interface types.

For example, the scope of a parameter instance at a S-VLAN can be all VLANs stacked above that particular S-VLAN. Scopes can overlap, for example, if a parameter instance is created for both an S-VLAN and a VLAN. The most specific instance overrides the other instances.

However, you cannot configure QoS parameter instances to downreference through the interface stack. For example, you cannot create a parameter instance with an interface type of ATM VP on an ATM1483 subinterface.

When you attach the parameter instance to an interface, it provides a default subscriber bandwidth for terminated and tunneled subscribers that terminate over that interface. To set parameter instances for a subscriber, a parameter instance is attached to a subscriber interface such as a vlan or atm-vc. The QoS administrator defines the available subscriber-interface types in the parameter definition. The parameter instance overrides the QoS profile attachment lower down the interface stack, providing a subscriber-specific value.

You can attach QoS profiles and QoS parameters to a logical interface in either order. If a scheduler profile calls for a parameter and no parameter instance is defined, the system behaves as if there is no shaping rate, shared-shaping rate, or assured rate for that node or queue.

## Related Topics

- Creating Parameter Instances on page 238
- For more information about using global parameter instances for IP multicast bandwidth adjustment, see *IP Multicast Bandwidth Adjustment for QoS Overview* on page 265

## Creating Parameter Instances

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You can create QoS parameter instances globally, for an interface, or for a subinterface.

Tasks to create parameter instances are:

- Creating a Global Parameter Instance on page 238
- Creating a Parameter Instance for an Interface on page 238
- Creating a Parameter Instance for an ATM VP on page 238
- Creating a Parameter Instance for an S-VLAN on page 239

### Creating a Global Parameter Instance

To create a global parameter instance:

- Create a parameter instance in Global Configuration mode.

```
host1(config)#qos-parameter max-subscriber-bandwidth 6000000
```

### Creating a Parameter Instance for an Interface

To create a parameter instance for an interface:

1. Specify an interface.

```
host1(config)#interface atm 11/0.1
host1(config)#interface gigabitEthernet 2/0
```

2. Specify the parameter name and the value.

```
host1(config-subif)#qos-parameter max-subscriber-bandwidth 6000000
```

### Creating a Parameter Instance for an ATM VP

to attach a parameter instance to a VP on the interface. Optionally, use the **qos-profile** keyword to attach a parameter instance to a QoS profile.

To create a parameter instance for an ATM VP:

1. Configure the ATM VP.

```
host1(config)#interface atm 2/0
host1(config-if)#atm vp-tunnel 4
```

2. Do either of the following:

- a. Attach the parameter instance to an ATM VP on the interface.

```
host1(config-if)#atm-vp 4 qos-parameter max-subscriber-bandwidth 375000
```

- b. Attach the parameter instance and associate with the QoS profile.

```
host1(config-if)#atm-vp 4 qos-profile video qos-parameter  
max-subscriber-bandwidth 375000
```

### Creating a Parameter Instance for an S-VLAN

to attach a parameter instance to a specified S-VLAN ID on the interface. Optionally, use the **qos-profile** keyword to attach a parameter instance to a QoS profile.

To create a parameter instance for an S-VLAN:

1. Specify the Ethernet interface and create the VLAN.

```
host1(config)#interface gigabitEthernet 3/0  
host1(config-if)#encapsulation vlan  
host1(config-if)#interface gigabitEthernet 3/0.1
```

2. Specify the S-VLAN ID.

```
host1(config-if)#svlan id 1 202
```

3. Attach the parameter instance to an S-VLAN ID on the interface.

```
host1(config-if)#svlan 202 qos-parameter max-subscriber-bandwidth 6000000
```

### Related Topics

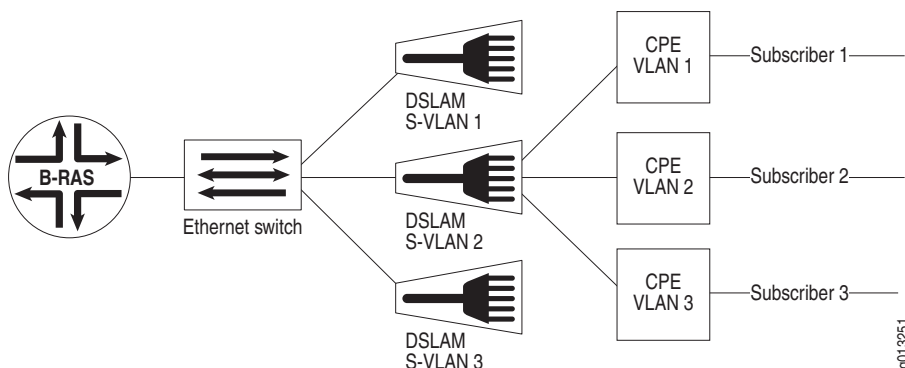
- Parameter Instances for QoS Clients Overview on page 236
- For information about creating QoS parameter instances for Service Manager, see *Referencing QoS Configurations in Service Definitions* in *JUNOS Broadband Access Configuration Guide, Chapter 27, Configuring Service Manager*
- **atm-vp qos-parameter** command
- **atm vp-tunnel** command
- **encapsulation vlan** command
- **interface** command
- **qos-parameter** command
- **svlan id** command
- **svlan qos-parameter** command

## Example: QoS Parameter Configuration for Controlling Subscriber Bandwidth

The example in this section illustrates how to use parameters to control the minimum and maximum bandwidth of a subscriber. The example includes procedures for both QoS administrators and QoS clients.

Through QoS parameter definitions, the QoS administrator defines a QoS scheduler hierarchy that corresponds to the physical network topology shown in Figure 58.

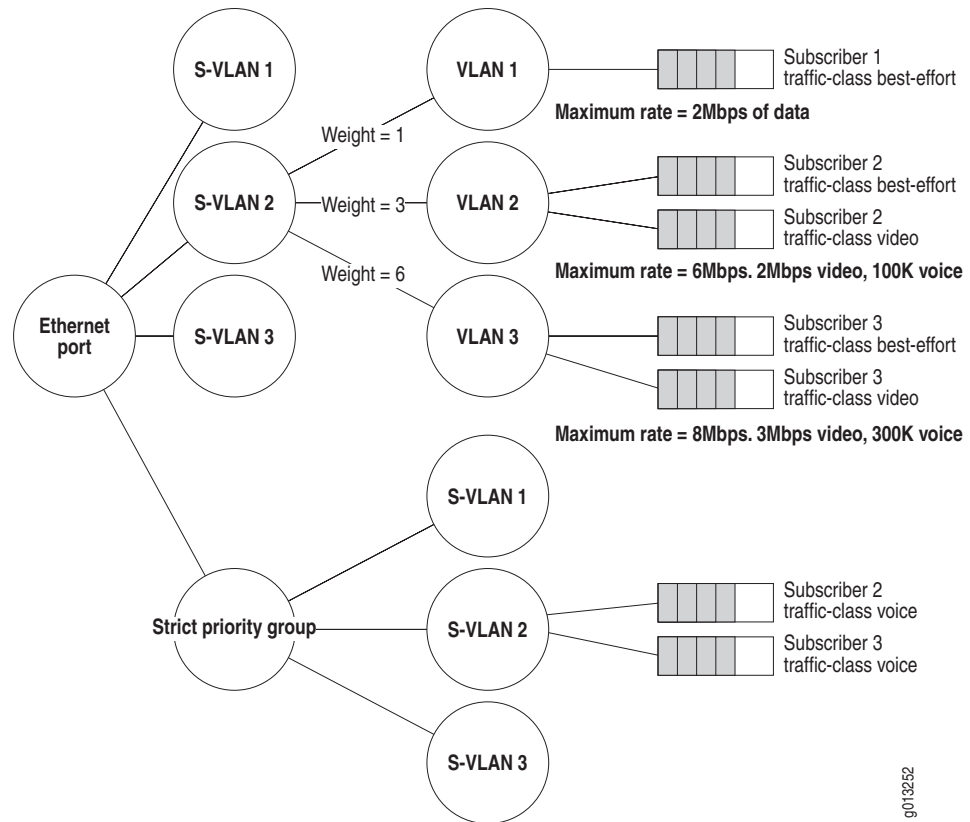
**Figure 58: Physical Network Topology**



The S-VLAN scheduler nodes correspond to the DSLAM in the physical network topology; the VLAN scheduler nodes correspond to the subscribers.

Figure 59 on page 241 shows the QoS scheduler hierarchy that the QoS client creates when configuring a different service for each subscriber.



**Figure 59: QoS Scheduler Hierarchy**

For Subscriber 1, the QoS client configures a basic best-effort data service, with a maximum rate of 2 Mbps, and assigns a scheduler weight value of 1.

For Subscriber 2, the QoS client configures a basic triple-play service consisting of voice, video, and best-effort data services. This service enables the subscriber to transmit up to 6 Mbps of combined voice, video, and best-effort data traffic. The service limits video traffic to 2 Mbps and enables low-latency bandwidth for one 100 Kbps voice call. The QoS client then assigns this subscriber a scheduler weight value of 3, enabling this subscriber to claim up to three times the bandwidth than the basic data service configured for Subscriber 1.

For Subscriber 3, the QoS client configures an enhanced triple-play service consisting of voice, video and best-effort data services. This enhanced triple-play service enables the subscriber to transmit up to 8 Mbps of combined voice, video, and best-effort data traffic. This service limits video traffic to 3 Mbps and enables low-latency bandwidth for up to three 100 Kbps voice calls. The QoS client then assigns this subscriber a scheduler weight value of 6, enabling this subscriber to claim up to six times the bandwidth of the basic data service subscriber configured for Subscriber 1, and up to twice the bandwidth of the basic triple-play subscriber configured for Subscriber 2.

## Procedure for QoS Administrators

This section describes the procedures to configure the scheduler hierarchy shown in Figure 59 by using QoS parameters.

### Configuring Traffic Classes and Traffic Class Groups

The QoS administrator configures traffic classes and traffic-class groups for best-effort data, video, and voice services.

1. Configure the traffic classes.
  - a. Configure the traffic class named best-effort.
  - b. Configure the traffic class named video.
  - c. Configure the traffic class named voice.
  - d. Enable the voice traffic class to provide a strict priority treatment throughout the fabric.

```
host1(config)#traffic-class best-effort
host1(config-traffic-class)#exit
```

```
host1(config)#traffic-class video
host1(config-traffic-class)#exit
```

```
host1(config)#traffic-class voice
host1(config-traffic-class)#fabric-strict-priority
host1(config-traffic-class)#exit
```

2. Configure a traffic-class group for low-latency expedited forwarding (EF) and add the voice traffic class into the traffic-class group EF.
  - a. Configure the EF traffic-class group with strict-priority scheduling.
  - b. Add the voice traffic class to the traffic-class group.

```
host1(config)#traffic-class-group EF auto-strict-priority
host1(config-traffic-class-group)#traffic-class voice
host1(config-traffic-class-group)#exit
```

The remaining traffic classes, best-effort and video, remain in the default traffic-class group.

### Configuring the Parameter Definitions

After configuring the traffic classes and traffic-class groups, the QoS administrator configures the parameter definitions for Subscribers 1, 2, and 3.

1. Configure a parameter definition for the maximum subscriber bandwidth.
  - a. Configure the parameter definition named max-subscriber-bandwidth.
  - b. Enable the parameter to control VLANs.
  - c. Enable the parameter to have instances created on VLAN subinterfaces.
  - d. Specify the valid range of this parameter as 512 Kbps–8 Mbps.

```

host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#instance-interface-type vlan
host1(config-qos-parameter-define)#range 512000 8192000
host1(config-qos-parameter-define)#exit

```

2. Configure a parameter definition for a subscriber's weight in the hierarchical round-robin (HRR) scheduler. This parameter is used to provide different scheduler weights for each of the three service offerings.
  - a. Configure the parameter definition named subscriber-weight.
  - b. Enable the parameter to control VLANs.
  - c. Enable the parameter to have instances created on VLAN subinterfaces.
  - d. Specify the valid range of this parameter as 1–6.

```

host1(config)#qos-parameter-define subscriber-weight
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#instance-interface-type vlan
host1(config-qos-parameter-define)#range 1 6
host1(config-qos-parameter-define)#exit

```

3. Configure a parameter definition for the subscriber's maximum video bandwidth. By creating a parameter instance on S-VLANs, the QoS administrator can specify a subscriber's maximum video bandwidth for each DSLAM in the hierarchy.
  - a. Configure the parameter definition named max-subscriber-video-bandwidth.
  - b. Enable the parameter to control VLANs.
  - c. Enable the parameter to have instances created on both SVLAN and VLAN subinterfaces.
  - d. Specify the valid range of this parameter as 1 Mbps–5 Mbps.

```

host1(config)#qos-parameter-define max-subscriber-video-bandwidth
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#instance-interface-type vlan
host1(config-qos-parameter-define)#instance-interface-type svlan
host1(config-qos-parameter-define)#range 1000000 5000000
host1(config-qos-parameter-define)#exit

```

4. Configure a parameter definition for the maximum number of 100 Kbps voice calls supported for the subscriber.
  - a. Configure the parameter definition named max-100Kbps-voice-calls.
  - b. Enable the parameter to control VLANs.
  - c. Enable the parameter to have instances created on VLAN subinterfaces.
  - d. Specify the valid range of this parameter as 1–3.

```

host1(config)#qos-parameter-define max-100Kbps-voice-calls
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#instance-interface-type vlan
host1(config-qos-parameter-define)#range 1 3
host1(config-qos-parameter-define)#exit

```

### Configuring the Scheduler Profiles

The QoS administrator can then reference the parameter definitions within a scheduler profile, which defines the shaping rates for the parameter.

1. Configure a scheduler profile to specify the maximum bandwidth of the subscriber's best-effort data.
  - a. Configure the scheduler profile named subscriber-best-effort.
  - b. Configure the shared-shaping rate by referencing the max-subscriber-bandwidth parameter and choosing automatic shared shaping.

```

host1(config)#scheduler-profile subscriber-best-effort
host1(config-scheduler-profile)#shared-shaping-rate max-subscriber-bandwidth auto
host1(config-scheduler-profile)#exit

```

2. Configure a scheduler profile to specify the maximum bandwidth of the subscriber's video service.
  - a. Configure the scheduler profile named subscriber-video.
  - b. Configure the shaping rate by referencing the max-subscriber-video-bandwidth parameter.

```

host1(config)#scheduler-profile subscriber-video
host1(config-scheduler-profile)#shaping-rate max-subscriber-video-bandwidth
host1(config-scheduler-profile)#exit

```

3. Configure a scheduler profile for the subscriber's weight within the HRR scheduler.
  - a. Configure the scheduler profile named subscriber-weight.
  - b. Configure the weight using the default for the subscriber-weight parameter.

```

host1(config)#scheduler-profile subscriber-weight
host1(config-scheduler-profile)#weight subscriber-weight
host1(config-scheduler-profile)#exit

```

4. Configure a scheduler profile for the subscriber's voice service.
  - a. Configure the scheduler profile named subscriber-voice.
  - b. Configure the shaping rate by referencing the max-100Kbps-voice-calls parameter and multiplying it by 100 Kbps of voice calls.

```

host1(config)#scheduler-profile subscriber-voice
host1(config-scheduler-profile)#shaping-rate max-100Kbps-voice-calls * 100000
host1(config-scheduler-profile)#exit

```

### Configuring the QoS Profiles

By referencing the scheduler profiles within QoS profiles, the QoS administrator creates the scheduler hierarchy. In this portion of the example, the QoS administrator configures QoS profiles for the best-effort data and triple-play service offerings.

1. Define a QoS profile for the best-effort data service.
  - a. Create the QoS profile named subscriber-data-service.
  - b. Create a node for S-VLAN subinterfaces.
  - c. Specify a node for VLAN subinterfaces and reference the subscriber-weight scheduler profile.
  - d. Specify a queue for VLAN subinterfaces, referencing the best-effort traffic class and the subscriber-best-effort scheduler-profile.

```

host1(config)#qos-profile subscriber-data-service
host1(config-qos-profile)#svlan node
host1(config-qos-profile)#vlan node scheduler-profile subscriber-weight
host1(config-qos-profile)#vlan queue traffic-class best-effort scheduler-profile subscriber-best-effort
host1(config-qos-profile)#exit

```

The best-effort queue rule for VLAN subinterfaces refers to the subscriber-best-effort scheduler profile. The scheduler profile refers to the max-subscriber-bandwidth parameter that controls the maximum rate of this subscriber's best-effort queue.

2. Define a QoS profile for the triple-play service and specify S-VLAN nodes and VLAN nodes.
  - a. Create a QoS profile named subscriber-triple-play.
  - b. Specify a node for S-VLAN subinterfaces.
  - c. Specify a node for VLAN subinterfaces and reference the subscriber-weight scheduler profile.
  - d. Specify a node for S-VLAN subinterfaces and reference the EF traffic-class group.
  - e. Specify a queue for VLAN subinterfaces, referencing the best-effort traffic class and the subscriber-best-effort scheduler profile.
  - f. Specify a queue for VLAN subinterfaces, referencing the video traffic class and the subscriber-video scheduler profile.
  - g. Specify a queue for VLAN subinterfaces, referencing the voice traffic-class and the subscriber-voice scheduler profile.

```

host1(config)#qos-profile subscriber-triple-play
host1(config-qos-profile)#svlan node
host1(config-qos-profile)#vlan node scheduler-profile subscriber-weight
host1(config-qos-profile)#svlan node group EF
host1(config-qos-profile)#vlan queue traffic-class best-effort scheduler-profile
subscriber-best-effort
host1(config-qos-profile)#vlan queue traffic-class video scheduler-profile
subscriber-video
host1(config-qos-profile)#vlan queue traffic-class voice scheduler-profile
subscriber-voice
host1(config-qos-profile)#exit

```

VLAN queues are used for each service. The VLAN queue rules reference scheduler profiles that define the scheduler rates for the service.

3. Configure a QoS profile and attach to all Fast Ethernet, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces in the chassis.
  - a. Create a QoS profile named ethernet-default.
  - b. Remove the QoS profile rule for creating IP nodes.
  - c. Remove the IP queue for the best-effort traffic-class.

```

host1(config)#qos-profile ethernet-default
host1(config-qos-profile)#no ip node
host1(config-qos-profile)#no ip queue traffic-class best-effort
host1(config-qos-profile)#exit

```

4. Configure the Fast Ethernet interface and VLAN subinterfaces.
  - a. Configure the Fast Ethernet interface in slot 9, port 0.
  - b. Configure the VLAN major interface.
  - c. Configure the VLAN subinterface at slot 9, port 0, subinterface 1.
  - d. Assign an S-VLAN ID of 2 and a VLAN ID of 1 to the VLAN subinterface.
  - e. Assign an IP address to the VLAN subinterface.
  - f. Repeat steps a–e to configure VLAN subinterfaces in slot 9, port 0, subinterface 2 and in slot 9, port 0, subinterface 3.

```

host1(config)# interface fastEthernet 9/0
host1(config-if)#encapsulation vlan
host1(config-if)#exit
host1(config)#interface fastEthernet 9/0.1
host1(config-subif)#svlan id 2 1
host1(config-subif)#ip address 192.1.1.1 255.255.255.0
host1(config)#interface fastEthernet 9/0.2
host1(config-subif)#svlan id 2 2

```

```

host1(config-subif)#ip address 192.2.1.1 255.255.255.0
host1(config-subif)#exit
host1(config)#interface fastEthernet 9/0.3
host1(config-subif)#vlan id 2 3
host1(config-subif)#ip address 192.3.1.1 255.255.255.0
host1(config-subif)#exit

```

## Procedure for QoS Clients

This section describes procedures to create parameter instances for Subscribers 1, 2, and 3.

### Creating a Global Parameter Instance

The QoS client creates global parameter instances to provide a minimal level of default service for the router. In this portion of the example, the QoS client configures 2 Mbps of data traffic and configures a scheduler weight of 1 for Subscriber 1. For Subscribers 2 and 3, the QoS client then configures a maximum of 2 Mbps of video bandwidth and 1 voice call.

To create a global parameter instance:

1. Create a global parameter instance for max-subscriber-bandwidth with a value of 2000000.
2. Create a global parameter instance for subscriber-weight with a value of 1.
3. Create a global parameter instance for subscriber-video-bandwidth with a value of 2000000.
4. Create a global parameter instance for max-100Kbps-voice-calls with a value of 1.

```

host1(config)#qos-parameter max-subscriber-bandwidth 2000000
host1(config)#qos-parameter subscriber-weight 1
host1(config)#qos-parameter max-subscriber-video-bandwidth 2000000
host1(config)#qos-parameter max-100Kbps-voice-calls 1

```

### Creating a Global Parameter Instance for Individual DSLAMs

Instead of creating global parameter instances, the QoS client can create different parameter instances for the DSLAMs that correspond to the S-VLAN nodes shown in Figure 59. In this portion of the example, the QoS client creates 1 Mbps video streams by default on DSLAM 1, rather than the 2Mbps global parameter instance.

1. Specify the Fast Ethernet interface in slot 9, port 0.
2. Attach the QoS parameter max-subscriber-video-bandwidth to S-VLAN 1.

```

host1(config)#interface fastEthernet 9/0
host1(config-if)#vlan 1 qos-parameter max-subscriber-video-bandwidth 1000000
host1(config-if)#exit

```

**Creating Parameter Instances for Subscribers**

The QoS client creates a parameter instance for Subscribers 1, 2, and 3.

1. Configure the basic-data service for Subscriber 1.
  - a. Specify the Fast Ethernet interface in slot 9, port 0.
  - b. Attach the QoS profile subscriber-data-service to the subscriber's Fast Ethernet interface.

```
host1(config)#interface fastEthernet 9/0.1
host1(config-subif)#qos-profile subscriber-data-service
host1(config-subif)#exit
```

This QoS profile references the scheduler profiles, which then reference the parameter instances max-subscriber-bandwidth and subscriber-weight. These global parameter instances are created with values 2 Mbps and 1.

2. Configure a basic triple-play service consisting of voice, video, and data services for Subscriber 2.
  - a. Specify the Fast Ethernet interface in slot 9, port 0.
  - b. Create a parameter instance for max-subscriber-bandwidth, enabling the subscriber to transmit up to 6 Mbps of combined voice, video, and data traffic.
  - c. Create a parameter instance for subscriber-weight with a value of 3. This value enables the subscriber to claim up to three times the bandwidth of Subscriber 1, with basic data service.
  - d. Create a parameter instance for max-subscriber-video-bandwidth, limiting video traffic to 2 Mbps.
  - e. Create a parameter instance for max-100Kbps-voice-calls, enabling bandwidth for one 100 Kbps voice call.
  - f. Attach the QoS profile subscriber-triple-play to the subscriber's interface.

```
host1(config)#interface fastEthernet 9/0.2
host1(config-if)#qos-parameter max-subscriber-bandwidth 6000000
host1(config-if)#qos-parameter subscriber-weight 3
host1(config-if)#qos-parameter max-subscriber-video-bandwidth 2000000
host1(config-if)#qos-parameter max-100Kbps-voice-calls 1
host1(config-if)#qos-profile subscriber-triple-play
host1(config-if)#exit
```



3. Configure a enhanced triple-play service consisting of voice, video, and data services for Subscriber 3. Enable the subscriber to have twice as much bandwidth as Subscriber 2, with basic triple-play service.
  - a. Create a parameter instance for max-subscriber-bandwidth, enabling the subscriber to transmit up to 8 Mbps of combined voice, video, and data traffic.
  - b. Create a parameter instance for subscriber-weight with a value of 6, enabling the subscriber to claim up to six times the bandwidth of Subscriber 1, with basic data service.
  - c. Create a parameter instance for max-subscriber-video-bandwidth, limiting video traffic to 3 Mbps.
  - d. Create a parameter instance for max-100Kbps-voice-calls, enabling up to three 100 Kbps voice calls.
  - e. Attach the QoS profile subscriber-triple-play to the subscriber's interface.

```

host1(config)#interface fastEthernet 9/0.3
host1(config-if)#qos-parameter max-subscriber-bandwidth 8000000
host1(config-if)#qos-parameter subscriber-weight 6
host1(config-if)#qos-parameter max-subscriber-video-bandwidth 3000000
host1(config-if)#qos-parameter max-100Kbps-voice-calls 3
host1(config-if)#qos-profile subscriber-triple-play
host1(config-if)#exit

```

## Monitoring the Subscriber Configuration

After completing the configuration, both the QoS administrator and the QoS client can monitor it by issuing **show** commands.

1. To display the traffic classes for best-effort, video, and voice, issue the **show traffic-class** command.

```

host1#show traffic-class

```

traffic class	fabric weight	fabric strict priority
-----	-----	-----
best-effort	8	no
video	8	no
voice	8	yes

2. To display the traffic-class group EF, issue the **show traffic-class-group** command.

```

host1#show traffic-class-group

traffic-class-group EF auto-strict-priority
traffic-class voice

```

3. To display the settings for all four QoS parameter definitions (max-subscriber-bandwidth, subscriber-weight, max-subscriber-video-bandwidth, and max-100Kbps-voice-calls), issue the **show qos-parameter-define** command.

```
host1#show qos-parameter-define
```

parameter name	controlled interface types	instance interface types	subscriber interface types
max-subscriber-bandwidth	vlan	vlan	<none>
subscriber-weight	vlan	vlan	<none>
max-subscriber-video-bandwidth	vlan	vlan, svlan	<none>
max-100Kbps-voice-calls	vlan	vlan	<none>
parameter name	value range	properties	
max-subscriber-bandwidth	512000 - 8192000	<none>	
subscriber-weight	1 - 10	<none>	
max-subscriber-video-bandwidth	1000000 - 5000000	<none>	
max-100Kbps-voice-calls	1 - 3	<none>	

4. To display the shaping rates and burst for the four scheduler profiles (subscriber-best-effort, subscriber-video, subscriber-weight, and subscriber-voice), issue the **show scheduler-profile** command.

```
host1#show scheduler-profile
```

scheduler	shaping rate	shaping burst	
default		<none>	<none>
subscriber-best-effort		<none>	<none>
subscriber-video	max-subscriber-video-bandwidth	default	default
subscriber-weight		<none>	<none>
subscriber-voice	max-100Kbps-voice-calls * 100000	default	default
scheduler	weight	strict priority	assured rate
default	8	no	<none>
subscriber-best-effort	8	no	<none>
subscriber-video	8	no	<none>
subscriber-weight	subscriber-weight	no	<none>
subscriber-voice	8	no	<none>
scheduler	shared shaping rate	shared shaping burst	shared shaping constituent
default	<none>	<none>	<none>
subscriber-best-effort	max-subscriber-bandwidth	default	<none>
subscriber-video	<none>	<none>	<none>
subscriber-weight	<none>	<none>	<none>
subscriber-voice	<none>	<none>	<none>

scheduler	shared shaping mode
default	<none>
subscriber-best-effort	auto implicit
subscriber-video	<none>
subscriber-weight	<none>
subscriber-voice	<none>

5. To display the settings for the QoS profile subscriber-triple-play, issue the **show qos-profile** command.

```
host1#show qos-profile subscriber-triple-play
```

```
qos-profile subscriber-triple-play:
t-class interface rule traffic
group type type class scheduler profile queue drop
-----
vlan node subscriber-weight
svlan node default
vlan queue best-effort subscriber-best-effort default default
vlan queue video subscriber-video default default
EF svlan node default
EF vlan queue voice subscriber-voice default default
statistics
profile
-----
```

```
default
default
```

```
default
```

6. To display the attachments on all QoS profiles, issue the **show qos-profile references** command.

```
host1#show qos-profile references
```

```
qos profile attachment
-----
atm-default (qos-port-type-profile)
serial-default (qos-port-type-profile)
ethernet-default (qos-port-type-profile)
server-default (qos-port-type-profile)
subscriber-data-service vlan FastEthernet9/0.1
subscriber-triple-play vlan FastEthernet9/0.2
subscriber-triple-play vlan FastEthernet9/0.3
```

```
Port attachments: 4
Interface attachments: 3
Not attached: 0
```

7. To display global and interface attachments on all of the QoS parameter instances, issue the **show qos-parameter references** command.

```
host1#show qos-parameter references
```

interface	parameter name	value
global	max-subscriber-bandwidth	2000000
global	subscriber-weight	1
global	max-subscriber-video-bandwidth	2000000
global	max-100Kbps-voice-calls	1
FastEthernet9/0.2	max-subscriber-bandwidth	6000000
FastEthernet9/0.2	subscriber-weight	3
FastEthernet9/0.2	max-subscriber-video-bandwidth	2000000
FastEthernet9/0.2	max-100Kbps-voice-calls	1
FastEthernet9/0.3	max-subscriber-bandwidth	8000000
FastEthernet9/0.3	subscriber-weight	6
FastEthernet9/0.3	max-subscriber-video-bandwidth	3000000
FastEthernet9/0.3	max-100Kbps-voice-calls	3
FastEthernet9/0 vlan 1	max-subscriber-video-bandwidth	1000000

```
Global parameter instances: 4
Parameter instances reported: 13
```

8. To display the queue forwarding rates for the VLANs on the Fast Ethernet interface in slot 9, port 0, issue the **show egress-queue rates** command.

```
host1#show egress-queue rates full interface fastEthernet 9/0
```

interface	traffic class	forwarded rate	aggregate drop rate	minimum rate	maximum rate
ethernet FastEthernet9/0	best-effort	*	*	0	100000000
vlan FastEthernet9/0.1	best-effort	*	*	0	2000000
vlan FastEthernet9/0.2	best-effort	*	*	0	6000000
	video	*	*	0	2000000
	voice	*	*	100000	100000
vlan FastEthernet9/0.3	best-effort	*	*	0	8000000
	video	*	*	0	3000000
	voice	*	*	300000	300000

```
Queues reported: 0
Queues filtered (under threshold): 0
* Queues disabled (no rate period): 8
**Queues disabled (no resources): 0
Total queues: 8
```

9. To display the shared-shaper settings for the VLANs on the Fast Ethernet interface in slot 9, port 0, issue the **show qos shared-shaper** command.

```
host1#show qos shared-shaper interface fastEthernet 9/0
```

interface	resource	shared shaping rate	shaping rate	other
vlan Eth9/0.1	vlan node			
	A vlan queue best-effort	2000000		rate 2000000
vlan Eth9/0.2	vlan node			
	A vlan queue best-effort	6000000		rate 6000000
	A vlan queue video		2000000	

```

A vlan queue EF voice          100000
vlan Eth9/0.3  vlan node
A vlan queue best-effort  8000000    rate 8000000
A vlan queue video        3000000
A vlan queue EF voice          300000

Total shared shapers:          3
Total constituents:            10
Total shared shaper failovers: 0
Compound shared shapers are not supported.

```

10. To display the scheduler hierarchy for the Fast Ethernet interface in slot 9, port 0, issue the **show qos scheduler-hierarchy** command.

```
host1#show qos scheduler-hierarchy interface fastEthernet 9/0
```

Scheduler hierarchy for the default traffic-class group

interface	resource	shaping rate	shared shaping rate	assured rate or weight
ethernet Eth9/0	ethernet port			wgt 8
ethernet Eth9/0	ethernet queue			wgt 8
svlan Eth9/0 svlan 2	svlan node			wgt 8
vlan Eth9/0.1	vlan node			wgt 1
vlan Eth9/0.1	vlan queue best-effort		2000000	wgt 8
vlan Eth9/0.2	vlan node			wgt 3
vlan Eth9/0.2	vlan queue video	2000000		wgt 8
vlan Eth9/0.2	vlan queue best-effort		6000000	wgt 8
vlan Eth9/0.3	vlan node			wgt 6
vlan Eth9/0.3	vlan queue video	3000000		wgt 8
vlan Eth9/0.3	vlan queue best-effort		8000000	wgt 8

Scheduler hierarchy for traffic-class group EF

interface	resource	shaping rate	shared shaping rate	assured rate or weight
ethernet Eth9/0	ethernet group node EF			wgt 8
svlan Eth9/0 svlan 2	svlan node EF			wgt 8
vlan Eth9/0.2	vlan queue EF voice	100000		wgt 8
vlan Eth9/0.3	vlan queue EF voice	300000		wgt 8

## Complete Configuration Example

You can use the complete configuration examples provided for each of the configurations in your own network. To customize the configuration example for your needs, copy the text into a text editor, and modify it.

To use the example for immediate use, copy it to the local console or Telnet session from which you access the router.

You can also save the example as a script (.scr) file that executes the commands as though they were entered at the terminal. For information about executing .scr files, see *JUNOS System Basics Configuration Guide, Chapter 2, Command-Line Interface*.

**QoS Administrator Configuration**

From Global Configuration mode:

! Configure traffic classes and traffic-class groups.

**traffic-class best-effort**

**exit**

**traffic-class video**

**exit**

**traffic-class voice**

**fabric-strict-priority**

**exit**

**traffic-class-group EF auto-strict-priority**

**traffic-class voice**

**exit**

!Configure the max-subscriber-bandwidth parameter definition.

**qos-parameter-define max-subscriber-bandwidth**

**controlled-interface-type vlan**

**instance-interface-type vlan**

**range 512000 8192000**

**exit**

!Configure the subscriber-weight parameter definition.

**qos-parameter-define subscriber-weight**

**controlled-interface-type vlan**

**instance-interface-type vlan**

**range 1 6**

**exit**

!Configure the max-subscriber-video parameter definition.

**qos-parameter-define max-subscriber-video-bandwidth**

**controlled-interface-type vlan**

**instance-interface-type vlan**

**instance-interface-type svlan**

**range 1000000 5000000**

**exit**

!Configure the max-100Kbps-voice-calls parameter definition.

**qos-parameter-define max-100Kbps-voice-calls**

**controlled-interface-type vlan**

**instance-interface-type vlan**

**range 1 3**

**exit**

! Configure the subscriber-best-effort scheduler profile.

**scheduler-profile subscriber-best-effort**

**shared-shaping-rate max-subscriber-bandwidth auto**

**exit**

! Configure the subscriber-video scheduler profile.

**scheduler-profile subscriber-video**

**shaping-rate max-subscriber-video-bandwidth**

**exit**

! Configure the subscriber-weight scheduler profile.

**scheduler-profile subscriber-weight**

**weight subscriber-weight**

**exit**

```

! Configure the subscriber-voice scheduler profile.
scheduler-profile subscriber-voice
shaping-rate max-100Kbps-voice-calls * 100000
exit
! Configure the subscriber-data-service QoS profile.
qos-profile subscriber-data-service
svlan node
vlan node scheduler-profile subscriber-weight
vlan queue traffic-class best-effort scheduler-profile subscriber-best-effort
exit
! Configure the subscriber-triple-play QoS profile.
qos-profile subscriber-triple-play
svlan node
vlan node scheduler-profile subscriber-weight
svlan node group EF
vlan queue traffic-class best-effort scheduler-profile subscriber-best-effort
vlan queue traffic-class video scheduler-profile subscriber-video
vlan queue traffic-class voice scheduler-profile subscriber-voice
exit
! Configure the ethernet-default QoS profile.
qos-profile ethernet-default
no ip node
no ip queue traffic-class best-effort
exit
! Attach the QoS profile to the VLAN and S-VLAN subinterfaces.
interface fastEthernet 9/0
encapsulation vlan
exit
interface fastEthernet 9/0.1
svlan id 2 1
ip address 192.1.1.1 255.255.255.0
interface fastEthernet 9/0.2
svlan id 2 2
ip address 192.2.1.1 255.255.255.0
exit
interface fastEthernet 9/0.3
svlan id 2 3
ip address 192.3.1.1 255.255.255.0
exit

```

### **QoS Client Configuration**

From Global Configuration mode:

```

! Configure the max-subscriber-bandwidth, subscriber-weight,
max-subscriber-video-bandwidth, and max-100Kbps-voice-calls global parameter
instances.
qos-parameter max-subscriber-bandwidth 2000000
qos-parameter subscriber-weight 1
qos-parameter max-subscriber-video-bandwidth 2000000
qos-parameter max-100Kbps-voice-calls 1
! Configure a global parameter instance for individual DSLAMs.
interface fastEthernet 9/0
svlan 1 qos-parameter max-subscriber-video-bandwidth 1000000
exit

```

```
! Configure the basic-data service for Subscriber 1.  
interface fastEthernet 9/0.1  
qos-profile subscriber-data-service  
exit  
! Configure the basic triple-play service for Subscriber 2.  
interface fastEthernet 9/0.2  
qos-parameter max-subscriber-bandwidth 6000000  
qos-parameter subscriber-weight 3  
qos-parameter max-subscriber-video-bandwidth 2000000  
qos-parameter max-100Kbps-voice-calls 1  
qos-profile subscriber-triple-play  
exit  
! Configure the enhanced triple-play service for Subscriber 3.  
interface fastEthernet 9/0.3  
qos-parameter max-subscriber-bandwidth 8000000  
qos-parameter subscriber-weight 6  
qos-parameter max-subscriber-video-bandwidth 3000000  
qos-parameter max-100Kbps-voice-calls 3  
qos-profile subscriber-triple-play  
exit
```