

## Example: QoS Parameter Configuration for IP Multicast Bandwidth Adjustment

In this example, a QoS administrator configures a QoS parameter definition to associate with the IP multicast bandwidth adjustment application.

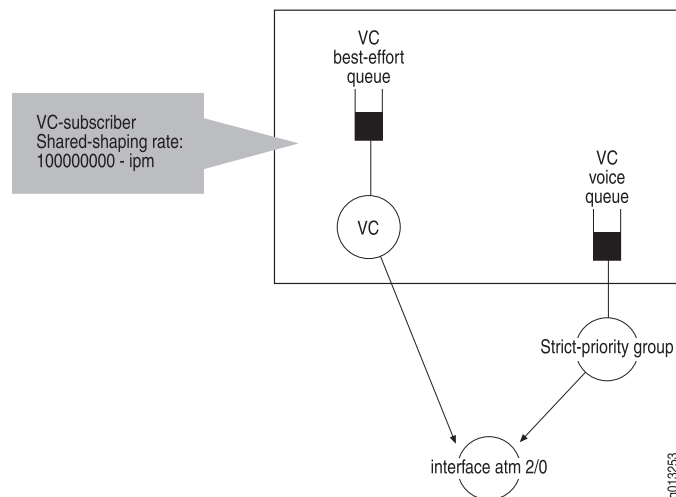
The QoS administrator configures the parameter definition to perform the QoS adjustment on an ATM VC subscriber. By specifying the **ip-multicast** keyword with the **qos-parameter-define** command, the IP parameter instances are created when the Internet Group Management Protocol (IGMP) joins and leaves.

When you specify a controlled-interface type for atm-vc, the system explicitly creates a parameter instance at the ATM VC with a value that is equal to the sum of the IP adjustments above this interface. This parameter value is referred by a scheduler profile and a QoS profile to create the QoS scheduler hierarchy that adjusts the shared-shaping rate when IGMP joins and leaves.

This subscriber has data, voice, and video service with total subscriber bandwidth of 10 Mbps. Voice traffic is shaped at 192 Kbps and belongs to the strict priority group. Video traffic is provided by the IP multicast bandwidth adjustment application and its rate is configured in the bandwidth map.

Figure 1 on page 1 shows the scheduler hierarchy built in this configuration.

**Figure 1: Scheduler Hierarchy with QoS Adjustment for IP Multicast**



### Configuring Traffic Classes and Traffic-Class Groups

The QoS administrator configures the traffic classes and traffic-class groups for best-effort data and voice services. The QoS administrator does not need to configure a traffic class for the video service because it is transmitted through the IP multicast connection.

1. Configure the traffic classes.
  - a. Configure the traffic class named best-effort.
  - b. Configure the traffic class named voice.

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

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

2. Configure a traffic-class group for low-latency expedited forwarding (EF) and add the traffic class for voice service into the traffic-class group EF.
  - a. Configure the EF traffic-class group with strict-priority scheduling.
  - b. Add the traffic class voice 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 class, best-effort, remains in the default traffic-class group.

#### **Configuring the QoS Parameter Definition and Global Parameter Instance**

The QoS administrator configures the QoS parameter definition and specifies the IP multicast bandwidth adjustment application. The QoS administrator must configure the parameter as hierarchical.

The QoS scheduler hierarchy is constructed when the subscriber logs on. However, because the parameter instance has not yet been created, the shared-shaping rate is undefined (that is, there is no shaping rate).

Therefore, the QoS administrator creates a global parameter instance to shape the subscriber to the desired bandwidth. The initial value is determined based on the application; in this example, the QoS administrator specifies 0 as the default.

1. Configure the QoS parameter definition ipm, associate it with the ip-multicast application, and assign it as a hierarchical parameter.
2. Configure a controlled-interface type of atm-vc.
3. Configure the global parameter instance.

```
host1(config)#qos-parameter-define ipm application ip-multicast hierarchical  
host1(config-qos-parameter-define)#controlled-interface-type atm-vc  
host1(config-qos-parameter-define)#exit  
host1(config)#qos-parameter ipm 0
```

Therefore, the initial shared-shaping rate is 10 Mbps (10 Mbps - ipm value of 0).

#### **Reference the Parameter Definition Within a Scheduler Profile**

The QoS administrator configures the scheduler profile for the ATM VC subscriber and configures the shared-shaping rate. When a scheduler profile references the parameter instance, it enables the IP multicast bandwidth adjustment application to adjust the subscriber bandwidth to account for the video traffic.

The QoS administrator then configures the scheduler profile to shape voice traffic.

1. Configure the scheduler profile for the ATM VC subscriber.

- a. Configure the scheduler profile named vc-subscriber.
- b. Configure the shared-shaping rate by referencing an expression to limit the subscriber bandwidth to 10 Mbps.

```
host1(config)#scheduler-profile vc-subscriber
host1(config-scheduler-profile)#shared-shaping-rate 10000000 - ipm burst
50 milliseconds auto
host1(config-scheduler-profile)#exit
```

2. Configure the scheduler profile for shaping voice traffic.
  - a. Configure the scheduler profile named 192K.
  - b. Configure the shaping rate at 1920000.

```
host1(config)#scheduler-profile 192K
host1(config-scheduler-profile)#shaping rate 192000
host1(config-scheduler-profile)#exit
```

#### **Adding the Scheduler Profiles to a QoS Profile**

The IP multicast adjustment application is initialized when IGMP joins or leaves. The QoS administrator specifies the scheduler hierarchy by using a QoS profile rule that refers to a scheduler profile with a parameter expression.

1. Create the QoS profile named ipm-adjusted.
2. Configure a queue for ATM VC subinterfaces with the best-effort traffic class.
3. Configure a queue for ATM VC subinterfaces with the voice traffic class and reference the 192K scheduler profile.
4. Configure a node for ATM VC subinterfaces and reference the scheduler profile vc-subscriber.

```
host1(config)#qos-profile ipm-adjusted
host1(config-qos-profile)#atm-vc queue traffic-class best-effort
host1(config-qos-profile)#atm-vc queue traffic-class voice scheduler-profile 192k
host1(config-qos-profile)#atm-vc node scheduler-profile vc-subscriber
host1(config-qos-profile)#exit
```

#### **Attaching the Parameter Definition to an Interface**

The QoS administrator creates a logical interface and attaches the parameter definition. The scheduler hierarchy is created when the QoS administrator creates the interface.

1. Configure the ATM interface in slot 2, port 0 as a point-to-point ATM interface.
2. Configure the ATM PVC with aal5snap encapsulation.
3. Attach the QoS profile vc-subscriber to the subinterface.
4. Configure the IP address for the ATM subinterface.

```
host1(config)#interface atm 2/0
host1(config-if)#interface atm 2/0.1 point-to-point
host1(config-subif)#atm pvc 100 0 100 aal5snap
host1(config-subif)#qos-profile ipm-adjusted
host1(config-subif)#ip address 1.1.1.1 255.255.255.0
```

**IP Multicast Bandwidth Adjustment** When an IGMP join occurs, the IP multicast bandwidth adjustment application creates the parameter instance ipm for the IP interface and the ATM VC subinterface. Because the shared-shaping rate of the ATM VC references the ipm parameter, the rate is recalculated. If the imp parameter has a value of 2 Mbps, the resulting shared-shaping rate is 8 Mbps (10 Mbps - 2 = 8 Mbps).

When another IGMP join occurs, the IP multicast bandwidth adjustment application recalculates the value for parameter ipm and configures it to another value (for example, 7 Mbps). The system readjusts the ipm at the ATM VC and readjusts the shared-shaping rate. If the voice traffic is 100 Kbps, then the best-effort traffic is 2.9 Mbps.

When an IGMP leave occurs, the IP multicast bandwidth adjustment application configures the ipm parameter instance with a new value and readjusts the shared-shaping rate.

## Monitoring the Configuration

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

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

```
host1#show traffic-class
```

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

2. To display the traffic-class group, 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 scheduler profile settings for vc-subscriber and 192K, issue the **show scheduler-profile** command.

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

scheduler	shaping rate	shaping burst	weight	strict priority	assured rate
default	<none>	<none>	8	no	<none>
vc-subscriber	<none>	<none>	8	no	<none>
192k	192000	default	8	no	<none>

scheduler	shared shaping rate	shared shaping burst	shared shaping constituent	shared shaping mode
default	<none>	<none>	<none>	<none>

vc-subscriber	10000000	- ipm	50 bytes	<none>	simple implicit
192k		<none>	<none>	<none>	<none>

- To display the attachments on all QoS profiles, including ipm-adjust, 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)
ipm-adjust                                atm-vc ATM2/0.1

Port attachments:      4
Interface attachments: 1
Not attached:          0

```

- To display the settings for the ipm-adjust QoS profile, issue the **show qos-profile** command.

```

host1#show qos-profile ipm-adjust
qos-profile ipm-adjust:
t-class interface rule  traffic    scheduler  queue    drop
statistics
group  type    type    class    profile    profile profile profile
-----
      atm-vc  node    vc-subscriber
      atm-vc  queue best-effort default    default default default
EF      atm-vc  queue voice  192k      default default default

```

- To display the settings for the ipm QoS parameter definition, issue the **show qos-parameter-define** command.

```

host1#show qos-parameter-define
      controlled instance subscriber
parameter interface interface interface value
      name      types    types    types    range
-----
ipm      atm-vc    <none>    <none>    <none>

parameter
name      properties
-----
ipm      ip-multicast-adjustment, hierarchical

```

- To display global and interface attachments on the ipm QoS parameter instance, issue the **show qos-parameter references** command.

```

host1#show qos-parameter references
      parameter
interface name    value

```

```

-----
global      ipm              0

```

```

Global parameter instances: 1
Parameter instances reported: 1

```

```

host1#show qos-parameter references interface atm 1/0.1

```

interface	parameter name	value	instance Type
atm-vc ATM1/0.1	ipm	200	hierarchical
ip ATM1/0.1	ipm	200	ip-multicast

```

Explicit parameter instances: 0
Hierarchical parameter instances: 1
IP multicast parameter instances: 1
Parameter instances reported: 2

```

- To display the queue forwarding rates for the ATM VC and IP interfaces on the ATM interface in slot 2, port 0, issue the **show egress-queue rates** command.

```

host1#show egress-queue rates interface atm 2/0.1

```

interface	traffic class	forwarded rate	aggregate drop rate	minimum rate	maximum rate
atm-vc ATM2/0.1	voice	0	0	192000	192000
ip ATM2/0.1	best-effort	0	0	0	10000000

```

Queues reported: 2
Queues filtered (under threshold): 0
* Queues disabled (no rate period): 0
**Queues disabled (no resources): 0
Total queues: 2

```

- To display the shared shaper settings for the ATM VC on the ATM interface in slot 2, port 0, issue the **show qos shared-shaper** command.

```

host1#show qos shared-shaper interface atm 2/0.1

```

interface	resource	shared shaping rate	shaping rate	other
atm-vc ATM2/0.1	A atm-vc node	10000000		rate 10000000
	A atm-vc queue EF voice		192000	

```

Total shared shapers: 1
Total constituents: 2
Total shared shaper failovers: 0
Compound shared shapers are supported.

```

## 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*.

From Global Configuration mode:

```
! Create the voice traffic class.
traffic-class voice
exit
traffic-class best-effort
exit
traffic-class-group EF auto-strict-priority
traffic-class best-effort
exit
! Create the ipm QoS parameter definition.
qos-parameter-define ipm application ip-multicast hierarchical
controlled-interface-type atm-vc
exit
! Create a global parameter instance of the ipm QoS parameter.
qos-parameter ipm 0
! Configure the vc-subscriber and 192K scheduler profiles.
scheduler-profile vc-subscriber
shared-shaping-rate 10000000 - ipm burst 50 milliseconds auto
exit
scheduler-profile 192K
shaping-rate 192000
exit
! Add the scheduler profiles to the ipm-adjusted QoS profile.
qos-profile ipm-adjusted
atm-vc queue traffic-class best-effort
atm-vc queue traffic-class voice scheduler-profile 192k
atm-vc node scheduler-profile vc-subscriber
exit
! Attach the parameter definition to an interface.
interface atm 2/0.1 point-to-point
atm pvc 100 0 100 aal5snap
qos-profile ipm-adjusted
ip address 1.1.1.1 255.255.255
```

**Related Topics** ■ [IP Multicast Bandwidth Adjustment for QoS Overview](#)

