

Chapter 27

Configuring the Shaping Mode for Ethernet with QoS Parameters

This chapter provides information for configuring the shaping mode for Ethernet using quality of service (QoS) parameters on E-series routers.

QoS parameters are discussed in the following sections:

- Cell Shaping Mode Using QoS Parameters Overview on page 275
- Guidelines for Configuring the Cell Shaping Mode with QoS Parameters on page 277
- Configuring a Parameter Definition to Shape Ethernet Traffic Using Cell Mode on page 278
- Example: QoS Parameter Configuration for QoS Cell Mode and Byte Adjustment on page 280

Cell Shaping Mode Using QoS Parameters Overview

You can associate the QoS cell mode application (**qos-cell-mode**) with a parameter definition for Ethernet interfaces configured on any E-series router. Creating a parameter instance with the QoS cell mode application on a VLAN subinterface enables the scheduler to perform cell mode shaping and scheduling for queues and nodes associated with the controlled-interface types above the logical interface on which you create the parameter instance.

Overriding the QoS Shaping Mode

The QoS cell mode application overrides the shaping mode specified at the port using the **qos-shaping-mode** command.

The QoS cell mode application applies the shaping mode to all logical interfaces specified in the controlled-interface type list above the logical interface on which you created the parameter instance.

For example, all of the interfaces stacked above the Gigabit Ethernet interface configured on slot 6, adapter 0, port 2 have cell shaping mode:

```
host1(config)#interface gigabitEthernet 6/0/2
host1(config-if)#qos-shaping-mode cell
```

The QoS administrator then applies frame shaping mode to the Gigabit Ethernet interface configured on slot 6, adapter 0, port 2, subinterface 1 using the QoS cell mode application. This parameter instance overrides the shaping mode configured at the port.

```
host1(config-if)#interface gigabitEthernet 6/0/2.1
host1(config-if)#qos-parameter cell-mode 0
```

Module Types and Capabilities for QoS Cell Mode Application

The QoS cell mode application is supported by all E-series routers. However, different module types support the application.

Table 26 lists the supported modules for the **qos-shaping-mode cell** command and the **qos-cell-mode** application for parameters. It also describes how the cell mode adjustment is performed by each module type.

Table 26: Supported Interfaces for qos-shaping-mode and qos-cell-mode Commands

Module Type	qos-shaping-mode cell Command	qos-cell-mode Application	Adjustment Performed By
Ethernet interfaces on ES2 4G LM on E120 routers and E320 routers	a	a	Internal cell-taxing mechanism
Ethernet interfaces on ERX-7xx models, ERX-14xx models, and ERX-310 routers	–	a	Parameter expression associated with qos-cell-mode application (see <i>Cell Tax Adjustment Using QoS Cell Mode</i> on page 276)
ATM interfaces on all E-series routers	a	–	Internal cell-taxing mechanism
All other interface types on all E-series routers	–	–	–

Cell Tax Adjustment Using QoS Cell Mode

The internal cell-taxing mechanism does not perform the cell mode adjustment on certain interface types. On these interfaces, the system uses a parameter expression associated with the **qos-cell-mode** application to determine whether the cell adjustment is required.



NOTE: Do not use the parameter expression on Ethernet interfaces configured on the ES2 4G LM.

For example, the subscriber-rate parameter represents the bandwidth of a subscriber. The shaping rate for the parameter is calculated by referencing an expression that represents the cell mode adjustment in a scheduler profile:

```
(config-scheduler-profile)# shaping-rate subscriber-rate - subscriber-rate *  
cell-mode % 25
```

The subscriber-rate - subscriber-rate * cell-mode % 25 expression provides for an explicit cell-tax factor of 25 percent when the subscriber local loop is transmitting cells. In cases where the local loop is very-high-bit-rate digital subscriber line (VDSL), the second term in the expression drops to 0.

Relationship with QoS Downstream Rate Application

L2C dynamically controls the QoS cell mode application when you create parameter instances for VLANs using both the QoS downstream rate application and the QoS cell mode application.

L2C controls QoS cell mode parameter instances at the VLAN subinterface only; the protocol does not control parameter instances at the major Ethernet interface or S-VLAN subinterface.

Related Topics

- Configuring a Parameter Definition to Shape Ethernet Traffic Using Cell Mode on page 278
- Example: QoS Parameter Configuration for QoS Cell Mode and Byte Adjustment on page 280
- For more information about configuring the QoS shaping mode, see *QoS Shaping Mode for Ethernet Interfaces Overview* on page 186
- For more information about configuring scheduler rates for QoS parameters, see *Scheduler Profiles and Parameter Expressions for QoS Administrators* on page 229
- For more information about the QoS downstream rate application, see *QoS Downstream Rate Application Overview* on page 293

Guidelines for Configuring the Cell Shaping Mode with QoS Parameters

When you specify the QoS cell mode application, the following considerations apply:

- You can have only one parameter definition with the QoS cell mode application configured.
- You must specify a controlled-interface type.
- You can specify only instance-interface types of atm, atm-vp, atm-vc, ethernet, svlan, and vlan.

- You can specify only the subscriber-interface type of vlan when you configure QoS cell mode application on its own or with the byte adjustment application. When you configure the QoS cell mode application with the QoS downstream rate application, you must specify a subscriber-interface type. L2C uses the subscriber-interface type to determine the instance-interface type on which to dynamically create the parameter.
- You can specify only 0 or 1 as the values for a parameter instance with the QoS cell mode application configured. 0 indicates frame mode, and 1 indicates cell mode. You cannot configure another range for the parameter definition using the **range** command.

Related Topics

- Cell Shaping Mode Using QoS Parameters Overview on page 275
- Configuring a Parameter Definition to Shape Ethernet Traffic Using Cell Mode on page 278
- Example: QoS Parameter Configuration for QoS Cell Mode and Byte Adjustment on page 280
- For more information about configuring scheduler rates for QoS parameters, see *Scheduler Profiles and Parameter Expressions for QoS Administrators* on page 229
- For more information about the QoS downstream rate application, see *QoS Downstream Rate Application Overview* on page 293

Configuring a Parameter Definition to Shape Ethernet Traffic Using Cell Mode

To associate a parameter instance with the QoS cell mode application:

1. Configure traffic classes.

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

2. Create a parameter definition.

- a. Configure the QoS parameter name and the application.

```
host1(config)#qos-parameter-define shaping-mode application qos-cell-mode
```

- b. Configure a controlled-interface type.

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

- c. Configure an instance-interface type.

```
host1(config-qos-parameter-define)#instance-interface-type vlan
```

3. Create the parameter instance and configure the shaping mode.

When you create the parameter instance and configure the shaping mode, the value of frame shaping mode is 0; the value for cell shaping mode is 1.

```
host1(config)#interface gigabitEthernet 6/0/2
host1(config-if)#encapsulation vlan
host1(config-if)#interface gigabitEthernet 6/0/2.1
host1(config-if)#vlan id 1
host1(config-if)#qos-parameter cell-mode 1
host1(config-if)#ip address 6.10.10.10 255.255.255.255
host1(config-if)#exit
host1(config)#interface gigabitEthernet 6/0/2
host1(config-if)#svlan 1 qos-parameter cell-mode 1
host1(config-if)#exit
host1(config)#interface gigabitEthernet 6/0/2
host1(config-if)#qos-parameter cell-mode 1
```

Related Topics

- Configuring a Parameter Definition to Shape Ethernet Traffic Using Cell Mode on page 278
- Example: QoS Parameter Configuration for QoS Cell Mode and Byte Adjustment on page 280
- For more information about configuring scheduler rates for QoS parameters, see *Scheduler Profiles and Parameter Expressions for QoS Administrators* on page 229
- For more information about the QoS downstream rate application, see *QoS Downstream Rate Application Overview* on page 293
- **controlled-interface-type** command
- **instance-interface-type** command
- **qos-parameter** command
- **qos-parameter-define** command
- **scheduler-profile** command
- **svlan qos-parameter** command
- **traffic-class** command

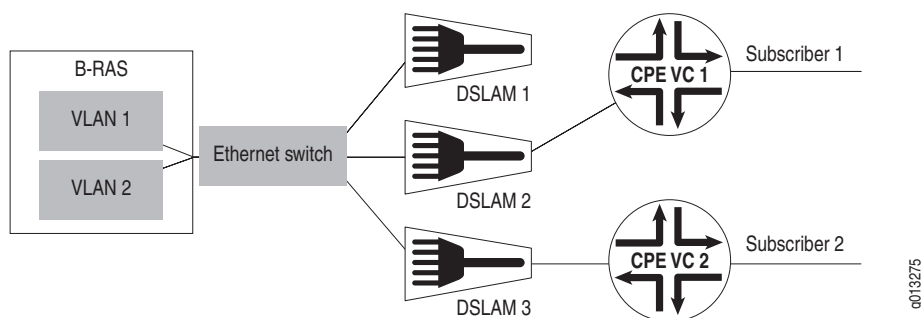
Example: QoS Parameter Configuration for QoS Cell Mode and Byte Adjustment

The example in this section illustrates how to configure the byte adjustment application to adjust the shaping rate for downstream ATM traffic from the customer premise equipment (CPE) to Ethernet interfaces configured on an E320 router.

In this example, the QoS administrator manages the shaping rate using a combination of the byte adjustment application and cell shaping mode to account for different layer 2 encapsulations and the ATM cell pad, header, and trailer.

Figure 62 displays the Ethernet network to which the QoS administrator applies the byte adjustment.

Figure 62: Byte Adjustment for VC1 and VC2



In Figure 62, VLAN 1 and VLAN 2 map to the subscribers at VC1 and VC2.

The QoS administrator allocates a total of 10 Mbps of bandwidth for voice, video, and data services to VC1, and 2 Mbps of bandwidth of data traffic for VC2.

Table 27 lists the shaping rate and byte adjustment for both subscribers.

Table 27: Byte Adjustment for Subscribers VC1 and VC2

	VC1	VC2
Protocol	A3 encapsulation	A1 encapsulation
Byte Adjustment	-28	-2
Voice Bandwidth	1000000 bps	1000000 bps
Video Bandwidth	10000 bps	–
Data Bandwidth	8000000 bps	–
Total Bandwidth	–	1000000 bps

Configuring Traffic Classes

The QoS administrator configures the traffic classes and traffic-class groups for video and voice services.

1. Configure the traffic class named voice.

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

2. Configure the traffic class named video.

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

Configuring the QoS Parameter Definition

The QoS administrator configures a parameter definition and the byte adjustment application. The QoS administrator then enables the QoS client to create a parameter instance of the byte adjustment from VLAN interfaces. All interfaces above the VLAN use the same byte adjustment value.

1. Configure a parameter definition named byte-adjustment.

```
host1(config)#qos-parameter-define byte-adjustment application
qos-byte-adjustment
```

2. Define the controlled-interface types for vlan and ip to adjust the shaping rate for the VLAN and IP queues.

- a. Configure the controlled-interface type for VLAN.

- b. Configure the controlled-interface type for IP.

```
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#controlled-interface-type ip
host1(config-qos-parameter-define)#exit
```

Configuring the QoS Shaping Mode

The QoS administrator then configures the QoS shaping mode using the QoS cell mode application. When you configure the QoS shaping mode to cell mode on port 0 of the IOA, all ports on the IOA use the same value.

1. Configure a parameter definition named cell-mode.

```
host1(config)#qos-parameter-define cell-mode application qos-cell-mode
```

2. Define the controlled-interface types for vlan and ip for the shaping mode.

```
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#controlled-interface-type ip
host1(config-qos-parameter-define)#exit
```

Reference the Parameter Definition Within a Scheduler Profile

The QoS administrator configures the shaping rate and the shared-shaping rate within scheduler profiles for the subscribers at VC1 and VC2.

1. Configure the scheduler profile for the subscriber VC1.

- a. Configure the scheduler profile named vc1.

- b. Configure the shared-shaping rate of 10000000 with a burst of 10 milliseconds.

```

host1(config)#scheduler-profile vc1
host1(config-scheduler-profile)#shared-shaping-rate 10000000 burst 10
milliseconds
host1(config-scheduler-profile)#exit

```

2. Configure the scheduler profile for the voice service.
 - a. Configure the scheduler profile named voice.
 - b. Configure the shared-shaping rate of 100000 with a burst of 10 milliseconds.

```

host1(config)#scheduler-profile voice
host1(config-scheduler-profile)#shaping-rate 100000 burst 10 milliseconds
host1(config-scheduler-profile)#exit

```

3. Configure the scheduler profile for the video service.
 - a. Configure the scheduler profile named voice.
 - b. Configure the shared-shaping rate of 8000000 with a burst of 10 milliseconds.

```

host1(config)#scheduler-profile video
host1(config-scheduler-profile)#shaping-rate 8000000 burst 10 milliseconds
host1(config-scheduler-profile)#exit

```

4. Configure the scheduler profile for the subscriber VC2.
 - a. Configure the scheduler profile named vc2.
 - b. Configure the shared-shaping rate of 1000000 with a burst of 10 milliseconds.

```

host1(config)#scheduler-profile vc2
host1(config-scheduler-profile)#shaping-rate 1000000 burst 10 m
host1(config-scheduler-profile)#exit

```

Adding the Scheduler Profiles to a QoS Profile

After configuring the scheduler profiles, the QoS administrator then configures QoS profiles for subscribers VC1 and VC2.

1. Configure the vc1 QoS profile with a shared-shaping rate of 10 Mbps.
 - a. Configure the QoS profile vc1.
 - b. Configure the vlan node and reference the scheduler profile vc1.
 - c. Configure the vlan queue and reference the voice traffic class and the voice scheduler profile.
 - d. Configure the vlan queue and reference the video traffic class and the video scheduler profile.


```

host1(config)#qos-profile vc1
host1(config-qos-profile)#vlan node scheduler-profile vc1
host1(config-qos-profile)#vlan queue traffic-class voice schedule-profile voice
host1(config-qos-profile)#vlan queue traffic-class video schedule-profile video
host1(config-qos-profile)#exit

```

2. Configure the vc2 QoS profile with a shaping rate of 1 Mbps.

- a. Configure the QoS profile vc2.
- b. Configure the vlan node and reference the scheduler profile vc2.

```

host1(config)#qos-profile vc2
host1(config-qos-profile)#vlan node scheduler-profile vc2
host1(config-qos-profile)#exit

```

Attaching the Parameter Definition to an Interface

The QoS administrator creates logical interfaces for VLAN1 and VLAN2 and attaches the parameter definitions to them.

1. Attach the parameter definition to VLAN1.

- a. Configure the Gigabit Ethernet interface in slot 6, adapter 0, port 0.
- b. Configure the VLAN major interface.
- c. Configure the Gigabit Ethernet interface in slot 6, adapter 0, port 0, subinterface 1.
- d. Assign VLAN ID of 1.
- e. Create a parameter instance for byte-adjustment with a value of -28.
- f. Create a parameter instance for cell-mode with a value of 1 (cell shaping mode).
- g. Attach the QoS profile vc1 to the Gigabit Ethernet interface.

```

host1(config)#interface gigabitEthernet 6/0/0
host1(config-if)#encapsulation vlan
host1(config-if)#interface gigabitEthernet 6/0/0.1
host1(config-if)#vlan id 1
host1(config-if)#qos-parameter byte-adjustment -28
host1(config-if)#qos-parameter cell-mode 1
host1(config-if)#qos-profile vc1
host1(config-if)#exit

```

2. Attach the parameter definition to VLAN2.

- a. Specify the Gigabit Ethernet interface in slot 6, adapter 0, port 1.
- b. Assign a VLAN ID of 2.
- c. Create a parameter instance for byte-adjustment with a value of -2.

- d. Create a parameter instance for cell-mode with a value of 1 (cell shaping mode).
- e. Attach the QoS profile vc2 to the Gigabit Ethernet interface.

```
host1(config-if)#interface gigabitEthernet 6/0/1.1
host1(config-if)#vlan id 2
host1(config-if)#qos-parameter byte-adjustment -2
host1(config-if)#qos-parameter cell-mode 1
host1(config-if)#qos-profile vc2
host1(config-if)#exit
```

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*.

From Global Configuration mode:

```
! Configure the traffic-classes for video and voice.
traffic-class voice
exit
traffic-class video
exit
! Create the byte-adjustment QoS parameter definition.
qos-parameter-define byte-adjustment application qos-byte-adjustment
controlled-interface-type vlan
controlled-interface-type ip
exit
! Create the cell-mode QoS parameter definition.
qos-parameter-define cell-mode application qos-cell-mode

controlled-interface-type vlan
controlled-interface-type ip
exit
! Configure the vc1 and vc2 scheduler profiles.
scheduler-profile vc1
shared-shaping-rate 10000000 burst 10 milliseconds
exit
scheduler-profile voice
shaping-rate 100000 burst 10 milliseconds
exit
scheduler-profile video
shaping-rate 8000000 burst 10 milliseconds
exit
scheduler-profile vc2
```

```

shaping-rate 1000000 burst 10 m
exit
! Add the scheduler profiles to the vc1 QoS profile.
qos-profile vc1
vlan node scheduler-profile vc1
vlan queue traffic-class voice schedule-profile voice
vlan queue traffic-class video schedule-profile video
exit
qos-profile vc2
vlan node scheduler-profile vc2
! Configure the byte adjustment for VLAN1 and VLAN2.
interface gigabitEthernet 6/0/0
encapsulation vlan
interface gigabitEthernet 6/0/0.1
vlan id 1
qos-parameter byte-adjustment -28
qos-parameter cell-mode 1
qos-profile vc1
interface gigabitEthernet 6/0/1.1
vlan id 2
qos-parameter byte-adjustment -2
qos-parameter cell-mode 1
qos-profile vc2

```

Related Topics

- Cell Shaping Mode Using QoS Parameters Overview on page 275

