

## Chapter 29

# Configuring the Downstream Rate Using QoS Parameters

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

QoS parameters are discussed in the following sections:

- QoS Downstream Rate Application Overview on page 297
- Guidelines for Configuring QoS Downstream Rate on page 299
- Configuring a Parameter Definition for QoS Downstream Rate on page 299
- Example: QoS Parameter Configuration for QoS Downstream Rate on page 302

## QoS Downstream Rate Application Overview

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You can associate the QoS downstream rate (**qos-downstream-rate**) application with a parameter definition. The QoS downstream rate application enables you to shape the downstream rate of VLANs and ATM VCs based on parameter instances that are created dynamically by the Access Node Control Protocol (ANCP), also known as the layer 2 control (L2C) protocol, or the Actual-Data-Rate-Downstream [26-130] DSL Forum vendor-specific attribute (VSA). The values of the parameter instances track the bandwidth of the local loop that is communicated by ANCP or the [26-130] VSA.

## Downstream Rate and the Shaping Mode

After you configure a parameter definition with the QoS downstream rate application, you can configure the shaping mode for the VLAN or ATM VC. For ATM VCs, use the **qos-shaping-mode** command.

For VLANs, you can use the QoS cell mode application with QoS parameters to perform a cell mode adjustment. ANCP creates instances of the parameter based on the DSL type of the local loop associated with the VLAN.

VLANs configured on the ES2 4G LM on the E120 and E320 routers use an internal cell-taxing mechanism to perform the cell mode adjustment. For VLANs configured on all other E-series routers, you must also configure a parameter expression to configure the cell mode adjustment.

## QoS Adaptive Mode and Downstream Rate

After you create the parameter definition, you must enable QoS adaptive mode for ANCP by issuing the **qos-adaptive-mode** command. ANCP uses this setting to dynamically create the parameter instances for the QoS downstream rate application and, if applicable, the QoS cell mode application. It also uses the setting to determine the value that the system uses when recalculating the shaping rate.

For example, if you created a parameter definition with the QoS cell mode application, ANCP configures parameter instances associated with a value of 0 to indicate a frame-oriented DSL types such as VDSL2. ANCP configures cell-oriented DSL types such as ADSL with a value of 1.

Table 32 lists the DSL types, interface type, and resultant shaping modes that ANCP configures when creating a parameter instance for the QoS cell mode application.

**Table 32: Access Loop Types and Resultant Shaping Mode**

Access Loop Type	Access Loop Interface Type	Shaping Mode
ADSL1	ATM	Cell
ADSL2	ATM	Cell
ADSL2 +	ATM	Cell
VDSL1	ATM	Cell
VDSL2	Ethernet	Frame
SDSL/SHDSL	ATM	Cell

## Obtaining Downstream Rates from a DSL Forum VSA

You can configure the QoS downstream rate application to shape VLANs or ATM VCs based on downstream rates obtained from the Actual-Data-Rate-Downstream [26-130] DSL Forum vendor-specific attribute (VSA).

## Related Topics

- [Configuring a Parameter Definition for QoS Downstream Rate on page 299](#)
- [Example: QoS Parameter Configuration for QoS Downstream Rate on page 302](#)
- For more information about configuring the shaping mode for Ethernet interfaces, see *QoS Shaping Mode for Ethernet Interfaces Overview* on page 188 and *Cell Shaping Mode Using QoS Parameters Overview* on page 277
- For more information about configuring byte adjustment for downstream rates, see *Byte Adjustment for ADSL and VDSL Traffic Overview* on page 289
- For information about configuring the shaping mode for ATM interfaces, see *Configuring the QoS Shaping Mode for ATM Interfaces* on page 184
- For more information about DSL Forum VSAs, see *JUNOS Broadband Access Configuration Guide, Chapter 3, Configuring RADIUS Attributes*

## Guidelines for Configuring QoS Downstream Rate

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When you specify the QoS downstream rate application, the following considerations apply:

- You can have only one parameter definition with the QoS downstream rate configured.
- You must specify a controlled-interface type.
- You must configure a subscriber-interface-type. ANCP uses the subscriber-interface type to determine the instance-interface type on which to dynamically create the parameter.
- Access loops can synchronize after the user has logged in. The business logic depends on the rate that is reported in the Access-Request message. We recommend that service providers use RADIUS Connect-Info attribute [77] as the default value for their business logic. When the ANCP rate information is not present, the system uses the default QoS parameter instance (which can be defined globally or per VLAN). The advisory transmit speed configurable per VLAN is reported to the RADIUS Connect-Info attribute [77]. Ensure that the value of the default QoS parameter is aligned with the value in RADIUS Connect-Info attribute 77.

### Related Topics

- QoS Downstream Rate Application Overview on page 297
- Configuring a Parameter Definition for QoS Downstream Rate on page 299
- Example: QoS Parameter Configuration for QoS Downstream Rate on page 302
- For more information about the RADIUS Connect-Info attribute, see *JUNOS Broadband Access Configuration Guide, Chapter 3, Configuring RADIUS Attributes*

## Configuring a Parameter Definition for QoS Downstream Rate

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To associate a parameter instance with the QoS downstream rate 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 for the QoS downstream rate application.

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

```
host1(config)#qos-parameter-define downstreamVLAN application
qos-downstream-rate
```

- b. Configure controlled-interface types.

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

- c. Configure subscriber-interface types.

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

3. Do one of the following:

- For VLANs, configure the shaping mode by creating a parameter definition with the QoS cell mode application. Ensure that you specify a subscriber-interface type.

*See Configuring a Parameter Definition to Shape Ethernet Traffic Using Cell Mode on page 280.*

- For ATM VCs, configure the shaping mode by issuing the **qos-shaping-mode** command.

*See Configuring the QoS Shaping Mode for ATM Interfaces on page 184.*

4. Enable QoS adaptive mode for the system by issuing the **qos-adaptive-mode** command in L2C Configuration mode.

```
host1(config)#I2c
host1(config-l2c)#qos-adaptive-mode
```

5. Enable the QoS downstream rate application to use downstream rates obtained from the Actual-Data-Rate-Downstream [26-130] DSL Forum VSA.

```
host1(config)#aaa qos downstream-rate
```

6. Configure the scheduler profile for the shaping rate.

```
host1(config)#scheduler-profile vlan1
host1(config-scheduler-profile)#shared-shaping-rate downstreamVLAN * 5 auto
```

7. Configure the QoS profile for the shaping rate.

```
host1(config)#qos-profile vlan1
host1(config-qos-profile)#vlan node scheduler-profile vlan1
```

8. Attach the QoS profile to a logical Ethernet interface.

ANCP or AAA dynamically creates the parameter instances for the QoS downstream rate application, and if applicable, the QoS cell mode application; therefore, you do not need to specify them.

```
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-profile vlan1
host1(config-if)#ip address 6.10.10.10 255.255.255.255
```

## Related Topics

- Example: QoS Parameter Configuration for QoS Downstream Rate
- For information about downstream rate and RADIUS, see *JUNOS Broadband Access Configuration Guide, Chapter 3, Configuring RADIUS Attributes*
- For more information about configuring ANCP (L2C) parameters, see *JUNOS IP Services Configuration Guide, Chapter 8, Configuring ANCP*
- **aaa qos downstream-rate** command
- **controlled-interface-type** command
- **encapsulation vlan** command
- **instance-interface-type** command
- **ip address** command
- **node** command
- **qos-parameter** command
- **qos-adaptive-mode** command
- **qos-parameter-define** command
- **qos-profile** command
- **queue** command
- **shared-shaping-rate** command
- **subscriber-interface-type** command
- **traffic-class** command
- **vlan id** command

## Example: QoS Parameter Configuration for QoS Downstream Rate

This example illustrates how to use parameters to control the downstream rate obtained from ANCP.

In this example, the subscribers on the 0.1 access loop are configured on VLAN1. They subscribe to voice, video, and data traffic with a bandwidth of 10 Mbps. Subscribers on the 1.1 access loop are configured on VLAN2, and subscribe to 1 Mbps of data traffic.

Table 33 lists the shaping mode and shaping rate information received by the QoS downstream rate application upon access loop synchronization. The parameter instances are created with these values.

**Table 33: Shaping Rate and Shaping Mode**

	VLAN1	VLAN2
<b>Shaping mode</b>	Cell	Cell
<b>Shaping rate</b>	10000000 bps	100000 bps

### Configuring Traffic Classes

The QoS administrator configures the traffic classes for voice and video 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 for QoS Downstream Rate

The QoS administrator configures a parameter definition for the QoS downstream rate application. Using subscriber-interface types, the QoS administrator then enables ANCP to create parameter instances of the QoS downstream rate application.

1. Configure a parameter definition named ancpVlan.

```
host1(config)#qos-parameter-define ancpVlan application qos-downstream-rate
```

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
```

3. Define the subscriber-interface types for vlan and ethernet.

```
host1(config-qos-parameter-define)#subscriber-interface-type vlan
host1(config-qos-parameter-define)#subscriber-interface-type ethernet
host1(config-qos-parameter-define)#exit
```

#### Configuring the QoS Parameter Definition for QoS Cell Mode

The QoS administrator then configures the QoS shaping mode using the QoS cell mode application. Using subscriber-interface types, the QoS administrator then enables ANCP to create parameter instances using the QoS cell mode application.

1. Configure a parameter definition named cellmodeVlan.

```
host1(config)#qos-parameter-define cellmodeVlan 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
```

3. Define the subscriber-interface types for vlan and ethernet.

```
host1(config-qos-parameter-define)#subscriber-interface-type vlan
host1(config-qos-parameter-define)#subscriber-interface-type ethernet
host1(config-qos-parameter-define)#exit
```

#### Enabling QoS Adaptive Mode

The QoS administrator enables QoS adaptive mode for ANCP.

1. Enter Layer 2 Control Configuration mode.

```
host1(config)#l2c
```

2. Enable QoS adaptive mode for the system.

```
host1(config-l2c)#qos-adaptive-mode
```

#### 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 VLAN1 and VLAN2 subscribers.

1. Configure the scheduler profile for the subscriber vlan1.

- a. Configure the scheduler profile named vlan1.

- b. Configure the shared-shaping rate by referencing the ancpVlan parameter with a burst of 10 milliseconds.

```
host1(config)#scheduler-profile vlan1
host1(config-scheduler-profile)#shared-shaping-rate ancpVlan burst 10
milliseconds auto
host1(config-scheduler-profile)#exit
```

2. Configure the scheduler profile for the voice service.
  - a. Configure the scheduler profile named voice.
  - b. Configure the 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 video.
  - b. Configure the 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 vlan2.
  - a. Configure the scheduler profile named vlan2.
  - b. Configure the shaping rate by referencing the ancpVlan parameter with a burst of 10 milliseconds.

```
host1(config)#scheduler-profile vlan2
host1(config-scheduler-profile)#shaping-rate ancpVlan burst 10 milliseconds
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 the VLAN1 and VLAN2 subscribers.

1. Configure the vlan1 QoS profile with a shared-shaping rate that matches the downstream rate.
  - a. Configure the QoS profile named vlan1.
  - b. Configure the vlan node and reference the scheduler profile vlan1.
  - 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 vlan1
host1(config-qos-profile)#vlan node scheduler-profile vlan1
host1(config-qos-profile)#vlan queue traffic-class voice scheduler-profile voice
host1(config-qos-profile)#vlan queue traffic-class video scheduler-profile video
host1(config-qos-profile)#exit
```



2. Configure the vlan2 QoS profile with a shaping rate of 1 Mbps.
  - a. Configure the QoS profile named vlan2.
  - b. Configure the vlan node and reference the scheduler profile vlan2.

```
host1(config)#qos-profile vlan2
host1(config-qos-profile)#vlan node scheduler-profile vlan2
host1(config-qos-profile)#exit
```

#### Attaching the QoS Profile to an Interface

The QoS administrator creates logical interfaces for VLAN1 and VLAN2 and attaches the QoS profiles to them. As the subscribers log in, ANCP creates the parameter instances for cellmodeVlan and ancpVlan using RADIUS VSAs.

1. Attach the vlan1 QoS profile 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. Attach the QoS profile vc1 to the 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-profile vlan1
host1(config-if)#exit
```

2. Attach the vlan2 QoS profile to VLAN2.
  - a. Specify the Gigabit Ethernet interface in slot 6, adapter 0, port 1.
  - b. Assign a VLAN ID of 2.
  - c. Attach the QoS profile vlan2 to the interface.

```
host1(config-if)#interface gigabitEthernet 6/0/1.1
host1(config-if)#vlan id 2
host1(config-if)#qos-profile vlan2
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 ancpVlan QoS parameter definition.
qos-parameter-define ancpVlan application qos-downstream-rate
controlled-interface-type vlan
controlled-interface-type ip
instance-interface-type vlan
instance-interface-type ethernet
exit
! Create the cellmodeVlan QoS parameter definition.
qos-parameter-define cellmodeVlan application qos-cell-mode
controlled-interface-type vlan
controlled-interface-type ip
instance-interface-type vlan
instance-interface-type ethernet
exit
! Enable QoS adaptive mode for ANCP.
l2c
qos-adaptive-mode
exit
! Configure the vlan1 and vlan2 scheduler profiles.
scheduler-profile vlan1
shared-shaping-rate ancpVlan burst 10 milliseconds auto
exit
scheduler-profile voice
shaping-rate 100000 burst 10 milliseconds
exit
scheduler-profile video
shaping-rate 8000000 burst 10 milliseconds
exit
scheduler-profile vlan2
shaping-rate ancpVlan burst 10 milliseconds
exit
! Add the scheduler profiles to the vlan1 and vlan2 QoS profiles.
qos-profile vlan1
vlan node scheduler-profile vlan1
vlan queue traffic-class voice scheduler-profile voice
vlan queue traffic-class video scheduler-profile video
exit
qos-profile vlan2
vlan node scheduler-profile vlan2
exit

```

! Configure the QoS downstream rate adjustment for VLAN1 and VLAN2.

```
interface gigabitEthernet 6/0/0
encapsulation vlan
interface gigabitEthernet 6/0/1.1
vlan id 1
qos-profile vlan1
exit
interface gigabitEthernet 6/0/1.1
vlan id 2
qos-profile vlan2
exit
```

### ***Related Topics***

- QoS Downstream Rate Application Overview on page 297

