Chapter 28

Configuring Byte Adjustment for Shapng Rates with QoS Parameters

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

QoS parameters are discussed in the following sections:

Byte Adjustment for ADSL and VDSL Traffic Overview

You can associate a parameter definition with a byte adjustment application to adjust the shaping rates for ADSL and VDSL traffic on E-series routers.

The byte adjustment differs for interfaces with cell shaping mode and frame shaping mode. For ADSL traffic, JUNOSe software supports a byte adjustment application (**qos-byte-adjustment**) to adjust rates for cell shaping mode. For VDSL traffic, JUNOSe software supports a frame byte-adjustment application (**qos-frame-byte-adjustment**) to adjust rates for frame shaping mode.

Frame is the default shaping mode for Ethernet interfaces on E-series routers. To configure the cell shaping mode, issue the **qos-shaping-mode** command or by specifying the **qos-cell-mode** application with a parameter definition.

Byte Adjustment for Cell Shaping of ADSL Traffic Overview

Managing the bandwidth of downstream ATM traffic to Ethernet interfaces is difficult because of the different layer 2 encapsulations. To reduce the number of packet drops in the Ethernet network, you can use the byte adjustment applications to account for the different encapsulations.

To adjust the shaping rates to account for different layer 2 encapsulations as well as the ATM cell pad, header, and trailer on interfaces, apply a parameter with the cell byte-adjustment application (**qos-byte-adjustment**).

When you apply a parameter with the **qos-byte-adjustment** application to an interface with frame shaping mode, you adjust shaping rates to account for different layer 2 encapsulations only.

Calculation and Example of Byte Adjustment for Cell Shaping

The system counts the bytes transmitted to track the shaping rate. Instead of counting the actual packet size, the system uses the CPE packet size. You can configure the byte adjustment so that the shaping rate matches the CPE bandwidth.

$$\text{Byte adjustment} = \text{CPE protocol overhead} - \text{B-RAS protocol overhead}$$

By default, the byte adjustment is set to 0. If the overhead between the access node and CPE is 0, you do not need to configure the byte adjustment value.

Figure 63 displays an example of an Ethernet encapsulation and an ATM encapsulation.

Figure 63: Byte Adjustment Calculation for Ethernet and ATM Encapsulations

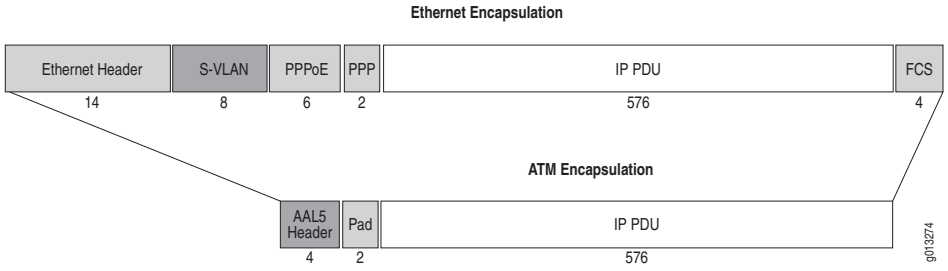

Table 29 lists the header lengths for the Ethernet encapsulation, which represents the CPE protocol overhead. The hierarchy is PPPoE over S-VLAN over Ethernet.

Table 29: Header Lengths for Ethernet Encapsulation

Header	Number of Bytes
EnetHeader	14 bytes (6-SA, 6-DA, 2-ethertype)
Vstack	8 bytes (2-vmanTci, 2-ethertype, 2-vlanTci, 2-ethertype)
PppoeHeader	6 bytes (1-version/type, 1-code, 2-session id, 2-length)
Ppp	2 bytes (2-protocol id)
FCS	4 bytes
Total	34 bytes

Table 30 lists the header lengths for the ATM encapsulation, which represents the B-RAS protocol overhead. The interface stack is PPPoA over ATM 1483 with LLC Mux. The ATM AAL5 trailer is considered cell tax and is not part of the byte adjustment calculation.

Table 30: Header Lengths for ATM Encapsulation

Header	Number of Bytes
ATM AAL5 LLC	4 bytes
PPP	2 bytes (2-protocol id)
Total	6 bytes

The byte adjustment calculation for these encapsulations is: $6 - 34 = 28$

Byte Adjustment for Frame Shaping of VDSL Traffic Overview

Packet fragmentation can occur at a DSLAM because of the associated segment header that is added for VDSL2 in frame mode. Because the segment header is not included in the ANCP rate report, the forwarding rate on an E-series router can be higher than the DSLAM rate, which can result in packet loss.

You can use a QoS parameter expression with the frame byte-adjustment application to reduce the forwarding rate so that it matches the rate at the DSLAM. To adjust rates for interfaces with frame shaping mode, apply the frame byte-adjustment application (**qos-frame-byte-adjustment**).

When you apply a parameter with the **qos-byte-adjustment** application to an interface with frame shaping mode, you adjust shaping rates to account for different layer 2 encapsulations only.

System Calculation for Byte Adjustment of ADSL and VDSL Traffic

You can create parameter instances for the cell byte-adjustment application and the frame byte-adjustment application on the same system. The system performs the byte adjustment calculation based on the shaping mode specified. The byte adjustment can have both a positive and negative value.

Table 31 lists the final byte adjustment value that the system uses depending on the configured shaping mode and the value that you configured for the byte adjustment applications.

Table 31: Byte Adjustment Values for Frame and Cell Shaping Modes

Shaping Mode on Port 0	Configured qos-frame-byte-adjustment Value	Configured qos-byte-adjustment Value	Final Byte Adjustment Value
Cell	Any value	-4	-4
Cell	Any value	Undefined	0
Frame	Undefined	Undefined	0
Frame	8	-4	8
Frame	Undefined	8	8

Related Topics

- Configuring a Parameter Definition to Adjust Cell Shaping Rates for ADSL Traffic on page 293
- Configuring a Parameter Definition to Adjust Frame Shaping Rates for VDSL Traffic on page 295
- Example: QoS Parameter Configuration for QoS Cell Mode and Byte Adjustment for Cell Shaping on page 282
- For more information about configuring shaping modes for Ethernet, 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 shaping the downstream rate using QoS parameter instances that were created dynamically by ANCP, see *QoS Downstream Rate Application Overview* on page 297

Guidelines for Configuring Byte Adjustment of Cell and Frame Shaping Rates Using QoS Parameters

When you specify the cell or frame byte-adjustment application, the following considerations apply:

- You can have only one QoS parameter definition with the cell byte-adjustment application (**qos-byte-adjustment**) configured.
- You can only have one QoS parameter definition with the frame byte-adjustment application (**qos-frame-byte-adjustment**) configured.
- You can specify only instance-interface types of lag, ethernet, svlan, and vlan.
- You can specify only an subscriber-interface type of vlan.
- The available range for parameters with the byte adjustment application is -32–63. You cannot configure another range using the **range** command.
- We recommend that you apply the byte adjustment parameter at the lowest interface column so that upper interfaces automatically have the parameter.
- On the ES2 10G LM, the shaping rate adjustment is performed more efficiently by the TFA ASIC than ASICS on other modules. The TFA ASIC performs an internal adjustment of 4 bytes. The maximum byte adjustment value that you can configure is 59. When you configure a byte adjustment value greater than 59 in a QoS parameter, the system automatically resets the value to 59.

Related Topics

- Byte Adjustment for ADSL and VDSL Traffic Overview on page 289
- Configuring a Parameter Definition to Adjust Cell Shaping Rates for ADSL Traffic on page 293
- Configuring a Parameter Definition to Adjust Frame Shaping Rates for VDSL Traffic on page 295
- Example: QoS Parameter Configuration for QoS Cell Mode and Byte Adjustment for Cell Shaping on page 282
- For more information about configuring shaping modes for Ethernet, see *QoS Shaping Mode for Ethernet Interfaces Overview* on page 188 and *Cell Shaping Mode Using QoS Parameters Overview* on page 277

Configuring a Parameter Definition to Adjust Cell Shaping Rates for ADSL Traffic

You can adjust shaping rates to account for different layer 2 encapsulations as well as the ATM cell pad, header, and trailer on interfaces with cell shaping mode using the **qos-byte-adjustment** application.

NOTE: When you apply a parameter with the **qos-byte-adjustment** application to an interface with frame shaping mode, you adjust shaping rates to account for different layer 2 encapsulations only.

To associate a parameter instance with the byte adjustment application:

1. Configure the 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 byteadjust1 application qos-byte-adjustment**

   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. Do one of the following:

   - Configure the shaping mode by issuing the **qos-shaping-mode** command.

     Frame shaping mode is the default for Ethernet interfaces on all E-series routers. You can only set the cell shaping mode for Gigabit Ethernet and 10-Gigabit Ethernet interfaces configured on the GE-2 line module, the GE-HDE line module, and the ES2 4G LM.

   - Configure the shaping mode by specifying the QoS cell mode application with a parameter definition.

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

4. Attach the parameter definition to a logical Ethernet interface.

   In this example, parameter instances are created for both the byte adjustment and QoS cell mode applications.

   host1(config)#**interface gigabitEthernet 7/0**
   host1(config-if)#**encapsulation vlan**
   host1(config-if)#**exit**
   host1(config)#**interface gigabitEthernet 7/0.1**
   host1(config-if)#**vlan id 1**
   host1(config-if)#**qos-parameter byteadjustment -16**
   host1(config-if)#**qos-parameter cell-mode 1**
   host1(config-if)#**ip address 1.1.1.1 255.255.255.0**

Related Topics

- Byte Adjustment for ADSL and VDSL Traffic Overview on page 289
- Guidelines for Configuring Byte Adjustment of Cell and Frame Shaping Rates Using QoS Parameters on page 292
- Example: QoS Parameter Configuration for QoS Cell Mode and Byte Adjustment for Cell Shaping on page 282
- For information about managing packet fragmentation for traffic with frame shaping mode, see *Configuring a Parameter Definition to Adjust Frame Shaping Rates for VDSL Traffic* on page 295
- For more information about configuring shaping modes for Ethernet, see *QoS Shaping Mode for Ethernet Interfaces Overview* on page 188 and *Cell Shaping Mode Using QoS Parameters Overview* on page 277
- **controlled-interface-type** command
- **encapsulation vlan** command
- **instance-interface-type** command
- **ip address** command
- **node** command

- **qos-parameter** command
- **qos-parameter-define** command
- **qos-profile** command
- **queue** command
- **traffic-class** command
- **vlan id** command

Configuring a Parameter Definition to Adjust Frame Shaping Rates for VDSL Traffic

Packet fragmentation can occur at a DSLAM because of the associated segment header that is added for VDSL2 in frame shaping mode. Because the segment header is not included in the ANCP rate report, the forwarding rate on an E-series router can be higher than the DSLAM rate, which can result in packet loss.

You can use a QoS parameter expression with the frame byte-adjustment application to reduce the forwarding rate so that it matches the VDSL downstream rate at the DSLAM. You can also configure the cell mode application to account for ADSL downstream traffic that is also being received.

To configure a QoS parameter definition to adjust frame shaping rates and manage packet fragmentation:

1. Configure the QoS parameter definition to accept downstream shaping rate instantiation from ANCP.

   host1(config)#**qos-parameter-define ancp-downstream application qos-downstream-rate**

2. Configure the QoS parameter definition for the frame byte-adjustment application to adjust the packet header.

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

   You can also configure the qos-byte-adjustment application with a different value.

3. Create the QoS parameter definition for the cell mode application to track the subscriber DSL type.

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

   The ADSL type corresponds to cell mode and VDSL corresponds to frame mode.

4. Configure the parameter expression to reduce the shaping rate to account for packet fragmentation.

   In the following expression, the adjustment is applied to traffic with frame shaping mode only. The byte adjustment value is 8 and the shaping rate is reduced by 2 percent.

   host1(config)#**scheduler-profile service-provider-business**
   host1(config-scheduler-profile)# **shaping-rate ancp-downstream - (ancp-downstream % 2 * (1 - sp-qos-cell-mode))**

TIP: To determine the expression value and the byte adjustment required, you must account for the actual segmentation header overhead added by the DSLAM. DSLAMs have different segmentation header overheads.

If the user packet size changes, you must change the expression value and the byte adjustment value.

5. To ensure that the router handles the byte adjustment value consistently for VDSL and ADSL networks, apply the QoS parameter for frame shaping mode globally.

   host1(config)#**qos-parameter frame-byte 8**

NOTE: The ancp-downstream rate and sp-qos-cell-mode QoS parameters are dynamically applied to QoS by ANCP.

Related Topics

- Byte Adjustment for ADSL and VDSL Traffic Overview on page 289
- **qos-parameter** command
- **qos-parameter-define** command
- **qos-profile** command
- **scheduler-profile** command
- **shaping-rate** command