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 Shaping Overview on page 287
- Guidelines for Configuring Byte Adjustment of Shaping Using QoS Parameters on page 289
- Configuring a Parameter Definition for Byte Adjustment on page 290

Byte Adjustment for Shaping Overview

You can associate a parameter definition with the byte adjustment application (**qos-byte-adjustment**) to adjust the shaping rates for Ethernet interfaces configured on E-series routers.

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 application to account for the different encapsulations.

You can apply a parameter with the byte adjustment application to interfaces with either frame or cell shaping mode. You can configure the shaping mode by issuing the **qos-shaping-mode** command or by specifying the **qos-cell-mode** application with a parameter definition.

The byte adjustment differs for interfaces with frame shaping mode and cell shaping mode. Frame shaping mode is the default for all Ethernet interfaces. When you apply a parameter with the byte adjustment application on an interface with frame shaping mode, you adjust shaping rates to account for different layer 2 encapsulations only.

When you apply a parameter with the byte adjustment application on an interface with cell shaping mode, you adjust shaping rates to account for different layer 2 encapsulations as well as the ATM cell pad, header, and trailer.

The byte adjustment can have both a positive and negative value. The system performs the byte adjustment calculation before the shaping mode calculation.

Byte Adjustment Calculation and Example

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

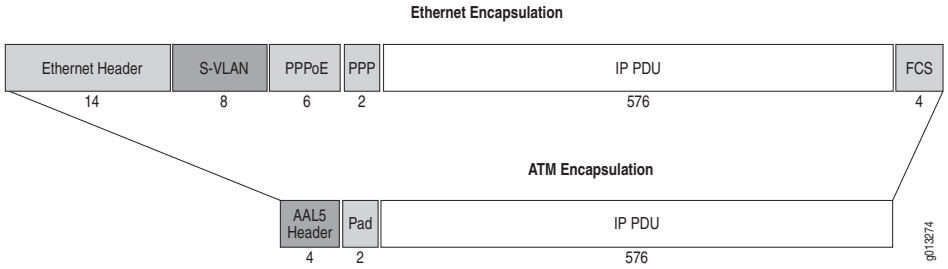

Table 28 lists the header lengths for the Ethernet encapsulation, which represents the CPE protocol overhead. The hierarchy is PPPoE over S-VLAN over Ethernet.

Table 28: 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 29 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 29: 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: $6 - 34 = 28$

Related Topics

- Guidelines for Configuring Byte Adjustment of Shaping Using QoS Parameters on page 289
- Configuring a Parameter Definition for Byte Adjustment on page 290
- Example: QoS Parameter Configuration for QoS Cell Mode and Byte Adjustment on page 280
- For more information about configuring shaping modes for Ethernet, see *QoS Shaping Mode for Ethernet Interfaces Overview* on page 186 and *Cell Shaping Mode Using QoS Parameters Overview* on page 275

Guidelines for Configuring Byte Adjustment of Shaping Using QoS Parameters

When you specify the byte adjustment application, the following considerations apply:

- You can have only one QoS parameter definition with the byte adjustment application configured.
- You can specify only instance-interface types of 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.
- To configure hierarchical parameters for the byte adjustment application, we recommend that you apply the byte adjustment parameter at the lowest interface column so that upper interfaces automatically have the parameter.

Related Topics

- Byte Adjustment for Shaping Overview on page 287
- Configuring a Parameter Definition for Byte Adjustment on page 290
- Example: QoS Parameter Configuration for QoS Cell Mode and Byte Adjustment on page 280
- For more information about configuring shaping modes for Ethernet, see *QoS Shaping Mode for Ethernet Interfaces Overview* on page 186 and *Cell Shaping Mode Using QoS Parameters Overview* on page 275

Configuring a Parameter Definition for Byte Adjustment

To associate a parameter instance with the byte adjustment 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 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.

     The 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 ES2 4G LM on the E120 router and the E320 router.

   - 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 Shaping Overview on page 287
- Guidelines for Configuring Byte Adjustment of Shaping Using QoS Parameters on page 289
- Example: QoS Parameter Configuration for QoS Cell Mode and Byte Adjustment on page 280
- For more information about configuring shaping modes for Ethernet, see *QoS Shaping Mode for Ethernet Interfaces Overview* on page 186 and *Cell Shaping Mode Using QoS Parameters Overview* on page 275
- **controlled-interface-type** command
- **instance-interface-type** command
- **node** command
- **qos-parameter** command
- **qos-parameter-define** command
- **qos-profile** command
- **queue** command
- **traffic-class** command