Ethernet Overhead Accounting

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The Ethernet Overhead Accounting feature enables the router to account for downstream Ethernet frame headers when applying shaping to packets.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Restrictions for Ethernet Overhead Accounting

- Ethernet overhead accounting allows the automatic inclusion of downstream Ethernet frame headers in the shaped rate. However, policing is not supported for Ethernet overhead accounting
- The router supports overhead accounting only for the shape and bandwidth commands.
- If you enable overhead accounting on a child policy, then you must enable overhead accounting on the parent policy.
- In a policy map, you must either enable overhead accounting for all classes in the policy or disable overhead accounting for all classes in the policy. You cannot enable overhead accounting for some classes and disable overhead accounting for other classes in the same policy.

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- When you enter the show policy-map interface command, the resulting classification byte counts and the queueing feature byte counts do not match. This mismatch occurs because the classification byte count does not consider overhead, whereas the queueing features do consider overhead.
- You can enable overhead accounting for shaping and bandwidth on top-level parent policies, middle-level child policies, and bottom-level child policies.
- If you enable overhead accounting on a parent policy, you are required to enable accounting on a child policy that is configured with the shape or bandwidth command. You are not required to enable accounting on a child policy that does not have the shape or bandwidth command configured.

Information About Ethernet Overhead Accounting

Benefits of Ethernet Overhead Accounting

The Ethernet Overhead Accounting feature enables the router to account for downstream Ethernet frame headers when applying shaping to packets. A user-defined offset specifies the number of overhead bytes that the router is to use when calculating the overhead per packet Valid offset values are from +63 bytes to -63 bytes of overhead. Before applying shaping, the router calculates teh overhead.

Ethernet interfaces and subinterfaces support overhead accounting. Using the shape or bandwidth command, you can configure accounting per VLAN and per port.

Subscriber Line Encapsulation Types

The subscriber-encap option of the shape and bandwidth commands specifies the encapsulation type at the subscriber line. The router supports the following subscriber line encapsulation types:

- snap-1483routed
- mux-1483routed
- snap-dot1q-rbe
- mux-dot1q-rbe
- snap-pppoa
- mux-pppoa
- snap-rbe
- mux-rbe

Overhead Calculation on the Router

When calculating overhead for traffic shaping, the router considers the encapsulation type used between the BRAS and the DSLAM and between the DSLAM and the CPE.

The table below describes the fields that the router uses for the various encapsulation types when calculating ATM overhead.

Table 1 Overhead Calculation

Encapsulation Type	Number of Bytes	Description
802.1Q	18	6-byte destination MAC address + 6-byte source MAC address + 2-byte protocol ID (0x8100) + 2-byte VID/CFI/PRIORITY + 2-byte length/type
802.3	14	6-byte destination MAC address + 6-byte source MAC address + 2-byte protocol ID (0x8000)
AAL5 MUX plus 1483	8	8-byte AAL5 trailer
AAL5 MUX plus PPPoA	10	8-byte AAL5 trailer + 2-byte protocol ID (0x002
AAL5 SNAP plus 1483	18	8-byte AAL5 trailer + 3-byte LLC header (0xAAAA03) + 3-byte OUI (0x0080c2) + 2-byte protocol ID (0x0007) + 2-byte PAD (0x0000)
AAL5 SNAP plus PPPoA	12	8-byte AAL5 trailer + 3-byte LLC header (0xFEFE03) + 1-byte protocol ID (0xCF)
PPPoE	6	1-byte version/type (0x11) + 1-byte code (0x00) + 2-byte session ID + 2-byte lengt
qinq	22	6-byte destination MAC address + 6-byte source MAC address + 2-byte protocol ID (0x8100) + 2-byte VID/CFI/PRIORITY + 2-byte protocol ID + 2-byte inner tag + 2-byte length or type

Overhead Accounting and Hierarchical Policies

In hierarchical policies, you can enable overhead accounting for shaping and bandwidth on top-level parent policies, middle-level child policies, and bottom-level child policies. If you enable overhead accounting on a:

- Parent class-default class, then you are not required to enable accounting on a child traffic class that does not contain the bandwidth or shape command.
- Child policy, then you must enable overhead accounting on the parent policy.

The parent and child classes must specify the same encapsulation type when enabling overhead accounting and configuring an offset using the user-defined offset [atm] command option.

The table below summarizes the configuration requirements for overhead accounting. For example, if overhead accounting is currently enabled for a parent policy, then accounting can be disabled or enabled on a child policy.

Table 2 Overhead Accounting Configuration Requirements

Policy Map or Class	Current Configuration	Configuration Requirement
Parent	Enabled	Enabled on child policy
Child	Enabled	Enabled on parent policy
Child class	Enabled	Enabled on all classes in the child policy map, except priority classes with policing
Child class (nonpriority without policing)	Disabled	Disabled on all classes in the child policy map
Child class (priority with policing)	Disabled	Disabled or enabled on all nonpriority classes in the child policy map

How to Configure Ethernet Overhead Accounting

Configuring Ethernet Overhead Accounting in a Hierarchical Policy

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **policy-map** *policy-map-name*
4. **class** *class-map-name*
5. **bandwidth** {*bandwidth-kbps* | **percent** *percentage* | **remaining percent** *percentage*} [**account** {{**qinq** | **dot1q**} {**aal5**} {*subscriber-encapsulation*}} | {**user-defined** *offset* [**atm**]}]
6. exit
7. **policy-map** *policy-map-name*
8. **class** *class-default*
9. **shape** [**average**] *rate*[**account** {{**qinq** | **dot1q**} [**aal5**] {*subscriber-encap*}} | {**user-defined** *offset* [**atm**]}]
10. **service-policy** *policy-map-name*
11. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**policy-map** *policy-map-name* **Example:** `Router(config)# policy-map Business`	Creates or modifies the child policy. Enters policy-map configuration mode. • The policy-map-name argument represents the name of the child policy map.
Step 4	**class** *class-map-name* **Example:** `Router(config-pmap)# class video`	Assigns the traffic class you specify to the policy map. Enters policy-map class configuration mode. • The class-map-name argument represents the name of a previously configured class map.

	Command or Action	Purpose
Step 5	**bandwidth** {*bandwidth-kbps* | **percent** *percentage* | **remaining percent** *percentage*} [**account** {{**qinq** | **dot1q**} {**aal5**} {*subscriber-encapsulation*}} | {**user-defined** *offset* [**atm**]}] **Example:** `Router(config-pmap-c)# bandwidth 8000 account dot1q aal5 snap-pppoa`	Enables class-based fair queueing and overhead accounting. • bandwidth-kbps--Specifies or modifies the minimum bandwidth allocated for a class belonging to a policy map. Valid values are from 8 to 2,488,320, which represents from 1 to 99 percent of the link bandwidth. • percentage--Specifies or modifies the maximum percentage of the link bandwidth allocated for a class belonging to a policy map. Valid values are from 1 to 99. • remaining percentage--Specifies or modifies the minimum percentage of unused link bandwidth allocated for a class belonging to a policy map. Valid values are from 1 to 99. • account--Enables ATM overhead accounting. • qinq--Specifies queue-in-queue encapsulation as the BRAS-DSLAM encapsulation type. • dot1q--Specifies IEEE 802.1Q VLAN encapsulation as the BRAS-DSLAM encapsulation type. • aal5--Specifies the ATM Adaptation Layer 5 that supports connection-oriented variable bit rate (VBR) services. • subscriber-encapsulation--Specifies the encapsulation type at the subscriber line. For more information, see the Configuring Ethernet Overhead Accounting in a Hierarchical Policy, page 4. • user-defined--Indicates that the router is to use the offset value that you specify when calculating ATM overhead. • offset--Specifies the number of bytes that the router is to use when calculating overhead. Valid values are from -63 to 63 bytes. • atm--(Optional) Applies the ATM cell tax in the ATM overhead calculation.
Step 6	exit **Example:** `router(config-pmap-c)# exit`	Exits policy-map class configuration mode.
Step 7	**policy-map** *policy-map-name* **Example:** `Router(config-pmap)# policy-map Test`	Creates or modifies the top-level parent policy. • policy-map-name--Specifies the name of the parent policy map.
Step 8	**class** *class-default* **Example:** `Router(config-pmap)# class class-default`	Configures or modifies the parent class-default class.

	Command or Action	Purpose
Step 9	**shape** [**average**] *rate*[**account** {{**qinq** | **dot1q**} [**aal5**] {*subscriber-encap*}} | {**user-defined** *offset* [**atm**]}] **Example:** `Router(config-pmap-c)# shape 8000 account qinq aal5 snap-dot1-rbe`	Shapes traffic to the indicated bit rate and enables overhead accounting. • average (Optional)--Is the committed burst (Bc) that specifies the maximum number of bits sent out in each interval. This option is only supported on the PRE3. • rate--Indicates the bit rate used to shape the traffic, in bits per second. When this command is used with backward explicit congestion notification (BECN) approximation, the bit rate is the upper bound of the range of bit rates that are permitted. • account--Enables ATM overhead accounting. • qinq--Specifies queue-in-queue encapsulation as the BRAS-DSLAM encapsulation type. • dot1q--Specifies IEEE 802.1Q VLAN encapsulation as the BRAS-DSLAM encapsulation type. • aal5--Specifies the ATM Adaptation Layer 5 that supports connection-oriented variable bit rate (VBR) services. • subscriber-encap--Specifies the encapsulation type at the subscriber line. For more information, see the Configuring Ethernet Overhead Accounting in a Hierarchical Policy, page 4. • user-defined--Indicates that the router is to use the offset value you specify when calculating ATM overhead. • offset--Specifies the number of bytes the router is to use when calculating overhead. Valid values are from -63 to +63 bytes. The router configures the offset size if you do not specify the offset option. • atm--Applies the ATM cell tax in the ATM overhead calculation. Configuring both the offset and atm options adjusts the packet size to the offset size and then adds the ATM cell tax.
Step 10	**service-policy** *policy-map-name* **Example:** `Router(config-pmap-c)# service-policy policy-map-name`	Applies a child policy to the parent class-default class. policy-map-name--Specifies the name of a previously configured child policy map. **Note** Do not specify the input or output keywords when applying a child policy to a parent class-default class.
Step 11	**end** **Example:** `Router(config-pmap-c)# end`	

Verifying Overhead Accounting

Configuration Examples for Ethernet Overhead Accounting

Example Enabling Ethernet Overhead Accounting

The following configuration example shows how to enable Ethernet overhead accounting. In the example, the configuration of the policy map named ethernet_ovrh shapes class-default traffic at a rate of 200,000 kbps and enables overhead accounting with a user-defined value of 18. The ethernet_ovrh policy is attached to Gigabit Ethernet subinterface 1/0/0.100, thereby enabling overhead accounting on the subinterface.

```
Router# configure-terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# policy-map ethernet_ovrh
Router(config-pmap)# class class-default
Router(config-pmap-c)# shape average 200000 account user-defined 18
!
Router(config)# interface GigabitEthernet1/0/0.100
Router(config-subif)# service-policy output ethernet_ovrh
!
Router# show running-config | begin 1/0/0.100
interface GigabitEthernet1/0/0.100
encapsulation dot1Q 101
pppoe enable group group_pta
service-policy output ethernet_ovrh
```

Example Verifying Ethernet Overhead Accounting

The following partial sample output from the show running-config command indicates that ATM overhead accounting is enabled for shaping. The BRAS-DSLAM encapsulation is dot1q and the subscriber line encapsulation is snap-rbe based on the AAL5 service.

```
subscriber policy recording rules limit 64
no mpls traffic-eng auto-bw timers frequency 0
call rsvp-sync
!
controller T1 2/0
framing sf
linecode ami
!
controller T1 2/1
framing sf
linecode ami
!
!
policy-map unit-test
class class-default
shape average 10 account dot1q aal5 snap-rbe
```

Example Verifying Ethernet Overhead Accounting with User-Defined Option

The following sample output for the policy map named ethernet_ovrh indicates that Ethernet overhead accounting is enabled for shaping and that the user-defined offset is 18 bytes. The sample output from the **showpolicy-mapinterface** command indicates that the ethernet_ovrh policy map is attached to the Gigabit Ethernet subinterface 1/0/0.100, enabling overhead accounting on the subinterface.

```
Router# show policy-map ethernet_ovrh
Policy Map ethernet_ovrh
Class class-default
```

```
Average Rate Traffic Shaping
cir 200000 (bps) account user-defined 18
Router# show policy-map interface GigabitEthernet1/0/0.100
GigabitEthernet1/0/0.100
Service-policy output: ethernet_ovrh
Class-map: class-default (match-any)
0 packets, 0 bytes
30 second offered rate 0 bps, drop rate 0 bps
Match: any
0 packets, 0 bytes
30 second rate 0 bps
Queueing
queue limit 8 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0
shape (average) cir 200000, bc 800, be 800
target shape rate 200000
Overhead Accounting Enabled
```

Additional References

Related Documents

Related Topic	Document Title
QoS commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	*Cisco IOS Quality of Service Solutions Command Reference*
Policing and Shaping.	"Policing and Shaping Overview" module
Class maps	"Applying QoS Features Using the MQC" module
Policy maps	"Applying QoS Features Using the MQC" module

Standards

Standard	Title
No new or modified standards are supported, and support for existing standards has not been modified.	--

MIBs

MIB	MIBs Link
No new or modified MIBs are supported, and support for existing MIBs has not been modified.	To locate and download MIBs for selected platforms, Cisco IOS XE software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported, and support for existing RFCs has not been modified.	--

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Ethernet Overhead Accounting

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 3 Feature Information for Ethernet Overhead Accounting

Feature Name	Releases	Feature Information
Ethernet Overhead Accounting	Cisco IOS XE Release 2.4	The Ethernet Overhead Accounting feature was introduced on the Cisco ASR 1000 series routers.

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