

PPP Session Queueing on ATM VCs

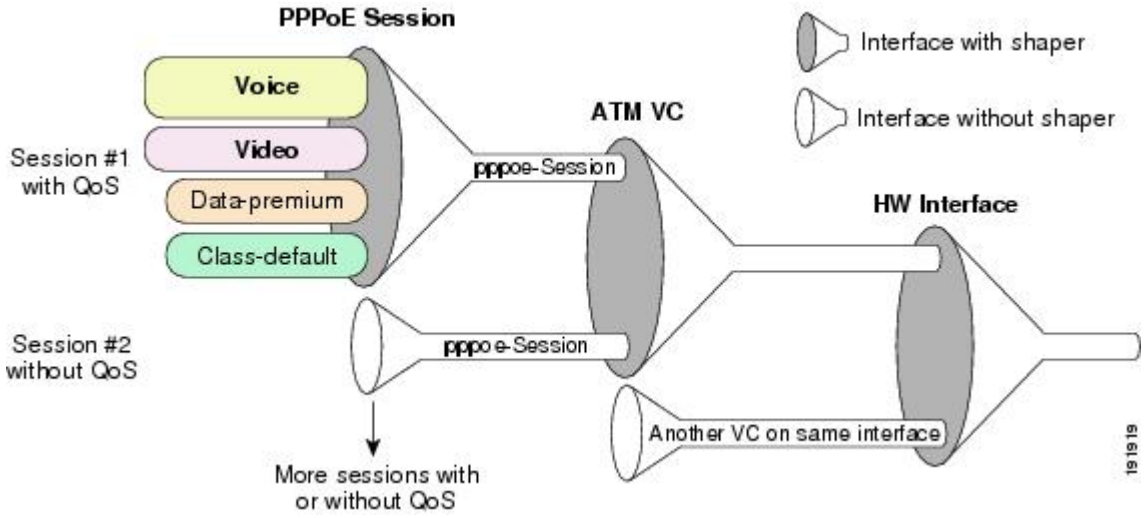
The PPP Session Queueing on ATM VCs feature enables you to shape and queue PPP over Ethernet over ATM (PPPoEoA) sessions to a user-specified rate. Multiple sessions can exist on any ATM VC and have Quality of Service (QoS) policies applied, or some of the sessions might have QoS policies. The router shapes the sum of allbandwidth used for PPPoEoA traffic on a VC so that the subscriber's connection to the Digital Subscriber Line Access Multiplexer (DSLAM) does not become congested. Queueing-related functionality provides different levels of service to the various applications that run over the PPPoEoA session.

A nested, two-level hierarchical service policy is used to configure session shaping directly on the router using the modular quality of service command-line interface (MQC). The hierarchical policy consists of the following:

- Child policy--Defines QoS actions using QoS commands such as the priority, bandwidth, and police commands.
- Parent policy--Contains only the class-default class with the shape or bandwidth remaining ratio command configured, or with both commands configured:
  - shape command--Shapes the session traffic to the specified bit rate, according to a specific algorithm.
  - bandwidth remaining ratio command--Specifies a ratio value that the router uses to determine how much unused bandwidth to allocate to the session during congestion.

Note The PPP Session Queueing on ATM VCs feature works with both PPP terminated aggregation (PTA) and L2TP access concentrator (LAC) configurations.

The figure below illustrates PPP session Queueing on ATM VCs.



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Prerequisites for PPP Session Queueing on ATM VCs

- PPPoEoA sessions must be enabled.
- Create traffic classes using the class-map command and specify the match criteria used to classify traffic.
- For dynamic PPPoEoA session queueing using RADIUS, you must:
  - Enable authentication, authorization, and accounting (AAA) on the router
  - Configure the RADIUS server for dynamic QoS
  - Create the subscriber's user profile on the RADIUS server

Restrictions for PPP Session Queueing on ATM VCs

- You cannot configure PPP session queueing on unshaped VCs--VCs without a specified peak cell rate (PCR) or sustained cell rate (SCR).
- VCs with session queueing polices cannot be part of a shaped virtual path (VP).
- If the same ATM category (for example, shaped unspecified bit rate (UBR)) contains both high and low bandwidth VCs, the SAR mechanism can cause low throughput for high bandwidth VCs. The workaround is to use different ATM classes for low and high bandwidth VCs. For example, configure low bandwidth VCs as shaped UBR and high bandwidth VCs as variable bit rate-nonreal-time (VBR-nrt) or constant bit rate (CBR).

- The CLASS-BASED QOS MIB does not include statistics for service policies applied to sessions.
- RADIUS accounting does not include queueing statistics.

Information About PPP Session Queueing on ATM VCs

Dynamically Applying QoS Policies to PPP Sessions on ATM VCs

The router allows you to dynamically apply QoS policy maps to PPPoEoA sessions using RADIUS. Although the actual configuration of the QoS policies occurs on the router, you can configure the following attribute-value (AV) pairs on RADIUS to specify the name of the policy map to dynamically apply to the session:

```
"ip:sub-qos-policy-in=<name of the QoS policy in ingress direction>"
"ip:sub-qos-policy-out=<name of egress policy>"
```

You define the AV pairs in one of the following RADIUS profiles:

- User profile--The user profile on the RADIUS server contains an entry that identifies the policy map name applicable to the user. The policy map name is the service that RADIUS downloads to the router after a session is authorized.
- Service profile--The service profile on the RADIUS server specifies a session identifier and an AV pair. The session identifier might be, for example, the IP address of the session. The AV pair defines the service (policy map name) to which the user belongs.

After receiving a service-logon request from the policy server, RADIUS sends a change of authorization (CoA) request to the router to activate the service for the subscriber, who is already logged in. If the authorization succeeds, the router downloads the name of the policy map from RADIUS using the ip:sub-qos-policy-in[out]= AV-pair and applies the QoS policy to the PPPoEoA session. Because the service policy contains queueing-related actions, the router sets up the appropriate class queues.

Note Although the router also supports the RADIUS vendor specific attribute (VSA) 38, Cisco-Policy-Down and Cisco-Policy-Up, we recommend that you use the ip:sub-qos-policy-in[out]= AV pairs for QoS policy definitions.

PPP Session Queueing Inheritance

PPP Sessions either inherit queues from their parent interface or they have their own queues. Each PPPoEoA session for which session queueing is configured has its own set of queues.

The table below describes the queues to which the router directs session traffic.

Table 1: PPP Session Queue Inheritance

Queueing Policy	Queue Used for Session Traffic
No policy	VC default queue

Queueing Policy	Queue Used for Session Traffic
Applied to the VC	VC queues
Applied to the session	Session queues

Interfaces Supporting PPP Session Queueing

The router supports PPP session queueing on shaped ATM VCs for outbound traffic only.

The router does not support PPP session queueing on inbound ATM interfaces.

Mixed Configurations and Queueing

A mixed configuration is one in which all sessions do not have QoS applied to them. On some VCs, the queueing policy is applied at the VC level, and on other VCs the queueing policies are applied on the sessions. Some sessions have no policy applied at all. As a result, the router uses the hierarchical queueing framework (HQF) to direct traffic in the following ways:

- If no queueing policy is applied at the VC or session level, the router sends all traffic on the VC to the default queue, including traffic from sessions on the VC that have a policing-only policy applied or no policy applied.
- If a queueing policy is applied at the VC level, but not at the session level, the router sends traffic to the queues associated with the queueing policy on the VC.
- If queueing policies are applied to some sessions on a VC but not to other sessions, the router sends the traffic with a policing-only policy or with no policy applied to the VC's default queue. The router sends traffic with queueing policies to the queues associated with the queueing policy applied to the session.

Bandwidth Mode and ATM Port Oversubscription

An ATM port can operate in reserved bandwidth mode or shared bandwidth mode.

When a port is not oversubscribed (the sum of the bandwidths of all VCs on the port is less than the port bandwidth), the port operates in reserved bandwidth mode--a specific amount of bandwidth is reserved for each VC on the port. If a VC does not use all of its allocated bandwidth, the unused bandwidth is not shared among the VCs on the port.

When the ATM port is oversubscribed (the sum of the bandwidths of all VCs on the port is greater than the port bandwidth), the port operates in shared bandwidth mode. In this mode, any unused bandwidth is available for reuse by the other VCs on the port, up to the VC's respective shape rate--traffic on a VC cannot exceed the shape rate of that VC.

Oversubscription at the Session Level

Oversubscription at the session level occurs after session traffic shaping and when the aggregate session traffic exceeds the subinterface shape rate. After all priority traffic is accounted for, the router distributes the remaining bandwidth on the VC to the sessions according to the value specified in the bandwidth remaining ratio command configured in the parent policy of the policy applied to the sessions. If the bandwidth remaining ratio command is not specified in the parent policy, the router uses a default ratio of 1.

How to Configure PPP Session Queueing on ATM VCs

Configuring PPP Session Queueing Using a Virtual Template

A virtual templat e is a logical interface whose configuration can specify generic configuration information for a specific purpose, user-specific configuration information, and router-dependent information. You configure a virtual template on an interface and apply QoS policy maps to the virtual template. The virtual template inherits the QoS features specified in the policy map. When the router establishes sessions on an interface, the router applies the QoS features specified in the virtual template configuration to the virtual access interfaces (VAIs) created for the sessions, including the QoS features specified in the policy map attached to the virtual template.

A broadband aggregation group (bba-group) configured on an ATM interface points to the virtual template the router uses to apply QoS policies to sessions. When a session arrives on an ATM interface, the router creates a virtual access interface (VAI) for the session and applies the policies associated with the virtual template to the sessions.

To configure PPPoEoA session queueing using a virtual template, perform the following configuration tasks:

Configuring an Hierarchical QoS Policy

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **policy-map** *policy-map-name*
4. **class** *class-map-name*
5. priority level level
6. **police** *bps* [*burst-normal burst-max*] [**conform-action** *action]* [**exceed-action** *action]* **violate-action** *action*
7. set cos value
8. bandwidth remaining ratio
9. exit
10. **policy-map** *policy-map-name*
11. **class** *class-default*
12. bandwidth remaining ratio
13. **shape** [**average**] *mean-rate*[*burst-size*] [*excess-burst-size*]
14. **service-policy** *policy-map-name*

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:**	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
	`Router> enable`	
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**policy-map** *policy-map-name* **Example:** `Router(config)# policy-map policy-map-name`	Creates or modifies the child policy. Enters policy-map configuration mode. policy-map-name is the name of the child policy map.
Step 4	**class** *class-map-name* **Example:** `Router(config-pmap)# class class-map-name`	Assigns the traffic class you specify to the policy map. Enters policy-map class configuration mode. class-map-name is the name of a previously configured class map and is the traffic class for which you want to define QoS actions. Repeat Steps 2 through 6 for each traffic class you want to include in the child policy map.
Step 5	priority level level **Example:** `Router(config-pmap-c)# priority level level`	(Optional) Defines multiple levels of a strict priority service model. When you enable a traffic class with a specific level of priority service, the implication is a single priority queue associated with all traffic enabled with the specified level of priority service. level is a number that indicates a specific priority level. Valid values are from 1 (high priority) to 4 (low priority). Default: 1
Step 6	**police** *bps* [*burst-normal burst-max*] [**conform-action** *action]* [**exceed-action** *action]* **violate-action** *action* **Example:** `Router(config-pmap-c)# police bps [burst-normal] [burst-max] [conform-action action] [exceed-action action] [violate-action action]`	(Optional) Configures traffic policing. bps is the average rate in bits per second. Valid values are 8000 to 200000000. (Optional) burst-normal is the normal burst size in bytes. Valid values are 1000 to 51200000. The default normal burst size is 1500 bytes. (Optional) burst-max is the excess burst size in bytes. Valid values are 1000 to 51200000. (Optional) conform-action action indicates the action to take on packets that conform to the rate limit. (Optional) exceed-action action indicates the action to take on packets that exceed the rate limit. (Optional) violate-action action indicates the action to take on packets that violate the normal and maximum burst sizes.

	Command or Action	Purpose
Step 7	set cos value **Example:** `Router(config-pmap-c)# set cos value`	(Optional) Sets the Layer 2 class of service (CoS) value of an outgoing packet. value is a specific IEEE 802.1Q CoS value from 0 to 7.
Step 8	bandwidth remaining ratio **Example:** `Router(config-pmap-c)# bandwidth remaining ratio`	(Optional) Specifies a bandwidth-remaining ratio for class-level or subinterface-level queues to be used during congestion to determine the amount of excess bandwidth (unused by priority traffic) to allocate to non-priority queues. ratio specifies the relative weight of this subinterface or queue with respect to other subinterfaces or queues. Valid values are from 1 to 1000.
Step 9	exit **Example:** `Router(config-pmap-c)# exit`	Exits policy-map class configuration mode.
Step 10	**policy-map** *policy-map-name* **Example:** `Router(config-pmap)# policy-map policy-map-name`	Creates or modifies the parent policy. policy-map-name is the name of the parent policy map.
Step 11	**class** *class-default* **Example:** `Router(config-pmap)# class class-default`	Configures or modifies the parent class-default class. You can configure only the class-default class in a parent policy. Do not configure any other traffic class.
Step 12	bandwidth remaining ratio **Example:** `Router(config-pmap-c)# bandwidth remaining ratio`	(Optional) Specifies a bandwidth-remaining ratio for class-level or subinterface-level queues to be used during congestion to determine the amount of excess bandwidth (unused by priority traffic) to allocate to non-priority queues. ratio specifies the relative weight of this subinterface or queue with respect to other subinterfaces or queues. Valid values are from 1 to 1000.
Step 13	**shape** [**average**] *mean-rate*[*burst-size*] [*excess-burst-size*] **Example:** `Router(config-pmap-c)# shape [average] mean-rate [burst-size] [excess-burst-size]`	Shapes traffic to the indicated bit rate and enables ATM overhead accounting. (Optional) average 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. mean-rate is also called committed information rate (CIR). 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

	Command or Action	Purpose
		rate is the upper bound of the range of bit rates that are permitted. (Optional) burst-size is the number of bits in a measurement interval (Bc). (Optional) excess-burst-size is the acceptable number of bits permitted to go over the Be.
Step 14	**service-policy** *policy-map-name* **Example:** `Router(config-pmap-c)# service-policy policy-map-name`	Applies the child policy to the parent class-default class. policy-map-name is the name of the child policy map configured in step 1.

Example

The following example shows how to configure a hierarchical QoS policy. In the example, the child-policy configures QoS features for two traffic classes: Premium and Silver. Premium traffic has priority and is policed at 40 percent. The router sets the IP precedence of Premium traffic to precedence level 3. Silver traffic is policed at 80000 bps and IP precedence level 3 is set. The child-policy is applied to the Parent policy class-default class, which shapes traffic to 200,000 Kbps.

```
Router(config)# policy-map child-policy
Router(config-pmap)# class Premium
Router(config-pmap-c)# priority
Router(config-pmap-c)# police percent 40
Router(config-pmap-c)# set ip precedence 3
Router(config-pmap-c)# class Silver
Router(config-pmap-c)# police 80000 10000 conform-action transmit exceed-action drop
Router(config-pmap-c)# set ip precedence 5
Router(config-pmap-c)# exit
Router(config-pmap)# policy-map Parent
Router(config-pmap)# class class-default
Router(config-pmap-c)# shape 200000
Router(config-pmap-c)# service-policy output child-policy
Router(config-pmap-c)# exit
Router(config-pmap)# exit
Router(config)#
```

Associating the Hierarchical Policy Map with a Virtual Template

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface virtual-template template-** *number*
4. **service-policy {input | output} policy-map-name**
5. exit

DETAILED STEPS

Procedure

	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	**interface virtual-template template-** *number* **Example:** `Router(config)# interface virtual-template template-number`	Creates a virtual template and enters interface configuration mode. template-number is the number you assign to the virtual template interface to identify it. Valid values are from 1 to 200. You can configure up to 200 virtual template interfaces on the router.
Step 4	**service-policy {input | output} policy-map-name** **Example:** `Router(config-if)# service-policy {input | output} policy-map-name`	Attaches the policy map you specify to the virtual template interface in the inbound or outbound direction that you specify. input specifies to apply the policy map to inbound traffic. output specifies to apply the policy map to outbound traffic. policy-map-name is the name of a previously configured policy map.
Step 5	exit **Example:** `Router(config-if)# exit`	Exits interface configuration mode.

Example

The following example shows how to associate a policy map with a virtual template. In this example, the policy map named Parent is associated with the virtual template named VirtualTemplate1.

```
Router(config)# interface virtual-template1
Router(config-if)# service-policy output Parent
Router(config-if)# exit
Router(config)#
```

Applying the Virtual Template to an ATM Subinterface

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **bba-group pppoe group-name**
4. **virtual-template template-number**
5. exit
6. interface atm number.subinterface [point-to-point]
7. pvc [name] vpi/vci
8. protocol pppoe group group-name
9. exit
10. exit

DETAILED STEPS

Procedure

	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	**bba-group pppoe group-name** **Example:** `Router(config)# bba-group pppoe group-name`	Creates a PPP over Ethernet (PPPoE) profile. Enters BBA group configuration mode. group-name is the name of the PPPoE profile.
Step 4	**virtual-template template-number** **Example:** `Router(config-bba-grp)# virtual-template template-number`	Associates a BBA group to the virtual template to be used for cloning virtual access interfaces. template-number is the identifying number of the virtual template.
Step 5	exit **Example:** `Router(config-bba-grp)# exit`	Exits BBA group configuration mode.

	Command or Action	Purpose
Step 6	interface atm number.subinterface [point-to-point] **Example:** `Router(config)# interface atm number.subinterface [point-to-point]`	Creates or modifies a subinterface. Enters subinterface configuration mode. atm is the interface type. number is the slot, module, and port number of the interface (for example 1/0/0). .subinterface is the number of the subinterface (for example, 1/0/0.1). (Optional) point-to-point indicates that the subinterface connects directly with another subinterface.
Step 7	pvc [name] vpi/vci **Example:** `Router(config-subif) pvc [name] vpi/vci`	Creates or modifies an ATM permanent virtual circuit (PVC). Enters ATM virtual circuit configuration mode. (Optional) name identifies the PVC and can contain up to 15 characters. vpi/ specifies the ATM network virtual path identifier (VPI) for this PVC. You must specify the slash. Valid values are from 0 to 255. The router treats a value that is outside the range of valid values as the connection ID. The default value is 0. **Note** The arguments vpi and vci cannot both be set to 0; if one is 0, the other cannot be 0. vci specifies the ATM network virtual channel identifier (VCI) for this PVC. Valid values are from 0 to 1 less than the maximum value set for this interface by the atm vc-per-vp command. A value that is out of range causes an " unrecognized command" error message. The VCI value has local significance only and, therefore, is unique only on a single link, not throughout the ATM network. Typically, lower values from 0 to 31 are reserved for specific traffic (for example, F4 OAM, SVC signaling, ILMI, and so on) and should not be used.
Step 8	protocol pppoe group group-name **Example:** `Router(config-atm-vc)# protocol pppoe group group-name`	Enables PPP over Ethernet (PPPoE) sessions to be established on permanent virtual circuits (PVCs). group specifies a PPPoE profile (bba-group) to be used by PPPoE sessions on the interface. group-name is the name of the PPPoE profile (bba-group) to be used by PPPoE sessions on the interface. The group group-name points to the bba-group to be used for applying a virtual template interface with QoS policies to sessions.

	Command or Action	Purpose
Step 9	exit **Example:** `Router(config-atm-vc)# exit`	Exits ATM virtual circuit configuration mode.
Step 10	exit **Example:** `Router(config-subif)# exit`	Exits subinterface configuration mode.

Examples

The following example shows how to associate a virtual template interface with an ATM interface and apply the policies in the virtual template to the sessions on the interface. In the example, the service policy named Parent is applied to the Virtual-Template 8, which is associated with the bba-group named pppoeoa-group. The bba-group is applied to PVC 101/210 on ATM subinterface 4/0/1.10.

```
bba-group pppoe pppoeoa-group
Virtual-Template 8
interface ATM4/0/1.10 point-to-point
pvc 101/210
vbr-nrt 4000 2000 50
no dbs enable
encapsulation aal5snap
protocol pppoe group pppoeoa-group
!
interface Virtual-Template8
ip unnumbered Loopback5555
no logging event link-status
peer default ip address pool pool-1
ppp authentication chap
service-policy output Parent
```

Configuring PPP Session Queueing Using Radius

To configure PPPoEoA session queueing using RADIUS, perform the following configuration tasks:

Configuring the Policy Map

The router allows you to use RADIUS to apply QoS policy maps to PPPoEoA sessions.

Adding the Cisco QoS AV Pairs to the RADIUS Profile

Cisco attribute-value (AV) pairs are vendor-specific attributes (VSAs) that allow vendors such as Cisco to support their own extended attributes. RADIUS attribute 26 is a Cisco VSA used to communicate vendor-specific information between the router and the RADIUS server.

The RADIUS user profile contains an entry for each user that the RADIUS server authenticates. Each entry establishes an attribute the user can access. When configuring PPPoEoA session queueing using RADIUS, enter the following Cisco AV-pair in the appropriate user profile:

```
Cisco-AVPair = "ip:sub-qos-policy-out=<name of egress policy>"
```

The Cisco AV-pair identifies the policy map the router is to use when applying QoS features to a PPPoEoA session. After receiving a service-logon request from the policy server, RADIUS sends a change of authorization (CoA) request to the router to activate the service for the user, who is already logged in. If the authorization succeeds, the router downloads the name of the policy map from RADIUS using the Cisco AV-pair and applies the QoS policy to the session.



Note Although the router also supports the RADIUS vendor specific attribute (VSA) 38, Cisco-Policy-Down and Cisco-Policy-Up, we recommend that you use the above attribute for QoS policy definitions.

Verifying PPP Session Queueing on ATM VCs

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **show policy-map [interface interface]**
4. show policy-map session [uid uid-number] [input | output [class class-name]]
5. **show running-config**

DETAILED STEPS

Procedure

	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	**show policy-map [interface interface]** **Example:** `Router# show policy-map [interface interface]`	Displays information about the policy map attached to the interface you specify. If you do not specify an interface, it displays information about all of the policy maps configured on the router.

	Command or Action	Purpose
		interface interface is the interface type and number (for example, atm 4/0/0).
Step 4	show policy-map session [uid uid-number] [input | output [class class-name]] **Example:** `Router# show policy-map session [uid uid-number] [input | output [class class-name]]`	Displays the QoS policy map in effect for subscriber sessions. (Optional) uid defines a unique session ID. (Optional) uid-number is a unique session ID. Valid values are from 1 to 65535. (Optional) input displays the upstream traffic of the unique session. (Optional) output displays the downstream traffic of the unique session. (Optional) class identifies the class that is part of the QoS policy-map definition. (Optional) class-name provides a class name that is part of the QoS policy-map definition.
Step 5	**show running-config** **Example:** `Router# show running-config`	Displays the running configuration on the router. The output shows the AAA setup and the configuration of the policy map, ATM VCs, PPPoEoA, dynamic bandwidth selection, virtual template, and RADIUS server.

Configuration Examples for PPP Session Queueing on ATM VCs

Example Configuring PPP Session Queueing on ATM VCs

The following example shows how to configure PPPoEoA session queueing. In the example, a hierarchical QoS policy named pm_hier2_0_2 is associated with Virtual-Template555, which is applied to the broadband aggregation group named pppoeoa-group.

```
bba-group pppoe pppoeoa-group
Virtual-Template 555
!
policy-map pm_hier2_child_0_2
class cm_0
priority level 1
police percent 5 2 ms 0 ms conform-action transmit exceed-action drop violate-action drop
queue-limit 77 packets
class cm_1
shape average percent 80
bandwidth remaining ratio 80
class class-default
shape average percent 50
bandwidth remaining ratio 20
policy-map pm_hier2_0_2
class class-default
shape average percent 100
```

```
bandwidth remaining ratio 100
service-policy pm_hier_child_0_2
interface ATM2/0/7.5555 point-to-point
pvc 1/5555
vbr-nrt 4000 2000 50
no dbs enable
encapsulation aal5snap
protocol pppoe group pppoeoa-group
!
!
interface Virtual-Template555
ip unnumbered Loopback5555
no logging event link-status
peer default ip address pool pool-1
ppp authentication chap
service-policy output pm_hier2_0_2
```

Example Configuring and Applying an Hierarchical Policy Map

The example belo shows how to configure a hierarchical policy and apply it to a virtual template. The example contains a child policy map named child1 with QoS features defined for the gold and bronze traffic classes. The child1 policy is applied to the parent policy map, which is shaped to 512000 bps. The hierarchical policy is applied to the virtual template named virtual-template 1.

```
Router(config)# policy-map child1
Router(config-pmap)# class gold
Router(config-pmap-c)# priority
Router(config-pmap-c)# police percent 40
Router(config-pmap-c)# class bronze
Router(config-pmap-c)# police 8000
Router(config-pmap-c)# exit
Router(config-pmap)# policy-map parent
Router(config-pmap)# class class-default
Router(config-pmap-c)# shape 512000
Router(config-pmap-c)# service-policy child1
Router(config-pmap-c)# exit
Router(config-pmap)# exit
Router(config)# interface virtual-template 1
Router(config-if)# service-policy output parent
```

Example Setting Up RADIUS for PPP Session Queueing on ATM VCs

This section shows how to define the Cisco AV pairs used to download the policy map name to the router. The first three lines of a subscriber's sample user profile contain the user password, service type, and protocol type. This information is entered into the subscriber's user profile when the user profile is first created. The last line is an example of the Cisco QoS AV-pair added to the user profile. The policy map name downloaded to the router is p23.

```
userid Password = "cisco"
Service-Type = Framed,
Framed-Protocol = PPP,
cisco-avpair = "sub-qos-policy-out=p23"
```

Example Verifying PPP Session Queueing on ATM VCs

Displaying PPP Session Information--show pxf cpu queue session Command

Use the `show pppoe session` command to display the sessions established on the router. In the example below, one session is active with a session ID (SID) of 6.

```
Router# show pppoe session
1 session in LOCALLY_TERMINATED (PTA) State
1 session total
Uniq ID PPPoE RemMAC Port VT VA State
 SID LocMAC VA-st Type
 14 6 0009.b68d.bb37 ATM2/0/7.5555 555 Vi3.1 PTA
   0009.b68d.bc37 VC: 1/5555    UP
```

Displaying PPP Session Information--show policy-map session Command

Use the `show policy-map session` command to display QoS policy map statistics for traffic in the downstream direction. The example below also shows the policy map configurations.

```
Router# show pppoe session
1 session in LOCALLY_TERMINATED (PTA) State
1 session total
Uniq ID PPPoE RemMAC Port VT VA State
 SID LocMAC VA-st Type
 14 6 0009.b68d.bb37 ATM2/0/7.5555 555  Vi3.1  PTA
 0009.b68d.bc37 VC: 1/5555 UP
Router#
Router#
Router# show policy-map session uid 14
SSS session identifier 14 -
 Service-policy output: pm_hier2_0_2
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 50 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0
shape (average) cir 2000000, bc 8000, be 8000
target shape rate 2000000
bandwidth remaining ratio 100
 Service-policy : pm_hier2_child_0_2
queue stats for all priority classes:
Queueing
priority level 1
queue limit 77 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0
Class-map: cm_0 (match-any)
0 packets, 0 bytes
30 second offered rate 0 bps, drop rate 0 bps
Match: ip precedence 0
0 packets, 0 bytes
30 second rate 0 bps
Priority: 0% (0 kbps), burst bytes 4470, b/w exceed drops: 0
Priority Level: 1
```

```
Police:
104000 bps, 1536 limit, 0 extended limit
conformed 0 packets, 0 bytes; action: transmit
exceeded 0 packets, 0 bytes; action: drop
violated 0 packets, 0 bytes; action: drop
Class-map: cm_1 (match-any)
0 packets, 0 bytes
30 second offered rate 0 bps, drop rate 0 bps
Match: ip precedence 1
0 packets, 0 bytes
30 second rate 0 bps
Queueing
queue limit 237 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0
shape (average) cir 1600000, bc 6400, be 6400
target shape rate 1600000
bandwidth remaining ratio 80
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 77 packets
(queue depth/total drops/no-buffer drops) 0/0/0
(pkts output/bytes output) 0/0
shape (average) cir 1000000, bc 4000, be 4000
target shape rate 1000000
bandwidth remaining ratio 20
Router# show policy-map pm_hier2_0_2
Policy Map pm_hier2_0_2
Class class-default
Average Rate Traffic Shaping
cir 100%
bandwidth remaining ratio 100
service-policy pm_hier2_child_0_2
Router# show policy-map pm_hier2_child_0_2
Policy Map pm_hier2_child_0_2
Class cm_0
priority level 1
police percent 5 2 ms 0 ms conform-action transmit exceed-action drop violate-action drop
queue-limit 77 packets
Class cm_1
Average Rate Traffic Shaping
cir 80%
bandwidth remaining ratio 80
Class class-default
Average Rate Traffic Shaping
cir 50%
bandwidth remaining ratio 20
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases

Related Topic	Document Title
QoS commands	*Cisco IOS QoS Command Reference*

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 PPP Session Queueing on ATM VCs

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 2: Feature Information for PPP Session Queueing on ATM VCs