



# MQC Policy Map Support on Configured VC Range

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## Information About MQC Policy Map Support on Configured VC Range

The MQC Policy Map Support on Configured VC Range feature simplifies the configuration of ATM VC ranges by allowing you to attach policy maps on a range of ATM VCs or on a specific VC within a range of VCs.

## How to Configure Policy Maps on ATM VC Ranges

To configure MQC policy maps on ATM VC ranges, perform the following configuration task:

- [Attaching QoS Policies to an ATM PVC Range, page 2](#)
- [Attaching QoS Policies to an Individual PVC within an ATM PVC Range, page 3](#)



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## Attaching QoS Policies to an ATM PVC Range

Use the following configuration task to attach a QoS policy to a range of ATM PVCs.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface atm** *slot/module/port*
4. **range** [*range-name*] **pvc** *start-vpi/start-vci end-vpi/end-vci*
5. **service-policy** [**input** | **output**] *policy-map-name*

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>interface atm</b> <i>slot/module/port</i>  <b>Example:</b> Router(config)# interface atm 1/0/0	Specifies the ATM interface. Enters interface configuration mode.
Step 4	<b>range</b> [ <i>range-name</i> ] <b>pvc</b> <i>start-vpi/start-vci end-vpi/end-vci</i>  <b>Example:</b> Router(config-if)# range pvc 101/304 200/400	Defines a range of ATM permanent virtual circuits (PVCs). Enters ATM range configuration mode.  (Optional) <i>range-name</i> is the name of the range. The <i>range-name</i> can be a maximum of 15 characters.  <i>start-vpi</i> specifies the beginning value for a range of virtual path identifiers (VPIs). The slash is required. If you do not provide a VPI value or the slash, the default value of 0 is used. Valid values for VPI are from 0 to 255.  <i>start-vci</i> specifies the beginning value for a range of virtual channel identifiers (VCIs). Valid values are from 32 to 65535.  <i>end-vpi</i> specifies the end value for a range of virtual path identifiers (VPIs). The slash is required. If you do not provide a VPI value or the slash, the <i>start-vpi</i> value is used by default. Valid values for VPI are from 0 to 255.  <i>end-vci</i> specifies the end value for a range of virtual channel identifiers (VCIs). Valid values are from 32 to 65535.

Command or Action	Purpose
<p><b>Step 5</b></p> <pre>Router(config-if-atm-range)# <b>service-policy</b> <input <i="" output]=""  =""/>policy-map-name</pre> <p><b>Example:</b></p> <pre>Router(config-if-atm-range)# <b>service-policy</b> output Downstream_Traffic</pre>	<p>Attaches the service policy you specify to the specified ATM PVC range.</p> <p><b>input</b> indicates to apply the service policy to the inbound traffic on the interface.</p> <p><b>output</b> indicates to apply the service policy to the outbound traffic on the interface.</p> <p><b>Note</b> For QoS policies containing the <b>bandwidth</b>, <b>priority</b>, <b>random-detect</b>, <b>queue-limit</b>, and <b>shape</b> commands, you must specify the <b>output</b> keyword. The router ignores these commands when you use them with the <b>input</b> keyword.</p> <p><i>policy-map-name</i> is the name of the policy map you want to attach to the subinterface.</p> <p><b>Note</b> The router applies the service policy to only the PVCs within the PVC range.</p>

## Attaching QoS Policies to an Individual PVC within an ATM PVC Range

Use the following configuration task to attach a QoS policy to an individual PVC within a range of ATM PVCs.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface atm** *slot/module/port*
4. **range** [*range-name*] **pvc** *start-vpi/start-vci end-vpi/end-vci*
5. **pvc-in-range** [*pvc-name*] *vpi/vci*
6. **service-policy** [**input** | **output**] *policy-map-name*

### DETAILED STEPS

Command or Action	Purpose
<p><b>Step 1</b></p> <pre><b>enable</b></pre> <p><b>Example:</b></p> <pre>Router&gt; <b>enable</b></pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<p><b>Step 2</b></p> <pre><b>configure terminal</b></pre> <p><b>Example:</b></p> <pre>Router# <b>configure terminal</b></pre>	<p>Enters global configuration mode.</p>

	Command or Action	Purpose
Step 3	<pre>interface atm slot/module/port</pre> <p><b>Example:</b> Router(config)# interface atm 1/0/0 </p>	Specifies the ATM interface. Enters interface configuration mode.
Step 4	<pre>range [range-name] pvc start-vpi/start-vci end-vpi/end-vci</pre> <p><b>Example:</b> Router(config-if)# range pvc 101/304 200/400 </p>	<p>Defines a range of ATM permanent virtual circuits (PVCs). Enters ATM range configuration mode.</p> <p>(Optional) <i>range-name</i> is the name of the range. The <i>range-name</i> can be a maximum of 15 characters.</p> <p><i>start-vpi</i> specifies the beginning value for a range of virtual path identifiers (VPIs). The slash is required. If you do not provide a VPI value or the slash, the default value of 0 is used. Valid values for VPI are from 0 to 255.</p> <p><i>start-vci</i> specifies the beginning value for a range of virtual channel identifiers (VCIs). Valid values are from 32 to 65535.</p> <p><i>end-vpi</i> specifies the end value for a range of virtual path identifiers (VPIs). The slash is required. If you do not provide a VPI value or the slash, the <i>start-vpi</i> value is used by default. Valid values for VPI are from 0 to 255.</p> <p><i>end-vci</i> specifies the end value for a range of virtual channel identifiers (VCIs). Valid values are from 32 to 65535.</p>
Step 5	<pre>pvc-in-range [pvc-name] vpi/vci</pre> <p><b>Example:</b> Router(config-if-atm-range)# pvc-in-range pvc 105/350 </p>	<p>Configures an individual PVC within a PVC range. Enters ATM range PVC configuration mode.</p> <p>(Optional) <i>pvc-name</i> is the name given to the PVC. The PVC name can have a maximum of 15 characters.</p> <p><i>vpi</i> is the virtual path identifier (VPI) for this PVC. The slash is required. If you do not specify a VPI value or the slash, the default value of 0 is used. Valid VPI values are from 0 to 255.</p> <p><i>vci</i> is the virtual circuit identifier (VCI) for this PVC. Valid values are from 32 to 2047.</p>

Command or Action	Purpose
<p><b>Step 6</b> <code>service-policy [input   output] policy-map-name</code></p> <p><b>Example:</b>  Router(config-if-atm-range-pvc)# service-policy  output Downstream_Rate</p>	<p>Attaches the service policy you specify to the specified PVC within the ATM PVC range.</p> <p><b>input</b> indicates to apply the service policy to the inbound traffic on the interface.</p> <p><b>output</b> indicates to apply the service policy to the outbound traffic on the interface.</p> <p><b>Note</b> For QoS policies containing the <b>bandwidth</b>, <b>priority</b>, <b>random-detect</b>, <b>queue-limit</b>, and <b>shape</b> commands, you must specify the <b>output</b> keyword. The router ignores these commands when you use them with the <b>input</b> keyword.</p> <p><i>policy-map-name</i> is the name of the policy map you want to attach to the subinterface.</p> <p><b>Note</b> The router applies the service policy to only the individual ATM PVC within the PVC range.</p>

## Configuration Examples for Policy Map Support on Configured VC Range

This section provides the following configuration examples:

- [Attaching QoS Service Policies to a Range of ATM PVCs: Example, page 5](#)
- [Attaching QoS Service Policies to an Individual PVC Within a Range of ATM PVCs: Example, page 6](#)

### Attaching QoS Service Policies to a Range of ATM PVCs: Example

The following example configuration shows how to attach policy maps to a range of ATM PVCs. In the example, the service policy named voice is attached to the range of ATM PVCs 1/32 to 1/34. The router applies the service policy to all of the PVCs within the PVC range.

```
Router(config)# interface atm 2/0/0
Router(config-if)# range pvc 1/32 1/34
Router(config-if-atm-range)# service-policy input voice
```

## Attaching QoS Service Policies to an Individual PVC Within a Range of ATM PVCs: Example

The following example configuration shows how to attach policy maps to a specific PVC within a PVC range. In the example, the service policy named data is attached to PVC 1/33 within the PVC range 1/32 to 1/34. The router applies the service policy to only PVC 1/33.

```
Router(config)# interface atm 2/0/0
Router(config-if)# range pvc 1/32 1/34
Router(config-if-atm-range)# service-policy input voice
Router(config-if-atm-range)# pvc-in-range 1/33
Router(config-if-atm-range-vc)# service-policy input data
```

## Additional References

The following sections provide references related to MQC Policy Map Support on VC Range.

### Related Documents

Related Topic	Document Title
MQC policy maps	<a href="#">Cisco IOS Quality of Service Solutions Configuration Guide, Release 12.2</a> <a href="#">Modular Quality of Service Command-Line Interface</a>

### MIBs

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

### Technical Assistance

Description	Link
The Cisco Technical Support & Documentation website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	<a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a>

# Command Reference

This feature uses no new or modified commands.

- [service-policy](#)

# service-policy

To attach a policy map to an input interface or virtual circuit (VC), or an output interface or VC, to be used as the service policy for that interface or VC, use the **service-policy** command. To remove a service policy from an input or output interface or input or output VC, use the **no** form of this command.

**service-policy** [**type access-control**] {**input** | **output**} *policy-map-name*

**no service-policy** [**type access-control**] {**input** | **output**} *policy-map-name*

## Syntax Description

<b>type access-control</b>	(Optional) Determines the exact pattern to look for in the protocol stack of interest.  <b>Note</b> This option is not available on the Cisco 10000 series router.
<b>input</b>	Attaches the specified policy map to the input interface or input VC.
<b>output</b>	Attaches the specified policy map to the output interface or output VC.
<i>policy-map-name</i>	The name of a service policy map (created using the <b>policy-map</b> command) to be attached. The name can be a maximum of 40 alphanumeric characters.

## Defaults

No service policy is specified.

## Command Modes

Interface configuration  
 VC submode (for a standalone VC)  
 Bundle-vc configuration (for ATM VC bundle members)  
 PVC range subinterface configuration (for a range of ATM PVCs)  
 PVC-in-range configuration (for an individual PVC within a PVC range)  
 Map-class configuration (for Frame Relay VCs)

## Command History

Release	Modification
12.0(5)T	This command was introduced.
12.0(5)XE	This command was integrated into Cisco IOS Release 12.0(5)XE.
12.0(7)S	This command was integrated into Cisco IOS Release 12.0(7)S.
12.1(1)E	This command was integrated into Cisco IOS Release 12.1(1)E.
12.1(2)T	This command was modified to enable low latency queueing (LLQ) on Frame Relay VCs.
12.4(2)T	This command was made available in the PVC range subinterface configuration mode and in the PVC-in-range configuration mode to extend policy map functionality on an ATM VC to the ATM VC range.
12.4(4)T	The <b>type stack</b> and the <b>type access-control</b> keywords were added to support flexible packet matching.



Release	Modification
12.3(7)XI2	This command was modified to support PVC range configuration mode and PVC-in-range configuration mode for ATM VCs on the Cisco 10000 series router and the Cisco 7200 series router.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB and implemented on the Cisco 10000 series router.

### Usage Guidelines

You can attach a single policy map to one or more interfaces or one or more VCs to specify the service policy for those interfaces or VCs.

Currently a service policy specifies class-based weighted fair queueing (CBWFQ). The class policies comprising the policy map are then applied to packets that satisfy the class map match criteria for the class.

To successfully attach a policy map to an interface or a VC, the aggregate of the configured minimum bandwidths of the classes comprising the policy map must be less than or equal to 75 percent of the interface bandwidth or the bandwidth allocated to the VC.

To enable LLQ for Frame Relay (priority queueing (PQ)/CBWFQ), you must first enable Frame Relay Traffic Shaping (FRTS) on the interface using the **frame-relay traffic-shaping** command in interface configuration mode. You then attach an output service policy to the Frame Relay VC using the **service-policy** command in map-class configuration mode.

To successfully attach a policy map to an interface or ATM VC, the aggregate of the configured minimum bandwidths of the classes that make up the policy map must be less than or equal to 75 percent of the interface bandwidth or the bandwidth allocated to the VC. For a Frame Relay VC, the total amount of bandwidth allocated must not exceed the minimum committed information rate (CIR) configured for the VC less any bandwidth reserved by the **frame-relay voice bandwidth** or **frame-relay ip rtp priority** map-class commands. If not configured, the minimum CIR defaults to half of the CIR.

Configuring CBWFQ on a physical interface is only possible if the interface is in the default queueing mode. Serial interfaces at E1 (2.048 Mbps) and below use WFQ by default. Other interfaces use FIFO by default. Enabling CBWFQ on a physical interface overrides the default interface queueing method. Enabling CBWFQ on an ATM permanent virtual circuit (PVC) does not override the default queueing method.

When you attach a service policy with CBWFQ enabled to an interface, commands related to fancy queueing such as commands pertaining to fair queueing, custom queueing, priority queueing, and Weighted Random Early Detection (WRED) are available using the modular quality of service command line interface (MQC). However, you cannot configure these features directly on the interface until you remove the policy map from the interface.

You can modify a policy map attached to an interface or a VC, changing the bandwidth of any of the classes comprising the map. Bandwidth changes that you make to an attached policy map are effective only if the aggregate of the bandwidth amounts for all classes comprising the policy map, including the modified class bandwidth, less than or equal to 75 percent of the interface bandwidth or the VC bandwidth. If the new aggregate bandwidth amount exceeds 75 percent of the interface bandwidth or VC bandwidth, the policy map is not modified.

### Cisco 10000 Series Router Usage Guidelines

The Cisco 10000 series router does not support applying CBWFQ policies to unspecified bit rate (UBR) VCs.

To successfully attach a policy map to an interface or a VC, the aggregate of the configured minimum bandwidths of the classes comprising the policy map must be less than or equal to 99 percent of the interface bandwidth or the bandwidth allocated to the VC. If you attempt to attach a policy map to an interface when the sum of the bandwidth assigned to classes is greater than 99 percent of the available bandwidth, the router logs a warning message and does not allocate the requested bandwidth to all of the classes. If the policy map is already attached to other interfaces, it is removed from them.

The total bandwidth is the speed (rate) of the ATM layer of the physical interface. The router converts the minimum bandwidth that you specify to the nearest multiple of 1/255 (ESR-PRE1) or 1/65535 (ESR-PRE2) of the interface speed. When you request a value that is not a multiple of 1/255 or 1/65535, the router chooses the nearest multiple.

The bandwidth percentage is based on the interface bandwidth. In a hierarchical policy, the bandwidth percentage is based on the nearest parent shape rate.

By default, a minimum bandwidth guaranteed queue has buffers for up to 50 milliseconds of 256-byte packets at line rate, but not less than 32 packets.

For Cisco IOS Release 12.0(22)S and later releases, to enable LLQ for Frame Relay (priority queueing (PQ)/CBWFQ) on the Cisco 10000 series router, first create a policy map and then assign priority to a defined traffic class using the **priority** command. For example, the following sample configuration shows how to configure a priority queue with a guaranteed bandwidth of 8000 kbps. In the example, the Business class in the policy map named Gold is configured as the priority queue. The Gold policy also includes the Non-Business class with a minimum bandwidth guarantee of 48 kbps. The Gold policy is attached to serial interface 2/0/0 in the outbound direction.

```
class-map Business
  match ip precedence 3
policy-map Gold
  class Business
    priority
    police 8000
  class Non-Business
    bandwidth 48
interface serial 2/0/0
  frame-relay encapsulation
  service-policy output Gold
```

### Examples

The following example shows how to attach the service policy map called policy9 to data-link connection identifier (DLCI) 100 on output serial subinterface 1 and enable LLQ for Frame Relay:

```
interface Serial1/0.1 point-to-point
  frame-relay interface-dlci 100
  class fragment
!
map-class frame-relay fragment
  service-policy output policy9
```

The following example shows how to attach the service policy map called policy9 to input serial interface 1:

```
interface Serial1
  service-policy input policy9
```

The following example shows how to attach the service policy map called policy9 to the input PVC called cisco:

```
pvc cisco 0/34
  service-policy input policy9
vbr-nt 5000 3000 500
  precedence 4-7
```

The following example shows how to attach the policy called policy9 to output serial interface 1 to specify the service policy for the interface and enable CBWFQ on it:

```
interface serial1
  service-policy output policy9
```

The following example shows how to attach the service policy map called policy9 to the output PVC called cisco:

```
pvc cisco 0/5
  service-policy output policy9
vbr-nt 4000 2000 500
  precedence 2-3
```

### Cisco 10000 Series Router Examples

The following example shows how to attach the service policy named user\_policy to data link connection identifier (DLCI) 100 on serial subinterface 1/0/0.1 for outbound packets.

```
interface serial 1/0/0.1 point-to-point
  frame-relay interface-dlci 100
  service-policy output user_policy
```



#### Note

You must be running Cisco IOS Release 12.0(22)S or later releases to attach a policy to a DLCI in this way. If you are running a release prior to Cisco IOS Release 12.0(22)S, attach the service policy as described in the previous configuration examples using the Frame Relay legacy commands.

The following example shows how to attach a QoS service policy named bronze to PVC 0/101 on the ATM subinterface 3/0/0.1 for inbound traffic.

```
interface atm 3/0/0
  atm pxf queuing
interface atm 3/0/0.1
  pvc 0/101
  service-policy input bronze
```

The following example shows how to attach a service policy named myQoS to the physical Gigabit Ethernet interface 1/0/0 for inbound traffic. VLAN 4, configured on the GigabitEthernet subinterface 1/0/0.3, inherits the service policy of the physical Gigabit Ethernet interface 1/0/0.

```
interface GigabitEthernet 1/0/0
  service-policy input myQoS
interface GigabitEthernet 1/0/0.3
  encapsulation dot1q 4
```

The following example shows how to apply the policy map named `policy1` to the virtual template named `virtual-template1` for all inbound traffic. In this example, the virtual template configuration also includes CHAP authentication and point-to-point protocol (PPP) authorization and accounting.

```
interface virtual-template1
 ip unnumbered Loopback1
 no peer default ip address
 ppp authentication chap vpn1
 ppp authorization vpn1
 ppp accounting vpn1
 service-policy policy1
```

The following example shows how to attach the service policy map called `voice` to ATM VC 2/0/0 within a PVC range of a total of 3 PVCs and enable PVC range configuration mode where a point-to-point subinterface is created for each PVC in the range. Each PVC created as part of the range has the voice service policy attached to it.

```
configure terminal
 interface atm 2/0/0
   range pvc 1/50 1/52
   service-policy input voice
```

The following example shows how to attach the service policy map called `voice` to ATM VC 2/0/0 within a PVC range, where every VC created as part of the range has the voice service policy attached to it. The exception is PVC 1/51, which is configured as an individual PVC within the range and has a different service policy called `data` attached to it in PVC-in-range configuration mode.

```
configure terminal
 interface atm 2/0/0
   range pvc 1/50 1/52
   service-policy input voice
   pvc-in-range 1/51
   service-policy input data
```

## Related Commands

Command	Description
<b>policy-map</b>	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
<b>show frame-relay pvc</b>	Displays statistics about PVCs for Frame Relay interfaces.
<b>show policy-map</b>	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.
<b>show policy-map interface</b>	Displays the configuration of all classes configured for all service policies on the specified interface or displays the classes for the service policy for a specific PVC on the interface.

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