



# AutoQoS — VoIP

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The AutoQoS — VoIP feature allows you to automate the delivery of quality of service (QoS) on your network and provides a means for simplifying the implementation and provisioning of QoS for Voice over IP (VoIP) traffic.

## Feature Specifications for AutoQoS — VoIP

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### Feature History

Release	Modification
12.2(15)T	This feature was introduced.

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### Supported Platforms

Cisco 2600 series, Cisco 2600 XM series, Cisco 2691, Cisco 3620, Cisco 3640, Cisco 3660, Cisco 3725, Cisco 3745, Cisco 7200 series

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## Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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## Prerequisites for AutoQoS — VoIP

- Ensure that no QoS policies (service policies) are attached to the interface. This feature cannot be configured if a QoS policy (service policy) is attached to the interface.
- To include Simple Network Protocol (SNMP) traps (monitored events), the SNMP server must be enabled.

## Restrictions for AutoQoS — VoIP

### General Restrictions

- The AutoQoS — VoIP feature is supported on the following interfaces, data-link connection identifiers (DLCIs), and permanent virtual circuits (PVCs) only:
  - Serial interfaces with PPP or High-Level Data Link Control (HDLC)
  - Frame Relay DLCIs in point-to-point subinterfaces only
  - ATM PVCs

The AutoQoS — VoIP feature is supported on low-speed ATM PVCs in point-to-point subinterfaces only. The AutoQoS — VoIP feature is supported on high-speed ATM PVCs in any type of subinterface.




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**Note** An ATM PVC is classified as low-speed if its bandwidth is less than or equal to 768 kbps; an ATM PVC is classified as high-speed if its bandwidth is greater than 768 kbps

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- Frame Relay-to-ATM Interworking links

### Serial Interface Restrictions

- For a serial interface with a low-speed link, Multilink PPP (MLP) is configured automatically. The serial interface must have an IP address. When MLP is configured, this IP address is removed and put on the MLP bundle. To ensure that the traffic goes through the low-speed link, the following conditions must be met:
  - The AutoQoS - VoIP feature must be configured at the *both* ends of the link.
  - The amount of bandwidth configured must be the same on *both* ends of the link.

### Frame Relay DLCI Restrictions

- The AutoQoS — VoIP feature cannot be configured on a Frame Relay DLCI if a map class is attached to the DLCI.
- If a Frame Relay DLCI is already assigned to one subinterface, the AutoQoS — VoIP feature cannot be configured from a different subinterface.
- For low-speed Frame Relay DLCIs configured for use on Frame Relay-to-ATM networks, MLP over Frame Relay (MLPoFR) is configured automatically. The subinterface must have an IP address. When MLPoFR is configured, this IP address is removed and put on the MLP bundle. The AutoQoS — VoIP feature must also be configured on the ATM side of the network.
- For low-speed Frame Relay DLCIs with Frame Relay-to-ATM Interworking, the AutoQoS — VoIP feature cannot be configured if a virtual template is already configured for the DLCI.

### ATM PVC Restrictions

- For a low-speed ATM PVC, the AutoQoS — VoIP feature cannot be configured if a virtual template is already configured for the ATM PVC.
- For low-speed ATM PVCs, MLP over ATM (MLPoATM) is configured automatically. The subinterface must have an IP address.

When MLPoATM is configured, this IP address is removed and put on the MLP bundle. The AutoQoS — VoIP feature must also be configured on the ATM side of the network.

## Information About AutoQoS — VoIP

To configure the AutoQoS — VoIP feature, you need to understand the following concepts:

- [Benefits of AutoQoS — VoIP, page 3](#)
- [Design Considerations, page 4](#)
- [Configurations for the Interface Configurations, Policy Maps, Class Maps, and ACLs, page 5](#)

## Benefits of AutoQoS — VoIP

The key benefits of the AutoQoS -VoIP feature include the following:

- Customers can implement the QoS features required for VoIP traffic without an in-depth knowledge of the following underlying technologies:
  - PPP
  - Frame Relay
  - ATM
  - Service policies
  - Link efficiency mechanisms (LEM), such as Link Fragmentation and Interleaving (LFI)
- The AutoQoS — VoIP feature simplifies QoS implementation and speeds up the provisioning of QoS technology over a Cisco network. It reduces human error and lowers training costs. With the AutoQoS — VoIP feature, one command (the **auto qos** command) enables QoS for VoIP traffic across every Cisco router and switch.
- Customers can also use existing Cisco IOS commands to modify the configurations automatically generated by the AutoQoS — VoIP feature as needed to meet specific requirements.
- The Cisco product, CiscoWorks QoS Policy Manager (QPM), can be used in conjunction with the AutoQoS — VoIP feature to provide a centralized, web-based tool to cost effectively manage and monitor network-wide QoS policies. The AutoQoS — VoIP feature together with CiscoWorks QPM, eases QoS implementation, provisioning, and management.

## Design Considerations

### General QoS Requirements

- Recommended methods and values are configured to meet the QoS requirements for voice traffic.
- The AutoQoS — VoIP feature takes the interface type and bandwidth into consideration when implementing the following QoS features:
  - Classification
 

Classification is used to differentiate the voice packets from the data packets and handle the voice packets appropriately.
  - Low latency queueing (LLQ) - Priority Queueing (PQ)
 

The LLQ (specifically, PQ) is applied to the voice packets to meet the latency requirements.
  - Compressed Real-Time Protocol (cRTP)
 

With cRTP, the 40-byte IP header of the voice packet is reduced from 2 to 4 bytes, thereby reducing voice bandwidth requirements. cRTP must be applied at both ends of a network link.
  - LFI
 

LFI is used to reduce the jitter of voice packets by preventing voice packets from getting delayed behind large data packets in a queue. LFI must be applied at both ends of a network link.

### Bandwidth Implications

- The bandwidth of the serial interface determines the speed of the link. The speed of the link in turn determines the configurations generated by the AutoQoS — VoIP feature.




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**Note** Changing the bandwidth before configuring the AutoQoS — VoIP feature is not recommended.

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The AutoQoS — VoIP feature uses the bandwidth at the time the feature is configured. AutoQoS — VoIP does not respond to changes made to bandwidth after the feature is configured.

For example, if the **auto qos voip** command is used to configure the AutoQoS — VoIP feature on an interface with 1000 Kbps, the AutoQoS — VoIP feature generates configurations for high-speed interfaces. However, if the bandwidth is later changed to 500 Kbps, the AutoQoS — VoIP feature will not use the lower bandwidth. The AutoQoS — VoIP feature retains the higher bandwidth and continues to use the generated configurations for high-speed interfaces.

To force the AutoQoS — VoIP feature to use the lower bandwidth (and thus generate configurations for the low-speed interfaces), use the **no auto qos voip** command to remove the AutoQoS — VoIP feature and then reconfigure the feature.

### Fragmentation for Frame Relay Networks

- For Frame Relay networks, fragmentation is configured using a delay of 10 milliseconds (ms) and a minimum fragment size of 60 bytes. This ensures that the VoIP packets are not fragmented. However, when the G.711 coder-decoder (codec) is used on low-speed links, the fragment size configured by the AutoQoS — VoIP feature could be smaller than the size of the G.711 VoIP packet.

To solve this potential problem, choose one of the following:

- Change the fragment size to the required value.
- Change the size of the G.711 VoIP packet to a smaller value.

For example, if the AutoQoS — VoIP feature is configured on a Frame Relay DLCI with 128 Kbps, the fragment size configured by the AutoQoS — VoIP feature will be 160 bytes. The size of the G.711 VoIP packet will be 160 bytes, minus the bytes in the packet headers for the layers. The workaround is to either change the fragment size from 160 bytes to 220 bytes or change the size of the G.711 VoIP packet from 160 bytes to 80 bytes.

### Signaling Protocols

- The AutoQoS — VoIP feature currently identifies the following signaling protocols:
  - H.323
  - H.225 (Unicast only)
  - Session Initiation Protocol (SIP)
  - “Skinny” gateway protocol
  - Media Gateway Control Protocol (MGCP)



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**Note** Access control lists (ACLs) can be configured to identify any additional signaling protocols that may be needed.

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## Configurations for the Interface Configurations, Policy Maps, Class Maps, and ACLs

The AutoQoS — VoIP feature automatically creates configurations that are then used for the interface configurations, policy maps, class maps, and ACLs. The interface configurations, policy maps, class maps, and ACLs are created to classify VoIP packets and to provide the appropriate QoS treatment for the network traffic.

This feature also creates interface (or PVC)-specific configurations. These interface (or PVC)-specific configurations are created according to the interface type and the link speed.



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**Note** Links with bandwidths lower than or equal to 768 kbps are considered low-speed links; links with bandwidths higher than 768 kbps are considered high-speed links.

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## How to Configure the AutoQoS — VoIP Feature

This section contains the following tasks. Each task is identified as either required or optional.

- [Enabling the AutoQoS — VoIP Feature, page 5](#) (required)
- [Verifying the Configuration, page 9](#) (optional)

### Enabling the AutoQoS — VoIP Feature

The only required step for enabling the AutoQoS — VoIP feature is to use the **auto qos voip** command. This command automatically creates configurations for interface configurations, policy maps, class maps, and ACLs. These interface configurations, policy maps, class maps, and ACLs are used to classify VoIP packets and to provide the appropriate QoS for the network traffic.

## Prerequisites for Using the auto qos Command

Before using the **auto qos** command at an interface or an ATM PVC, ensure that the following prerequisites have been met:

- Cisco Express Forwarding (CEF) must be enabled at the interface or ATM PVC.
- If the interface or subinterface has a link speed of 768 kbps or lower, configure the primary or secondary IP address of the interface by using the **ip address** command.
- For all interfaces or subinterfaces, configure the amount of bandwidth by using the **bandwidth** command. The amount of bandwidth allocated should be based on the link speed of the interface.
- For an ATM PVC, configure the variable bit rate (VBR) by using either the **vbr-nrt** command or the **vbr-rt** command or configure the constant bit rate (CBR) by using the **cbr** command.

## Restrictions for Using the auto qos Command

- The **auto qos voip** command is not supported on subinterfaces.
- Do not change the bandwidth of the interface before using the **auto qos** command.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **bandwidth** *kilobits*
5. **vbr-nrt** *output-pcr output-scr output-mbs [input-pcr] [input-scr] [input-mbs]*
6. **vbr-rt** *peak-rate average-rate burst*
7. **cbr** *rate*
8. **pvc** [*name*] *vpilvci [ces | ilmi | qsaal | smds]*
9. **ip address** *ip-address mask [secondary]*
10. **frame-relay interface-dlci** *dlci [ietf | cisco] [voice-cir cir] [ppp virtual-template-name]*
11. **auto qos voip** [**trust**] [**fr-atm**]
12. **exit**

### 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.

	Command or Action	Purpose
Step 3	<p><b>interface</b> <i>type number</i></p> <p><b>Example:</b> Router(config-if)# interface s4/0</p>	<p>Configures an interface (or subinterface) type and enters interface configuration mode.</p> <ul style="list-style-type: none"> <li>Enter the interface type number.</li> </ul>
Step 4	<p><b>bandwidth</b> <i>kilobits</i></p> <p><b>Example:</b> Router(config-if)# bandwidth 1540</p>	<p>(Optional) Sets a bandwidth value for an interface.</p> <ul style="list-style-type: none"> <li>Enter the bandwidth value in kbps.</li> </ul> <p><b>Note</b> This step applies only to interfaces and subinterfaces. It is not required for ATM PVCs.</p>
Step 5	<p><b>vbr-nrt</b> <i>output-pcr output-scr output-mbs</i> <i>[input-pcr] [input-scr] [input-mbs]</i></p> <p><b>Example:</b> Router(config-if)# vbr-nrt 10000 5000 32 20000 10000 64</p>	<p>(Optional) Configures the variable bit rate-nonreal time (VBR-NRT) QoS and specifies the output peak cell rate (PCR), output sustainable cell rate (SCR), and output maximum burst cell size (MBS) for an ATM PVC, PVC range, switched virtual circuit (SVC), virtual circuit (VC) class, or VC bundle member.</p> <ul style="list-style-type: none"> <li>Enter the output PCR, SCR, and MBS.</li> </ul> <p><b>Note</b> This step applies only to ATM PVCs. It is not required for interfaces or subinterfaces.</p>
Step 6	<p><b>vbr-rt</b> <i>peak-rate average-rate burst</i></p> <p><b>Example:</b> Router(config-if)# vbr-rt 640 56 80</p>	<p>(Optional) Configures the real-time VBR for Voice over ATM connections.</p> <ul style="list-style-type: none"> <li>Enter the peak information rate (PIR), the average information rate (AIR), and the burst size.</li> </ul> <p><b>Note</b> This step applies only to ATM PVCs. It is not required for interfaces or subinterfaces.</p>
Step 7	<p><b>cbr</b> <i>rate</i></p> <p><b>Example:</b> Router(config-if-atm-vc)# cbr 56</p>	<p>(Optional) Configures the CBR for the ATM circuit emulation service (CES) for an ATM PVC.</p> <p>This command can be used in different modes, including ATM-VC configuration mode (for ATM PVCs and SVCs), ATM PVC range configuration mode (for an ATM PVC range), or ATM PVC-in-range configuration mode (for an individual PVC within a PVC range).</p> <ul style="list-style-type: none"> <li>Enter the CBR.</li> </ul> <p><b>Note</b> This step applies only to ATM PVCs. It is not required for interfaces or subinterfaces.</p>
Step 8	<p><b>pvc</b> [<i>name</i>] <i>vpi/vci</i> [<i>ces   ilmi   qsaal   smds</i>]</p> <p><b>Example:</b> Router(config-if)# pvc 1/32</p>	<p>(Optional) Creates or assigns a name to an ATM PVC and specifies the encapsulation type on an ATM PVC.</p> <ul style="list-style-type: none"> <li>Enter the ATM network virtual path identifier (VPI) and the ATM network virtual channel identifier (VCI) for the ATM PVC.</li> </ul> <p><b>Note</b> This step applies only to ATM PVCs. It is not required for interfaces or subinterfaces.</p>

	Command or Action	Purpose
Step 9	<p><b>ip address</b> <i>ip-address mask</i> [<b>secondary</b>]</p> <p><b>Example:</b>  Router(config-if)# ip address 10.10.100.1  255.255.255.0</p>	<p>(Optional) Sets a primary or secondary IP address for an interface.</p> <p><b>Note</b> Applies only to low-speed interfaces (that is, interfaces with link speeds of 768 kbps or lower.)</p>
Step 10	<p><b>frame-relay interface-dlci</b> <i>dlci</i> [<b>ietf</b>   <b>cisco</b>]  [<b>voice-cir</b> <i>cir</i>] [<b>ppp</b> <i>virtual-template-name</i>]</p> <p><b>Example:</b>  Router(config-if)# frame-relay interface-dlci  100</p>	<p>(Optional) Assigns a DLCI to a specified Frame Relay subinterface on the router or access server, or assigns a specific PVC to a DLCI, or applies a virtual template configuration for a PPP session.</p> <ul style="list-style-type: none"> <li>Enter the DLCI number.</li> </ul> <p><b>Note</b> This step applies only to Frame Relay interfaces (either low-speed or high-speed).</p>
Step 11	<p><b>auto qos voip</b> [<b>trust</b>] [<b>fr-atm</b>]</p> <p><b>Example:</b>  Router(config-if)# auto qos voip  or  Router(config-fr-dlci)# auto qos voip</p>	<p>Configures the AutoQoS — VoIP feature.</p> <p><b>Note</b> For low-speed Frame Relay DLCIs interconnected with ATM PVCs in the same network, the <b>fr-atm</b> keyword must be explicitly configured in the <b>auto qos voip</b> command to configure the AutoQoS - VoIP feature properly. That is, the command must be configured as <b>auto qos voip fr-atm</b>.</p>
Step 12	<p><b>exit</b></p> <p><b>Example:</b>  Router(config-if)# exit</p>	<p>(Optional) Returns to interface configuration mode.</p>

## FAQs and Troubleshooting Tips

Below are answers to frequently asked questions (FAQs) and tips for troubleshooting situations that you may encounter when configuring or using the AutoQoS — VoIP feature.

### Why can't I configure the AutoQoS — VoIP feature?

- To configure the feature, CEF must be is enabled. Verify that CEF is enabled on your network.
- Also, the feature cannot be enabled if a service policy is already attached to the interface. Determine whether there is a service policy attached to the interface. If so, remove the service policy from the interface.

### Why isn't the AutoQoS — VoIP feature supported on my router?

- The AutoQoS — VoIP feature is supported only on the IP Plus image for lower-end platforms. Verify that you have the IP Plus image installed on your router.

### Why are some of my QoS configurations still present after I disable the AutoQoS — VoIP feature?

- You have to manually disable any QoS configurations that were modified by the AutoQoS — VoIP feature.

### Why did my low-speed network link go down when I enabled the AutoQoS — VoIP feature?

- Ensure that AutoQoS — VoIP is enabled on *both* sides of the network link.

### Why can't I establish an end-to-end connection on the Frame Relay link?

- Check the bandwidth on both sides of the Frame Relay link. The bandwidth on both sides of the link *must be the same*, otherwise a fragmentation size mismatch occurs and a connection cannot be established.

**Note**

For more help, see the [“Technical Assistance”](#) section.

## What to Do Next

If the interface configurations, policy maps, class maps, and ACLs created (on the basis of the configurations created by the AutoQoS - VoIP feature) do not meet the needs of your network, the interface configurations, policy maps, class maps, and ACLs can be modified using the appropriate Cisco IOS commands.

**Note**

While you can modify the interface configurations, policy maps, class maps, and ACLs, they may not be removed properly when the AutoQoS — VoIP feature is disabled using the **no auto qos** command. You may need to manually remove any modified interface configurations, policy maps, class maps, and ACLs. For more information about the **no auto qos** command, see the [“Command Reference”](#) section.

## Verifying the Configuration

The AutoQoS — VoIP feature automatically generates configurations that, in turn, are used to create interface configurations, policy maps, class maps, and ACLs. These interface configurations, policy maps, class maps, and ACLs configure the QoS features on your network.

To verify the configuration (that is, the contents of the interface configurations, policy maps, class maps, and ACLs), use the following commands:

### SUMMARY STEPS

1. **enable**
2. **show auto qos [interface [interface type]]**
3. **show policy-map interface [interface type]**
4. **exit**

## 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>show auto qos [interface [interface type]]</b>  <b>Example:</b> Router# show auto qos interface s4/0	(Optional) Displays the interface configurations, policy maps, class maps, and ACLs created on the basis of automatically generated configurations. <ul style="list-style-type: none"> <li>The interface configurations, policy maps, class maps, and ACLs can be displayed for a specific interface or all interfaces.</li> </ul>
Step 3	<b>show policy-map interface [interface type]</b>  <b>Example:</b> Router# show policy-map interface s4/0	(Optional) Displays the packet statistics of all classes that are configured for all service policies either on the specified interface or subinterface or on a specific PVC on the interface. <ul style="list-style-type: none"> <li>The packet statistics can be displayed for a specific interface, subinterface, PVC, or all interfaces, subinterfaces, or PVCs.</li> </ul>
Step 4	<b>exit</b>  <b>Example:</b> Router# exit	(Optional) Exits privileged EXEC mode.

## Configuration Examples for AutoQoS — VoIP

This section provides the following configuration examples:

- [Configuring the AutoQoS — VoIP Feature Examples, page 10](#)
- [Verifying the AutoQoS — VoIP Feature Configuration Examples, page 12](#)

### Configuring the AutoQoS — VoIP Feature Examples

When the **auto qos voip** command is used to configure the AutoQoS — VoIP feature, configurations are generated. These configurations are then used to create interface configurations, policy maps, class maps, and aCLs.

This section contains the following examples of configuring the AutoQoS — VoIP feature on the interfaces, PVCs, and links.

### Configuring the AutoQoS — VoIP Feature on a High-Speed Serial Interface Example

In this example, the AutoQoS — VoIP feature is configured on the high-speed serial interface s1/2.

```
Router> enable
Router# configure terminal
Router(config)# interface s1/2
Router(config-if)# bandwidth 1540
Router(config-if)# auto qos voip
Router(config-if)# exit
```

### Configuring the AutoQoS — VoIP Feature on a Low-Speed Serial Interface Example

In this example, the AutoQoS — VoIP feature is configured on the low-speed serial interface s1/3.

```
Router# configure terminal
Router(config)# interface s1/3
Router(config-if)# bandwidth 512
Router(config-if)# ip address 10.10.100.1 255.255.255.0
Router(config-if)# auto qos voip
Router(config-if)# exit
```

### Configuring the AutoQoS — VoIP Feature on High-Speed Frame Relay Interfaces Example

In this example, the AutoQoS — VoIP feature is configured on the high-speed serial point-to-point Frame Relay subinterface s4/1.2.

```
Router> enable
Router# configure terminal
Router(config)# interface s4/1.2 point-to-point
Router(config-if)# bandwidth 1540
Router(config-if)# frame-relay interface-dlci 100
Router(config-fr-dlci)# auto qos voip
Router(config-if)# exit
```

### Configuring the AutoQoS — VoIP Feature on Low-Speed Frame Relay Interfaces Example

In this example, the AutoQoS — VoIP feature is configured on the low-speed point-to-point Frame Relay subinterface s4/2.1.

```
Router# configure terminal
Router(config)# interface s4/2.1 point-to-point
Router(config-if)# bandwidth 512
Router(config-if)# ip address 10.10.100.1 255.255.255.0
Router(config-if)# frame-relay interface-dlci 100
Router(config-fr-dlci)# auto qos voip
Router(config-if)# exit
```

### Configuring the AutoQoS — VoIP Feature on a High-Speed ATM PVC Example

In this example, the AutoQoS — VoIP feature is configured on the high-speed point-to-point ATM PVC ATM5/0.1.

```
Router# configure terminal
Router(config)# interface ATM5/0.1 point-to-point
Router(config-if)# pvc 1/32
Router(config-if)# vbr-nrt 1540 1540
Router(config-if)# auto qos voip
Router(config-if)# exit
```

### Configuring the AutoQoS — VoIP Feature on a Low-Speed ATM PVC Example

In this example, the AutoQoS — VoIP feature is configured on a low-speed point-to-point ATM PVC ATM5/0.2.

```
Router# configure terminal
Router(config)# interface ATM5/0.2 point-to-point
Router(config-if)# ip address 10.10.100.1 255.255.255.0
Router(config-if)# pvc 1/32
Router(config-if)# vbr-nrt 512 512
Router(config-if)# auto qos voip
Router(config-if)# exit
```

### Configuring the AutoQoS — VoIP Feature for Frame Relay-to-ATM Interworking Example

In this example, the AutoQoS — VoIP feature is configured for Frame Relay-to-ATM Interworking. The AutoQoS — VoIP feature is configured on the serial point-to-point subinterface s1/3.1.

```
Router# configure terminal
Router(config)# interface s1/3.1 point-to-point
Router(config-if)# bandwidth 512
Router(config-if)# ip address 10.10.100.1 255.255.255.0
Router(config-if)# frame-relay interface-dlci 100
Router(config-if)# auto qos voip fr-atm
Router(config-if)# exit
```

In this configuration, the optional **fr-atm** keyword is used to enable the AutoQoS — VoIP feature for the Frame Relay-to-ATM Interworking.



#### Note

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The ATM-to-ATM side of the network needs no special configuration to distinguish it from the ATM-to-Frame Relay side of the network.

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## Verifying the AutoQoS — VoIP Feature Configuration Examples

When the **auto qos voip** command is used to configure the AutoQoS — VoIP feature, configurations are generated. These configurations are then used to create interface configurations, policy maps, class maps, and ACLs. The **show auto qos interface** command can be used to verify the contents of the interface configurations, policy maps, class maps, and ACLs.

This section contains the following sample output of the **show auto qos interface** command for interfaces, PVCs, and links.



#### Note

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The **show auto qos interface** command output displays only those configurations created by the AutoQoS - VoIP feature.

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### Sample show auto qos interface Command Output for a High-Speed Serial Interface

The following is sample output of the **show auto qos** command for a high-speed serial interface:

```
Router# show auto qos interface s6/0

Serial6/0 -
!
interface Serial6/0
  service-policy output AutoQoS-Policy-UnTrust
```

### Sample show auto qos interface Command Output for a Low-Speed Serial Interface

The following is sample output of the **show auto qos interface** command for a low-speed serial interface:

```
Router# show auto qos interface s6/0

Serial6/0 -
!
interface Serial6/0
  no ip address
  encapsulation ppp
  no fair-queue
  ppp multilink
  multilink-group 2001100126
!
interface Multilink2001100126
  bandwidth 512
  ip address 10.10.100.1 255.255.255.0
  service-policy output AutoQoS-Policy-UnTrust
  ppp multilink
  ppp multilink fragment-delay 10
  ppp multilink interleave
  ip rtp header-compression iphc-format
```

### Sample show auto qos Interface Command Output for a High-Speed Frame Relay Interface

The following is sample output of the **show auto qos** command for a high-speed Frame Relay interface:

```
Router# show auto qos interface s6/1.1

Serial6/1.1: DLCI 100 -
!
interface Serial6/1
  frame-relay traffic-shaping
!
interface Serial6/1.1 point-to-point
  frame-relay interface-dlci 100
  class AutoQoS-VoIP-FR-Serial6/1-100
!
map-class frame-relay AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay cir 1540000
  frame-relay bc 15400
  frame-relay be 0
  frame-relay mincir 1540000
  service-policy output AutoQoS-Policy-UnTrust
```



#### Note

The output of the **show autoqos interface** command for high-speed Frame Relay interfaces is similar to the output for low-speed Frame Relay interfaces. The only difference is that Frame Relay Fragmentation and cRTP are not configured for high-speed Frame Relay interfaces.

### Sample show auto qos interface Command Output for a Low-Speed Frame Relay Interface

The following is sample output of the **show auto qos** command for a low-speed Frame Relay interface:

```
Router# show auto qos interface s6/1.1

Serial6/1.1: DLCI 100 -
!
interface Serial6/1
  frame-relay traffic-shaping
!
```

```

interface Serial6/1.1 point-to-point
 frame-relay interface-dlci 100
   class AutoQoS-VoIP-FR-Serial6/1-100
 frame-relay ip rtp header-compression
!
map-class frame-relay AutoQoS-VoIP-FR-Serial6/1-100
 frame-relay cir 512000
 frame-relay bc 5120
 frame-relay be 0
 frame-relay mincir 512000
 service-policy output AutoQoS-Policy-UnTrust
 frame-relay fragment 640

```

### Sample show auto qos interface Command Output for a High-Speed ATM PVC

The following is sample output of the **show auto qos** command for a high-speed ATM PVC:

```

Router# show auto qos interface a2/0.1

ATM2/0.1: PVC 1/100 -
!
interface ATM2/0.1 point-to-point
 pvc 1/100
   tx-ring-limit 3
   service-policy output AutoQoS-Policy-UnTrust

```

### Sample show auto qos interface Command Output for a Low-Speed ATM PVC

The following is sample output of the **show auto qos** command for a low-speed ATM PVC:

```

Router# show auto qos interface a2/0.1

ATM2/0.1: PVC 1/100 -
!
interface ATM2/0.1 point-to-point
 pvc 1/100
   tx-ring-limit 3
   encapsulation aal5mux ppp Virtual-Template200
!
interface Virtual-Template200
 bandwidth 512
 ip address 10.10.100.1 255.255.255.0
 service-policy output AutoQoS-Policy-UnTrust
 ppp multilink
 ppp multilink fragment-delay 10
 ppp multilink interleave

```

### Sample show auto qos interface Command Output for Frame Relay-to-ATM Interworking Links

The following is sample output of the **show auto qos** command for Frame Relay-to-ATM Interworking links:

```

Router# show auto qos interface s6/1.1

Serial6/1.1: DLCI 100 -
!
interface Serial6/1
 frame-relay traffic-shaping
!
interface Serial6/1.1 point-to-point
 frame-relay interface-dlci 100 ppp Virtual-Template200
   class AutoQoS-VoIP-FR-Serial6/1-100
!

```

```

interface Virtual-Template200
  bandwidth 512
  ip address 10.10.100.1 255.255.0.0
  service-policy output AutoQoS-Policy-UnTrust
  ppp multilink
  ppp multilink fragment-delay 10
  ppp multilink interleave
!
map-class frame-relay AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay cir 512000
  frame-relay bc 5120
  frame-relay be 0
  frame-relay mincir 512000

```

## Additional References

For additional information related to AutoQoS — VoIP, refer to the following references:

- [Related Documents, page 15](#)
- [Standards, page 16](#)
- [MIBs, page 16](#)
- [RFCs, page 16](#)
- [Technical Assistance, page 17](#)

## Related Documents

Related Topic	Document Title
QoS commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	<i>Cisco IOS Quality of Service Solutions Command Reference</i> , Release 12.2 T
QoS concepts and features applicable to VoIP; high-level examples for configuring these features in different network environments	<i>Quality of Service for Voice over IP</i> , Cisco Integrated Networking Solutions document
LFI and cRTP	“Link Efficiency Mechanisms” section of the <i>Cisco IOS Quality of Service Solutions Configuration Guide</i> , Release 12.2
Packet classification	“Classification” section of the <i>Cisco IOS Quality of Service Solutions Configuration Guide</i> , Release 12.2
LLQ	“Congestion Management” section of the <i>Cisco IOS Quality of Service Solutions Configuration Guide</i> , Release 12.2
Service policies	“Modular Quality of Service Command-Line Interface” section of the <i>Cisco IOS Quality of Service Solutions Configuration Guide</i> , Release 12.2
Frame Relay and ATM commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	<i>Cisco IOS Wide-Area Networking Command Reference</i> , Release 12.2 T
Frame-Relay DLCIs, ATM PVCs, Frame Relay-to-ATM Interworking, MLPoFR, and other information about Frame Relay networks	<i>Cisco IOS Wide-Area Networking Configuration Guide</i> , Release 12.2

Related Topic	Document Title
MLP	<i>Cisco IOS Dial Technologies Configuration Guide</i> , Release 12.2
CEF	<i>Cisco IOS Switching Services Configuration Guide</i> , Release 12.2
SNMP	<i>Cisco IOS Configuration Fundamentals Configuration Guide</i> , Release 12.2
CiscoWorks QPM	Product information available online at Cisco.com

## Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

## MIBs

MIBs	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing standards has not been modified by this feature.	To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at the following URL:  <a href="http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml">http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml</a>

To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:

<http://tools.cisco.com/ITDIT/MIBS/servlet/index>

If Cisco MIB Locator does not support the MIB information that you need, you can also obtain a list of supported MIBs and download MIBs from the Cisco MIBs page at the following URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>

To access Cisco MIB Locator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to [cco-locksmith@cisco.com](mailto:cco-locksmith@cisco.com). An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

<http://www.cisco.com/register>

## RFCs

RFCs	Title
No new or modified RFCs are supported by this feature, and support for existing standards has not been modified by this feature.	—

## Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 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/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a>

## Command Reference

This section documents new commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2 T command reference publications.

### New Commands

- [auto qos voip](#)
- [show auto qos](#)

# auto qos voip

To configure the AutoQoS — VoIP feature on an interface, use the **auto qos voip** command in interface configuration mode or Frame Relay DLCI configuration mode. To remove the AutoQoS — VoIP feature from an interface, use the **no** form of this command.

**auto qos voip [trust] [fr-atm]**

**no auto qos voip [trust] [fr-atm]**

## Syntax Description

<b>trust</b>	(Optional) Indicates that the differentiated services code point (DSCP) markings of a packet are trusted (relied on) for classification of the voice traffic. If the optional <b>trust</b> keyword is not specified, the voice traffic is classified using Network-Based Application Recognition (NBAR), and the packets are marked with the appropriate DSCP value.
<b>fr-atm</b>	(Optional) Enables the AutoQoS — VoIP feature for the Frame Relay-to-ATM links. This option is available on the Frame Relay data-link connection identifiers (DLCIs) for Frame Relay-to-ATM interworking only.

## Defaults

No default behavior or values

## Command Modes

Interface configuration  
 Frame Relay DLCI configuration (for use with Frame Relay DLCIs)

## Command History

Release	Modification
12.2(15)T	This command was introduced.

## Usage Guidelines

To enable the AutoQoS — VoIP feature for Frame Relay-to-ATM interworking, the **fr-atm** keyword must be configured explicitly. However, the **fr-atm** keyword affects low-speed DLCIs *only*. It does not affect high-speed DLCIs.



### Note

DLCIs with link speeds lower than or equal to 768 kbps are considered low-speed DLCIs; DLCIs with link speeds higher than 768 kbps are considered high-speed DLCIs.

Depending on whether the **trust** keyword has been configured for this command, the AutoQoS — VoIP feature automatically creates one of the two following policy maps:

- “AutoQoS-Policy-Trust” (created if the **trust** keyword is configured)
- “AutoQoS-Policy-UnTrust” (created if the **trust** keyword is *not* configured)

Both of these policy maps, designed to handle the Voice over IP (VoIP) traffic on an interface or a permanent virtual circuit (PVC), can be modified to suit the quality of service (QoS) requirements of the network. To modify these policy maps, use the appropriate Cisco IOS command.

These policy maps should not be attached to an interface or PVC by using the **service-policy** command. If the policy maps are attached in this manner, the AutoQoS — VoIP feature (that is, the policy maps, class maps, and access control lists (ACLs)) will not be removed properly when the **no auto qos voip** command is configured.

For low-speed Frame Relay DLCIs interconnected with ATM PVCs in the same network, the **fr-atm** keyword must be explicitly configured in the **auto qos voip** command to configure the AutoQoS — VoIP feature properly. That is, the command must be configured as **auto qos voip fr-atm**.

For low-speed Frame Relay DLCIs configured with Frame Relay-to-ATM, Multilink PPP (MLP) over Frame Relay (MLPoFR) is configured automatically. The subinterface must have an IP address. When MLPoFR is configured, this IP address is removed and put on the MLP bundle. The AutoQoS — VoIP feature must also be configured on the ATM side by using the **auto qos voip** command.

The **auto qos voip** command is not supported on subinterfaces.

The **auto qos voip** command is available for Frame Relay DLCIs.

### Disabling AutoQoS — VoIP

The **no auto qos voip** command disables the AutoQoS — VoIP feature and removes the configurations associated with the feature.

When the **no auto qos voip** command is used, the **no** forms of the individual commands originally generated by the AutoQoS — VoIP feature are configured. With the use of individual **no** forms of the commands, the system defaults are reinstated. The **no** forms of the commands will be applied just as if the user had entered the commands individually. As the configuration reinstating the default setting is applied, any messages resulting from the processing of the commands are displayed.



#### Note

If you delete a subinterface or PVC (either ATM or Frame Relay PVCs) without configuring the **no auto qos voip** command, the AutoQoS — VoIP feature will not be removed properly.

### Examples

The following example shows the AutoQoS — VoIP feature configured on a serial point-to-point subinterface 4/1.2. In this example, both the **trust** and **fr-dlci** keywords are configured.

```
Router> enable
Router# configure terminal
Router(config)# interface s4/1.2 point-to-point
Router(config-if)# bandwidth 100
Router(config-if)# ip address 10.10.100.1 255.255.255.0
Router(config-if)# frame-relay interface-dlci 102
Router(config-fr-dlci)# auto qos voip trust fr-dlci
Router(config-if# exit
```

### Related Commands

Command	Description
<b>service policy</b>	Attaches a policy map to an input interface or VC, or an output interface or VC, to be used as the service policy for that interface or VC.
<b>show auto qos interface</b>	Displays the configurations created by the AutoQoS — VoIP feature on a specific interface or all interfaces.

# show auto qos

To display the configurations created by the AutoQoS — VoIP feature on a specific interface or all interfaces, use the **show auto qos** command in EXEC mode.

```
show auto qos [interface interface type]
```

Syntax Description	interface	(Optional) Indicates that the configurations for a specific interface type will be displayed.
	<i>interface type</i>	(Optional) Specifies the interface type.

**Defaults** By default, displays the configurations created for all interface types.

**Command Modes** EXEC

Command History	Release	Modification
	12.2(15)T	This command was introduced.

**Usage Guidelines** When the **auto qos voip** command is used to configure the AutoQoS — VoIP feature, configurations are generated for each interface or permanent virtual circuit (PVC). These configurations are then used to create the interface configurations, policy maps, class maps, and access control lists (ACLs). The **show auto qos** command can be used to verify the contents of the interface configurations, policy maps, class maps, and ACLs.

The **show auto qos interface** command can be used with Frame Relay data-link connection identifiers (DLCIs) and ATM PVCs.

**Examples** The following section contains sample output of the **show auto qos** command when the various optional keywords are specified.



**Note**

The **show auto qos** command displays only those configurations created by the AutoQoS - VoIP feature.

**show auto qos interface command Example**

When the **interface** keyword is configured along with the corresponding *interface type* argument, the **show auto qos interface [interface type]** command displays the configurations created by the AutoQoS — VoIP feature on the specified interface.

In the following example, the serial subinterface S6/1.1 has been specified:

```
Router# show auto qos interface s6/1.1

S6/1.1: DLCI 100 -
!
interface Serial6/1
  frame-relay traffic-shaping
!
interface Serial6/1.1 point-to-point
  frame-relay interface-dlci 100
  class AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay ip rtp header-compression
!
map-class frame-relay AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay cir 512000
  frame-relay bc 5120
  frame-relay be 0
  frame-relay mincir 512000
  service-policy output AutoQoS-Policy-UnTrust
  frame-relay fragment 640
```

When the **interface** keyword is configured but an interface type is not specified, the **show auto qos interface** command displays the configurations created by the AutoQoS — VoIP feature on all the interfaces or PVCs on which the AutoQoS — VoIP feature is enabled.

```
Router# show auto qos interface

Serial6/1.1: DLCI 100 -
!
interface Serial6/1
  frame-relay traffic-shaping
!
interface Serial6/1.1 point-to-point
  frame-relay interface-dlci 100
  class AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay ip rtp header-compression
!
map-class frame-relay AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay cir 512000
  frame-relay bc 5120
  frame-relay be 0
  frame-relay mincir 512000
  service-policy output AutoQoS-Policy-UnTrust
  frame-relay fragment 640

ATM2/0.1: PVC 1/100 -
!
interface ATM2/0.1 point-to-point
  pvc 1/100
  tx-ring-limit 3
  encapsulation aal5mux ppp Virtual-Template200
!
interface Virtual-Template200
  bandwidth 512
  ip address 10.10.100.1 255.255.255.0
  service-policy output AutoQoS-Policy-UnTrust
  ppp multilink
  ppp multilink fragment-delay 10
  ppp multilink interleave
```

**show auto qos Command Example**

The **show auto qos** command displays all of the configurations created by the AutoQoS — VoIP feature.

```
Router# show auto qos

Serial6/1.1: DLCI 100 -
!
interface Serial6/1
  frame-relay traffic-shaping
!
interface Serial6/1.1 point-to-point
  frame-relay interface-dlci 100
  class AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay ip rtp header-compression
!
map-class frame-relay AutoQoS-VoIP-FR-Serial6/1-100
  frame-relay cir 512000
  frame-relay bc 5120
  frame-relay be 0
  frame-relay mincir 512000
  service-policy output AutoQoS-Policy-UnTrust
  frame-relay fragment 640
```

Table 1 describes the significant fields shown in the display.

**Table 1** show auto qos Field Descriptions

Field	Description
class AutoQoS-VoIP-FR-Serial6/1-100	Name of class created by the AutoQoS — VoIP feature. In this instance, the name of the class is AutoQoS-VoIP-FR-Serial6/1-100.
class AutoQoS-VoIP-FR-Serial6/1-100	Name of class created by the AutoQoS — VoIP feature. In this instance, the name of the class is AutoQoS-VoIP-FR-Serial6/1-100.
service-policy output AutoQoS-Policy-UnTrust	Indicates that the policy map called “AutoQoS-Policy-UnTrust” has been attached to interface in the outbound direction of the interface.

**Related Commands**

Command	Description
auto qos voip	Configures the AutoQoS — VoIP feature on an interface.