Quality of Service and Bandwidth Management Configuration

This topic provides a reference configuration for Quality of Service (QoS) and bandwidth management using RSVP within a Cisco Unified Communications deployment. The information is based primarily on testing performed during Cisco Unified Communications Release 6.0(1) system testing. This topic does not contain detailed step-by-step procedures; instead, for or detailed information about installing, configuring, and administering these functions, refer to the related Cisco documentation listed in Table 1.

Related Documentation

For related information about QoS and RSVP, see the documents listed in Table 1.

<table>
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<th>Document</th>
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Reference Configuration

The system-wide testing of IP telephony functionality for Cisco Unified Communications Release 6.0(1) included Cisco QoS and RSVP. For general information about the tested functionality in Cisco Unified Communications Release 6.0(1), see the System Release Notes.

Network Topologies

During Cisco Unified Communications Release 6.0(1) testing, this component was installed and tested in the following site models:

- SJC-RFD

For more information on these site models, see Tested Deployments and Site Models.
Configuration Details

This topic includes the following sections:

- Quality of Service (QoS) Configuration
- Bandwidth Management Using RSVP Agents

Quality of Service (QoS) Configuration

This section provides sample configuration files that show how Quality of Service (QoS) settings were configured on selected switches and WAN routers during Cisco Unified Communications Release 6.0(1) testing for IP telephony. For the testing, QoS was configured on the following Cisco devices that passed VoIP traffic to and from SCCP, analog, and T1-PRI endpoints:

- Cisco 1760 modular access router
- Cisco 2651 and Cisco 2691 multiservice routers
- Cisco 3640 multiservice router
- Cisco 3725 and Cisco 3745 multiservice access routers
- Cisco 7206 router
- Cisco Catalyst 4506 switch

QoS was also configured on the following devices to test VoIP traffic to and from SIP, analog, and T1-PRI endpoints:

- Cisco 3745 multiservice access router
- Cisco 3845 router
- Cisco Catalyst 4506 switch
- Cisco 7206 router
- Cisco Catalyst 3550 switch


This document provides design considerations and guidelines for implementing Cisco QoS within an enterprise environment on specific Cisco router and Cisco Catalyst switch types.

Most devices tested during Cisco Unified Communications Release 6.0(1) were configured with Cisco AutoQoS. For additional information about AutoQoS, see the “Quality of Service Commands” chapter in the Cisco IOS Quality of Service Solutions Command Reference at [http://www.cisco.com/en/US/products/ps6441/products_configuration_guide_book09186a008065c7a1.html](http://www.cisco.com/en/US/products/ps6441/products_configuration_guide_book09186a008065c7a1.html).


This section includes portions of the configuration files for the following devices:

- Cisco 3745 Router Configuration
- Cisco Catalyst 4506 Switch Configuration
- Cisco 7206 Router Configuration
Cisco 3745 Router Configuration

This section shows a portion of the serial interface configuration for the Cisco 3745 router that was used in QoS testing. It demonstrates how to configure auto qos voip trust on the LAN-to-WAN edge using Cisco AutoQoS. For additional installation and configuration information, see the Cisco 3745 Multiservice Access Router documentation available at http://www.cisco.com/en/US/products/hw/routers/ps282/tsd_products_support_series_home.html.

```
class-map match-any AutoQoS-VoIP-RTP-Trust
  match ip dscp ef
class-map match-any AutoQoS-VoIP-Control-Trust
  match ip dscp cs3
  match ip dscp af31

policy-map AutoQoS-Policy-Trust
  class AutoQoS-VoIP-RTP-Trust
    priority percent 70
  class AutoQoS-VoIP-Control-Trust
    bandwidth percent 5
  class class-default
    fair-queue

controller T1 0/0
  framing esf
  linecode b8zs
  channel-group 1 timeslots 1-24 speed 64

interface Serial0/0:1
  description WAN connection to SJC-RFD-WAN-1 port 2/0/4
  no ip address
  encapsulation frame-relay
  no fair-queue
  frame-relay traffic-shaping

interface Serial0/0:1.1 point-to-point
  ip address 10.3.180.13 255.255.255.252
  frame-relay interface-dlci 104
  class AutoQoS-FR-Se0/0:1-104
    auto qos voip trust

map-class frame-relay AutoQoS-FR-Se0/0:1-104
  frame-relay cir 1536000
  frame-relay bc 15360
  frame-relay be 0
  frame-relay mncir 1536000
  service-policy output AutoQoS-Policy-Trust
  logging trap debugging
  logging facility local1
  logging 10.3.2.129

rmon event 33333 log trap AutoQoS description "AutoQoS SNMP traps for Voice Drops" owner AutoQoS
```

Cisco Catalyst 4506 Switch Configuration

This section shows a portion of the configuration file for a Cisco Catalyst 4506 switch that was used in QoS testing. It demonstrates how to configure global QoS and the ports which were linked to Cisco Unified IP Phones. For additional installation and configuration information, see the Cisco Catalyst 4500 series documentation available at http://www.cisco.com/en/US/products/hw/switches/ps4324/tsd_products_support_series_home.html.
Cisco 7206 Router Configuration

This section shows a portion of the configuration file for a Cisco 7206 core router that was used in QoS testing. It demonstrates how to configure auto qos voip trust on the WAN-to-LAN edge using Cisco AutoQoS. For additional installation and configuration information, see the Cisco 7200 series router documentation available at http://www.cisco.com/en/US/products/hw/routers/ps341/tsd_products_support_series_home.html.

class-map match-any AutoQoS-VoIP-RTP-Trust
  match ip dscp ef
  class-map match-all going-pc
  match access-group 121
class-map match-any AutoQoS-VoIP-Control-Trust
  match ip dscp cs3
match ip dscp af31
class-map match-all bla
  match ip rtp 16384 16383
!
policy-map AutoQoS-Policy-Trust
class AutoQoS-VoIP-RTP-Trust
  priority percent 70
class AutoQoS-VoIP-Control-Trust
  bandwidth percent 5
class class-default
  fair-queue
!
interface Serial5/4:1
  no ip address
  encapsulation frame-relay
  no fair-queue
  no arp frame-relay
  frame-relay traffic-shaping
  frame-relay lmi-type ansi
  frame-relay intf-type dce
!
interface Serial5/4:1.1 point-to-point
  ip address 10.3.180.14 255.255.255.252
  no arp frame-relay
  frame-relay interface-dlci 104
  class AutoQoS-FR-Se5/4:1-104
  auto qos voip trust
!
interface Serial6/2:1
  no ip address
  encapsulation frame-relay
  no fair-queue
  no arp frame-relay
  frame-relay traffic-shaping
  frame-relay lmi-type ansi
  frame-relay intf-type dce
!
interface Serial6/2:1.1 point-to-point
  ip address 10.3.180.10 255.255.255.252
  no arp frame-relay
  frame-relay interface-dlci 103
  class AutoQoS-FR-Se6/2:1-103
  auto qos voip trust
!
map-class frame-relay AutoQoS-FR-Se5/4:1-104
  frame-relay cir 1536000
  frame-relay bc 15360
  frame-relay be 0
  frame-relay mincir 1536000
  service-policy output AutoQoS-Policy-Trust
!
map-class frame-relay AutoQoS-FR-Se6/2:1-103
  frame-relay cir 1536000
  frame-relay bc 15360
  frame-relay be 0
  frame-relay mincir 1536000
  service-policy output AutoQoS-Policy-Trust
!
rmron event 33333 log trap AutoQoS description "AutoQoS SNMP traps for Voice Drops" owner AutoQoS
Bandwidth Management Using RSVP Agents

The RSVP agent enables Cisco Unified Communications Manager to provide resource reservation for voice and video media to ensure QoS and call admission control (CAC). The RSVP Agent registers with Cisco Unified Communications Manager as either a media termination point or a transcoder device. Each endpoint involved in a call normally requires an RSVP Agent. The agent pair (one agent for endpoint A, another agent for endpoint B) signals RSVP on behalf of the endpoints that Cisco Unified Communications Manager controls.

Note

RSVP does not support intercluster RSVP Agents. That is, RSVP does not support reservations between two RSVP Agents that are located in different Unified Communications Manager clusters.

When a call takes place from a location that has RSVP Agent to another location that does not have RSVP Agent, Cisco Unified Communications Manager will manage the quality of service (QoS) of the call by using both location-based CAC and RSVP. The first part of the call, from the location that has RSVP Agent to the hub/central site that has RSVP, uses the RSVP mechanism. The second part of the call, from the hub/central site to the location that does not have RSVP, gets managed through location-based CAC. If either mechanism fails to allocate bandwidth, the call fails.

RSVP Configuration on Cisco Routers


The following commands are new or modified for this feature:

- codec (DSP Farm profile)
- rsvp
- sccp ccm
- show sccp connections rsvp
- Interface-level configuration

```
interface Serial1/0:0
ip address 10.3.181.205 255.255.255.252
load-interval 30
auto qos voip trust
auto discovery qos
service-policy output AutoQoS-Policy-Trust
ip rsvp bandwidth 960
ip rsvp resource-provider none
```

```
hostname DFW-2-2821
```

```
ip rsvp bandwidth 960
ip rsvp resource-provider none
```

```
dspfarm profile 10 mtp
codec g711ulaw
codec pass-through
rsvp
```
maximum sessions software 11
associate application SCCP

ip rsvp policy preempt

Two complete IOS configurations, one for a Cisco RSVP Agent on a Cisco 2821 router and the second for a Cisco RSVP Agent configured for video deployment, are available as text files in the Resource Library section of the Cisco Unified Communications IP Telephony Technical Information Site for Release 5.1(1) at

Cisco Unified Communications Manager Configuration to Support RSVP

Configuration information is included in the "Configuring RSVP Agent" chapter in the Cisco Unified Communications Manager and Cisco IOS Interoperability Guide at: