



Configuring RSVP Agent

The RSVP Agent feature implements a Resource Reservation Protocol (RSVP) agent on Cisco IOS voice gateways that support Cisco Unified Communications Manager Version 5.0.1. 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). Cisco Unified Communications Manager controls the RSVP agent through Skinny Client Control Protocol (SCCP). This signaling is independent of the signaling protocol used for the call so SCCP, SIP, H.323, and MGCP calls can all use the RSVP agent.

Benefits of this feature include the following:

- Improves flexibility and scalability of bandwidth management in a meshed network by decentralizing call admission control
- Provides method of managing unpredictable bandwidth requirements of video media
- Enables RSVP across WAN for Cisco IP phones and other devices that do not support RSVP

Feature History for RSVP Agent

Release	Modification
12.4(6)T	This feature was introduced.

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.

- [Finding Feature Information, page 2](#)
- [Prerequisites for RSVP Agent, page 2](#)
- [Restrictions for RSVP Agent, page 2](#)
- [Information About RSVP Agent, page 3](#)
- [How to Enable the RSVP Agent on the Voice Gateway, page 4](#)
- [Configuration Examples for RSVP Agent, page 11](#)

- [Additional References, page 13](#)

Finding Feature Information

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

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

Prerequisites for RSVP Agent

Cisco IOS Voice Gateway

- Cisco IOS Release 12.4(4)T or a later release.
- Transcoder and MTP services must be configured on the voice gateway. See "Configuring Enhanced Conferencing and Transcoding for Voice Gateway Routers" on page 67 .
- SCCP must be enabled on the local interface that the voice gateway uses to register with Cisco Unified Communications Manager. See the "Enabling SCCP on the Cisco Unified Communications Manager Interface" section on page 81 .
- The **ip rsvp bandwidth** command must be enabled on all interfaces.
- The **ip rsvp policy preempt** command must be enabled.
- The **sccp ccm** command must use the keyword **version 5.0.1**.

Cisco Unified Communications Manager

- Cisco Unified Communications Manager 5.0.1 or a later release.
- Transcoder and MTP services must be configured in Cisco Unified Communications Manager. See the following chapters in the *Cisco Unified Communications Manager Administration Guide* :
 - "[Media Termination Point Configuration](#)"
 - "[Transcoder Configuration](#)"
- RSVP policy level must be configured in Cisco Unified Communications Manager. See the "Service Parameters Configuration" chapter in the *Cisco Unified Communications Manager Administration Guide* .

Restrictions for RSVP Agent

- RSVP agent is not supported by conference devices.

- RSVP agent is not supported by a hardware MTP or transcoder device using the NM-HDV.
- RSVP agent is supported by a software MTP using the NM-HDV only if the `dsp services dspfarm` command is not enabled for the voice card.
- Lip-sync for video calls is not supported.

Information About RSVP Agent

RSVP Agent

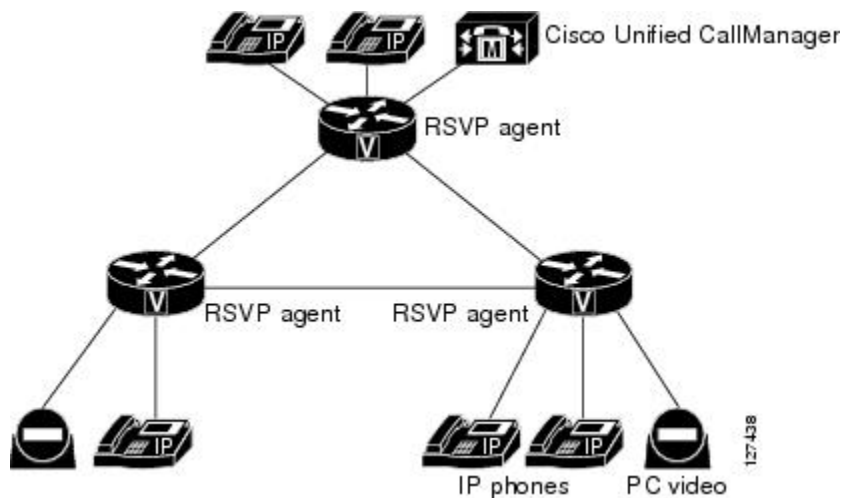
Resource Reservation Protocol (RSVP) is the IP service that allows applications to request end-to-end QoS guarantees from the network. Cisco VoIP applications use RSVP for call admission control, limiting the accepted voice load on the IP network to guarantee the QoS levels of calls. In networks that include both voice and video media, bandwidth requirements can vary considerably over any given time. Cisco Unified Communications Manager ensures resource reservation for voice and video media by using RSVP.

The RSVP agent is a transcoding or MTP device on the Cisco IOS gateway that registers with Cisco Unified Communications Manager as RSVP-capable. The RSVP agent is controlled by Cisco Unified Communications Manager which communicates with the RSVP agent using SCCP.

Cisco Unified Communications Manager consults its policy configuration to determine if RSVP is required for a voice or video call. If the configured QoS level for a call is optional or mandatory, and the RSVP agent is enabled on the voice gateway, Cisco Unified Communications Manager inserts a pair of RSVP agents into the media path to provide RSVP support. The RSVP agent on the Cisco IOS gateway creates the RSVP reservation for the two endpoints and bridges the media connection so that resources are reserved for the media path, providing QoS for the call.

The figure below shows where the RSVP agent fits in a Cisco Unified Communications Manager meshed network.

Figure 1: RSVP Agent in Cisco Unified Communications Manager Meshed Network



To support video calls, MTP and transcoding resources can process multiple streams in a single session, including audio, video and data, one-way or two-way, using a pass-through mode. In pass-through mode, a SCCP device processes streams using a pure software MTP, regardless of the type of stream, so it can be used for any stream type. Video and data streams are processed using pass-through mode. Audio streams can be processed with or without pass-through mode.

How to Enable the RSVP Agent on the Voice Gateway



Note

This document does not contain details about configuring Cisco Unified Communications Manager. See the documentation and online help for Cisco Unified Communications Manager for configuration instructions.

Enabling RSVP in a DSP Farm Profile

Perform this procedure to enable the RSVP agent on an MTP or transcoder device.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **dspfarm profile *profile-identifier* {mtp | transcode}**
4. **codec pass-through**
5. **maximum sessions {hardware | software} *number***
6. **associate application sccp**
7. **rsvp**
8. **no shutdown**
9. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.

	Command or Action	Purpose
Step 3	<p>dspfarm profile <i>profile-identifier</i> {mtp transcode}</p> <p>Example:</p> <pre>Router(config)# dspfarm profile 20 transcode</pre>	<p>Enters DSP farm profile configuration mode to define a profile for DSP farm services.</p> <p>Note The <i>profile-identifier</i> and service type uniquely identifies a profile. If the service type and <i>profile-identifier</i> pair is not unique, you are prompted to choose a different <i>profile-identifier</i> .</p>
Step 4	<p>codec pass-through</p> <p>Example:</p> <pre>Router(config-dspfarm-profile)# codec pass-through</pre>	<p>Enables codec pass-through mode for the DSP farm profile.</p> <ul style="list-style-type: none"> • Codec pass-through must be enabled for the RSVP agent to support Cisco Unified Communications Manager. • Transcoder profiles support multiple codecs. MTP profiles support only one codec in addition to pass-through mode. You must define a separate MTP profile for each additional codec.
Step 5	<p>maximum sessions {hardware software} <i>number</i></p> <p>Example:</p> <pre>Router(config-dspfarm-profile)# maximum sessions 4</pre>	<p>Specifies the maximum number of sessions that are supported by the profile.</p> <ul style="list-style-type: none"> • <i>number</i> --Range is determined by the available registered DSP resources. Default is 0. <p>Note The hardware and software keywords apply only to MTP profiles.</p>
Step 6	<p>associate application sccp</p> <p>Example:</p> <pre>Router(config-dspfarm-profile)# associate application sccp</pre>	<p>Associates the SCCP protocol to the DSP farm profile.</p>
Step 7	<p>rsvp</p> <p>Example:</p> <pre>Router(config-dspfarm-profile)# rsvp</pre>	<p>Enables RSVP support in the DSP farm profile.</p>
Step 8	<p>no shutdown</p> <p>Example:</p> <pre>Router(config-dspfarm-profile)# no shutdown</pre>	<p>Enables the profile, allocates DSP farm resources, and associates the application.</p>
Step 9	<p>end</p> <p>Example:</p> <pre>Router(config-dspfarm-profile)# end</pre>	<p>Exits to privileged EXEC mode.</p>

What to Do Next

Assign the DSP-farm profile to the appropriate Cisco Unified Communications Manager group. See the "Associating a DSP Farm Profile to a Cisco Unified Communications Manager Group" section on page 85 .

Verifying RSVP Agent Configuration

Perform this procedure to verify the RSVP Agent configuration on the voice gateway.

SUMMARY STEPS

1. **show running-config**
2. **show dspfarm profile** *profile-number*
3. **show sccp ccm group** *group-number*

DETAILED STEPS

Step 1 **show running-config**

Use the **show running-config** command to verify that the RSVP agent is enabled on the SCCP device and that the device is assigned to a Cisco Unified Communications Manager group:

Example:

```
Router# show running-config
!
sccp ccm group 1
bind interface FastEthernet0/0
associate ccm 2 priority 3
associate ccm 1 priority 2
associate profile 10 register mtp_A1
associate profile 120 register xcoder_A2
associate profile 110 register mtp_A2
associate profile 20 register xcoder_A1
!
dspfarm profile 20 transcode
codec g711ulaw
codec gsmfr
codec g711alaw
codec g729r8
codec g729ar8
codec g729br8
codec g729abr8
codec pass-through
rsvp
maximum sessions 5
associate application SCCP
!
```

Step 2 **show dspfarm profile** *profile-number*

Use the **show dspfarm profile** command to verify the configuration and status of the resource:

Example:

```
Router# show dspfarm profile 20
Dspfarm Profile Configuration
```

```

Profile ID = 20, Service = TRANSCODING, Resource ID = 1
Profile Description :
Profile Admin State : UP
Profile Operation State : ACTIVE
Application : SCCP Status : ASSOCIATED
Resource Provider : FLEX_DSPRM Status : UP
Number of Resource Configured : 5
Number of Resource Available : 5
Codec Configuration
Codec : gsmfr, Maximum Packetization Period : 20
Codec : g729abr8, Maximum Packetization Period : 60
Codec : g711alaw, Maximum Packetization Period : 30
Codec : g711ulaw, Maximum Packetization Period : 30
Codec : g729r8, Maximum Packetization Period : 60
Codec : g729ar8, Maximum Packetization Period : 60
Codec : g729br8, Maximum Packetization Period : 60
Codec : pass-through, Maximum Packetization Period : 0
RSVP : ENABLED

```

Step 3 **show sccp ccm group** *group-number*

Use the **show sccp ccm group** command to verify the DSP farm profiles that are assigned to the Cisco Unified Communications Manager group and the registration names of the SCCP devices.

Example:

```

Router# show sccp ccm group 1
CCM Group Identifier: 1
Description: None
Bound Interface: NONE, IP Address: NONE
Associated CCM Id: 1, Priority in this CCM Group: 2
Associated CCM Id: 2, Priority in this CCM Group: 3
Associated Profile: 10, Registration Name: mtp_A1
Associated Profile: 20, Registration Name: xcoder_A1
Associated Profile: 110, Registration Name: mtp_A2
Associated Profile: 120, Registration Name: xcoder_A2
Registration Retries: 3, Registration Timeout: 10 sec
Keepalive Retries: 3, Keepalive Timeout: 30 sec
CCM Connect Retries: 3, CCM Connect Interval: 10 sec
Switchover Method: GRACEFUL, Switchback Method: GRACEFUL_GUARD
Switchback Interval: 10 sec, Switchback Timeout: 7200 sec
Signaling DSCP value: default, Audio DSCP value: default

```

Troubleshooting the RSVP Agent

You can troubleshoot the performance of the RSVP agent by performing any of the following steps.

SUMMARY STEPS

1. **show sccp**
2. **show sccp connections**
3. **show sccp connections details**
4. **show sccp connections rsvp**
5. **show ip rsvp installed**
6. **show sccp statistics**
7. **debug sccp all**
8. **debug call rsvp-sync {events | func-trace}**
9. **debug voip ccapi inout**

DETAILED STEPS

Step 1 **show sccp**

Before the start of a call, use the **show sccp** command to verify that the MTP or transcoder device is successfully registered with Cisco Unified Communications Manager:

Example:

```
Router# show sccp
SCCP Admin State: UP
Gateway IP Address: 192.168.20.1, Port Number: 0
IP Precedence: 5
User Masked Codec list: None
Call Manager: 192.168.20.11, Port Number: 2000
                Priority: N/A, Version: 5.0.1, Identifier: 3
Call Manager: 192.168.20.12, Port Number: 2000
                Priority: N/A, Version: 5.0.1, Identifier: 1
Call Manager: 192.168.20.13, Port Number: 2000
                Priority: N/A, Version: 5.0.1, Identifier: 2
.....
Software MTP Oper State: ACTIVE - Cause Code: NONE
Active Call Manager: 192.168.20.12, Port Number: 2000
TCP Link Status: CONNECTED, Profile Identifier: 10
Reported Max Streams: 1004, Reported Max OOS Streams: 0
Supported Codec: pass-thru, Maximum Packetization Period: N/A
Supported Codec: g711ulaw, Maximum Packetization Period: 30
Supported Codec: rfc2833 dtmf, Maximum Packetization Period: 30
RSVP : ENABLED
```

Step 2 **show sccp connections**

During the call, use the **show sccp connections** command to display information about the active SCCP connections established for the call, the DSP farm service type (MTP or transcoding), codec (for example, pass-through or g711ulaw), and remote end information:

Example:

```
Router# show sccp connections
sess_id  conn_id  stype mode   codec  ripaddr  rport sport
17537646 19438263 mtp  sendrecv pass_th 192.168.20.5 35548 16576
```



```
17537646 19438260 mtp sendrecv pass_th 192.168.22.1 16832 19164
Total number of active session(s) 1, and Connection(s) 2
```

Step 3 show sccp connections details

Use the **show sccp connections details** command to display details about active SCCP connections, including the internal call leg ID:

Example:

```
Router# show sccp connections details
bridge-info(bid, cid) - Normal bridge information(Bridge id, Calleg id)
mmbridge-info(bid, cid) - Mixed mode bridge information(Bridge id, Calleg id)
sess_id conn_id call-id codec pkt-period type bridge-info(bid, cid)
mmbridge-info(bid, cid)
17537646 - 326 N/A N/A swmtmpmsp All RTPSPI Callegs N/A

17537646 19438263 324 pass_th 20 rtpspi (221,326) N/A

17537646 - 326 N/A N/A swmtmpmsp All RTPSPI Callegs N/A

17537646 19438260 325 pass_th 20 rtpspi (222,326) N/A

Total number of active session(s) 1, connection(s) 2, and callegs 4
```

Step 4 show sccp connections rsvp

Use the **show sccp connections rsvp** command to display information about the active RSVP reservations for the call:

Example:

```
Router# show sccp connections rsvp
sess_id conn_id rsvp_id dir local ip :port remote ip :port
17537646 19438260 -244 SEND 192.168.20.1 :19164 192.168.22.1 :16832
17537646 19438260 -245 RECV 192.168.20.1 :19164 192.168.22.1 :16832
Total active sessions 1, connections 2, rsvp sessions 2
```

Step 5 show ip rsvp installed

Use the **show ip rsvp installed** command to see that the RSVP reservation is successfully made and to display the reserved bandwidth for the call:

Example:

```
Router# show ip rsvp installed
RSVP: Loopback0 has no installed reservations
RSVP: FastEthernet0/0 has no installed reservations
RSVP: Serial0/0
BPS To From Protoc DPort Sport Weight Conversation
80K 192.168.22.1 192.168.20.1 UDP 16832 19164 25 265
RSVP: FastEthernet0/1 has no installed reservations
RSVP: Serial0/1 has no installed reservations
```

Step 6 show sccp statistics

Use the **show sccp statistics** command to display the SCCP messages exchanged between the RSVP agent and Cisco Unified Communications Manager:

Example:

```
Router# show sccp statistics
SCCP Application Service(s) Statistics:
Profile Identifier: 10, Service Type: Software MTP
TCP packets rx 9, tx 6
```

```

Unsupported pkts rx 0, Unrecognized pkts rx 0
Register tx 0, successful 0, rejected 0, failed 0
KeepAlive tx 1, successful 1, failed 0
OpenReceiveChannel rx 2, successful 2, failed 0
CloseReceiveChannel rx 0, successful 0, failed 0
StartMediaTransmission rx 2, successful 2, failed 0
StopMediaTransmission rx 0, successful 0, failed 0
PortReq rx 1
PortRes tx 1, successful 1, failed 0
PortClose rx 0
QosListen rx 1
QosPath rx 1
QosTeardown rx 0, send 0, rcv 0, sendrcv 0
QosResvNotify tx 2, send 2, rcv 0, sendrcv 0
QosErrorNotify tx 0, send 0, rcv 0, sendrcv 0
    err0 0, err1 0, err2 0, err3 0, err4 0, err5 0,
    err6 0, err7 0, err8 0, err9 0, err10 0, err11 0,
QosModify rx 1, send 0, rcv 1, sendrcv 0
UpdateDscp rx 0
Reset rx 0, successful 0, failed 0
MediaStreamingFailure rx 0
Switchover 0, Switchback 0

```

Step 7 debug sccp all

Use the **debug sccp all** command to display the sequence of the SCCP messages. The message sequence may be different if the RSVP policy defined in Cisco Unified Communications Manager is not set to mandatory.

Example:

```

Router# show sccp statistics
Router# show log | incl (rcvd | txed)
Feb  4 20:28:41.791: sccp_parse_control_msg: rcvd KeepAliveAckMessage msg
Feb  4 20:28:41.803: sccp_parse_control_msg: rcvd KeepAliveAckMessage msg
Feb  4 20:28:41.815: sccp_parse_control_msg: rcvd KeepAliveAckMessage msg
Feb  4 20:28:55.647: sccp_parse_control_msg: rcvd PortReq msg
:
Feb  4 20:28:55.647: sccp_send_port_res: PortRes
msg txed in hex(including header) - len 36
Feb  4 20:28:55.651: sccp_parse_control_msg: rcvd QosPath
msg:
Feb  4 20:28:55.651: sccp_parse_control_msg: rcvd QosListen
msg:
Feb  4 20:28:55.675: sccp_send_qos_resv_notify: QosResvNotify
txed in hex(including header) - len 36
Feb  4 20:28:57.706: OpenReceviceChannel
msg rcvd in hex -
Feb  4 20:28:57.710: sccp_open_receive_chnl_ack: OpenRecvChnlAck
msg txed in hex(including header) - len 32
Feb  4 20:28:57.714: OpenReceviceChannel
msg rcvd in hex -
Feb  4 20:28:57.718: StartMediaTrans
msg rcvd in hex -
Feb  4 20:28:57.726: sccp_open_receive_chnl_ack: OpenRecvChnlAck
msg txed in hex(including header) - len 32
Feb  4 20:28:57.866: StartMediaTrans
msg rcvd in hex -
Feb  4 20:28:57.870: sccp_parse_control_msg: rcvd QosModify
msg:
Feb  4 20:28:57.878: sccp_send_qos_resv_notify: QosResvNotify
txed in hex(including header) - len 36

```

Step 8 debug call rsvp-sync {events | func-trace}

Use the **debug call rsvp-sync event** and **debug call rsvp-sync func-trace** with the **debug sccp all** command to show how SCCP messages and RSVP events trigger each other.

Step 9 debug voip ccapi inout

Use the **debug voip ccapi inout** command to trace the execution path through the call control application programming interface (API).

Configuration Examples for RSVP Agent

RSVP Agent Example

```
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router
!
boot-start-marker
boot-end-marker
!
logging buffered 5000000 debugging
no logging console
enable password lab
!
no network-clock-participate slot 2
no network-clock-participate aim 0
no network-clock-participate aim 1
no aaa new-model
ip subnet-zero
ip cef
!
!
no ip domain lookup
no ftp-server write-enable
voice-card 2
 dspfarm
 dsp services dspfarm
!
!
!
interface Loopback0
 ip address 192.168.26.1 255.255.255.255
 max-reserved-bandwidth 100
 ip rsvp bandwidth
!
interface FastEthernet0/0
 ip address 192.168.20.1 255.255.255.0
 max-reserved-bandwidth 100
 duplex auto
 speed auto
 fair-queue 64 256 1000
 ip rsvp bandwidth
!
interface Serial0/0
 ip address 192.168.25.2 255.255.255.252
 max-reserved-bandwidth 100
 fair-queue 64 256 37
 ip rsvp bandwidth
!
interface FastEthernet0/1
 ip address 192.168.24.1 255.255.255.0
 max-reserved-bandwidth 100
 shutdown
```

```

duplex auto
speed auto
fair-queue 64 256 1000
ip rsvp bandwidth
!
interface Serial0/1
ip address 192.168.25.69 255.255.255.252
max-reserved-bandwidth 100
shutdown
fair-queue 64 256 37
ip rsvp bandwidth
!
router ospf 10
log-adjacency-changes
network 192.168.0.0 0.0.255.255 area 0
!
ip classless
ip http server
ip rsvp policy preempt
!
!
!
control-plane
!
!
!
voice-port 2/0/0
!
voice-port 2/0/1
!
!
sccp local FastEthernet0/0
sccp ccm 192.168.20.11 identifier 3 version 4.0
sccp ccm 192.168.20.13 identifier 2 version 5.1
sccp ccm 192.168.20.12 identifier 1 version 5.1
sccp
!
sccp ccm group 1
bind interface FastEthernet0/0
associate ccm 2 priority 3
associate ccm 1 priority 2
associate profile 10 register mtp_A1
associate profile 120 register xcoder_A2
associate profile 110 register mtp_A2
associate profile 20 register xcoder_A1
!
dspfarm profile 20 transcode
codec g711ulaw
codec gsmfr
codec pass-through
codec g711alaw
codec g729r8
codec g729ar8
codec g729br8
codec g729abr8
rsvp
maximum sessions 5
associate application SCCP
!
dspfarm profile 120 transcode
codec g729abr8
codec gsmfr
codec g711alaw
codec g711ulaw
codec g729r8
codec g729ar8
codec g729br8
codec pass-through
rsvp
maximum sessions 5
associate application SCCP
!
dspfarm profile 30 conference

```

```

codec g711ulaw
codec g711alaw
codec g729ar8
codec g729abr8
codec g729r8
codec g729br8
!
dspfarm profile 10 mtp
  codec g711ulaw
  codec pass-through
  rsvp
  maximum sessions hardware 2
  maximum sessions software 10
  associate application SCCP
!
dspfarm profile 110 mtp
  codec pass-through
  codec g711ulaw
  rsvp
  maximum sessions hardware 2
  maximum sessions software 10
  associate application SCCP
!
!
!
line con 0
  exec-timeout 0 0
line aux 0
line vty 0 4
  exec-timeout 0 0
  no login
!
ntp clock-period 17175018
ntp server 192.168.20.12
end

```

Additional References

- [Cisco Unified Communications Manager Administration Guide](#) , Release 5.0(1)
- [Cisco Unified Communications Manager System Guide](#) , Release 5.0(1)
- [Cisco Unified Communications Manager Features and Services Guide](#) , Release 5.0(1)

CCDE, CCENT, CCSI, Cisco Eos, Cisco Explorer, Cisco HealthPresence, Cisco IronPort, the Cisco logo, Cisco Nurse Connect, Cisco Pulse, Cisco SensorBase, Cisco StackPower, Cisco StadiumVision, Cisco TelePresence, Cisco TrustSec, Cisco Unified Computing System, Cisco WebEx, DCE, Flip Channels, Flip for Good, Flip Mino, Flipshare (Design), Flip Ultra, Flip Video, Flip Video (Design), Instant Broadband, and Welcome to the Human Network are trademarks; Changing the Way We Work, Live, Play, and Learn, Cisco Capital, Cisco Capital (Design), Cisco:Financed (Stylized), Cisco Store, Flip Gift Card, and One Million Acts of Green are service marks; and Access Registrar, Aironet, AllTouch, AsyncOS, Bringing the Meeting To You, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, CCSP, CCVP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Lumin, Cisco Nexus, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Collaboration Without Limitation, Continuum, EtherFast, EtherSwitch, Event Center, Explorer, Follow Me Browsing, GainMaker, iLYNX, IOS, iPhone, IronPort, the IronPort logo, Laser Link, LightStream, Linksys, MeetingPlace, MeetingPlace Chime Sound, MGX, Networkers, Networking Academy, PCNow, PIX, PowerKEY, PowerPanels, PowerTV, PowerTV (Design), PowerVu, Prisma, ProConnect, ROSA, SenderBase, SMARTnet, Spectrum Expert, StackWise, WebEx, and the WebEx logo are registered trademarks of Cisco and/or its affiliates in the United States and certain other countries.

