



# Multimedia Conference Manager with Voice Gateway Image with RSVP to ATM SVC Mapping

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**November 2, 2000**  
**Cisco IOS Software Release 12.1(3)XI**

This feature module describes the Multimedia Conference Manager with Voice Gateway Image with RSVP to ATM SVC Mapping feature. It includes information on the following topics:

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## Feature Overview

This feature is designed to deliver the Cisco H.323 gatekeeper, proxy, and voice gateway solutions with routing as a single Cisco IOS image. In addition, the ability to map H.323 Resource Reservation Protocol (RSVP) reservations to ATM non-real-time variable bit rate (VBR) switched virtual circuits (SVCs) has also been incorporated for guaranteeing quality of service (QoS) over ATM backbones for video applications.

## MCM, Gatekeeper, Proxy, and Gateway

The H.323 Multimedia Conference Manager (MCM) provides the network administrator with the ability to identify H.323 traffic and apply appropriate policies. H.323 MCM is implemented on Cisco IOS software. MCM provides a network manager with the ability to limit the H.323 traffic on the LAN and WAN; provides user accounting for records based on the service utilization; injects QoS for the H.323 traffic generated by applications such as VoIP, data conferencing and video conferencing; and provides the mechanism to implement security for H.323 communications. In addition to this functionality, this new and separate image also incorporates Cisco voice gateway and routing functionalities in the same image.

For more detailed information about the MCM, see *Multimedia Conference Manager*.

## ATM VBR SVC Support for Video

ATM non-real-time variable bit rate (VBR) switched virtual circuit (SVC) service operates much like X.25 SVC service, although ATM allows much higher throughput. Virtual circuits are created and released dynamically, providing user bandwidth on demand. This service requires a signaling protocol between the router and the switch. Each ATM node is required to establish a separate connection to every other node in the ATM network with which it needs to communicate. All such connections are established using a permanent virtual circuit (PVC) or an SVC with an ATM signaling mechanism.

With this feature, customers that use ATM backbones can guarantee that video sessions traverse that backbone with QoS features enabled. The Cisco IOS image takes H.323 RSVP reservations and maps them to ATM VBR SVCs that are dynamically established and torn down when video sessions are established and terminated. End-to-end IP routing across the network backbone is no longer required to guarantee video QoS.

## Benefits

### One-Box Solution

By incorporating the gateway into the MCM image, customers can reduce their overall cost of ownership. What was historically a two-box solution is now reduced to one box. Not only is this a cost savings to the customer, but also one less box to manage.

### Bandwidth and Resource Management

Users can stipulate bandwidth limits for each video conferencing connection as well as an aggregate bandwidth limit for all video conferencing sessions. This is not an attempt to provide line conditioning, rather the ability to provide notification to endpoints of bandwidth limitations.

### NetMeeting Capabilities

The Proxy can now forward T.120 connections, thus enhancing real-time data conferencing capabilities.

### Load-Balancing

The gatekeeper has been enhanced to perform load-balancing functionality for external H.323 v2 gateways.

### Call Accounting

The MCM supports Call Accounting functionality for proxied calls. Proxied calls are recorded into call history to provide additional call detail information.

### Call Manager Environments

Use of an H.323 gatekeeper is recommended for use with multiple Call Manager or Call Manager cluster domains. This provides critical Connection Admission Control (CAC) between domains to guarantee that the number of calls between locations does not exceed available bandwidth. Thus, integration of necessary gatekeeper functionality within a Cisco IOS gateway device saves costs and increases reliability of IP telephony systems.

## Restrictions

- Permanent virtual pathways (PVPs) are supported only on OC-3 cards and DS3/E3 cards. Neither the T1-IMA cards nor the T1 interface on the Cisco MC3810 supports PVPs.
- T.120 proxy has been tested and proven to work with Microsoft NetMeeting 3.01. Based on testing, T.120 proxying does not currently work with VCon endpoints. T.120 proxy works only with endpoints that can connect to ports other than the default port of 1503. Microsoft NetMeeting 3.01 can do this, but VCon cannot.
- Some older H.323 endpoint implementations, especially those used in video conferencing, may not be able to connect to an H.225 call setup port number other than 1720. If you have to use those endpoints with the MCM proxy feature, consider using an image without the Cisco H.323 VoIP gateway (an -ix- image.)
- ATM-25 cards have not been tested for interoperability with this feature.

## Related Features and Technologies

### Multimedia Conference Manager

Deploying H.323 applications and services requires careful design and planning both on the network infrastructure and the H.323 devices. The Multimedia Conference Manager provides both gatekeeper and proxy capabilities, which are required for service provisioning and management of H.323 networks. The Multimedia Conference Manager feature provides H.323 application options previously unavailable. Using Multimedia Conference Manager, you can implement H.323-compliant applications on existing networks in an incremental fashion without upgrades.

## Related Documents

- *Configuring H.323 VoIP Gatekeeper for Cisco Access Platforms*
- *Multimedia Conference Manager*
- *New VC Configuration*
- *RSVP-ATM QoS Interworking*
- *Video over ATM Switched Virtual Circuits on the Cisco MC3810*

## Supported Platforms

- Cisco 2600 series
- Cisco 3600 series
- Cisco 3810
- Cisco 7200 series

# Supported Standards, MIBs, and RFCs

## Standards

New or modified standards supported by this feature:

- T.120 is now supported.

## MIBs

New or modified MIBs supported by this feature:

- CISCO-GATEKEEPER-MIB
- CISCO-PROXY-CONTROL-MIB

To obtain lists of MIBs supported by platform and Cisco IOS release and to download MIB modules, go to the Cisco MIB web site on Cisco Connection Online (CCO) at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

## RFCs

No new or modified RFCs are supported by this feature.

## Prerequisites

For this feature to function properly, you must have 16 megabytes of Flash memory and 64 megabytes of DRAM memory. For the Cisco 3660 and Cisco 7200 series, 96 megabytes of DRAM is required.

## Configuration Tasks

See the following sections for configuration tasks for the Multimedia Conference Manager (MCM) with Voice Gateway Image with RSVP to ATM SVC Mapping feature. Each task in the list indicates if the task is optional or required.

- Configuring the Proxy and T.120
- Configuring the Gatekeeper
- Configuring the ATM SVC

## Configuring the Proxy and T.120

To configure the MCM for voice, video, and data traffic, refer to the document *Multimedia Conference Manager*.

To configure the MCM for this feature, follow these steps:

	Command	Purpose/Comment
Step 1	Router(config)# <b>proxy h323</b>	Enables the proxy's activity. If the current running state has the negative specified, the proxy is dormant.
Step 2	Router(config)# <b>ip routing</b>	Makes sure that Fast Switching is enabled, which is required for the T.120 feature.
Step 3	Router(config)# <b>interface e0</b>	Enters interface configuration mode.
Step 4	Router(config-if)# <b>ip route-cache same-interface</b>	Tells the proxy that when sending the packets out, it should use the same interface that the packets came in on. The packets are sent within the interrupt service context. Otherwise, the packets are queued for processing by the Cisco IOS, which is slower and may lead to packet loss.
Step 5	Router(config-if)# <b>h323 interface</b>	Enables proxy on this interface. With this feature, a port can be assigned. To use the default port, enter <b>no h323 interface</b> and then <b>h323 interface</b> .
Step 6	Router(config-if)# <b>h323 h323-id proxy</b>	Names proxy in registration with the gatekeeper. If the proxy has registered successfully on a Cisco MCM gatekeeper, you can see the name of the proxy if you enter <b>show gatekeeper endpoints</b> .
Step 7	Router(config-if)# <b>h323 gatekeeper id DVM1 ipaddr 172.28.129.50</b>	Specifies the gatekeeper interface for registration. You can specify a gatekeeper name (with <b>id</b> ), IP address (with <b>ipaddr</b> ), and port. You can also tell the proxy to use a well-known multicast address to discover a gatekeeper.
Step 8	Router(config-if)# <b>h323 t120 proxy</b>	Enables T.120 proxy capabilities on the router. To disable the T.120 proxy, enter <b>h323 t120 bypass</b> .
Step 9	Router(config-if)# <b>exit</b>	Exits interface configuration mode.

## Configuring the Gatekeeper

To configure the gatekeeper to support zones, use the **zone local** and **zone remote** commands, beginning in gatekeeper configuration mode, as described in the document *Configuring H.323 VoIP Gatekeeper for Cisco Access Platforms*.

	Command	Purpose/Comment
Step 1	Router(config)# <b>gatekeeper</b>	Enters gatekeeper configuration mode.
Step 2	Router(config-gk)# <b>bandwidth session Zone3 500</b>	Specifies the maximum bandwidth allowed for a session in Zone3 to 500 kbps.
Step 3	Router(config-gk)# <b>exit</b>	Exits gatekeeper configuration mode.

## Configuring the ATM SVC

Refer to the document *RSVP-ATM QoS Interworking* for information on how to configure RSVP over an ATM network.

## Verifying Configuration

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- Step 1** Enter the **show gatekeeper status** command to see information about the remote bandwidth.

```
Router# show gatekeeper status

Gatekeeper State:UP
Zone Name:        DVM1
Zone Name:        DVM2
Zone Name:        test1
Accounting:       DISABLED
Security:         DISABLED
Maximum Remote Bandwidth:
→ Current Remote Bandwidth:0 kbps
```

**Step 2** Enter the **show gatekeeper zone status** command. This displays the bandwidth information for all zones.

```
Router# show gatekeeper zone status
                        GATEKEEPER ZONES
                        =====
GK name      Domain Name  RAS Address  PORT  FLAGS
-----
DVM1         dvm1.com      172.28.129.50  1719  LS
BANDWIDTH INFORMATION (kbps) :
  Maximum interzone bandwidth :
  Current interzone bandwidth : 0
  Maximum total bandwidth :
  Current total bandwidth : 0
  Maximum session bandwidth :
SUBNET ATTRIBUTES :
  All Other Subnets :(Enabled)
PROXY USAGE CONFIGURATION :
  Inbound Calls from DVM2 :
    to terminals in local zone DVM1 :use proxy
    to gateways in local zone DVM1 :do not use proxy
  Outbound Calls to DVM2 :
    from terminals in local zone DVM1 :use proxy
    from gateways in local zone DVM1 :use proxy
  Inbound Calls from all other zones :
    to terminals in local zone DVM1 :use proxy
    to gateways in local zone DVM1 :do not use proxy
  Outbound Calls to all other zones :
    from terminals in local zone DVM1 :use proxy
    from gateways in local zone DVM1 :do not use proxy
DVM2         dvm2.com      172.28.129.50  1719  LS
BANDWIDTH INFORMATION (kbps) :
  Maximum interzone bandwidth :
  Current interzone bandwidth : 0
  Maximum total bandwidth :
  Current total bandwidth : 0
  Maximum session bandwidth :
SUBNET ATTRIBUTES :
  All Other Subnets :(Enabled)
PROXY USAGE CONFIGURATION :
  Inbound Calls from all other zones :
    to terminals in local zone DVM2 :use proxy
    to gateways in local zone DVM2 :do not use proxy
  Outbound Calls to all other zones :
    from terminals in local zone DVM2 :use proxy
    from gateways in local zone DVM2 :do not use proxy
test1        cisco.com      172.28.129.50  1719  LS
BANDWIDTH INFORMATION (kbps) : Maximum session bandwidth :
SUBNET ATTRIBUTES :
  All Other Subnets :(Enabled)
PROXY USAGE CONFIGURATION :
  Inbound Calls from all other zones :
    to terminals in local zone test1 :use proxy
    to gateways in local zone test1 :do not use proxy
  Outbound Calls to all other zones :
    from terminals in local zone test1 :use proxy
    from gateways in local zone test1 :do not use proxy
TEST2        test2.com      172.28.129.54  1719  RS
  Maximum interzone bandwidth :
  Current interzone bandwidth : 0
```

- Step 3** Enter the **show proxy h323 status** command. This displays information about the proxy such as the T.120 mode and what port is being used.

```
Router# show proxy h323 status

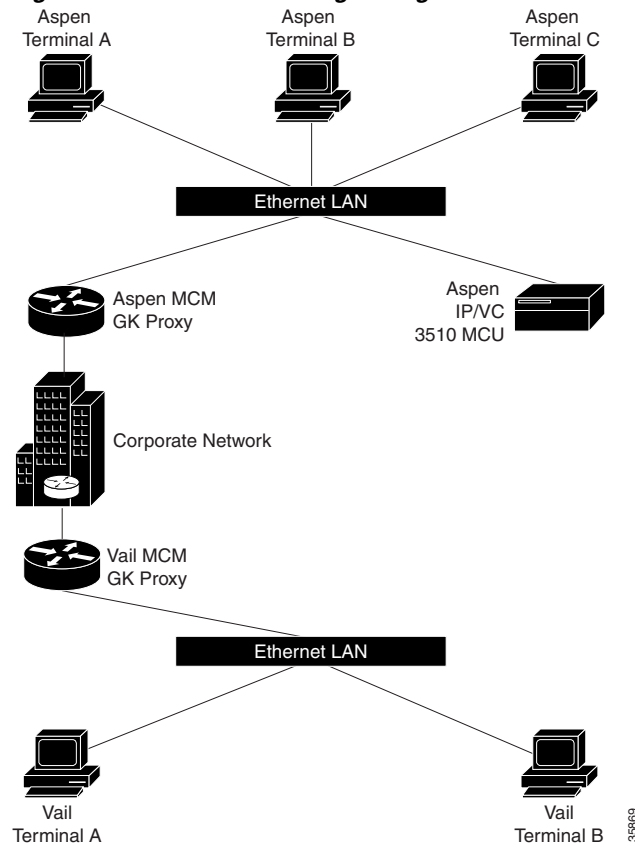
      H.323 Proxy Status
      =====
H.323 Proxy Feature:Enabled
Proxy interface = Ethernet0:UP
Proxy IP address = 172.28.129.50
Proxy IP port = 11720
Application Specific Routing:Disabled
RAS Initialization:Complete
Proxy aliases configured:
  H323_ID:PROXY
Proxy aliases assigned by Gatekeeper:
  H323_ID:PROXY
Gatekeeper multicast discovery:Disabled
Gatekeeper:
  Gatekeeper ID:DVM1
  IP address:172.28.129.50
Gatekeeper registration succeeded
T.120 Mode:PROXY
RTP Statistics:OFF
Number of calls in progress:0
```

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## Configuration Examples

### Cisco IP/VC 3510 MCU with Cisco IOS MCM/Proxy

The following example is of an interzone calling configuration with two zones defined as Aspen and Vail.

**Figure 1 Interzone Calling Configuration with Two Zones**

The terminals are H.323 terminals.

The definitions for the above are as follows:

- Aspen Terminal A has an E.164 address of 31.
- Aspen Terminal B has an E.164 address of 32.
- Aspen Terminal C has an E.164 address of 33.
- Aspen IP/VC 3510 MCU has an IP address of 10.0.0.2.
- Aspen IP/VC 3510 MCU has three conference prefixes defined 60, 61 and 62.
- Aspen MCM GK Proxy has an IP Address of 10.0.0.1.
- Domain is cisco.com.
- Vail Terminal A has an E.164 address of 21.
- Vail Terminal B has an E.164 address of 22.
- Vail MCM GK proxy has an IP Address of 12.0.0.1.
- Aspen has a zone prefix of 11.
- Vail has a zone prefix of 12.

Every device with Aspen in its name is registered with the Aspen gatekeeper, and every device with Vail in its name is registered with the Vail gatekeeper.

The following is the configuration for Aspen MCM GK Proxy:

```

Hostname          Aspen_MCM_GK_Proxy
Proxy h323
interface Ethernet0/0
ip address 10.0.0.1 255.0.0.0
h323 interface
h323 qos ip-precedence 6
h323 h323-id aspen-proxy
h323 gatekeeper id aspen ipaddr 10.0.0.1
gatekeeper
zone local aspen cisco.com 10.0.0.1
zone remote vail cisco.com 12.0.0.1
zone prefix aspen 11
zone prefix vail 12
use-proxy aspen default outbound-from gateway
no shutdown

```

The following is the configuration for Vail MCM GK Proxy:

```

Hostname          Vail_MCM_GK_Proxy
Proxy h323
interface Ethernet0/0
ip address 10.0.0.1 255.0.0.0
h323 interface
h323 qos ip-precedence 6
h323 h323-id vail-proxy
h323 gatekeeper id vail ipaddr 12.0.0.1
gatekeeper
zone local vail cisco.com 12.0.0.1
zone remote aspen cisco.com 10.0.0.1
zone prefix aspen 11
zone prefix vail 12
gw-type-prefix 60 hopoff aspen
gw-type-prefix 61 hopoff aspen
gw-type-prefix 62 hopoff aspen
use-proxy aspen default outbound-from gateway
no shutdown

```

In this example, any terminal registered with the Aspen or Vail gatekeeper may participate in a multiparty call with any participant in either zone. For example, Aspen Terminal A could have a conference with Aspen Terminal C and Vail Terminal A by dialing 61555\*\*33\*\*1221. The conference prefix is 61, the conference password is 555, the invite is \*\*, the E.164 address of Aspen Terminal C is 33, the zone prefix to reach the Vail zone is 12, and the E.164 address of Vail Terminal A is 21.

Alternatively, each terminal could independently dial 61555 to join the conference.

## Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.1 command reference publications.

- **bandwidth**
- **bandwidth remote**
- **h323 interface**
- **h323 t120**

# bandwidth

To specify the maximum aggregate bandwidth for H.323 traffic, use the **bandwidth** gatekeeper configuration command. To disable, use the **no** form of this command.

```
bandwidth { interzone | total | session } { default | zone zone-name } bandwidth-size
```

```
no bandwidth { interzone | total | session } { default | zone zone-name } bandwidth-size
```

Syntax Description		
<b>interzone</b>		Specifies the total amount of bandwidth for H.323 traffic from the zone to any other zone.
<b>total</b>		Specifies the total amount of bandwidth for H.323 traffic allowed in the zone.
<b>session</b>		Specifies the maximum bandwidth allowed for a session in the zone.
<b>default</b>		Specifies the default value for all zones.
<b>zone</b>		Specifies a particular zone.
<i>zone-name</i>		Names the particular zone.
<i>bandwidth-size</i>		Maximum bandwidth. For <b>interzone</b> and <b>total</b> , the range is 1 to 10,000,000 kbps. For <b>session</b> , the range is 1 to 5,000 kbps.

Defaults	
	None

Command Modes	
	Gatekeeper configuration

Command History	Release	Modification
	12.1(5)T	This command was introduced.

Usage Guidelines	
	The functionality of this command in previous Cisco IOS software releases was obtained by using the <b>zone</b> gatekeeper command.

Examples	
	The following example configures the default maximum bandwidth for all zones to 5,000 kbps:

```
Router(config)# gatekeeper
Router(config-gk)# bandwidth total default 5000
```

Related Commands	Command	Description
	<b>bandwidth remote</b>	Specifies the total bandwidth for H.323 traffic between this gatekeeper and any other gatekeeper.

<b>Command</b>	<b>Description</b>
<b>h323 interface</b>	Defines which port the proxy will listen on.
<b>h323 t120</b>	Enables the T.120 capabilities on your router and specifies bypass or proxy mode.

# bandwidth remote

To specify the total bandwidth for H.323 traffic between this gatekeeper and any other gatekeeper, use the **bandwidth remote** gatekeeper configuration command. To disable, use the **no** form of this command.

**bandwidth remote** *bandwidth-size*

**no bandwidth remote** *bandwidth-size*

<b>Syntax Description</b>	<i>bandwidth-size</i>	Maximum bandwidth. Range is 1 to 10,000,000 kbps.
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<b>Defaults</b>	None
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<b>Command Modes</b>	Gatekeeper configuration
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(5)T	This command was introduced.

<b>Usage Guidelines</b>	The functionality of this command in previous Cisco IOS software releases was obtained by using the <b>zone</b> gatekeeper command.
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<b>Examples</b>	The following example configures the remote maximum bandwidth to 100,000 kbps:
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```
Router(config)# gatekeeper
Router(config-gk)# bandwidth remote 100000
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<b>bandwidth</b>	Specifies the maximum aggregate bandwidth for H.323 traffic from a zone to another zone, within a zone, or for a session in a zone.
	<b>h323 interface</b>	Defines which port the proxy will listen on.
	<b>h323 t120</b>	Enables the T.120 capabilities on your router and specifies bypass or proxy mode.

## h323 interface

To select an interface whose IP address will be used by the proxy to register with the gatekeeper, use the **h323 interface** interface configuration command. To use the default port, use **no h323 interface** and then **h323 interface**.

**h323 interface** [ *port number* ]

**no h323 interface** [ *port number* ]

---

### Syntax Description

<i>port number</i>	(Optional) The port number the proxy will listen on for incoming call setup requests. Range is 1 to 65,356.  The default port number for the proxy is 11,720 in -isx- or -jsx- Cisco IOS images.  The default port number for the proxy is 1720 in -ix- Cisco IOS images, which do not contain the VoIP gateway.
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### Defaults

Default port number is image dependent; see the Syntax Description table above.

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### Command Modes

Interface configuration

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### Command History

Release	Modification
12.0(5)	This command was introduced.
12.1(5)T	The ability to specify the proxy port number was added.

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### Usage Guidelines

At proxy startup, the code checks for the presence of the VoIP gateway subsystem. If the subsystem is found to be present, the proxy code opens and listens for call setup requests on the new port. The proxy then registers this port with the gatekeeper.

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### Examples

The following example show how to configure Ethernet interface 0 (e0) for incoming call setup requests:

```
Router(config)# interface e0
Router(config-if)# h323 interface
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>bandwidth</b>	Specifies the maximum aggregate bandwidth for H.323 traffic from a zone to another zone, within a zone, or for a session in a zone.
<b>bandwidth remote</b>	Specifies the total bandwidth for H.323 traffic between this gatekeeper and any other gatekeeper.
<b>h323 t120</b>	Enables the T.120 capabilities on your router and specifies bypass or proxy mode.

# h323 t120

To enable the T.120 capabilities on your router and to specify bypass or proxy mode, use the **h323 t120** interface configuration command.

```
h323 t120 { bypass | proxy }
```

## Syntax Description

<b>bypass</b>	Bypass mode. In this mode, the H.245 Open Logical Channel messages for T.120 data channels are passed unmodified through the proxy, and TCP connections for T.120 are established directly between the two endpoints of the H.323 call.
<b>proxy</b>	Proxy mode. In this mode, T.120 features function properly.

## Defaults

Bypass mode

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(5)T	This command was introduced.

## Usage Guidelines

The **no** form of this command has no function—the only possible commands are **h323 t120 bypass** and **h323 t120 proxy**.

## Examples

The following example shows how to enable the T.120 capabilities:

```
Router(config)# proxy h323
Router(config)# interface e0
Router(config-if)# h323 t120 proxy
```

## Related Commands

Command	Description
<b>bandwidth</b>	Specifies the maximum aggregate bandwidth for H.323 traffic from a zone to another zone, within a zone, or for a session in a zone.
<b>bandwidth remote</b>	Specifies the total bandwidth for H.323 traffic between this gatekeeper and any other gatekeeper.
<b>h323 interface</b>	Defines which port the proxy will listen on.

# Glossary

**AAA**—Authorization, authentication, and accounting.

**ABR**—Available bit rate.

**ASR**—Application Specification Routing.

**ATM**—Asynchronous Transfer Mode. The ATM module command-line interface (CLI) uses a subset of the Cisco IOS software commands. Generally, the Cisco IOS software works the same on the ATM module as it does on routers.

**BGP**—Border Gateway Protocol.

**Cisco IOS**—The Cisco Internetwork Operating System.

**CLI**—Command-line interface.

**gatekeeper**—A gatekeeper maintains a registry of devices in the multimedia network. The devices register with the gatekeeper when they start up, and request admission to a call from the gatekeeper.

**gateway**—Gateways allow H.323 terminals to communicate with non-H.323 terminals by converting protocols.

**H.225.0**—An ITU standard that governs H.323 session establishment and packetization. H.225.0 actually describes several different protocols: Registration, Admission, and Status protocol (RAS); use of Q.931; and use of Real-Time Transport Protocol (RTP).

**H.245**—An ITU standard that governs H.323 endpoint control.

**H.323**—An International Telecommunication Union (ITU) standard that describes packet-based video, audio, and data conferencing. H.323 is an umbrella standard that describes the architecture of the conferencing system, and refers to a set of other standards (H.245, H.225.0, and Q.931) to describe its actual protocol.

**H.323 terminal**—Endpoints in the multimedia network that provide real-time, two-way communications with another H.323 terminal. H.323 terminals are typically computer-based video conferencing systems.

**MCM**—Multimedia Conference Manager. Provides both gatekeeper and proxy capabilities, which are required for service provisioning and management of H.323 networks.

**MCU**—Multipoint control unit. An endpoint on the LAN that provides the capability for three or more terminals and gateways to participate in a multipoint conference.

**NAT**—Network Address Translation.

**NMS**—Network management system.

**node**—An H.323 entity that uses Registration, Admission, and Status protocol (RAS) to communicate with the gatekeeper; for example, an endpoint such as a terminal, proxy, or gateway.

**PAT**—Port Address Translation.

**proxy**—Special gateways that relay one H.323 session to another.

**PVC**—Permanent virtual circuit.

**Q.931**—An ITU standard that describes ISDN signaling. The H.225.0 standard uses a variant of Q.931 to establish and disconnect H.323 sessions.

**QoS**—Quality of service. Prioritizes network traffic with IEEE 802.1P class of service (CoS) values that allow network devices to recognize and deliver high-priority traffic in a predictable manner. When congestion occurs, QoS drops low-priority traffic to allow delivery of high-priority traffic.

**RAI**—Resource Availability Indication.

**RAS**—Registration, Admission, and Status protocol. This is the protocol used between endpoints and the gatekeeper.

**RTP**—Real-Time Transport Protocol. An IETF standard protocol. The H.225.0 standard describes how to use RTP to handle the packetization of video and audio in H.323.

**SNMP**—Simple Network Management Protocol.

**SVC**—Switched virtual circuits.

**T.120**—An ITU standard that describes data conferencing. H.323 provides for the ability to establish T.120 data sessions inside an existing H.323 session.

**VBR**—Variable bit rate.

**VoFR**—Voice over Frame Relay.

**VoIP**—Voice over IP. Voice over IP enables a router to carry voice traffic (for example, telephone calls and faxes) over an IP network.