



Overview of Cisco Unified Border Element with Gatekeeper

**Revised: Month Day, Year,
First Published: June 19, 2006
Last Updated: July 11, 2008**

This guide describes the Cisco Unified Border Element with Gatekeeper(Cisco UBE with Gatekeeper) and related features.



Activation

Before you can configure the software features described in this guide, you will need a Product Authorization Key (PAK). Before you start the configuration process, please register your products and activate your PAK at the following URL <http://www.cisco.com/go/license>.

An Cisco Unified Border Element, in this guide called an Cisco UBE but sometimes elsewhere called an IP-to-IP Gateway, border element or session border controller, facilitates connectivity between independent VoIP networks by enabling H.323 VoIP and videoconferencing calls from one IP network to another. This gateway performs most of the same functions of a PSTN-to-IP gateway, but typically joins two IP call legs, rather than a PSTN and an IP call leg. Media packets can flow either through the gateway (thus hiding the networks from each other) or around the gateway, if so configured.

Cisco Unified Border Element with Gatekeeper is a special Cisco IOS software image that runs on Cisco multiservice gateway platforms. It provides a network-to-network interface point for billing, security, call admission control, quality of service, and signaling interworking.

Cisco Unified Border Element with Gatekeeper is designed to meet the interconnection needs of Internet telephony service providers (ITSPs) and of enterprises. One set of images provides basic interconnection and a second set provides interconnection through an Open Settlement Protocol (OSP) provider, enabling ITSPs to gain the benefits of the Cisco Unified Border Element with Gatekeeper while making use of the routing, billing, and settlement capabilities offered by OSP-based clearinghouses.

For the most effective and scalable results, use the Cisco Unified Border Element concurrently with a Cisco gatekeeper.

Feature history for the umbrella Cisco Unified Border Element with Gatekeeper suite of features is shown below. Individual feature histories are provided at the end of each chapter.



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Your software release may not support all the features documented in this module. For the latest feature information and caveats, see 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 “Cisco Unified Border Element with Gatekeeper Features Roadmap” section on page 3.

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

**Note**

For more information about Cisco IOS voice features, see the entire Cisco IOS Voice Configuration Library—including feature documents, and troubleshooting information—at http://www.cisco.com/en/US/docs/ios/12_3/vvf_c/cisco_ios_voice_configuration_library_glossary/vcl.htm

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Prerequisites for Cisco Unified Border Element with Gatekeeper Configuration

Cisco Unified Border Element with Gatekeeper Hardware

- Install the routers that will serve as session border controllers in your VoIP network.

Cisco Unified Border Element with Gatekeeper Software

- Cisco Product Authorization Key (PAK)

**Activation**

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- Obtain the appropriate feature license for each router on which you will install an image that supports the Cisco Unified Border Element with Gatekeeper feature. Additional information on obtaining a feature license can be found at: http://www.cisco.com/en/US/prod/collateral/voicesw/ps6790/gatecont/ps5640/product_data_sheet_09186a00801da698.html
- Install the appropriate Cisco IOS image on each router and configure a working VoIP network. Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to <http://tools.cisco.com/ITDIT/CFN/>. An account on Cisco.com is not required.

Table 1 provides additional information on image and feature sets that support the Cisco Unified Border Element with Gatekeeper.

Table 1 Cisco IOS Image and Feature Sets for the Cisco Unified Border Element with Gatekeeper Feature

Platform	Software Image Name	Software Feature Set
Cisco 2601XM Cisco 2611XM Cisco 2620XM Cisco 2621XM Cisco 2650XM Cisco 2651XM	c2600-adventerprisek9_ivs-mz c2600-ipvoice_ivs-mz	Cisco 2600 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES Cisco 2600 INT VOICE/VIDEO, IPIPGW, TDMIP GW
Cisco 2691	c2691-adventerprisek9_ivs-mz c2691-ipvoice_ivs-mz	Cisco 2600 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES Cisco 2600 INT VOICE/VIDEO, IPIPGW, TDMIP GW
Cisco 2851 Cisco 2821 Cisco 2811	c2800nm-adventerprisek9_ivs-mz c2800nm-ipvoice_ivs-mz	Cisco 2800 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES Cisco 2800 INT VOICE/VIDEO, IPIPGW, TDMIP GW
Cisco 2801	c2801-adventerprisek9_ivs-mz c2801-ipvoice_ivs-mz	Cisco 2801 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES Cisco 2801 INT VOICE/VIDEO, IPIPGW, TDMIP GW
Cisco 3725	c3725-adventerprisek9_ivs-mz c3725-ipvoice_ivs-mz	Cisco 3725 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES Cisco 3725 INT VOICE/VIDEO, IPIPGW, TDMIP GW
Cisco 3745	c3745-adventerprisek9_ivs-mz c3745-ipvoice_ivs-mz	Cisco 3745 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES Cisco 3745 INT VOICE/VIDEO, IPIPGW, TDMIP GW
Cisco 3825	c3825-adventerprisek9_ivs-mz c3825-ipvoice_ivs-mz	Cisco 3825 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES Cisco 3825 INT VOICE/VIDEO, IPIPGW, TDMIP GW
Cisco 3845	c3845-adventerprisek9_ivs-mz c3845-ipvoice_ivs-mz	Cisco 3845 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES Cisco 3845 INT VOICE/VIDEO, IPIPGW, TDMIP GW
Cisco AS5350XM	c5350-adventerprisek9_ivs-mz c5350-ipvoice_ivs-mz	Cisco 5350 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES Cisco 5350 INT VOICE/VIDEO, IPIPGW, TDMIP GW
Cisco AS5400XM	c5400-adventerprisek9_ivs-mz c5400-ipvoice_ivs-mz	Cisco 5400 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES Cisco 5400 INT VOICE/VIDEO, IPIPGW, TDMIP GW
Cisco 7200	c7200-adventerprisek9_mz c7200-adventerprisek9_li-mz c7200-adventerprisek9_li-mz	Cisco 7200 Series IOS ADVANCED ENTERPRISE SERVICES
Cisco 7301	c7301-adventerprisek9_mz c7301-adventerprisek9_li-mz c7200-adventerprisek9_li-mz	Cisco 7301 Series IOS ADVANCED ENTERPRISE SERVICES

Restrictions for Cisco Unified Border Element with Gatekeeper Configuration

- Via-zone-enabled gatekeepers are not supported by Cisco Unified Communications Manager.

Information About Cisco Unified Border Element with Gatekeeper

Feature benefits include the following:

- Capacity control and improved call routing control using carrier-based routing with the Cisco Unified Border Element with Gatekeeper feature and routing traffic through the gateways.
- Improved billing and settlement capabilities.
- Provides key services at the edge of the network for scalability.

To configure the Cisco Unified Border Element with Gatekeeper feature, you should understand the following concepts:

- [Gatekeeper Functionality, page 12](#)
- [Cisco Unified Border Element with Gatekeeper Network Topology, page 12](#)
- [Features Supported by the Cisco Unified Border Element with Gatekeeper, page 14](#)

Gatekeeper Functionality

Gatekeepers are responsible for the following tasks.

- Gateway selection and load balancing
- Call routing (zone selection)
- Gatekeeper-based billing
- Control of call admission, security, and bandwidth
- Enforcement of call capacities

Cisco Unified Border Element with Gatekeeper Network Topology

In the current VoIP market, ITSPs who provide wholesale VoIP services use their own IP-to-TDM gateways to exchange calls with the PSTN. Problems occur when a wholesaler receives a call from an originating ITSP and decides to terminate the call to another ITSP. Because it does not own the PSTN gateways, the wholesaler does not receive call setup or release information and therefore cannot bill for the call. Wholesalers are forced either to forbid these connections, thereby foregoing a potential revenue source, or to set up the call through a combination of back-to-back IP-to-TDM gateways. This solution results in reduced quality due to double media coding and decoding, and it wastes TDM port resources.

Cisco UBE allows the wholesaler to terminate the call from the originating ITSP and then reoriginate it, thereby providing a point at which accurate call detail records (CDRs) can be collected for billing.

The superior interconnect capability provided by the Cisco UBE enables service providers to conceal their internal network and business relationships while improving call admission control, flexible routing, and protocol interworking capabilities.

The Cisco UBE includes the following changes to gateways and gatekeepers to allow Cisco UBE with Gatekeeper call legs:

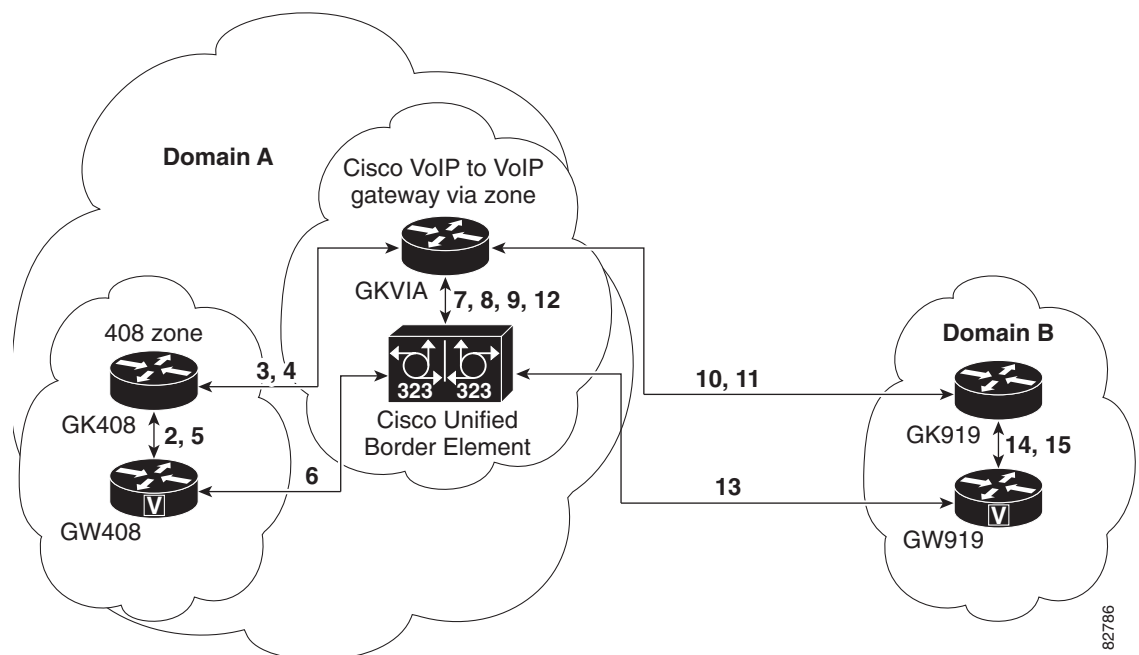
- Support for H.323-to-H.323, H.323-to-SIP, and SIP-to-SIP connection types
- Support for transparent codec on H.323-to-H.323 connection types

- Support for H.323 call capacities
- Introduction of gatekeeper via-zones. *Via-zone* is a Cisco term for a zone that contains Cisco UBEs and via-zone-enabled gatekeepers. A via-zone-enabled gatekeeper is capable of recognizing via-zones and sending traffic to via-zone gateways. Cisco via-zone-enabled gatekeepers include a via-zone command-line interface (CLI) command.

Via-zones are usually located on the edge of an ITSP network and are like a VoIP transfer point, or tandem zone, where traffic passes through on the way to the remote zone destination. Gateways in this zone terminate requested calls and reoriginate traffic to its final destination. Via-zone gatekeepers operate as usual for applications that are not Cisco UBE Gatekeepers in via-zones support resource management (for example, gateway selection and load balancing) using the Capacities field in the H.323 Version 4 RAS messages.

Figure 1 shows a simple topology example of the Cisco UBE using via-zone gatekeepers.

Figure 1 Cisco Unified Border Element with Gatekeeper Feature Sample Topology



The gatekeeper in Domain A and the gatekeeper in Domain B are connected to the via-zone gatekeeper. GK408 and the via-zone gatekeeper exchange Registration, Admission, and Status (RAS) messages for the originating side. Then the connection is made between the originating gateway and the Cisco UBE. The via-zone gatekeeper exchanges RAS messages with GK919 for the terminating side. If the call is accepted, the Cisco UBE completes the connection from GW408 to GW919, and the media flows through the Cisco UBE.

In a basic call scenario, on receiving a location request (LRQ) message from the originating gatekeeper (GK408), the via-zone-enabled gatekeeper (GKVIA) processes the message and determines that the call should be set up using the Cisco UBE. After the originating gateway receives its admission confirmation (ACF) message, it sets up the call.

With the Cisco Multiservice IP-to-IP Gateway feature, instead of the originating gateway signaling the terminating gateway directly, the Cisco UBE controls the call set-up both the signaling and media channel. The Cisco UBE is terminating the signaling and media channels, but the information associated

with the media is propagated through to the opposite call leg. This process allows the endpoints to determine what media channel capabilities to use for the call. When the call is established, the audio stream flows through the Cisco UBE, meaning that the gateway terminates the audio channel on one call leg and then reoriginates it to the other leg.

The following scenario illustrates a basic call from the originating gateway to the terminating gateway, using the Cisco UBE and gatekeepers.

1. GW408 (the originating gateway) calls someone in the 919 area code, which is serviced by GW919 (the terminating gateway).
2. GW408 sends an ARQ with the called number having the 919 area code to a gatekeeper in its zone (GK408).
3. GK408 resolves 919 to belong to a via-zone gatekeeper (GKVIA). GK408 then sends an LRQ to GKVIA.
4. GKVIA receives the LRQ for the 919 number. GKVIA resolves the 919 prefix to belong to the Cisco UBE. GKVIA is configured to route requests for 919 prefix calls through its Cisco UBE. GKVIA sends an LCF to GK408.
5. GK408 returns an ACF specifying Cisco UBE to GW408.
6. GW408 sends a SETUP message to Cisco UBE for the 919 number.
7. Cisco UBE consults GKVIA with an ARQ message with the **answerCall=true** parameter to admit the incoming call.
8. GKVIA responds with an ACF to admit the call. From the perspective of the gatekeeper, the first call leg has been established.
9. Cisco UBE has a dial peer specifying that RAS messages should be sent to GKVIA for all prefixes. Cisco UBE initiates the resending of the call by sending the ARQ message with the **answerCall** parameter set to, false to GKVIA for 919.
10. GKVIA knows that prefix 919 belongs to GK919, and since the source zone is the via-zone, the GKVIA sends an LRQ to GK919.
11. GK919 sees prefix 919 as a local zone and sends an LCF pointing to GW919.
12. GKVIA returns an ACF specifying GW919.
13. Cisco UBE sends a SETUP message to GW919 for the 919 call.
14. GW919 sends an ARQ to GK919 to request admission for the call.
15. GK919 sends an ACF with the **answerCall=true** parameter.

All other messages (for example, Proceeding, Alerting, and Connect) are created as two legs between GW408, and GW919, with the Cisco UBE acting as an intermediate gateway

Features Supported by the Cisco Unified Border Element with Gatekeeper

This section contains lists of the following types of supported features:

- [Gatekeeper Call-Signaling Features, page 15](#)
- [Gatekeeper-Related Features, page 16](#)
- [Interoperability Features, page 16](#)

Gatekeeper Call-Signaling Features

Table 2 is a list of supported Gatekeeper call-signaling features.

Table 2 Cisco Unified Border Element with Gatekeeper Call Signaling Features

Feature	H.323-to-H.323 Support?	H.323-to-SIP Support?	SIP-to-SIP Support?	Additional Information
Alternate endpoint retry	Yes	—	—	Configuration for all alternate endpoints must be consistent.GK
Alternate gatekeeper support	Yes	—	—	—
Annex E	Yes	—	—	—
Bandwidth request (BRQ)	Yes	—	—	—
Call Deflection (H.450.3)	No	—	—	—
Call multiplexing over single H.225 channel	Yes	—	—	—
Carrier-based routing	Yes	—	—	—
Facility Call Forward	No	—	—	—
Facility RouteCall to Gatekeeper	Yes	—	—	—
Gatekeeper security	Yes	—	—	—
Interdomain LRQ authentication	Yes	—	—	—
Interzone token	Yes	—	—	—
IRR call start time	Yes	—	—	—
IRR frequency	Yes	—	—	—
ISUP/GTD transport in H.225 (Annex M.2)	Yes	—	—	—
Lightweight RRQs	Yes	—	—	—
Overlap signaling processing on H.323 terminating gateways	Yes	—	—	—
QSIG Tunneling	Yes	—	—	—
Security checks at GK for ARQ/DRQ/ BRQ/URQ/IIR	Yes	—	—	Introduced in Cisco IOS Release 12.4(15)XY.
Security Checks at GK for RRQ	Yes	—	—	Introduced in Cisco IOS Release 12.4(15)XY.
Source CallSignaling address (in the answer ARQ)	Yes	—	—	—
Unsolicited IRR with billing token	Yes	—	—	—

Gatekeeper-Related Features

Table 3 shows a list of supported gatekeeper-related features. Those gatekeeper functions not listed are supported in conjunction with via-zones.

Table 3 Supported Gatekeeper-Related Features

Feature	Supported?
Directory gatekeepers	Yes
Gatekeeper clusters	Yes
Annex G border elements	No
ISUP/GTD transport in RAS	Yes
GKTMP	Yes
Multiple local zones	Yes
Hot Standby Router Protocol (HSRP)	Yes

Interoperability Features

Table 4 shows a list of supported interoperability features.

Table 4 Supported Interoperability Features

Feature	Supported?	Additional Information
BroadSoft	Yes	First supported in 12.4(6)T images.
Cisco ATA 186	Yes	—
Cisco ATA 188	Yes	First supported in 12.3(7)T images.
Cisco Unified Communications Manager	Yes	—
Cisco CallManager Express	Yes	—
Cisco gateways	Yes	Compatible with H.323 version 2 and above.
Cisco MCM Proxy	Yes	Cannot register proxy in the same zone as an Cisco UBE.
Third-party gatekeepers	Yes	Third-party gatekeepers must support the equivalent of via-zone functionality.
Third-party gateways	Partially	First supported in 12.3(7)T images.

Additional References

The following sections provide additional references related to the Cisco Unified Border Element with Gatekeeper.



Note

- In addition to the references listed below, each chapter provides additional references related to Cisco Unified Border Element.
- Some of the products and services mentioned in this guide may have reached end of life, end of sale, or both. Details are available at http://www.cisco.com/en/US/products/prod_end_of_life.html.
- The preface and glossary for the entire voice-configuration library suite of documents is listed below.

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
Cisco IOS Voice commands	Cisco IOS Voice Command Reference
Cisco IOS Voice Configuration Library	For more information about Cisco IOS voice features, including feature documents, and troubleshooting information—at http://www.cisco.com/en/US/docs/ios/12_3/vvf_c/cisco_ios_voice_configuration_library_glossary/vcl.htm
Cisco IOS Release 15.0	Cisco IOS Release 15.0 Configuration Guides
Cisco IOS Release 12.4	<ul style="list-style-type: none"> • Cisco IOS Release 12.4 Configuration Guides • Cisco IOS Release 12.4T Configuration Guides
Cisco IOS Release 12.3	<ul style="list-style-type: none"> • Cisco IOS Release 12.3 documentation • Cisco IOS Voice commands • Cisco IOS Voice Troubleshooting and Monitoring Guide • Tcl IVR Version 2.0 Programming Guide
Cisco IOS Release 12.2	Cisco IOS Voice, Video, and Fax Configuration Guide, Release 12.2
DSP documentation	High-Density Packet Voice Feature Card for Cisco AS5350XM and AS5400XM Universal Gateways http://www.cisco.com/en/US/docs/ios/12_4t/12_4t11/vfc_dsp.html
GKTMP (GK API) Documents	<ul style="list-style-type: none"> • <i>GKTMP Command Reference:</i> http://www.cisco.com/en/US/docs/ios/12_2/gktmp/gktmpv4_2/gk_cli.htm • <i>GKTMP Messages:</i> http://www.cisco.com/en/US/docs/ios/12_2/gktmp/gktmpv4_2/gk_tmp.html

Related Topic	Document Title
internet Low Bitrate Codec (iLBC) Documents	<ul style="list-style-type: none"> • Codecs section of the Dial Peer Configuration on Voice Gateway Routers Guide http://www.cisco.com/en/US/docs/ios/12_3/vvf_c/dial_peer/dp_ovrvw.html • Dial Peer Features and Configuration section of the Dial Peer Configuration on Voice Gateway Routers Guide http://www.cisco.com/en/US/docs/ios/12_3/vvf_c/dial_peer/dp_config.html
Cisco Unified Border Element Configuration Examples	<ul style="list-style-type: none"> • Local-to-remote network using the IPIPGW http://www.cisco.com/en/US/tech/tk1077/technologies_configuration_example09186a00801b0803.shtml • Remote-to-local network using the IPIPGW: http://www.cisco.com/en/US/tech/tk1077/technologies_configuration_example09186a0080203edc.shtml • Remote-to-remote network using the IPIPGW: http://www.cisco.com/en/US/tech/tk1077/technologies_configuration_example09186a0080203edd.shtml • Remote-to-remote network using two IPIPGWs: http://www.cisco.com/en/US/tech/tk1077/technologies_configuration_example09186a0080203edb.shtml
Related Application Guides	<ul style="list-style-type: none"> • Cisco Unified Communications Manager and Cisco IOS Interoperability Guide • Cisco IOS Fax, Modem, and Text Support over IP Configuration Guide • “Configuring T.38 Fax Relay” chapter • Cisco IOS SIP Configuration Guide • Cisco Unified Communications Manager (CallManager) Programming Guides • Quality of Service for Voice over IP
Related Platform Documents	<ul style="list-style-type: none"> • Cisco 2600 Series Multiservice Platforms • Cisco 2800 Series Integrated Services Routers • Cisco 3600 Series Multiservice Platforms • Cisco 3700 Series Multiservice Access Routers • Cisco 3800 Series Integrated Services Routers • Cisco 7200 Series Routers • Cisco 7301
Related gateway configuration documentation	<p>Media and Signaling Authentication and Encryption Feature for Cisco IOS H.323 Gateways.</p> <p>http://www.cisco.com/en/US/docs/ios/12_4t/12_4t11/htsecure.htm</p>

Related Topic	Document Title
Cisco IOS NAT Configuration Guide, Release 12.4T	<p><i>Configuring Cisco IOS Hosted NAT Traversal for Session Border Controller</i></p> <p>http://www.cisco.com/en/US/docs/ios/12_4t/ip_addr/configuration/guide/htnatsbc.html</p>
Troubleshooting and Debugging guides	<ul style="list-style-type: none"> • Cisco IOS Debug Command Reference, Release 12.4 at http://www.cisco.com/en/US/docs/ios/debug/command/reference/db_book.html • <i>Troubleshooting and Debugging VoIP Call Basics</i> at http://www.cisco.com/en/US/tech/tk1077/technologies_tech_note09186a0080094045.shtml • <i>VoIP Debug Commands</i> at http://www.cisco.com/en/US/docs/routers/access/1700/1750/software/configuration/guide/debug.html

Standards

Standard	Title
H.323 Version 4 and earlier	<i>H.323 (ITU-T VOIP protocols)</i>

MIBs

MIB	MIBs Link
None.	<p>To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:</p> <p>http://www.cisco.com/go/mibs</p>

RFCs

RFC	Title
RFC 2833	<i>RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals</i>
RFC 3261	<i>SIP: Session Initiation Protocol</i>

Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	<p>http://www.cisco.com/cisco/web/support/index.html</p>

Glossary

IZCT—Inter-Zone Clear Token.
OGK —Originating Gatekeeper.
TGK —Terminating Gatekeeper.
OGW—Originating Gateway.
TGW—Terminating Gateway.
ARQ— Admission Request.
ACF—Admission Confirm.
ARJ—Admission Reject.
LRQ—Location Request.
LCF— Location Confirm.
LRJ—Location Reject.

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