Cisco Modem Relay

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This document describes how to configure Cisco modem relay. This enhanced version of Cisco modem relay adds support for a nonnegotiated, bearer-switched mode for modem transport called gateway-controlled modem relay. The modem transport parameters are configured directly on the gateway by default, instead of being negotiated by the call agent.

History for the Cisco Modem Relay Feature

Release	Modification
12.4(4)T	This feature was introduced.
12.4(6)T	This feature was implemented on the Cisco 1700 series and Cisco 2800 series.

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.

Note For more information about this and related Cisco IOS voice features, see the following:

- *Cisco IOS Fax and Modem Services over IP Application Guide*
- *Cisco IOS Voice Configuration Library*; including library preface and glossary, other feature documents, and troubleshooting documentation.

Contents

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Prerequisites for Cisco Modem Relay

Before you configure Cisco modem relay, you must:

- Establish a working H.323, Session Intiated Protocol (SIP), or Media Gateway Control Protocol (MGCP) network for voice calls.
- Ensure that you have a Cisco IOS image that supports gateway-controlled modem relay.
- Determine network suitability to relay modem traffic. The key attributes are packet loss, delay, and jitter. These characteristics of the network can be determined by using the Cisco IOS Service Assurance Agent (SA Agent) feature.
- For TI 549 digital signal processors (DSPs), configure high codec complexity for the originating and terminating gateways.

Restrictions for Cisco Modem Relay

Restrictions of Cisco modem relay are as follows:

- Cisco modem relay does not work with third-party gateways.
- Cisco modem is supported on TI C5510 and TI C549 DSPs only.
- Cisco modem relay does not support the V.150.1 signaling standard.
- Cisco modem relay does not support Skinny Client Control Protocol (SCCP).
- The originating gateway and the terminating gateway must both be configured for Cisco modem relay. If one gateway is configured for modem pass-through, the call occurs using modem pass-through.
- Originating and terminating gateways must both be configured for a high or flex codec complexity to use Cisco modem relay. If either the originating or terminating gateway is configured for a medium complexity codec, modem pass-through is used.
- The named signaling event (NSE) 199 event signal is sent with triple redundancy once from the terminating gateway. If this signal is lost or not recognized, the call occurs using modem pass-through.
- Gateway-XID is enabled by default when Cisco modem relay is configured.
- There is no mechanism to indicate that an upspeed has not taken place because of a call admission control (CAC) failure, regardless of tone detection. (Upspeed occurs when the gateway dynamically changes the codec from the codec configured for voice to G.711 with no VAD and no EC for the duration of the session.)

- Cisco modem relay works only if both modems are high-speed modems (V.34, V.90) that use V.42*bis* bidirectional compression. For low-speed modems, gateways that carry traffic use modem pass-through.
- Cisco modem relay works only if both modems use the V.42 error correction protocol and if the error correction layer in both modems is enabled.
- MGCP, H.323, and SIP can be configured on the same gateway with some restrictions—all calls in a particular T1 or E1 must be handled by the same signaling type. If your gateway has multiple T1 or E1 facilities, calls on some T1s or E1s can be managed by MGCP and others can be managed by H.323 or SIP.

Supported Platforms

The Cisco Modem Relay feature adds support for modem relay functionality on the TI C5510-based analog and digital gateways, network modules, network interface cards (NICs), and the TI C549 DSP. See Table 1 for the list of DSPs, network modules, and platforms supported by this feature.

Table 1 Supported DSPs, Network Modules, and Platforms

DSPs	Network Modules	Platforms
TI C549	NM-HDV	Cisco 2600XM series, Cisco 2691, Cisco 2800 series, Cisco 3600 series, Cisco 3700 series, and Cisco 3800 series.
TI C5510	NM-HD-1V, NM-HD-2V, NM-HD-2VE, and all associated VIC, VWIC, VIC2, and VWIC2 interface modules	Cisco 2600XM series, Cisco 2691, Cisco 2800 series, Cisco 3600 series, Cisco 3700 series, and Cisco 3800 series. **Note** The Cisco 2801 does not support network modules.
	NM-HDV2, NM-HDV2-1T1/E1, NM-HDV2-2T1/E1	Cisco 2600XM series, Cisco 2691, Cisco 2800 series, Cisco 3600 series, Cisco 3700 series, and Cisco 3800 series. All platforms require PVDM2 module.
	EVM-HD-8FXS/DID and all associated EMs	Cisco 2600XM series, Cisco 2691, Cisco 2800 series, Cisco 3600 series, Cisco 3700 series, and Cisco 3800 series. All platforms require PVDM2 module.
	IAD2430/VGA224. No SCCP support for fax or modem.	Line side high-density analog gateways (SIP and H.323 only).
	DSPs are directly on the motherboard instead of on a network module.	Cisco 2800 series and Cisco 3800 series. **Note** The Cisco 2801 supports DSPs only on the motherboard.

Information About Cisco Modem Relay

To configure the Cisco Modem Relay feature, you should understand the following concept:

Modes for Modem Transport

Cisco modem relay is a nonnegotiated, bearer-switched mode for modem transport that does not involve call-agent-assisted negotiation during the call setup. Instead, the negotiation parameters are configured directly on the gateway. These gateway-controlled negotiation parameters use NSEs to indicate the switchover from voice, to voice-band data (VBD), to modem relay.

Upon detecting 2100-Hz tone, the terminating gateway sends an NSE 192 to the originating gateway and switches over to modem pass-through. The terminating gateway also sends an NSE 199 to indicate modem relay. If this event is recognized by the originating gateway, the call occurs as modem relay. If the event is not recognized, the call occurs as modem pass-through.

Because Cisco modem relay uses configured parameters, it removes the signaling dependency from the call agent and allows modem relay support independent of call control. Cisco modem relay can be deployed over any call agent that can set up a voice connection between gateways, including Cisco CallManager, Cisco CallManager Express, Cisco PGW 2200 Softswitch, and Cisco BTS 10200 Softswitch.

The gateway-controlled modem relay parameters are enabled by default when Cisco modem relay is configured, and when Cisco modem relay is configured, gateway exchange identification (XID) parameter negotiation is always enabled. Gateway XID parameters are negotiated using the Simple Packet Relay Transport (SPRT) protocol.

How to Configure Cisco Modem Relay

This section describes the tasks required to configure Cisco modem relay for MGCP, H.323, or SIP:

Configuring Codec Complexity for TI 549 DSPs

Codec complexity determines the codec types supported on the DSP.

- The TI 5510 DSP supports medium, high, and flex complexity. The default is flex complexity.
- The TI 549 DSP supports only high complexity.

If your platform uses the TI 549 DSP, you must configure high codec complexity.

Note The VG224 and IAD2430 platforms only support flex complexity.

Supported Codecs

Cisco modem relay for MGCP and H.323 signaling types supports the high complexity codecs listed in Table 2.

Table 2 Supported High Complexity Codecs for MGCP and H.323

Codec	Description
clear channel	Clear channel at 64,000 bits per second (bps).
g711alaw	G.711 a-law 64,000 bps
g711ulaw	G.711 mu-law 64,000 bps
g723ar53	G.723.1 Annex-A 5300 bps
g723ar63	G.723.1 Annex-A 6300 bps
g723r53	G.723.1 5300 bps
g723r63	G.723.1 6300 bps
g726r16	G.726 16,000 bps
g726r24	G.726 24,000 bps
g726r32	G.726 32,000 bps
g728	G.728 16,000 bps
g729br8	G.729 Annex-B 8000 bps
g729r8	G.729 8000 bps
gsmefr	GSMEFR 12,200 bps
gsmfr	GSMFR 13,200 bps

Cisco modem relay for SIP supports the high complexity codecs listed in Table 3.

Table 3 Supported High Complexity Codecs for SIP

Codec	Description
g711alaw	G.711 a-law 64,000 bps
g711ulaw	G.711 mu-law 64,000 bps
g723r63	G.723.1 6300 bps
g723r16	G.723.1 1600 bps
g728	G.728 16,000 bps
g729r8	G.729 8000 bps

To configure high codec complexity for the Cisco 2600, Cisco 2800, Cisco 3600, Cisco 3700, and Cisco 3800 series routers on the originating and terminating gateways, perform the following steps:

SUMMARY STEPS

1. **enable**
2. **configure terminal**

3. **voice-card** *slot*
4. **codec complexity high**

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.
Step 3	**voice-card** *slot* **Example:** `Router(config)# voice-card 0`	Enters voice-card configuration mode. • *slot*—Specifies the voice-card slot location.
Step 4	**codec complexity high** **Example:** `Router(config-voice-card)# codec complexity high`	Sets codec complexity to high.

Configuring MGCP Modem Relay

Note You must configure Cisco modem relay on the originating and terminating gateways.

MGCP commands apply to the entire gateway. To configure Cisco modem relay for MGCP calls, use the following commands:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mgcp modem relay voip mode** [**nse**] **codec** [**g711alaw** | **g711ulaw**] [**redundancy**] **gw-controlled**

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.
Step 3	**mgcp modem relay voip mode [nse] codec** [**g711alaw** | **g711ulaw**] [**redundancy**] **gw-controlled** **Example:** `Router(config)# mgcp modem relay voip mode nse codec g711ulaw redundancy gw-controlled`	Configures Cisco modem relay parameters for MGCP. • **nse**—Named signaling event. • **codec**—(Optional) Sets the voice compression selection for speech or audio signals. – **g711alaw** is required for E1. – **g711ulaw** is required for T1. • **redundancy**—(Optional) Sends redundant packets for modem traffic during the pass-through phase. Disabled by default. • **gw-controlled**—Sets the gateway-configured method for establishing modem relay parameters.

Configuring H.323 and SIP Modem Relay

Note You must configure Cisco modem relay parameters on *both* the originating and terminating gateways. The NSE **payload-type** *number*, **codec,** and negotiation parameter settings must match.

For H.323 and SIP configurations, Cisco modem relay can be configured at two levels:

- Under voice-service configuration mode—This configuration is the global, or system-wide configuration that is applied to any VoIP call on the gateway. The default for voice-service configuration mode is **no modem relay**. See the "Configuring Cisco Modem Relay Parameters Globally for H.323 and SIP" section on page 8.
- Under dial-peer voice configuration mode for VoIP dial peers—This configuration applies only to calls that match a specific dial peer. The default dial-peer configuration is **modem relay system**, which tells the gateway to use the parameters configured at the global level. See the "Configuring Cisco Modem Relay Parameters for a Specific Dial Peer for H.323 and SIP" section on page 9.

The two configuration tasks can be used separately or together. If both are configured, the dial-peer configuration overrides the global configuration.

Configuring Cisco Modem Relay Parameters Globally for H.323 and SIP

To configure Cisco modem relay parameters globally, use the following commands beginning in global configuration mode.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice service voip**
4. **modem relay nse** [**payload-type** *number*] **codec** {**g711ulaw** | **g711alaw**} [**redundancy**[**maximum-sessions** *value*]] **gw-controlled**

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	**voice service voip** **Example:** `Router(config)# voice service voip`	Enters voice-service configuration mode.
Step 4	**modem relay nse** [**payload-type** *number*] **codec** {**g711ulaw** | **g711alaw**} [**redundancy** [**maximum-sessions** *value*]] **gw-controlled** **Example:** `Router(conf-voi-serv)# modem relay nse payload-type 100 codec g711ulaw redundancy maximum-sessions 1 gw-controlled`	Configures Cisco modem relay parameters. • **nse**—Named signaling event. • **payload-type**—(Optional) Sets the **payload-type** for NSE packets. The default number is 100. • **codec**—Sets the upspeed voice compression selection for speech or audio signals. – **g711ulaw** is required for T1. – **g711alaw** is required for E1. • **redundancy—**(Optional) Sends redundant packets for modem traffic during the pass-through phase. Disabled by default. • **maximum-sessions**—(Optional) Maximum number of redundant, simultaneous modem pass-through sessions. The default value is 16. • **gw-controlled**—Enabled by default. Sets the gateway-configured method for establishing modem relay parameters. **Note** To use negotiated parameters, you must explicitly set the **signaling-assisted** keyword.

Configuring Cisco Modem Relay Parameters for a Specific Dial Peer for H.323 and SIP

Note When Cisco modem relay is configured for a specific dial peer, the dial-peer configuration takes precedence over the global configuration.

To configure Cisco modem relay for a specific dial peer, use the following commands beginning in global configuration mode.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **dial-peer voice** *tag* **voip**
4. **modem relay** {**nse** [**payload-type** *number*] **codec** {**g711alaw** | **g711ulaw**} [**redundancy**] | **system**} **gw-controlled**

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.
Step 3	**dial-peer voice** *tag* **voip** **Example:** `Router(config)# dial-peer voice 12 voip`	Enters dial-peer configuration mode for a specific dial peer.
Step 4	**modem relay** {**nse** [**payload-type** *number*] **codec** {**g711alaw** | **g711ulaw**} [**redundancy**] | **system**} **gw-controlled** **Example:** `Router(config-dial-peer)# modem relay nse payload-type 100 codec g711ulaw redundancy gw-controlled`	Configures Cisco modem relay parameters. • **nse**—Named signaling event. • **payload-type**—(Optional) Sets the payload type for NSE packets. The default is 100. • **codec**—Sets the upspeed voice compression selection for speech or audio signals. – **g711ulaw** is required for T1. – **g711alaw** is required for E1. • **redundancy—**(Optional) Sends redundant packets for modem traffic during the pass-through phase. Disabled by default. • **system**—This default setting uses the global configuration parameters set with the **modem relay** command in voice-service configuration mode. • **gw-controlled**—Specifies the gateway-configured method for establishing modem relay parameters.

Troubleshooting Tips

Before using **debug** commands to troubleshoot Cisco modem relay, be sure that:

- You can complete a voice call.
- Cisco modem relay is configured on both the originating and terminating gateways.
- Both the originating and terminating gateways have the same NSE **payload-type** *number* and **codec** parameters.

Use the following **debug** commands to troubleshoot Cisco modem relay:

- To verify that parameter negotiation has occurred, use these **debug** commands:
  - **debug mgcp packet**—Use to check that modem relay parameters are not sent in the session definition protocol (SDP) for MGCP calls.
  - **debug h245 ans1**—Use to check that modem relay parameters are not sent as part of H.245 messaging.
  - **debug ccsip calls**—Use to check SIP messages.
- The following are additional **debug** commands for troubleshooting:
  - **debug voip hpi all**—Use to check for event 199.
  - **debug voip dsmp all**—Use to check for event 199 and for modem relay parameters.
  - **debug voip dsmp session**—Use to see if event 199 has been implemented for this session.

Note See the *Cisco IOS Debug Command Reference* for additional modem relay **debug** commands.

The following **show** commands can be used to verify Cisco modem relay configurations.

- **show call active voice**—Displays call information for voice calls in progress. Use the **brief** keyword to display a truncated version.
- **show dial-peer voice** *tag* **summary**—Displays information for voice dial peers. Use the *tag* argument to get information about a specific dial peer. Use the **summary** keyword to display a short summary of each dial peer
- **show call history voice**—Displays the history table for voice calls. Use the **brief** keyword to display a truncated version.
- **show modem relay statistics**—Displays various statistics for modem relay.

DSP Modem Relay Termination Codes

Table 4 lists the gateway DSP modem relay termination codes that display when you enter the **debug hpi all** command. The DSP-to-host messages for the modem relay termination indicate modem relay session termination time, physical or link layer, and other causes for disconnection. On receiving this indication from the DSP, the host can disconnect the call or place the channel in modem pass-through state.

Table 4 Modem Relay Termination Cause Codes

Modem Relay Termination Cause Code	Description
0x65	SPRT—Channel 1 maximum retransmit count exceeded on DSP.
0x66	SPRT—Channel 1 invalid transport frame type in transmit queue.
0x67	SPRT—Channel 2 maximum retransmit count exceeded on DSP.
0x68	SPRT—Channel 2 invalid transport frame type in transmit queue.
0x69	SPRT—Channel 1 invalid base sequence number received by DSP from remote host.
0x6A	SPRT—Channel 2 invalid base sequence number received by DSP from remote host.
0x6B	SPRT—Received RELEASE request from peer.

Table 4 Modem Relay Termination Cause Codes (continued)

Modem Relay Termination Cause Code	Description
0x6C	SPRT—Channel 1 invalid transmit sequence number.
0x6D	SPRT—Channel 2 invalid transmit sequence number.
0x6E	SPRT—Invalid transmit t_frame type.
0x6F	SPRT—Requested to transmit null (zero length) info t_frame.
0x71	V42—Unexpected Set Asynchronous Balanced Mode Extended (SABME) received.
0x72	V42—Client modem capability appears incompatible with V42*bis* capability on originating leg gateway.
0x73	V42—Client modem capability appears incompatible with V42*bis* capability on terminating leg gateway.
0x74	V42—Exceeded maximum XID retransmit count.
0x77	V42—Exceeded maximum SABME retransmit count.
0x78	V42—network registrar (NR) sequence exception.
0x79	V42—Invalid acknowledgement received.
0x7A	V42—Exceeded N401 retransmit count.
0x7B	SPRT—Requested to transmit info t_frame that exceeds maximum allowed size.
0x7C	V42—Received V42 DISC packet from client modem.
0x7D	V42—Received V42 FRMR packet from client modem.
0x82	V42—Failed to add packet to V42 transmit queue.
0x8C	V42—Invalid “VA”.
0x8D	PHYSICAL—Modem data pump terminated or failed.
0xC9	SPRT—Channel 1 maximum retransmit count exceeded on line card.
0xCA	SPRT—Channel 2 maximum retransmit count exceeded on line card.
0xCD	SPRT—Channel 1 invalid base sequence number received by line card from DSP.
0xCE	SPRT—Channel 2 invalid base sequence number received by line card from DSP.
0xCF	SPRT—Channel 1 invalid base sequence number received by line card from remote host.
0xD0	SPRT—Channel 2 invalid base sequence number received by line card from remote host.

Configuration Examples for Cisco Modem Relay

This section provides the following configuration examples for Cisco modem relay:

Cisco Modem Relay Enabled for MGCP: Example

The following example shows an MGCP configuration with modem relay enabled, the named signaling event and redundant packets parameters set:

```
version 12.3
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption!
hostname Router
!
boot-start-marker
boot system flash:c2800nm-ipvoice-mz.cisco_0224
boot-end-marker
!
card type t1 1 1
logging buffered 10000000 debugging
enable password lab
!
no aaa new-model
!
resource manager
!
clock timezone PST -8
clock summer-time PDT recurring
network-clock-participate slot 1
ip subnet-zero
!
ip cef
no ip dhcp use vrf connected
!
ip domain list cisco.com
no ip domain lookup
ip domain name cisco.com
ip host ccm 10.3.102.99
no ftp-server write-enable
isdn switch-type primary-qsig
!
voice-card 0
 codec complexity high
 dspfarm
!
voice-card 1
 dspfarm
!
voice service pots
!
voice service voip
 no fax-relay sg3-to-g3
 h323
 modem relay nse codec g711ulaw gw-controlled
!
voice service voatm
```

```
!
controller T1 1/0
 framing esf
 clock source internal
 linecode b8zs
 pri-group timeslots 1-12,16,24
!
controller T1 1/1
 framing esf
 clock source internal
 linecode b8zs
 pri-group timeslots 1-8,16,24 service mgcp
!
interface GigabitEthernet0/0
 ip address 10.2.109.103 255.255.0.0
 duplex auto
 speed auto
 no clns route-cache
!
interface GigabitEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface Serial1/0:23
 no ip address
 no logging event link-status
 isdn switch-type primary-qsig
 isdn incoming-voice voice
 no cdp enable
!
interface Serial1/1:23
 no ip address
 no logging event link-status
 isdn switch-type primary-qsig
 isdn incoming-voice voice
 isdn bind-l3 ccm-manager
 no cdp enable
!
ip default-gateway 10.2.0.1
ip classless
ip route 10.0.0.0 255.0.0.0 10.2.0.1
ip route 192.168.254.254 255.255.255.255 GigabitEthernet0/0
!
ip http server
!
control-plane
!
voice-port 0/0/0
!
voice-port 0/0/1
!
voice-port 1/0:23
 connection plar 2000
!
voice-port 1/1:23
!
ccm-manager mgcp
ccm-manager music-on-hold
ccm-manager config server 10.3.102.99
!
mgcp
mgcp call-agent ccm service-type mgcp version 0.1
```

```
mgcp dtmf-relay voip codec all mode out-of-band
mgcp rtp unreachable timeout 1000 action notify
mgcp modem relay voip mode nse redundancy gw-controlled
mgcp package-capability rtp-package
no mgcp package-capability res-package
mgcp package-capability sst-package
no mgcp package-capability fxr-package
mgcp package-capability pre-package
no mgcp timer receive-rtcp
mgcp sdp simple
mgcp fax t38 inhibit
no mgcp fax-relay sg3-to-g3
mgcp rtp payload-type g726r16 static
!
mgcp profile default
!
dial-peer voice 2000 voip
 destination-pattern 2...
 session target ipv4:10.2.109.104
!
dial-peer voice 3000 voip
 destination-pattern 3...
 modem relay nse codec g711ulaw gw-controlled
 session protocol sipv2
 session target ipv4:10.2.109.104
!
dial-peer voice 2 pots
 incoming called-number 2...
 no digit-strip
 port 1/1:23
!
dial-peer voice 3 pots
 incoming called-number 3...
 no digit-strip
 port 1/0:23
!
dial-peer voice 5000 voip
!
dial-peer voice 10001 pots
!
dial-peer voice 10002 voip
!
dial-peer voice 1000 pots
!
dial-peer voice 6000 pots
!
!
line con 0
 exec-timeout 0 0
line aux 0
line vty 0 4
 exec-timeout 0 0
 password lab
 login
!
scheduler allocate 20000 1000
ntp clock-period 17180156
ntp server 10.2.0.1 prefer
!
end
```

Cisco Modem Relay Configured on the VoIP Dial Peer: Example

In this example, dial peer 2000 is configured with modem relay enabled, the G.711 a-law codec specified, and redundant packets enabled:

```
version 12.3
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router
!
boot-start-marker
boot system flash:c2691-ipvoice-mz.cisco_0224
boot-end-marker
!
logging buffered 100000 debugging
enable password lab
!
no aaa new-model
!
resource manager
!
memory-size iomem 25
clock timezone PST -8
clock summer-time PDT recurring
no network-clock-participate slot 1
voice-card 1
 codec complexity high
 dspfarm
!
ip subnet-zero
ip cef
!
no ip dhcp use vrf connected
!
no ip domain lookup
no ftp-server write-enable
!
voice service voip
 fax protocol pass-through g711ulaw
 sip
!
controller T1 1/0
 framing sf
 linecode ami
!
controller T1 1/1
 framing sf
 linecode ami
!
interface FastEthernet0/0
 ip address 10.2.109.104 255.255.0.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
ip default-gateway 10.2.0.1
```

```
ip classless
ip route 10.0.0.0 255.255.255.255 10.2.0.1
!
no ip http server
!
control-plane
!
dial-peer voice 2000 voip
 modem relay nse codec g711alaw redundancy gw-controlled
 fax rate disable
 fax protocol pass-through g711alaw
!
line con 0
 exec-timeout 0 0
line aux 0
line vty 0 1
 exec-timeout 0 0
 password lab
 login
line vty 2 4
 login
!
ntp clock-period 17180780
ntp server 192.168.254.253 prefer
!
end
```

Additional References

The following sections provide references related to Cisco modem relay.

Related Documents

Related Topic	Document Title
Modem relay configuration information	*Modem Support for VoIP*
Cisco IOS Voice Configuration Library, including library preface and glossary, other feature documents, and troubleshooting documentation.	*Cisco IOS Voice Configuration Library*
Cisco IOS command references	• *Cisco IOS Debug Command Reference* • *Cisco IOS Voice Command Reference*
Cisco MGCP configuration information	*Cisco IOS MGCP and Related Protocols Configuration Guide*
Cisco SIP configuration information	*Cisco IOS SIP Configuration Guide*

Standards

Standard	Description
V.34	Broadband modems—A modem operating at rates of up to 33,600 bps for use on the public switched telephone network (PSTN) and on leased point-to-point 2-wire telephone-type circuits.
V.90	A digital modem and analog modem pair for use on the PSTN at data rates of up to 56,000 bps downstream and up to 33,600 bps upstream.

MIB

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

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

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of 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.	http://www.cisco.com/techsupport

Command Reference

This section documents the following modified commands:

- **mgcp modem relay voip mode**
- **modem relay (dial-peer)**
- **modem relay (voice-service)**

mgcp modem relay voip mode

To enable named signaling event (NSE) based modem relay mode for VoIP calls on a Media Gateway Control Protocol (MGCP) gateway, use the **mgcp modem relay voip mode** command in global configuration mode. To disable this function, use the **no** form of this command.

mgcp modem relay voip mode [**nse**] **codec** [**g711alaw** | **g711ulaw**] [**redundancy**] **gw-controlled**

no mgcp modem relay voip mode

Syntax Description

nse	(Optional) Instructs the gateway to use NSE mode for upspeeding.
codec	(Optional) Specifies a codec to use for upspeeding: • **g711alaw**—G.711 a-law 64,000 bits per second (bps) for E1. • **g711ulaw**—G.711 mu-law 64,000 bps for T1. This is the default.
redundancy	(Optional) Specifies packet redundancy for modem traffic during modem pass-through. By default, redundancy is disabled.
gw-controlled	Specifies the gateway-configured method for establishing modem relay parameters.

Command Default

Modem relay in NSE mode is disabled. All modem calls go through as pass-through calls, which are less reliable and use more bandwidth than modem relay calls, provided that pass-through is enabled.
The G.711 mu-law codec is used for upspeeding.
Redundancy is disabled and no duplicate data packets are sent while the gateway is in modem/fax pass-through mode.

Command Modes

Global configuration

Command History

Release	Modification
12.2(11)T	This command was introduced on the following platforms: Cisco 2600 series, Cisco 3620, Cisco 3640, Cisco 3660, Cisco 7200 series, and Cisco AS5300.
12.4(2)T	Usage guidelines were added for the **nse** keyword.
12.4(4)T	The **gw-controlled** keyword was added.
12.4(6)T	This feature was implemented on the Cisco 1700 series and Cisco 2800 series.

Usage Guidelines

The **mgcp modem relay voip mode** command enables non secure modem relay mode for MGCP VoIP calls. By default, NSE modem relay mode is disabled. This command configures upspeeding, which is needed because modem pass-through is an intermediate step while the gateway switches from handling voice calls to handling modem relay calls.

The **mgcp modem relay voip mode nse** command is not supported on the TI C2510 digital signal processor (DSP), formerly known as the TI C5510 DSP; only the TI C549 DSP supports negotiation of NSE parameters. If Cisco CallManager is used as the call agent, the **mgcp modem relay voip mode nse** command is not supported.

Redundancy causes the gateway to generate duplicate (redundant) data packets for fax/modem pass-through calls as per RFC 2198. For these calls to be more reliable, redundant packets transmission is needed to make up for excessive loss of packets in VoIP networks. Even if one of the gateways is configured with redundancy, calls go through. Gateways can handle asymmetric (one-way) redundancy.

To enable secure voice and data calls between Secure Telephone Equipment (STE) and IP-STE endpoints using the state signaling events (SSE) protocol, use the **mgcp modem relay voip mode sse** command. Before configuring SSE parameters, you must use the **mgcp package-capability mdste** command to enable modem relay capabilities and SSE protocol support.

The **gw-controlled** keyword specifies that modem transport parameters are configured directly on the gateway instead of being negotiated by the call agent.

Examples

The following example enables MGCP modem relay and specifies the following: NSE mode for upspeeding, G.711 mu-law codec, packet redundancy, and gateway-controlled for modem traffic during modem pass-through:

```
Router(config)# mgcp modem relay voip mode nse codec g711ulaw redundancy gw-controlled
```

Related Commands

Command	Description
mgcp modem relay voip gateway-xid	Optimizes the modem relay transport protocol and the estimated one-way delay across the IP network.
mgcp modem relay voip mode sse	Enables SSE-based modem relay.
mgcp package-capability mdste	Enables MGCP gateway support for processing events and signals for modem connections over a secure communication path between IP-STE and STE.
mgcp tse payload	Enables TSEs for communications between gateways, which are required for modem relay over VoIP using MGCP.

modem relay (dial-peer)

To configure modem relay over VoIP for a specific dial peer, use the **modem relay** command in dial-peer configuration mode. To disable modem relay over VoIP for a specific dial peer, use the **no** form of this command.

modem relay {**nse** [**payload-type** *number*] **codec** {**g711alaw** | **g711ulaw**} [**redundancy**] | **system**} **gw-controlled**

no modem relay {**nse** | **system**}

Syntax Description

nse	Named signaling event (NSE).
payload-type *number*	(Optional) NSE payload type. Range is from 98 to 119. Default is 100.
codec	Sets the upspeed voice compression selection for speech or audio signals. The upspeed method is used to dynamically change the codec type and speed to meet network conditions. A faster codec speed may be required to support both voice and data calls and a slower speed for only voice traffic.
g711ulaw	Codec G.711 mu-law 64,000 bits per second (bps) for T1.
g711alaw	Codec G.711 a-law 64,000 bps for E1.
redundancy	(Optional) Packet redundancy (RFC 2198) for modem traffic. Sends redundant packets for modem traffic during pass-through.
system	This default setting uses the global configuration parameters set with the **modem relay** command in voice-service configuration mode for VoIP.
gw-controlled	Specfies the gateway-configured method for establishing modem relay parameters.

Command Default

Cisco modem relay is disabled.
Payload type: 100

Command Modes

Dial-peer configuration

Command History

Release	Modification
12.2(11)T	This command was introduced on the following platforms: Cisco 2600 series, Cisco 3620, Cisco 3640, Cisco 3660, Cisco 7200 series, and Cisco AS5300.
12.4(4)T	The **gw-controlled** keyword was added.
12.4(6)T	This feature was implemented on the Cisco 1700 series and Cisco 2800 series.

Usage Guidelines

This command applies to VoIP dial peers. Use this command to configure modem relay over VoIP for a specific dial peer.

Use the same codec type for the originating and terminating gateway, as follows:

- T1 requires the G.711 mu-law codec.
- E1 requires the G.711 a-law codec.

The **system** keyword overrides the configuration for the dial peer, and the values from the **modem-relay** command in voice-service configuration mode for VoIP are used.

When using the **voice service voip** and **modem relay nse** commands on a terminating gateway to globally set up modem relay with NSEs, you must also ensure that each incoming call will be associated with a VoIP dial peer to retrieve the global fax or modem configuration. You associate calls with dial peers by using the **incoming called-number** command to specify a sequence of digits that incoming calls can match. You can ensure that all calls will match at least one dial peer by using the following commands:

```
Router(config)# dial-peer voice tag voip
Router(config-dial-peer)# incoming called-number .
```

Examples

The following example shows Cisco modem relay configured for a specific dial peer using the G.711 mu-law codec and enabling redundancy and gateway-controlled negotiation parameters:

```
Router(config-dial-peer)# modem relay nse codec g711ulaw redundancy gw-controlled
```

Related Commands

Command	Description
incoming called-number	Defines an incoming called number to match a specific dial peer.
modem passsthrough (voice service)	Enables fax or modem pass-through over VoIP globally for all dial peers.
modem relay (voice-service)	Enables fax or modem pass-through over VoIP globally for all dial peers.
voice service voip	Enters voice-service configuration mode and specifies the voice encapsulation type.

modem relay (voice-service)

To configure modem relay over VoIP for all connections, use the **modem relay** command in voice-service configuration mode. To disable modem relay over VoIP for all connections, use the **no** form of this command.

modem relay nse [**payload-type** *number*] **codec** {**g711ulaw** | **g711alaw**}
[**redundancy**[**maximum-sessions** *value*]] **gw-controlled**

no modem relay nse

Syntax Description

nse	Named signaling event (NSE).
payload-type *number*	(Optional) NSE payload type. Range is from 98 to 119. Default is 100.
codec	Sets the upspeed voice compression selection for speech or audio signals. The upspeed method is used to dynamically change the codec type and speed to meet network conditions. A faster codec speed may be required to support both voice and data calls and a slower speed for only voice traffic.
g711ulaw	Codec G.711m u-law 64,000 bits per second (bps) for T1.
g711alaw	Codec G.711 a-law 64,000 bps for E1.
redundancy	(Optional) Packet redundancy (RFC 2198) for modem traffic. Sends redundant packets for modem traffic during pass-through.
maximum-sessions *value*	(Optional) Maximum redundant, simultaneous modem-relay pass-through sessions. Range is from 1 to 10000. Default is 16. Recommended value for the Cisco AS5300 is 26.
gw-controlled	Specfies the gateway-configured method for establishing modem relay parameters.

Command Default

Cisco modem relay is disabled.
Payload type: 100.

Command Modes

Voice-service configuration

Command History

Release	Modification
12.2(11)T	This command was introduced on the following platforms: Cisco 2600 series, Cisco 3620, Cisco 3640, Cisco 3660, Cisco 7200 series, and Cisco AS5300.
12.4(4)T	The **gw-controlled** keyword was added.
12.4(6)T	This feature was implemented on the Cisco 1700 series and Cisco 2800 series.

Usage Guidelines

Use this command to configure modem relay over VoIP. The default behavior for this command is **no modem relay**. Configuration of modem relay for VoIP dial peers via the **modem relay** dial-peer configuration command overrides this voice-service command for the specific VoIP dial peer on which the dial-peer command is configured.

Use the same payload-type number for both the originating and terminating gateways.

Use the same codec type for the originating and terminating gateway, as follows:

- T1 requires the G.711 mu-law codec.
- E1 requires the G.711 a-law codec.

The **maximum-sessions** keyword is an optional parameter for the **modem relay** command. This parameter determines the maximum number of redundant, simultaneous modem relay sessions. The recommended value for the **maximum-sessions** keyword is 16. The value can be set from 1 to 10000. The **maximum-sessions** keyword applies only if the **redundancy** keyword is used.

When using the **voice service voip** and **modem relay nse** commands on a terminating gateway to globally set up modem relay with NSEs, you must also ensure that each incoming call will be associated with a VoIP dial peer to retrieve the global fax or modem configuration. You associate calls with dial peers by using the **incoming called-number** command to specify a sequence of digits that incoming calls can match. You can ensure that all calls will match at least one dial peer by using the following commands:

```
Router(config)# dial-peer voice tag voip
Router(config-dial-peer)# incoming called-number .
```

Examples

The following example shows Cisco modem relay enabled with NSE payload type 101 using the G.711 mu-law codec, enabling redundancy and gateway-controlled negotiation parameters:

```
Router(conf-voi-serv)# modem relay nse payload-type 101 codec g711ulaw redundancy
maximum-sessions 1 gw-controlled
```

Related Commands

Command	Description
incoming called-number	Defines an incoming called number to match a specific dial peer.
modem relay (dial-peer)	Configures modem relay on a specific VoIP dial peer.

Glossary

CM—call menu signal. A V.8 signal transmitted from the *call* DCE to indicate modulation modes available in the call DCE. CM consists of a repeating sequence of bits, modulated using a V.21 low-band channel. See joint menu signal (JM).

DSMP—Distributed Stream Media Processor. The software component that controls the DSP on behalf of the media service provider that handles conference calls. The DSMP also manages packet transmission and reception in fast switching.

JM—joint menu signal. A V.8 signal transmitted from the *answer* DCE to indicate modulation modes available jointly in the call and answer DCE. JM consists of a repeating sequence of bits, modulated using a V.21 high-band channel. See call menu signal (CM).

modem pass-through—The transport of modem signals through an IP network using pulse code modulation (PCM)-encoded packets.

modem relay—Modem relay demodulates a modem signal at one voice gateway and passes it as packet data to another voice gateway, where the signal is remodulated and sent to a receiving modem. On detection of the modem answer tone, the gateways switch into modem pass-through mode, and then, if the call menu (CM) signal is detected, the two gateways switch into modem relay mode.

VBD—voice band data. The transport of modem signals over a voice channel of an IP network with the appropriate encoding for modem signals.

Note See *Internetworking Terms and Acronyms* for terms not included in this glossary.