



Configuring DTMF Relay, Fax Relay, and Modem Relay

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This document describes how to enable DTMF Relay, Fax Relay and Modem Relay for analog Foreign Exchange Service (FXS) ports on Cisco voice gateways under the control of Cisco Unified Communications Manager or Cisco Unified Communications Express (Cisco Unified CME).

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the “[Feature Information for DTMF Relay, Fax Relay, and Modem Relay for SCCP FXS Ports in Cisco IOS](#)” section on page 191.

Finding Support Information for Platforms and Cisco IOS Software Images

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.

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Prerequisites for DTMF Relay, Fax Relay, and Modem Relay for SCCP FXS Ports in Cisco IOS

Cisco IOS Gateway

- Cisco IOS Release 12.4(6)XE or a later release.
- The Cisco IOS gateway is set up and configured for operation. For information, see the appropriate Cisco configuration documentation.
- The analog FXS voice ports are set up and configured for operation. For information, see the [Cisco IOS Voice Port Configuration Guide](#).
- SCCP version 4.0 or a later version and the SCCP telephony control (STC) application is enabled on the Cisco IOS gateway. For configuration information, see the [“Configuring FXS Ports for Basic Calls” section on page 17](#).

Analog Endpoints in Cisco Unified Communications Manager

- Cisco Unified Communications Manager 4.2 or a later version.
- For RFC 2833 DTMF Digit Relay: Cisco Unified Communications Manager 5.0.1 or a later version.

Analog Endpoints in Cisco Unified CME

- Cisco Unified CME 4.0 or a later version.

Restrictions for DTMF Relay, Fax Relay, and Modem Relay for SCCP FXS Ports in Cisco IOS

- Autoconfiguration using TFTP download of extensible markup language (XML) dial-peer configuration files from Cisco Unified Communications is not supported.
- RFC 2833 DTMF Digit Relay is not supported for Cisco Unified CME or Cisco Unified Survivable Remote Site Telephony (Cisco Unified SRST).
- RFC 2833 DTMF Digit Relay does not support FXS ports configured for SCCP private line, automatic ring-down (PLAR).
- RFC 2833 DTMF Digit Relay is not supported between two SCCP analog phones; one of the endpoints must be a Session Initiation Protocol (SIP) trunk, a Cisco IOS gateway, or a port.

Information About DTMF Relay, Fax Relay, and Modem Relay for SCCP FXS Ports in Cisco IOS

To configure DTMF Relay, Fax Relay, and Modem Relay for SCCP FXS Ports in Cisco IOS, you should understand the following concepts:

- [RFC 2833 DTMF Digit Relay Support on SCCP Controlled Endpoints, page 183](#)
- [SCCP Gateway Controlled Fax Relay, page 183](#)
- [SCCP Gateway Controlled Modem Relay, page 183](#)

RFC 2833 DTMF Digit Relay Support on SCCP Controlled Endpoints

The RFC 2833 DTMF Digit Relay feature on the SCCP analog gateway sends RFC 2833 digits through Real-time Transport Protocol (RTP) packets and out-of-band (OOB) digits to Cisco Unified Communications Manager. This feature is not supported in Cisco Unified CME or Cisco Unified SRST.

The RFC 2833 DTMF Digit Relay feature is enabled by default on the Cisco IOS gateway and on the Cisco Unified Communications Manager, where it can be disabled. No configuration is required on the SCCP analog gateway or on Cisco Unified Communications Manager to enable this feature.

SCCP Gateway Controlled Fax Relay

Before Cisco IOS Release 12.4(6)XE, SCCP gateways supported fax passthrough only. In Cisco IOS Release 12.4(6)XE and later releases, SCCP Gateway Controlled Fax Relay adds support for the following fax relay features for SCCP analog endpoints:

- T.38 named signaling events (NSE) forced fax relay—Provides an ITU-T standards-based method for fax relay. Data is packetized and encapsulated according to the T.38 standard fax protocol. The SCCP gateway uses NSEs to indicate T.38 fax relay switchover. Configuring the gateway to unconditionally use T.38 NSE forced fax relay enables interoperability with a Cisco voice gateway that does not support interworking and negotiation of T.38 fax relay and NSE attributes at the time of call setup.
- Cisco fax relay—Proprietary fax relay implementation that uses RTP to transport fax data. Fax relay is the default mode for passing faxes through a VoIP network, and Cisco fax relay is the default fax relay type on Cisco voice gateways.
- Super Group 3 (SG3) to G3 fax relay—Allows the fax stream between two SG3 fax machines to negotiate down to G3 speeds (less than 14.4 kbps) allowing SG3 fax machine interoperability over T.38 fax relay with G3 fax machines.

For configuration information, see the [“Configuring SCCP Gateway Fax Relay Features”](#) section on page 184.

SCCP Gateway Controlled Modem Relay

There are two ways to transport modem traffic over VoIP networks: modem pass-through and modem relay.

Modem pass-through transports modem signals through a packet network using PCM encoded packets; traffic is susceptible to packet loss, jitter, and latency in the IP network.

With modem relay, the modem signals are demodulated at one gateway, converted into digital form, and carried in Simple Packet Relay Transport (SPRT) packets to the other gateway. There the modem signal is re-created and remodulated, then passed to the receiving modem. Modem relay lessens bandwidth requirements and significantly reduces the effect that dropped packets, jitter, and latency have on the modem session.

Before Cisco IOS Release 12.4(6)XE, only modem pass-through only and Cisco Unified Communications Manager-controlled modem relay were supported for SCCP gateways. In Cisco IOS Release 12.4(6)XE and later releases, the SCCP Gateway Controlled Modem Relay feature adds support for SCCP gateway-controlled modem relay.

Cisco uses a proprietary protocol, NSE, to signal events that are exchanged between gateways, using Real-time Transport Protocol (RTP) packets. SCCP gateway-controlled modem-relay bypasses NSE parameter negotiation between gateways and uses the NSE mechanism to indicate the gateway control mode to the other gateway. NSE signaling capability must be configured on both the originating and terminating gateways to enable modem-relay calls for SCCP analog endpoints.

For configuration information, see the [“Configuring SCCP Gateway Controlled Modem Relay” section on page 186](#).

**Note**

In addition to a proprietary, NSE-based modem-relay implementation, Cisco offers V.150.1 modem-relay implementation. The VMWI for SCCP FXS Ports in Cisco IOS feature supports only NSE modem relay. For information about feature mode, see the [“Configuring Feature Mode” section on page 93](#).

How to Configure DTMF Relay, Fax Relay, and Modem Relay for SCCP FXS Ports in Cisco IOS

This section contains the following tasks:

- [Configuring SCCP Gateway Fax Relay Features, page 184](#)
- [Configuring SCCP Gateway Controlled Modem Relay, page 186](#)
- [Verifying and Troubleshooting DTMF Relay, Fax Relay, and Modem Relay for SCCP FXS Ports in Cisco IOS Feature Configuration, page 187](#)

Configuring SCCP Gateway Fax Relay Features

To configure SCCP gateway fax relay features, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice service voip**
4. **fax protocol t38 nse force**
5. **fax protocol cisco**

6. `fax-relay sg3-to-g3`
7. `end`

DETAILED STEPS

	Command or Action	Purpose
Step 1	<code>enable</code> Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none">Enter your password if prompted.
Step 2	<code>configure terminal</code> Example: Router# configure terminal	Enters global configuration mode.
Step 3	<code>voice service voip</code> Example: Router(config)# voice service voip	Enters voice service configuration mode and specifies VoIP encapsulation.
Step 4	<code>fax protocol t38 nse force</code> Example: Router(config-voi-serv)# fax protocol t38 nse force	(Optional) Specifies ITU-T T.38 standard fax protocol. <ul style="list-style-type: none">nse force—Configures the SCCP gateway to use NSEs to indicate T.38 fax relay switchover, whether T.38 functionality is negotiated with the far-end gateway or not.
Step 5	<code>fax protocol cisco</code> Example: Router(config-voi-serv)# fax protocol cisco	(Optional) Specifies the Cisco-proprietary fax protocol as the default fax protocol for SCCP analog endpoints.
Step 6	<code>fax-relay sg3-to-g3</code> Example: Router(config-voi-serv)# fax relay sg3-to-g3	(Optional) Enables the fax stream between two SG3 fax machines to negotiate down to G3 speeds.
Step 7	<code>end</code> Example: Router(config-voi-serv)# end	Exits the current configuration mode and returns to global configuration mode.

Examples

The following output from the `show voice dsp` command displays fax codec settings:

```
Router# show voice dsp

TYPE  NUM   CH CODEC   VERSION   STATE.....
=====
C5510 001  01 fax      9.0.108   busy
C5510 001  02 fax      9.0.108   busy
```

The following output from the `show voice call summary` command display fax codec settings:

```
Router# show voice call summary

PORT          CODEC          VAD  VTSP.....
=====
1/0/0         t38 (or cisco) n  S_CONNECT
1/0/1         t38 (or cisco) n  S_CONNECT
```

Troubleshooting Tips

The following commands can help troubleshoot SCCP fax relay features:

- **debug voip application stcapp all**
- **debug voip vtsp all**

Configuring SCCP Gateway Controlled Modem Relay

This task configures SCCP gateway controlled modem relay.

Prerequisites

SCCP gateway controlled modem relay must be configured on both the originating and terminating gateways.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice service voip**
4. **modem relay nse codec [g711u | g711a] gw-controlled**
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<pre>enable</pre> <p>Example: Router> enable </p>	Enables privileged EXEC mode. <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	<pre>configure terminal</pre> <p>Example: Router# configure terminal </p>	Enters global configuration mode.
Step 3	<pre>voice service voip</pre> <p>Example: Router(config)# voice service voip </p>	Enters voice service configuration mode and specifies VoIP encapsulation.
Step 4	<pre>modem relay nse codec [g711u g711a] gw-controlled</pre> <p>Example: Router(conf-voi-serv)# modem relay nse codec g711u gw-controlled </p>	Configures modem relay over VoIP. <ul style="list-style-type: none"> g711u—Specifies codec G.711m u-law 64,000 bits per second (bps) for T1. g711a—Specifies codec G.711 a-law 64,000 bps for E1. gw-controlled—Specifies the gateway-configured method for establishing modem relay parameters.
Step 5	<pre>end</pre> <p>Example: Router(conf-voi-serv)# end </p>	Exits the current configuration mode and returns to global configuration mode.

Verifying and Troubleshooting DTMF Relay, Fax Relay, and Modem Relay for SCCP FXS Ports in Cisco IOS Feature Configuration

To verify the configuration of VMWI for SCCP FXS Ports in Cisco IOS features, use the **show-running config** command. A sample output is located in the “[Configuration Examples for DTMF Relay, Fax Relay, and Modem Relay for SCCP FXS Ports in Cisco IOS](#)” section on page 189.

Use the following commands to verify and troubleshoot the configuration of the dial tone generation after remote onhook feature:

- show dial-peer voice *number***—Displays whether the dial tone after remote onhook feature is enabled.
- show stcapp device voice-port *port***—Displays whether the dial tone after remote onhook feature is enabled.
- debug voip application stcapp all**—Displays detailed debugging for SCCP and STC application ports.
- debug voip application stcapp port *port-number***—Displays detailed debugging for the specified SCCP and STC application port.

Use the following commands to verify and troubleshoot the configuration of the ground start FXS ports feature:

- **show stcpp device summary**—Displays a summary of endpoints associated with the STC application, their states, types and call control device.
- **show voice port slot/subunit/port**—Displays whether ground-start signaling is enabled and displays port states.
- **debug vpm signal**—Displays supervisory disconnect event messages.

Use the following commands to verify and troubleshoot the RFC 2833 DTMF digit relay feature.

- **debug voip application stcpp port port-number**—Displays RFC 2833 send and receive payload messages.
- **debug voip hpi**—Displays digital signal processor (DSP) programming.
- **debug voip rtp session named-event**—Verifies the gateway sending inband DTMF signaling.

Use the following commands to verify and troubleshoot SCCP gateway controlled modem relay:

- **show voice call summary**—Displays modem relay voice port settings.
- **show voice dsp**—Displays modem relay DSP channel status.
- **debug voip application stcpp all**—Displays STC application modem relay information.
- **debug voip dsm all**—Displays modem relay DSP stream manager (DSM) messages.
- **debug voip dsmp all**—Displays modem relay distributed stream media processor (DSMP) messages.
- **debug voip hpi all**—Displays gateway DSP modem relay termination codes and messages indicating probable causes for disconnection.

Use the following commands to verify and troubleshoot SCCP gateway controlled fax relay:

- **show voice call summary**—Displays fax relay voice port settings.
- **show voice dsp**—Displays fax relay DSP channel status.
- **debug voip application stcpp all**— Displays STC application fax relay information.
- **debug voip dsm all**—Displays fax relay DSM messages.
- **debug voip dsmp all**—Displays fax relay DSMP messages.
- **debug voip hpi all**—Displays gateway DSP fax relay information on RTP packet events.
- **debug voip vtsp all**—Displays gateway voice telephony service provider (VTSP) debugging information for fax calls.

**Note**

For more information on these commands, see the [Cisco IOS Voice Command Reference](#), [Cisco IOS Debug Command Reference](#), Release 12.4T, and [Cisco IOS Configuration Fundamentals Command Reference](#), Release 12.4.

Configuration Examples for DTMF Relay, Fax Relay, and Modem Relay for SCCP FXS Ports in Cisco IOS

The following example shows modem relay enabled and dial tone after remote onhook is disabled. The **fax protocol cisco** command does not appear in the output because it is set to its default value.

```
Router# show running-config
.
.
modem relay nse codec g711ulaw
.
.
no tone dialtone remote-onhook
dial-peer voice 3002 pots
  service stcapp
  port 1/1/0
!
!
!
```

Additional References

The following sections provide references related to the VMWI for SCCP FXS Ports in Cisco IOS feature.

Related Documents

Related Topic	Document Title
Cisco Unified Communications Manager interoperability	<i>Cisco Unified CallManager and Cisco IOS Interoperability Guide</i>
Cisco Unified Communications Manager	<i>Cisco Unified Communications Manager System Guide</i>
Cisco Unified Communications Express	<i>Cisco Unified CME Administrator Guide</i>
Cisco IOS debugging	<i>Cisco IOS Debug Command Reference</i>
Cisco IOS voice commands	<i>Cisco IOS Voice Command Reference</i>
Cisco IOS voice configuration guides	<i>Cisco IOS Voice Configuration</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>	http://www.cisco.com/techsupport

Feature Information for DTMF Relay, Fax Relay, and Modem Relay for SCCP FXS Ports in Cisco IOS

Table 1 lists the features in this module and provides links to specific configuration information. Only features that were introduced or modified in Cisco IOS Release 12.4(6)XE or a later release appear in the table.

For information on a feature in this technology that is not documented here, see the “[Supplementary Services Features Roadmap](#)” section on page 1.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

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://www.cisco.com/go/cfn>. An account on Cisco.com is not required.



Note

Table 1 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 1 Feature Information for VMWI for SCCP FXS Ports in Cisco IOS Feature

Feature Name	Releases	Feature Information
DTMF Relay, Fax Relay and Modem Relay for SCCP FXS Ports in Cisco IOS	12.4(6)XE 12.4(11)T	<p>Enhances the transmission of DTMF digits, faxes and modems between SCCP FXS ports on Cisco IOS gateways. DTMF digit transmission is supported by using RFC 2833. Cisco Fax Relay, Cisco T.38 Fax Relay, and Cisco Modem Relay are supported using Names Signaling Events (NSE).</p> <p>The following sections provide information about this feature:</p> <ul style="list-style-type: none"> Information About DTMF Relay, Fax Relay, and Modem Relay for SCCP FXS Ports in Cisco IOS, page 182. How to Configure DTMF Relay, Fax Relay, and Modem Relay for SCCP FXS Ports in Cisco IOS, page 184. <p>The following commands were introduced or modified by this feature: debug voip application stcapp all; debug voip application stcapp port; show stcapp device; tone dialtone remote-onhook</p>

