



Configuring Cisco Fax Relay

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This chapter describes configuration for Cisco fax relay on an IP network. With Cisco fax relay, gateways terminate T.30 fax signaling by spoofing a virtual fax machine to the locally attached fax machine. The gateways use a Cisco-proprietary fax-relay RTP-based protocol to communicate between them.

History for the Cisco Fax Relay Feature

Release	Modification
12.2(11)T	This feature was introduced.
12.4(4)T	The fax-relay sg3-to-g3 command was integrated into Cisco IOS release 12.4(4)T

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 [Cisco IOS Voice Configuration Library](#); including library preface and glossary, other feature documents, and troubleshooting documentation.

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Americas Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

Finding Feature Information

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

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

Prerequisites for Configuring Cisco Fax Relay

Before you configure Cisco fax relay, perform the following steps:

- Install a software release that supports Cisco fax relay.
- Establish a working H.323 or SIP network for voice calls.
- Complete voice interoperability testing with third-party gateways and gatekeepers.

Restrictions for Configuring Cisco Fax Relay

Restrictions for implementing Cisco fax relay are as follows.

- Some platforms, such as the Cisco AS5350, Cisco AS5800, and Cisco AS5850, do not support Cisco-proprietary fax relay.
- Third-party vendors must adhere to V.8 and T.30 specifications.
- Third-party vendors might experience a 2.5- to 4-second delay before the fax transmission begins. This is the ANSam timeout value specified in the T.30 specification.
- SG3 V.8 fax CM message suppression supports only the TI C5421, TI C549, and TI C5510 digital signal processors (DSPs).
- SG3 V.8 fax CM message suppression is enabled by default for Cisco fax relay.
- If you use modem pass-through to send SG3 faxes and you use Cisco fax relay to send G3 faxes, you must configure both modem pass-through and fax relay.
- When a two-gateway solution is used, both gateways must be configured to use SG3 V.8 fax CM message suppression.
- When a one-gateway solution is used, other gateways can be Cisco gateways that do not support SG3 V.8 fax CM message suppression or third-party gateways that are not SG3-capable if the fax CM message suppression gateway is the originating gateway.
- SG3 fax machines will scale down to G3 speeds if the SG3 V.8 fax CM message is suppressed or if the signals are not delivered reliably by low bit rate codecs.

Information About Cisco Fax Relay

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Methods for Fax Relay

Cisco provides two methods for fax relay. One method is a Cisco-proprietary method called Cisco fax relay, and it is described in this chapter. The second method is based on the ITU-T T.38 standard, and it is described in "[Configuring T.38 Fax Relay](#)."

- T.38 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. This capability has been supported in Cisco IOS Release 11.3 and later releases and is widely available. Cisco fax relay uses Real-Time Transport Protocol (RTP) to transport the fax data.
- Cisco fax relay is configured on the VoIP dial peers that direct calls into and out of the packet network. Cisco fax relay can be configured under the H.323 and Session Initiation Protocol (SIP) call control protocols.

Fax Relay Packet Loss Concealment

Cisco fax relay supports fax relay packet loss concealment, which is a technique that allows gateways to disregard packet loss rates that might otherwise cause fax failures. High-end fax machines with the memory to store page data often are able to use Error Correction Mode (ECM) for error-free page transmission. When ECM is enabled, a fax page is transmitted in a series of blocks that contain frames with packets of data. After receiving the data for a complete page, a receiving fax machine notifies the transmitting fax machine of any frames with errors. The transmitting fax machine then retransmits the specified frames. This process is repeated until all frames are received without errors. If the receiving fax machine is unable to receive an error-free page, the fax transmission may fail and one of the fax machines may disconnect. On networks that have a packet loss rate greater than 2 per cent, fax transmissions routinely fail when ECM is enabled because of ECM's low tolerance for packet loss.

The Fax Relay Packet Loss Concealment feature allows you to control whether ECM is enabled or disabled for fax transmissions on a VoIP dial peer. By disabling ECM on networks with a large amount of packet loss, you ensure that more fax transmissions are completed, although they may not be totally error-free.

When ECM is disabled, a fax page is transmitted using high-speed modulation in its raw encoded format. When detecting line errors with ECM disabled, the receiving fax machine has three options (in order of increasing severity):

- Respond to page reception with the ReTrain Positive command. This response causes the transmitting fax to go through the training check process before transmitting the next page.
- Respond to the page reception with the ReTrain Negative command. This response causes the transmitting fax to go through the Training Check Frame (TCF) process with a lower modulation scheme.
- Disconnect immediately.

Fax relay ECM is enabled by default. To disable ECM, you use the **fax-relay ecm disable** command on the VoIP dial peer. After this command is configured, the gateway's Digital Signal Processor (DSP) fax-relay firmware modifies the T.30 Digital Information Signal (DIS) message. This modification is performed on DIS signals in both directions, so that ECM is disabled even when only one gateway is configured to disable ECM.

Disabling of ECM is recommended for dial peers handling fax relay traffic on known lossy networks, especially those with a packet loss rate of 2 percent or greater. The **debug fax relay t30** command provides information about the E.164 destination and T.30 messages associated with fax transmissions. Note that an excessive number of simultaneous debug operations can degrade performance.

Fax CM Message Tone Suppression

Super Group 3 (SG3) is a new generation of fax machines that support speeds of up to 33.6 kbps through V.34 half duplex (HD) modulation and V.8 signaling.

SG3 V.8 fax CM message tone suppression enables SG3 fax machines to scale down without end-user interaction and without using the extra bandwidth required by modem pass-through and allows SG3 fax machines to interoperate over a fax-relay network at G3 speeds by blocking the SG3 V.8 CM message, or fax tone, from reaching the called fax machine. This causes the called fax machine to time out on the ANSam tone and scale down to G3 speeds by initiating V.21 negotiations.

SG3 V.8 fax CM message tone suppression supports both the one-gateway and two-gateway solutions:

- With a one-gateway solution, the gateway on one end of the call can be configured to suppress the SG3 V.8 fax CM message independently of the gateway on the other end of the call. The one-gateway solution suppresses the fax CM tone on both TDM and IP interfaces (TI C5510 DSPs only), and can interoperate with third-party gateways when the fax CM tone suppression gateway is the originating gateway. A one-gateway solution
- With a two-gateway solution, the gateways on both ends of the call must have this feature enabled. The two-gateway solution suppresses the fax CM tone only on the TDM interface (TI C5421 and TI C549 DSPs). Both gateways must support this feature to interoperate at G3 speeds, or the fax tone suppression gateway must be the originating gateway.

**Note**

If both the originating gateway and the terminating gateways are configured for V.8 fax CM message suppression, the suppression occurs on the originating gateway.

How to Configure Cisco Fax Relay

Cisco fax relay can be configured globally for all VoIP dial peers or for individual dial peers. This section contains the following tasks:

**Note**

Fax relay parameters that are set for an individual dial peer under the **dial-peer voice** command take precedence over global settings made under the **voice service voip** command.

- [Configuring Cisco Fax Relay for One or More Individual VoIP Dial Peers](#), page 4
- [Configuring Cisco Fax Relay for VoIP Dial Peers Globally](#), page 6

Configuring Cisco Fax Relay for One or More Individual VoIP Dial Peers

Use the following steps to configure Cisco fax relay for individual dial peers.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **dial-peer voice *tag* voip**
4. **fax protocol { cisco | none | system }**
5. **fax rate { 12000 | 14400 | 2400 | 4800 | 7200 | 9600 | disable | voice } [bytes rate]**
6. **fax-relay ecm disable**
7. **fax nsf *word***
8. **fax-relay sg3-to-g3 *system***

DETAILED STEPS

Command or Action	Purpose
<p>Step 1 enable</p> <p>Example:</p> <pre>Router> enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> • Enter your password if prompted.
<p>Step 2 configure terminal</p> <p>Example:</p> <pre>Router# configure terminal</pre>	<p>Enters global configuration mode.</p>
<p>Step 3 dial-peer voice <i>tag</i> voip</p> <p>Example:</p> <pre>Router(config)# dial-peer voice 25 voip</pre>	<p>Enters dial-peer configuration mode and defines a dial peer that directs traffic to or from a packet network.</p> <ul style="list-style-type: none"> • <i>tag</i> --Dial-peer identifier that consists of one or more digits. Valid entries are from 1 to 2147483647. • voip --Calls from this dial peer use voice encapsulation on the packet network.
<p>Step 4 fax protocol { cisco none system }</p> <p>Example:</p> <pre>Router(config-dial-peer)# fax protocol cisco</pre>	<p>Specifies the fax protocol for this dial peer.</p> <ul style="list-style-type: none"> • cisco -- Cisco-proprietary fax protocol. This is the default. • none --No fax protocol. • system --Use global configuration for this dial peer.

Command or Action	Purpose
<p>Step 5 <code>fax rate { 12000 14400 2400 4800 7200 9600 disable voice } [bytes rate]</code></p> <p>Example:</p> <pre>Router(config-dial-peer)# fax rate 14400</pre>	<p>(Optional) Selects the fax transmission speed to be attempted when this dial peer is used.</p> <ul style="list-style-type: none"> • 12000 , 14400, 2400, 4800, 7200, 9600--Maximum bits-per-second speed. • disable --Disables fax relay transmission capability. • voice --Highest possible transmission speed allowed by the voice rate. For example, if the voice codec is G.711, fax transmission occurs at up to 14400 bps because 14400 bps is less than the 64-kbps voice rate. If the voice codec is G.729 (8 kbps), the fax transmission speed is 7200 bps. This is the default. • bytes rate --(Optional) Fax packetization rate, in ms. Range is 20 to 48. The default is 20.
<p>Step 6 <code>fax-relay ecm disable</code></p> <p>Example:</p> <pre>Router(config-dial-peer)# fax- relay ecm disable</pre>	<p>(Optional) Disables fax-relay ECM.</p> <p>Note To enable ECM, use the no form of this command.</p>
<p>Step 7 <code>fax nsf word</code></p> <p>Example:</p> <pre>Router(config-dial-peer)# fax nsf 000000</pre>	<p>(Optional) Allows the router to override the settings made by fax machines that try to implement proprietary encodings (non-standard facilities, or NSF). By default, the NSF code is not overridden.</p> <ul style="list-style-type: none"> • <i>word</i> --Two-digit hexadecimal country code and a four-digit hexadecimal manufacturer code. <p>Note Setting this command to all zeroes prevents transfer of NSF during fax negotiation and overwrites the NSF so that only standard fax transactions occur. Because a router demodulates and decodes fax tones based on the T.30 specification, transactions or encoding that are proprietary can cause fax relay transmissions to fail.</p>
<p>Step 8 <code>fax-relay sg3-to-g3 system</code></p> <p>Example:</p> <pre>Router(config-dial-peer)# fax- relay sg3-to-g3 system</pre>	<p>Specifies that for SIP and H.323 signaling types, V.8 fax CM message suppression is enabled on the specific dial peer. Enabled by default.</p> <ul style="list-style-type: none"> • <i>system</i> --Uses the protocol set under the voice-service configuration.

Configuring Cisco Fax Relay for VoIP Dial Peers Globally

Use the following steps to configure Cisco fax relay globally for VoIP dial peers.



Note

Fax relay parameters that are set for an individual dial peer under the **dial-peer voice** command take precedence over global settings made under the **voice service voip** command.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice service voip**
4. **fax protocol { cisco | none }**
5. **fax-relay sg3-to-g3**

DETAILED STEPS

Command or Action	Purpose
Step 1 enable Example: <pre>Router> enable</pre>	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2 configure terminal Example: <pre>Router# configure terminal</pre>	Enters global configuration mode.
Step 3 voice service voip Example: <pre>Router(config)# voice service voip</pre>	Enters voice-service configuration mode.
Step 4 fax protocol { cisco none } Example: <pre>Router(config-voi-serv)# fax protocol cisco</pre>	Specifies the fax protocol for all dial peers. <ul style="list-style-type: none"> • cisco --Cisco-proprietary fax protocol. • none --Disables fax relay and fax pass-through.
Step 5 fax-relay sg3-to-g3 Example: <pre>Router(config-voi-serv)# fax-relay sg3-to-g3</pre>	(Optional) Specifies that for SIP and H.323 signaling types, V.8 fax CM message suppression is enabled for all dial peers on the digital signal processor (DSP) firmware. Enabled by default.

Configuration Examples for Cisco Fax Relay

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- [Configuration Disabled for MGCP Example, page 9](#)

- [Show Fax Portion of Telephony Call Leg Example, page 9](#)

MGCP VoIP Dial Peer Example

SG3 V.8 fax CM message suppression is enabled by default and does not appear in the running configuration. To view the configuration for:

- H.323 and SIP--Use the **show dial-peer voice tag** command.
- MGCP--Use the **show mgcp** command.

```
Router# show dial-peer voice 2000
VoiceOverIpPeer2000
  peer type = voice, information type = voice,
  description = '',
  tag = 2000, destination-pattern = '',
  answer-address = '', preference=0,
  CLID Restriction = None
  CLID Network Number = ''
  CLID Second Number sent
  CLID Override RDNIS = disabled,
  source carrier-id = '', target carrier-id = '',
  source trunk-group-label = '', target trunk-group-label = '',
  numbering Type = 'unknown'
  group = 2000, Admin state is up, Operation state is up,
  incoming called-number = '2...', connections/maximum = 0/unlimited,
  DTMF Relay = disabled,
  modem transport = relay, nse, payload type = 100, codec = g711alaw, , ga
  teway-controlled,
  URI classes:
    Incoming (Called) =
    Incoming (Calling) =
    Destination =
  huntstop = disabled,
  in bound application associated: 'DEFAULT'
  out bound application associated: ''
  dnis-map =
  permission :both
  incoming COR list:maximum capability
  outgoing COR list:minimum requirement
  Translation profile (Incoming):
  Translation profile (Outgoing):
  incoming call blocking:
  translation-profile = ''
  disconnect-cause = 'no-service'
  advertise 0x40 capacity_update_timer 25 addrFamily 4 oldAddrFamily 4
  type = voip, session-target = 'ipv4:10.2.109.103',
  technology prefix:
  settle-call = disabled
  ip media DSCP = ef, ip signaling DSCP = af31,
  ip video rsvp-none DSCP = af41,ip video rsvp-pass DSCP = af41
  ip video rsvp-fail DSCP = af41,
  UDP checksum = disabled,
  session-protocol = cisco, session-transport = system,
  req-qos = best-effort, acc-qos = best-effort,
  req-qos video = best-effort, acc-qos video = best-effort,
  req-qos audio def bandwidth = 64, req-qos audio max bandwidth = 0,
  req-qos video def bandwidth = 384, req-qos video max bandwidth = 0,
  RTP dynamic payload type values: NTE = 101
  Cisco: NSE=100, fax=96, fax-ack=97, dtmf=121, fax-relay=122
        CAS=123, ClearChan=125, PCM switch over u-law=0,A-law=8
  RTP comfort noise payload type = 19
  fax rate = fax, payload size = 20 bytes
  fax protocol = system
  fax-relay ecm enable
  Fax Relay SG3-to-G3 Enabled (by system configuration)
  fax NSF = 0xAD0051 (default)
  codec = g729r8, payload size = 20 bytes,
  Media Setting = flow-through (global)
  Expect factor = 10, Icpif = 20,
  Playout Mode is set to adaptive,
```

```

Initial 60 ms, Max 250 ms
Playout-delay Minimum mode is set to default, value 40 ms
Fax nominal 300 ms
Max Redirects = 1, signaling-type = cas,
VAD = enabled, Poor QOV Trap = disabled,
Source Interface = NONE
voice class sip url = system,
voice class sip rellxx = system,
redirect ip2ip = disabled
probe disabled,
voice class perm tag = ``
Time elapsed since last clearing of voice call statistics never
Connect Time = 0, Charged Units = 0,
Successful Calls = 0, Failed Calls = 0, Incomplete Calls = 0
Accepted Calls = 0, Refused Calls = 0,
Last Disconnect Cause is "",
Last Disconnect Text is "",
Last Setup Time = 0.

```

Configuration Disabled for MGCP Example

When SG3 V.8 fax CM message suppression is not enabled, the running configuration shows **no mgcp fax-relay sg3-to-g3**, as shown in mgcp section of the following example:

```

Router# show running config
Building configuration...
Current configuration : 3231 bytes
!
! No configuration change since last restart
!
version 12.3
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router
!
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 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

```

Show Fax Portion of Telephony Call Leg Example

The **show call active fax** command lists information about the fax part of the telephony call leg. Use this command to verify the SG3 fax CM suppression type, as shown in the following example:

```

Router# show call active fax
Telephony call-legs: 1
SIP call-legs: 0
H323 call-legs: 0
Call agent controlled call-legs: 0
SCCP call-legs: 0
Multicast call-legs: 0
Total call-legs: 1

```

```

GENERIC:
SetupTime=2635990 ms
Index=1
PeerAddress=7001
PeerSubAddress=
PeerId=7000
PeerIfIndex=19
LogicalIfIndex=5
ConnectTime=2649400 ms
CallDuration=00:00:08 sec
CallState=4
CallOrigin=2
ChargedUnits=0
InfoType=fax
TransmitPackets=506
TransmitBytes=13616
ReceivePackets=134
ReceiveBytes=2388
TELE:
ConnectionId=[0x33333333 0x77777777 0xFFFFFFFF 0xDDDDDDDD
IncomingConnectionId=[0x66666666 0BBBBBBBB 0x88888888 0xEEEEEEEE
CallID=5
TxDuration=14800 ms
VoiceTxDuration=4150 ms
FaxTxDuration=0 ms
FaxRate=7200 bps
SG3 Fax CM Suppression Type=TDM
NoiseLevel=-69
ACOMLevel=6
OutSignalLevel=-79
InSignalLevel=-73
InfoActivity=1
ERLLevel=6
EchoCancellerMaxReflector=4
SessionTarget=
ImgPages=0
CallerName=
CallerIDBlocked=False
OriginalCallingNumber=
OriginalCallingOctet=0x0
OriginalCalledNumber=
OriginalCalledOctet=0x80
OriginalRedirectCalledNumber=
OriginalRedirectCalledOctet=0x0
TranslatedCallingNumber=7001
TranslatedCallingOctet=0x0
TranslatedCalledNumber=
TranslatedCalledOctet=0x80
TranslatedRedirectCalledNumber=
TranslatedRedirectCalledOctet=0x0
GwCollectedCalledNumber=9102
DSPIdentifier=3/1:1
Telephony call-legs: 1
SIP call-legs: 0
H323 call-legs: 0
Call agent controlled call-legs: 0
SCCP call-legs: 0
Multicast call-legs: 0
Total call-legs: 1

```

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