



Configuring T.38 Fax Relay

This chapter describes how to configure T.38 fax relay on an IP network. It includes the following features:

- Fax Relay Packet Loss Concealment
- MGCP Based Fax (T.38) and DTMF Relay
- SIP T.38 Fax Relay
- T.38 Fax Relay for T.37/T.38 Fax Gateway
- T.38 Fax Relay for VoIP H.323

Feature History for Fax Relay Packet Loss Concealment

Release	Modification
12.1(3)T	This feature was introduced.
12.1(5)XM	This feature was implemented on the Cisco AS5800.
12.1(5)XM2	This feature was implemented on the Cisco AS5350 and Cisco AS5400.
12.2(2)XB1	This feature was implemented on the Cisco AS5850.
12.2(11)T	This feature was integrated into this release and implemented on the Cisco AS5350, Cisco AS5400, Cisco AS5800, and Cisco AS5850.

Feature History for MGCP Based Fax (T.38) and DTMF Relay

Release	Modification
12.2(2)XB	This feature was introduced.
12.2(8)T	This feature was integrated into this release and implemented on the Cisco 2600 series, Cisco 3600 series, and Cisco 7200 series.
12.2(11)T	This feature was implemented on the Cisco AS5300, Cisco AS5350, Cisco AS5400, and Cisco AS5800.
12.2(11)T2	The gateway force keyword pair was introduced.
12.2(15)T	This feature was implemented on the Cisco 1751 and Cisco 1760.
12.4T	The mgcp fax t38 inhibit command was no longer configured by default for MGCP gateways that use the auto-configuration function.

Feature History for SIP T.38 Fax Relay

Release	Modification
12.2(13)T	This feature was introduced.

Feature History for T.38 Fax Relay for T.37/T.38 Fax Gateway

Release	Modification
12.1(3)X1	This feature was introduced.

Feature History for T.38 Fax Relay for VoIP H.323

Release	Modification
12.2(13)T	This feature was introduced.

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:

- [Chapter 1, “Fax Services over IP Overview”](#)
- [Cisco IOS Voice Configuration Library](#)

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Prerequisites for T.38 Fax Relay

H.323 and SIP T.38 Fax Relay

- Ensure that your platform is supported.
- Complete the following tasks:
 - Install a software release that supports fax pass-through.

- Install appropriate hardware and memory for your platform (see [Table 4-1](#)).
- Establish a working H.323 or SIP network for voice calls. T.38 fax relay interoperability requires H.323 Version 2.
- Complete voice interoperability testing with third-party gateways and gatekeepers.
- To disable fax relay ECM, ensure that you have system processing engine (SPE) firmware version 2.8.3.8 or a higher version.

Table 4-1 T.38 Fax Relay Prerequisites by Platform

Platform	Memory Requirements	Hardware Requirements	Minimum Cisco IOS Release	Supported Call-Control Protocols
Cisco 1750	16-MB Flash 64-MB DRAM	Voice feature card (VFC) with one or more slots for voice interface cards (VICs) Firmware with real-time fax signaling is required. The firmware must be version 3.5.15 or later.	12.2(4)T	H.323
Cisco 1751	—	—	12.2(8)T	H.323
			12.2(15)T	MGCP
Cisco 1760	—	—	12.2(15)T	MGCP
Cisco 2420	—	—	12.2(2)XB	MGCP
Cisco 2600 series	128-MB RAM	Digital or analog voice network modules with voice/WAN interface cards (VWICs) or VICs	12.1(3)T, 12.2(8)T	H.323
			12.2(2)XB, 12.2(8)T	SIP
Cisco 3600 series	128-MB RAM	Digital or analog voice network modules with VWICs or VICs	12.1(3)T, 12.2(8)T	H.323
			12.2(2)XB1, 12.2(8)T	SIP
			Cisco 3660 only 12.2(2)XB, 12.2(8)T	MGCP
Cisco 3725 and Cisco 3745	—	—	12.2(8)T	H.323
Cisco AS5300	16-MB Flash 128-MB DRAM	VFC with Version 8.02 or later VCWare installed DSPM-549 (high-complexity VCWare only) or DSPM-542	12.1(3)XI, 12.1(5)T	H.323
			12.2(2)XB1, 12.2(11)T	SIP
			12.2(2)XB, 12.2(11)T	MGCP

Table 4-1 T.38 Fax Relay Prerequisites by Platform (continued)

Platform	Memory Requirements	Hardware Requirements	Minimum Cisco IOS Release	Supported Call-Control Protocols
Cisco AS5350 ¹	128-MB RAM	Universal Port dial feature card (DFC) running SPE firmware	12.1(5)XM2, 12.2(11)T	H.323
			12.2(2)XB1, 12.2(11)T	SIP
Cisco AS5400 ¹	256-MB RAM	Universal Port DFC running SPE firmware	12.1(5)XM2, 12.2(11)T	H.323
			12.2(2)XB1, 12.2(11)T	SIP
			12.2(2)XB, 12.2(11)T	MGCP
Cisco AS5800 ¹	256-MB RAM	Universal Port DFC running SPE firmware	12.1(5)XM, 12.2(11)T	H.323
Cisco AS5850 ¹	—	Universal Port DFC running SPE firmware	12.2(2)XB1, 12.2(11)T	H.323
			12.2(2)XB2, 12.2(11)T	SIP
Cisco MC3810	64-MB RAM (96 to 128 MB is recommended)	—	12.1(3)T	H.323
			12.2(2)XB, 12.2(8)T	MGCP

1. The following platforms do not support Cisco-proprietary fax relay: Cisco AS5350, Cisco AS5400, Cisco AS5800, and Cisco AS5850.

MGCP T.38 Fax Relay

- Install a software release that supports T.38 fax relay.
- Install appropriate hardware and memory for your platform (see [Table 4-1](#)).
- Identify endpoints and configure the MGCP application as described in the appropriate section of the *MGCP and Related Protocols Configuration Guide*, Release 12.3
- Complete voice interoperability testing with third-party gateways and gatekeepers
- Ensure that you have adequate memory in the gateway. Although 96 to 128 MB of RAM is recommended, the memory requirement is dependent on the platform and the anticipated number of calls to be made through the system.

Restrictions for T.38 Fax Relay

H.323 T.38 Fax Relay

- The transport protocols specified in the ITU-T recommendation for T.38 are Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). However, for T.38 fax relay on Cisco gateways, only UDP is supported for the transport layer.
- Some third-party gateways and gatekeepers may not be compatible with Cisco voice gateways for T.38 fax relay because different manufacturers can select certain parts of H.323 and T.38 to implement into their gateways and gatekeepers. Voice interoperability testing with these third-party gateways and gatekeepers should be performed to make sure that T.38 fax relay can be successful.
- T.38 fax relay is not supported on Cisco MC3810 series concentrators with Voice Compression Modules (VCMs).
- T.38 fax relay is not supported by Multimedia Conference Manager (MCM) H.323 proxy in Cisco IOS Release 12.1(3)T.
- If the **fax rate disable** command is configured on a dial peer, neither the originating nor the terminating gateway can enter into Cisco fax relay mode, T.38 fax relay mode, or fax pass-through mode. The **fax rate disable** command disables fax transfer support.

SIP T.38 Fax Relay

- The transport protocols specified in the ITU-T recommendation for T.38 are Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). However, for T.38 fax relay on Cisco gateways, only UDP is supported for the transport layer.
- If SIP T.38 fax relay is not supported by both gateways, the T.38 negotiation fails and the call reverts to an audio codec.
- T.38 fax relay requires a 64-kbps transmission rate, the same amount of bandwidth as a voice call with the G.711 codec.
- Fax Calling Tones (CNG) are optional and are not used to initiate a switch to T.38 mode. Instead, Called Station Identifier (CED) tones or preamble flags are used.
- SIP fax relay does not rely on NSEs to signal a switch to T.38 mode. Standard RFC 2543 and RFC 2327 SIP and SDP signaling are used instead.
- If the **fax rate disable** command is configured on a dial peer, neither the originating nor the terminating gateway can enter into Cisco fax relay mode, T.38 fax relay mode, or fax pass-through mode. The **fax rate disable** command disables fax transfer support.

MGCP T.38 Fax Relay

- Cisco-proprietary fax relay is not supported under MGCP.
- Only UDP is supported for the transport layer.
- If T.38 is not supported by both gateways, fax pass-through is attempted.
- The gateway does not dynamically issue a call admission control (CAC) request to increase the bandwidth allocated for a call when the call is switched from voice to fax. A best-effort support of bandwidth requirements for the call is supported.

Information About T.38 Fax Relay

The section contains the following information:

- [H.323 and SIP T.38 Fax Relay, page 4-6](#)
- [MGCP T.38 Fax Relay, page 4-9](#)

T.38 fax relay is real-time fax transmission; that is, two fax machines communicating with each other as if there were a direct phone line between the two. Fax relay is configured by using a few additional commands on gateway dial peers that have already been defined and configured for voice calls.

Cisco provides two methods for fax relay: a Cisco-proprietary method and a method based on the ITU-T T.38 standard. On most platforms, Cisco fax relay is the default if a fax method is not explicitly configured. Cisco fax relay is described in [Chapter 3, “Configuring Cisco Fax Relay.”](#) The T.38-standard method for fax relay is described in the current chapter.

T.38 fax relay is configured on VoIP dial peers that direct calls into and out of the packet network.

T.38 fax gateways provide the following functions:

- Demodulation of incoming T.30 fax signals at the transmitting gateway (T.30 is the standard procedure for fax transmission in the PSTN.)
- Translation of T.30 fax signals into T.38 Internet Fax Protocol (IFP) packets
- Exchange of IFP packets between the transmitting and receiving T.38 gateways
- Translation of T.38 IFP packets back into T.30 signals at the receiving gateway

T.38 fax relay can be configured under the following call control protocols: H.323, Session Initiation Protocol (SIP), and Media Gateway Control Protocol (MGCP).

H.323 and SIP T.38 Fax Relay

This section contains information about some of the capabilities available with H.323 and SIP T.38 fax relay, and includes the following sections:

- [Fax Relay Packet Loss Concealment, page 4-7](#)
- [H.323 or SIP T.38 Fax Relay Fallback, page 4-7](#)
- [H.323 or SIP Support of Resource Reservation Protocol for T.38 Fax Relay, page 4-8](#)
- [H.323 Support for Call Admission Control, page 4-8](#)
- [H.323 or SIP Support for NSEs with T.38 Fax Relay, page 4-8](#)
- [H.323 or SIP T.38 Fax Relay Interworking with Cisco MGCP Gateways, page 4-8](#)

Fax Relay Packet Loss Concealment

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.

H.323 or SIP T.38 Fax Relay Fallback

As of Cisco IOS Release 12.2(13)T, you can specify a fallback fax method for the gateway to attempt if H.323 or SIP T.38 fax relay cannot be successfully initiated between gateways. A failure to switch to T.38 fax relay can occur if you are interworking with a network that does not support T.38 fax relay. The following are the fallback options:

- Cisco fax relay.
- Fax pass-through using a G.711 codec.
- No fallback. The fax is transmitted using the existing voice codec. If modem pass-through has been configured, the fax is transferred through named service event (NSE) pass-through.

H.323 or SIP Support of Resource Reservation Protocol for T.38 Fax Relay

As of Cisco IOS Release 12.2(13)T, H.323 or SIP gateways that are configured for T.38 fax relay allow Resource Reservation Protocol (RSVP) bandwidth adjustments when the original voice call is configured to use RSVP. When the original voice codec is restored at the end of the fax session, the original RSVP bandwidth is restored as well. When current bandwidth is unavailable, the fax proceeds at a best-effort rate without RSVP and with no performance guarantees. RSVP bandwidth adjustments for fax transmissions are made as follows:

- T.38 fax relay—RSVP bandwidth is adjusted to 80 kbps
- Fax pass-through—RSVP bandwidth is adjusted to 96 kbps

H.323 Support for Call Admission Control

As of Cisco IOS Release 12.2(13)T, H.323 call admission control (CAC) adjustments are allowed in the case of fax relay and fax pass-through. An H.323 gateway that uses a gatekeeper requests the following bandwidths from the gatekeeper when codec changes are necessary:

- T.38 fax relay—Bandwidth of 80 kbps
- Fax pass-through—Bandwidth of 96 kbps

If the gatekeeper accepts the bandwidth changes, the session is permitted to continue over the fax codec (G.711). If the gatekeeper rejects the bandwidth increase, the fax codec is terminated and the gateway uses the configured fax protocol fallback or the original voice codec, in which case the fax transfer fails.

H.323 or SIP Support for NSEs with T.38 Fax Relay

As of Cisco IOS Release 12.2(13)T, you can use the **fax protocol** command to specify that a gateway should use NSEs for fax signaling. This option allows interoperability with MGCP gateways as well as other H.323 and SIP gateways. The use of NSEs and their payload type is negotiated in Session Description Protocol (SDP) messages. Because NSEs are passed in the media stream, they avoid the signaling delays that can be introduced by MGCP call agents. The addition of the NSE capability to Cisco SIP and H.323 gateways addresses these delays and improves interoperability between MGCP, SIP, and H.323 products.

If NSEs are specified and NSE use is not successfully negotiated between gateways, T.38 fax relay signaled through the protocol stack is attempted. If protocol-stack T.38 fax relay also fails, the configured fallback fax transfer protocol is used.

H.323 or SIP T.38 Fax Relay Interworking with Cisco MGCP Gateways

As of Cisco IOS Release 12.2(13)T, you can specify that gateways must use T.38 fax relay and NSEs even though those gateways may be unable to negotiate those attributes by themselves at the time of call setup. This may happen during negotiations for fax attributes between H.323 or SIP gateways and MGCP gateways.

Both gateways must be configured to use T.38 fax relay and NSEs. On an H.323 or SIP gateway, use the **fax protocol t38 nse force** command. On an MGCP gateway, use the **mgcp fax t38 gateway force** command.

MGCP T.38 Fax Relay

When MGCP-based fax relay is disabled, MGCP networks use pass-through for fax relay transmission. However, when MGCP-based fax relay is enabled, ITU-T T.38 support is added, providing a standardized method of supporting reliable fax transmission in the MGCP network. With MGCP-based fax relay, interworking is allowed between the T.38 application that already exists on Cisco gateways and the MGCP applications on call agents (CAs).



Note

Cisco-proprietary fax relay is not supported under MGCP.

MGCP-based fax relay provides two modes of implementation: gateway-controlled mode and CA-controlled mode. In gateway-controlled mode, a gateway advertises its capabilities using Session Description Protocol (SDP) messages during the establishment of a call, using the call-control protocol that was used to establish the call. After the call is established, the connected gateways negotiate the actual switch from voice to T.38 fax relay by exchanging named service event (NSE) or named telephony event (NTE) messages embedded in the RTP stream. That transmission is transparent to the CA, which knows only about the voice call. Gateway-controlled mode allows you to use MGCP-based fax relay (T.38) without upgrading the CA software to support the capability.

In CA-controlled mode, the gateways rely on the MGCP CA to direct the T.38 fax relay call flow.

Details about MGCP T.38 fax relay are provided in the following sections:

- [Gateway-Controlled MGCP T.38 Fax Relay](#)
- [CA-Controlled MGCP T.38 Fax Relay](#)
- [MGCP T.38 Fax Relay Interworking with Cisco H.323 and SIP Gateways](#)

Gateway-Controlled MGCP T.38 Fax Relay

In gateway-controlled mode, the gateways do not need instruction from the CA to switch to T.38 mode. This mode should be used if the CA has not been upgraded to support T.38 and MGCP interworking or if the CA does not want to manage fax calls.

Gateway-controlled mode can also be used to bypass the message delay overhead caused by CA handling; for example, to meet time requirements for switchover to T.38 mode. If the CA does not specify a mode to the gateway, the gateway defaults to gateway-controlled mode.

In gateway-controlled mode, the gateways exchange NSEs that provide the following services:

- Instruct the peer gateway to switch to T.38 for the call.
- Either acknowledge the switch and a readiness to accept packets or indicate that a gateway cannot accept T.38 packets.

MGCP-based fax relay in gateway-controlled mode uses the following call flow:

1. An incoming call is initially established as a voice call.
2. The gateways advertise capabilities in an SDP exchange during connection establishment.
3. If both gateways do not support T.38, fax pass-through is used for fax transmission. If both gateways do support T.38, they attempt to switch to T.38 upon fax tone detection. The existing audio channel is used for T.38 fax relay, and the existing connection port is reused to minimize delay. If failure occurs at some point during the switch to T.38, the call reverts to the original settings that it had as a voice call. If this failure occurs, a fallback to fax pass-through is not supported.

4. Upon completion of the fax image transfer, the connection remains established and reverts to a voice call using the previously designated codec, unless the CA instructs the gateway to do otherwise. If the CA has been configured to control fax relay, the CA instructs the gateway on processing the call with the `fx: extension of the local connection option (LCO)`.

CA-Controlled MGCP T.38 Fax Relay

CA-controlled MGCP T.38 fax relay enables T.38 fax relay interworking between H.323 gateways and MGCP gateways and between two MGCP gateways under the control of a call agent. In Cisco IOS Release 12.3(1) and later releases, the feature has been modified. The new method supersedes previous methods for CA-controlled fax relay and introduces the following gateway capabilities to enable this functionality:

- Ability to accept the MGCP FXR package, to receive the `fxr` prefix in commands from the call agent, and to send the `fxr` prefix in notifications to the call agent.
- Ability to accept a new port when switching from voice to fax transmission during a call. This new ability allows successful T.38 CA-controlled fax between H.323 and MGCP gateways for those occasions in which the H.323 gateway assigns a new port when changing the call type from voice to fax. New ports are assigned in H.323 gateways using Cisco IOS images from Release 12.2(2)T to Release 12.2(7.5)T. Note that gateways in MGCP-to-MGCP fax calls simply reuse the same port. CA-controlled T.38 fax relay enables MGCP gateways to handle both situations, either switching to a new port or reusing the same port, as directed by the call agent.



Note

The CA-controlled mode described in this document makes obsolete the previous method that was described in *Media Gateway Control Protocol-Based Fax (T.38) and Dual Tone Multifrequency (IETF RFC 2833) Relay*, Cisco IOS Release 12.2(8)T. The previous CA-controlled mode for T.38 fax relay used the `ca` parameter to communicate with the call agent, and the `ca` parameter is no longer supported as of Cisco IOS Release 12.3(1). The previous method has been superseded by the CA-controlled mode described in the current document. Note that the gateway (GW)-controlled mode that is described in the previous document remains supported and is the same as the GW-controlled mode that is described in this document.

The sequence for T.38 CA-controlled fax is as follows:

1. The MGCP call agent determines that CA-controlled mode is necessary for fax relay because the far end of the connection is an H.323 gateway or other entity incapable of directly negotiating T.38 with the Cisco IOS MGCP gateway.
2. The call agent establishes a voice call with the local MGCP gateway and specifies that any subsequent fax transmissions should take place using T.38 fax relay in CA-controlled mode. The call agent includes an “`fxr/fx:t38`” or “`fxr/fx:t38-loose`” parameter in the Local Connection Options parameter of the Create Connection (CRCX) command that it sends to the MGCP gateway. The term “loose” indicates that a description of T.38 capabilities is not required in the resulting Session Description Protocol (SDP) message.
3. When the voice call is established between the gateways, the call agent asks the MGCP gateway to notify it of any T.38 events with an “`R: fxr/t38`” requested event parameter in a Notification Request (RQNT) or Modify Connection (MDCX) command. If the MGCP gateway detects fax transmission during this call, it generates a Notify (NTFY) command with an “`O: fxr/t38(start)`” observed event parameter and sends it to the call agent.
4. The call agent responds with an MDCX containing one or both of the following:
 - “`a:image/t38`” descriptor in the Local Connection Options parameter

- “m=image *port* udptl t38” line in the included SDP message

Note that *port* is replaced in the MDCX with the actual port number for the fax transmission. This port number can be the same as or different from the port number negotiated earlier when the voice call was established. T.38 CA-controlled fax supports either using the same port or switching to a new port for fax. Note that if the MGCP gateway does not detect fax first, it may receive the same MDCX prior to sending a NTFY.

5. When the fax transmission is complete, the MGCP gateway sends the call agent a NTFY command with an “O: fxr/t38(stop)” parameter. The call agent then has the option of either sending another MDCX to return to voice or using a Delete Connection (DLCX) command to terminate the call.

MGCP T.38 Fax Relay Interworking with Cisco H.323 and SIP Gateways

Some MGCP call agents do not properly pass those portions of Session Description Protocol (SDP) messages that advertise T.38 and NSE capabilities. As a result, gateways that are controlled by these call agents are unable to use NSEs to signal T.38 fax relay to other gateways that use NSEs. As of Cisco IOS Release 12.2(13)T, you can configure gateways to use T.38 fax relay and NSEs even though those gateways may be unable to negotiate those attributes by themselves at the time of call setup.

The **mgcp fax t38 gateway force** command provides a way to ensure gateway-controlled T.38 fax relay between an MGCP gateway and another gateway. The other gateway in the negotiation can be an H.323, Session Initiation Protocol (SIP), or MGCP gateway. Both gateways must be configured to use NSEs to signal T.38 fax relay mode switchover. On H.323 and SIP gateways, use the **fax protocol t38 nse force** command to specify the use of NSEs for T.38 fax relay. On MGCP gateways, use the **mgcp fax t38 gateway force** command.

NSEs are the Cisco-proprietary version of named telephony events (NTEs), which are defined in IETF RFC 2833. NSEs and NTEs are used to communicate telephony signaling events that are normally indicated by the presence of tones, such as dual-tone multifrequency (DTMF) or fax transmissions. NSEs and NTEs do not transmit audible signaling tones across the network, but instead work by sending a binary code that is later used to recreate a tone. NSEs use different values to represent events and tones than NTEs use.

NSEs and NTEs are passed in the media stream. They consist of Real-Time Transport Protocol (RTP) packets that have the same source and destination IP addresses and User Datagram Protocol (UDP) ports as the rest of the media stream. However, NSE and NTE packets use different RTP payload types than the rest of the media stream so that they can stand apart from the audio packets in the stream. NSEs are normally sent with RTP payload type 100.

How to Configure H.323 and SIP T.38 Fax Relay

Configuration of T.38 fax relay, or real-time fax, on Cisco voice gateways is similar to configuration of VoIP calls. For H.323 and SIP networks, the only tasks that differ are configuration of VoIP dial peers.

T.38 fax relay configuration on H.323 and SIP networks consists of the following tasks:

- [Configuring One or More Individual VoIP Dial Peers for T.38 Fax Relay, page 4-12](#) (required)
- [Configuring T.38 Fax Relay on VoIP Dial Peers Globally, page 4-14](#) (optional)
- [Verifying the T.38 Fax Relay Configuration, page 4-15](#) (optional)

Configuring One or More Individual VoIP Dial Peers for T.38 Fax Relay

There are two ways to configure T.38 fax relay on gateways:

- Individually define and configure each dial peer, as described in this section.
- Globally assign fax capabilities to all previously defined VoIP dial peers, as described in the [“Configuring T.38 Fax Relay on VoIP Dial Peers Globally”](#) section on page 4-14.



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. **dial-peer voice tag voip**
2. **dtmf-relay h245-signal**
3. **fax protocol {system | t38 [nse [force]] [ls-redundancy value [hs-redundancy value]] [fallback {cisco | none | pass-through {g711ulaw | g711alaw}}]}**
4. **fax rate {12000 | 14400 | 2400 | 4800 | 7200 | 9600 | disable | voice} [bytes rate]**
5. **fax-relay ecm disable**
6. **session protocol sipv2**
7. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<pre>dial-peer voice tag voip</pre> <p>Example: Router(config)# dial-peer voice 25 voip</p>	<p>Enters dial-peer configuration mode and defines a dial peer that directs traffic to or from a packet network. Argument and keyword are as follows:</p> <ul style="list-style-type: none"> • tag—Dial-peer identifier that consists of one or more digits. Range: 1 to 2147483647. • voip—Calls from this dial peer use voice encapsulation on the packet network.
Step 2	<pre>dtmf-relay h245-signal</pre> <p>Example: Router(config-dial-peer)# dtmf-relay h245-signal</p>	<p>Forwards dual-tone multifrequency (DTMF) tones by using the H.245 “signal” User Input Indication method to compress the tones at one end of the call and to decompress them at the other end. Supports tones 0 through 9, *, #, and A through D.</p>

Command or Action	Purpose
<p data-bbox="138 260 203 289">Step 3</p> <pre data-bbox="235 260 779 373"> fax protocol {system t38 [nse [force]] [ls-redundancy <i>value</i> [hs-redundancy <i>value</i>]] [fallback {cisco none pass-through {g711ulaw g711alaw}}]} </pre> <p data-bbox="235 422 332 451">Example:</p> <pre data-bbox="235 457 779 506"> Router(config-dial-peer)# fax protocol t38 ls-redundancy 2 hs-redundancy 2 </pre>	<p data-bbox="808 260 1529 323">Specifies the fax protocol for this dial peer. Keywords and arguments are as follows:</p> <ul data-bbox="824 338 1529 1010" style="list-style-type: none"> • system—Global configuration for this dial peer. • t38—ITU-T T.38 fax relay protocol. • nse—(Optional) Use of Cisco named service events (NSEs) for fax signaling. • force—(Optional) Required use of NSEs on gateways, which permits interworking of H.323 or SIP gateways with MGCP gateways for T.38 fax relay. For more information, see the “MGCP T.38 Fax Relay Interworking with Cisco H.323 and SIP Gateways” section on page 4-11. • ls-redundancy—(Optional) Number of redundant T.38 fax packets to be sent for low-speed V.21-based T.30 fax machine protocol. Range varies by platform from 0 (no redundancy) to 5 or 7. For details, see command-line interface (CLI) help. Default: 0. • hs-redundancy—(Optional) Number of redundant T.38 fax packets to be sent for high-speed V.17, V.27, and V.29 T.4 or T.6 fax machine image data. Range varies by platform from 0 (no redundancy) to 2 or 3. For details, see CLI help. Default: 0. <p data-bbox="808 1024 1529 1115">Note Setting the hs-redundancy parameter to a value greater than 0 causes a significant increase in the network bandwidth consumed by the fax call.</p> <ul data-bbox="824 1142 1529 1266" style="list-style-type: none"> • fallback—If T.38 fax relay fails, selects Cisco fax relay, no fallback, or fax pass-through with a G.711 a-law codec or a G.711 u-law codec as the alternate method to attempt fax transmission.

	Command or Action	Purpose
Step 4	<pre>fax rate {12000 14400 2400 4800 7200 9600 disable voice} [bytes rate]</pre> <p>Example: Router(config-dial-peer)# fax rate 14400</p>	<p>(Optional) Selects the fax transmission speed to be attempted when this dial peer is used. Keywords and argument are as follows:</p> <ul style="list-style-type: none"> • 12000, 14400, 2400, 4800, 7200, 9600—Maximum bits-per-second speed. • bytes rate—(Optional) Fax packetization rate, in ms. Range: 20 to 48. Default: 20. For T.38 fax relay, this keyword-argument pair is valid only on Cisco 5350, Cisco 5400, and Cisco 5850 routers. For other routers, the packetization rate for T.38 fax relay is fixed at 40 ms and cannot be changed with this keyword-argument pair. • 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. <p>Default: voice.</p>
Step 5f	<pre>fax-relay ecm disable</pre> <p>Example: Router(config-dial-peer)# fax-relay ecm disable</p>	<p>(Optional) Disables fax-relay ECM.</p> <p>Note To enable ECM, use the no form of this command.</p>
Step 6	<pre>session protocol sipv2</pre> <p>Example: Router(config-dial-peer)# session protocol sipv2</p>	<p>(Optional) Specifies the IETF SIP session protocol for calls between the local and remote routers using the packet network.</p> <p>Note This command is required for SIP calls.</p>
Step 7	<pre>exit</pre> <p>Example: Router(config-dial-peer)# exit</p>	<p>Exits dial-peer configuration mode.</p>

Configuring T.38 Fax Relay on VoIP Dial Peers Globally

If you are adding fax relay capability to a number of previously defined VoIP dial peers, you can configure all of them globally at one time in voice-service configuration mode.

Alternatively, you can add fax relay capability to VoIP dial peers one at a time by following the instructions in the [“Configuring One or More Individual VoIP Dial Peers for T.38 Fax Relay”](#) section on page 4-12.



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. **voice service voip**
2. **fax protocol t38** [**nse** [**force**]] [**ls-redundancy** *value* [**hs-redundancy** *value*]] [**fallback** {**cisco** | **none** | **pass-through** {**g711ulaw** | **g711alaw**}}]
3. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<pre>voice service voip</pre> <p>Example: Router(config)# voice service voip</p>	Enters voice-service configuration mode.
Step 2	<pre>fax protocol t38 [nse [force]] [ls-redundancy value [hs-redundancy value]] [fallback {cisco none pass-through {g711ulaw g711alaw}}]</pre> <p>Example: Router(config-voi-serv)# fax protocol t38 ls-redundancy 0 hs-redundancy 0 fallback pass-through g711ulaw</p>	<p>Specifies the fax protocol for all VoIP dial peers. Keywords and arguments are as follows:</p> <ul style="list-style-type: none"> • nse—(Optional) Use of Cisco named service events (NSEs) for fax signaling. • force—(Optional) Required use of NSEs for fax signaling, which permits interworking of H.323 or SIP gateways with MGCP gateways for T.38 fax relay. • ls-redundancy—(Optional) Number of redundant T.38 fax packets to be sent for the low-speed V.21-based T.30 fax machine protocol. Range varies by platform from 0 (no redundancy) to 5 or 7. For details, see CLI help. Default: 0. • hs-redundancy—(Optional) Number of redundant T.38 fax packets to be sent for high-speed V.17, V.27, and V.29 T.4 or T.6 fax machine image data. The value range varies by platform from 0 (no redundancy) to 2 or 3. For details, see CLI help. Default: 0. <p>Note Setting the hs-redundancy parameter greater than 0 causes a significant increase in the network bandwidth consumed by the fax call.</p>
Step 3	<pre>exit</pre> <p>Example: Router(config-voi-serv)# exit</p>	Exits voice-service configuration mode.

Verifying the T.38 Fax Relay Configuration

This task allows you to confirm that the settings you have made are present in the router configuration.

SUMMARY STEPS

1. **show running-config**
2. **show dial-peer voice** [*tag*] [**summary**]

DETAILED STEPS

	Command or Action	Purpose
Step 1	<code>show running-config</code> Example: Router# show running-config	Displays the gateway running configuration, including dial-peer configuration.
Step 2	<code>show dial-peer voice [tag] [summary]</code> Example: Router# show dial-peer voice 25	Displays dial-peer configuration information for you to verify that T.38 fax relay is enabled. <ul style="list-style-type: none"> <i>tag</i>— (Optional) Particular dial peer with an identifier that consists of one or more digits. Range: 1 to 2147483647. summary—(Optional) Displays brief output.

Troubleshooting Tips for H.323 or SIP T.38 Fax Relay

To troubleshoot T.38 fax relay, perform the following steps:

- Make sure that you can make a voice call.
- Make sure that the desired fax protocol was set using the **fax protocol** command on both the originating and terminating gateways.
- Make sure that the fax protocol is configured as T.38 at the global configuration level or at the dial-peer configuration level for both the originating and terminating gateways.
- Use the **show call active voice** command to display information for the active call table.
- Use the **show call history fax** command to display recent call history for faxes.
- Use the **show dial-peer voice** command to display configuration information for dial peers.
- For H.323 gateways, use the **debug cch323 all** command to enable all H.323 debugging capabilities, or use one of the following commands to debug problems while making the call:
 - **debug cch323 error**
 - **debug cch323 h225**
 - **debug cch323 h245**
 - **debug cch323 RAS**
 - **debug cch323 session**
 - **debug voip ccapi inout**
 - **debug vtsp session**
- For SIP gateways, use the **debug ccsip all** command to enable all SIP debugging capabilities, or use one of the following SIP debug commands:
 - **debug ccsip calls**
 - **debug ccsip error**
 - **debug ccsip events** for T.38 fax relay
 - **debug ccsip info**
 - **debug ccsip media**

- **debug ccsip messages**
- **debug ccsip states**

How to Configure MGCP T.38 Fax Relay

MGCP T.38 fax relay configuration consists of the following tasks:

- Configuring MGCP T.38 Fax Relay—Select one of the following:
 - [Configuring Gateway-Controlled MGCP T.38 Fax Relay, page 4-17](#)
 - [Configuring CA-Controlled MGCP T.38 Fax Relay, page 4-19](#)
- [Verifying MGCP T.38 Fax Relay Configuration, page 4-20](#)
- [Troubleshooting Tips for MGCP T.38 Fax Relay, page 4-23](#)

Configuring Gateway-Controlled MGCP T.38 Fax Relay

This task configures a gateway for gateway-controlled MGCP T.38 fax relay.

SUMMARY STEPS

1. **mgcp fax t38** {**ecm** | **gateway force** | **hs_redundancy** *value* | **inhibit** | **ls_redundancy** *value* | **nsf** *word*}
2. **mgcp tse payload** *value*
3. **mgcp timer nse-response t38** *timer*
4. **mgcp fax rate** {**2400** | **4800** | **7200** | **9600** | **12000** | **14400** | **voice**}

DETAILED STEPS

Command or Action	Purpose
<p>Step 1</p> <pre>mgcp fax t38 {ecm gateway force hs_redundancy value inhibit ls_redundancy value nsf word}</pre> <p>Example: Router(config)# mgcp fax t38 ls_redundancy 2</p>	<p>(Optional) Configures MGCP T.38 fax relay parameters. Keywords and arguments are as follows:</p> <ul style="list-style-type: none"> • ecm—Enables Error Correction Mode (ECM) for the gateway. By default ECM is not enabled. • gateway force—Forces gateway-controlled T.38 fax relay using Cisco-proprietary named service events (NSEs) even if the capability to use T.38 and NSEs cannot be negotiated by the MGCP call agent at call setup time. Default: force is not enabled. • hs_redundancy value—Number of redundant T.38 fax packets to send for high-speed V.17, V.27, and V.29 T.4 or T.6 fax machine image data. Range: 0 (no redundancy) to 2. Default: 0. • ls_redundancy value—Number of redundant T.38 fax packets to send for low-speed V.21-based T.30 fax machine protocol. Range: 0 (no redundancy) to 5. Default: 0. <p>Note Setting the hs_redundancy parameter greater than 0 causes a significant increase in network bandwidth consumed by a fax call.</p> <ul style="list-style-type: none"> • inhibit—Disables MGCP-based T.38 fax relay on the gateway. By default, T.38 is enabled. <p>Note If the MGCP gateway uses the auto-configuration function, the mgcp fax t38 inhibit command is automatically configured on the gateway each time a new configuration is downloaded. Beginning with Cisco IOS Software Release 12.4T, the auto-configuration of this command is removed. For MGCP gateways running Cisco IOS version 12.4T or later, you must manually configure the mgcp fax t38 inhibit command to use T.38 fax relay.</p> <ul style="list-style-type: none"> • nsf—Overrides the non-standard facilities (NSF) code with the code provided in the <i>word</i> argument. NSFs are capabilities that fax manufacturers have built into fax machines to distinguish their products from others. By default, the NSF code is not overridden. <ul style="list-style-type: none"> – <i>word</i>—Two-digit country code and four-digit manufacturer code, in hexadecimal.

	Command or Action	Purpose
Step 2	<pre>mgcp tse payload value</pre> <p>Example: Router(config)# mgcp tse payload 106</p>	<p>Enables use of MGCP telephony service event (TSE) packets and sets their payload type value. TSEs are RTP packets with a unique payload value that identifies them as TSEs. TSEs provide a way to communicate telephony events between MGCP gateways. Gateways must use the same payload type to communicate using TSEs. The argument is as follows:</p> <ul style="list-style-type: none"> <i>value</i>—Range: 98 to 119. Default: 100. <p>Note This command is required for gateway-controlled MGCP T.38 fax relay.</p>
Step 3	<pre>mgcp timer nse-response t38 timer</pre> <p>Example: Router(config)# mgcp timer nse-response t38 250</p>	<p>Configures the timer for awaiting T.38 NSE responses. This timer is configured to tell the terminating gateway how long to wait for an NSE from a peer gateway. The peer gateway either acknowledges the switch and its readiness to accept packets or indicates that it cannot accept T.38 packets. The argument is as follows:</p> <ul style="list-style-type: none"> <i>timer</i>—Timeout period for awaiting T.38 NSE responses from a peer gateway, in ms. Range: 100 to 3000. Default: 200.
Step 4	<pre>mgcp fax rate {2400 4800 7200 9600 12000 14400 voice}</pre> <p>Example: Router(config)# mgcp fax rate 9600</p>	<p>(Optional) Establishes the maximum fax transmission rate for MGCP T.38 sessions. The MGCP fax rate is set to the highest possible transmission speed allowed by the voice codec by default. To reset MGCP endpoints to their default fax rate, use the no form of this command.</p> <ul style="list-style-type: none"> MGCP normally limits the maximum fax rate on a voice port to the bandwidth of the configured voice codec. This ensures that the fax session does not exceed the bandwidth initially authorized for the voice call. In some cases an administrator may desire to exceed the voice bandwidth when the call switches to fax in order to offer the best possible fax rate. The mgcp fax rate command allows you to override this limitation. When the MGCP fax rate is set to the highest possible transmission speed allowed by the voice codec (mgcp fax rate voice), all MGCP endpoints limit T.38 fax calls to this speed. <p>Note The values for this command apply only to the fax transmission speed and do not affect the quality of the fax itself.</p>

Configuring CA-Controlled MGCP T.38 Fax Relay

This task configures a gateway to allow CA-controlled MGCP T.38 fax relay. You must configure the CA as well.

SUMMARY STEPS

1. **no mgcp fax t38 inhibit**
2. **mgcp package-capability fxr-package**
3. **mgcp default-package fxr-package**

DETAILED STEPS

	Command	Purpose
Step 1	<pre>no mgcp fax t38 inhibit</pre> <p>Example: Router(config)# no mgcp fax t38 inhibit</p>	<p>(Optional) Enables T.38 fax relay on the gateway if it has been previously disabled.</p> <p>Note T.38 fax relay is enabled on the gateway by default. The command is included here to illustrate how you would enable T.38 if it were disabled by a previous command.</p> <p>Note If the MGCP gateway uses the auto-configuration function, the mgcp fax t38 inhibit command is automatically configured on the gateway each time a new configuration is downloaded. Beginning with Cisco IOS Software Release 12.4T, the auto-configuration of this command is removed. For MGCP gateways running Cisco IOS version 12.4T or later, you must manually configure the mgcp fax t38 inhibit command to use T.38 fax relay.</p>
Step 2	<pre>mgcp package-capability fxr-package</pre> <p>Example: Router(config)# mgcp package-capability fxr-package</p>	<p>(Optional) Enables use of the FXR package on the gateway.</p> <p>Note The FXR package is enabled by default. The command is included here to illustrate how you would enable the package if it were disabled by a previous command.</p>
Step 3	<pre>mgcp default-package fxr-package</pre> <p>Example: Router(config)# mgcp default-package fxr-package</p>	<p>(Optional) Selects the FXR package as the default package.</p> <p>When the FXR package is the default package, the call agent omits the “fxr/” prefix on two types of requests in CRCX, MDCX, DLCX, and RQNT messages: requests to detect events (“R:<pkg>/<evt>”) and requests to generate events (“S:<pkg>/<evt>”). For example, to ask for T.38 detection, the call agent sends “R:t38” in an RQNT message rather than “R:fxr/t38.” Note that the “fxr/fx:” parameter to the Local Connection Options is not affected by selection of FXR as the default package and always needs the “fxr/” prefix.</p>

Verifying MGCP T.38 Fax Relay Configuration

Use these commands to examine the configuration on the router.

SUMMARY STEPS

1. **show running-config**
2. **show mgcp**

DETAILED STEPS

- Step 1** Use the **show running-config** command to verify the running configuration. See the “[Configuration Examples for T.38 Fax Relay](#)” section on page 4-23 for examples of the output from this command.
- Step 2** Use the **show mgcp** command to verify that T.38 fax relay is enabled and, for CA-controlled mode, that the FXR package is supported.

```
Router# show mgcp

MGCP Admin State ACTIVE, Oper State ACTIVE - Cause Code NONE
MGCP call-agent: 172.16.184.144 3562 Initial protocol service is MGCP 0.1
MGCP block-newcalls DISABLED
MGCP send SGCP RSIP: forced/restart/graceful/disconnected DISABLED
MGCP quarantine mode discard/step
MGCP quarantine of persistent events is ENABLED
MGCP dtmf-relay voip codec all mode nse
MGCP dtmf-relay for VoAAL2 disabled for all codec types
MGCP voip modem passthrough disabled
MGCP voaal2 modem passthrough disabled
MGCP voip modem relay: Disabled.
MGCP TSE payload: 102
MGCP T.38 Named Signalling Event (NSE) response timer: 200
MGCP Network (IP/AAL2) Continuity Test timer: 200
MGCP 'RTP stream loss' timer disabled
MGCP request timeout 500
MGCP maximum exponential request timeout 4000
MGCP gateway port: 2427, MGCP maximum waiting delay 3000
MGCP restart delay 0, MGCP vad DISABLED
MGCP rtrcac DISABLED
MGCP system resource check DISABLED
MGCP xpc-codec: DISABLED, MGCP persistent hookflash: DISABLED
MGCP persistent offhook: ENABLED, MGCP persistent onhook: DISABLED
MGCP piggyback msg ENABLED, MGCP endpoint offset DISABLED
MGCP simple-sdp DISABLED
MGCP undotted-notation DISABLED
MGCP codec type g711ulaw, MGCP packetization period 20
MGCP JB threshold lwm 30, MGCP JB threshold hwm 150
MGCP LAT threshold lwm 150, MGCP LAT threshold hwm 300
MGCP PL threshold lwm 1000, MGCP PL threshold hwm 10000
MGCP CL threshold lwm 1000, MGCP CL threshold hwm 10000
MGCP playout mode is adaptive 60, 4, 200 in msec
MGCP media (RTP) dscp: ef, MGCP signaling dscp: af31
MGCP default package: line-package
MGCP supported packages: gm-package dtmf-package trunk-package line-package
                        hs-package atm-package ms-package dt-package res-package
                        mt-package fxr-package

MGCP Digit Map matching order: shortest match
SGCP Digit Map matching order: always left-to-right
MGCP VoAAL2 ignore-lco-codec DISABLED
MGCP T.38 Fax is ENABLED
MGCP T.38 Fax ECM is DISABLED
MGCP T.38 Fax NSF Override is DISABLED
MGCP T.38 Fax Low Speed Redundancy: 0MGCP T.38 Fax High Speed Redundancy: 0
MGCP Upspeed payload type for G711ulaw: 0, G711alaw: 8
MGCP control bind :DISABLED
```

```
MGCP media bind :DISABLED
MGCP Dynamic payload type for G.726-16K codec
MGCP Dynamic payload type for G.726-24K codec
MGCP Dynamic payload type for G.Clear codec
```

Step 3 Also use the **show mgcp** command to verify NSF state and redundancy setting. In the following example, fax relay is enabled, ECM is disabled, NSF override is disabled, and low- and high-speed redundancy are set to their default values, 0.

```
Router# show mgcp

MGCP Admin State ACTIVE, Oper State ACTIVE - Cause Code NONE
MGCP call-agent: 172.18.195.147 2436 Initial protocol service is MGCP 0.1
MGCP block-newcalls DISABLED
MGCP send RSIP for SGCP is DISABLED
MGCP quarantine mode discard/step
MGCP quarantine of persistent events is ENABLED
MGCP dtmf-relay for VoIP disabled for all codec types
MGCP dtmf-relay for VoAAL2 disabled for all codec types
MGCP voip modem passthrough mode: CA, codec: g711ulaw, redundancy: DISABLED,
MGCP voaal2 modem passthrough mode: NSE, codec: g711ulaw
MGCP TSE payload: 119
MGCP T.38 Named Signalling Event (NSE) response timer: 200
MGCP Network (IP/AAL2) Continuity Test timer: 200
MGCP 'RTP stream loss' timer disabled
MGCP request timeout 500
MGCP maximum exponential request timeout 4000
MGCP gateway port: 2427, MGCP maximum waiting delay 3000
MGCP restart delay 0, MGCP vad DISABLED
MGCP rtrcac DISABLED
MGCP system resource check DISABLED
MGCP xpc-codec: DISABLED, MGCP persistent hookflash: DISABLED
MGCP persistent offhook: ENABLED, MGCP persistent onhook: DISABLED
MGCP piggyback msg ENABLED, MGCP endpoint offset DISABLED
MGCP simple-sdp DISABLED
MGCP undotted-notation DISABLED
MGCP codec type g729r8, MGCP packetization period 10
MGCP JB threshold lwm 30, MGCP JB threshold hwm 150
MGCP LAT threshold lwm 150, MGCP LAT threshold hwm 300
MGCP PL threshold lwm 1000, MGCP PL threshold hwm 10000
MGCP CL threshold lwm 1000, MGCP CL threshold hwm 10000
MGCP playout mode is adaptive 60, 4, 200 in msec
MGCP IP ToS low delay disabled, MGCP IP ToS high throughput disabled
MGCP IP ToS high reliability disabled, MGCP IP ToS low cost disabled
MGCP IP RTP precedence 5, MGCP signaling precedence: 3
MGCP default package: dt-package
MGCP supported packages: gm-package dtmf-package trunk-package line-package
                        hs-package rtp-package as-package atm-package ms-package
                        dt-package mo-package res-package mt-package
                        dt-package mo-package res-package mt-package

MGCP Digit Map matching order: shortest match
SGCP Digit Map matching order: always left-to-right
MGCP VoAAL2 ignore-lco-codec DISABLED
MGCP T.38 Fax is ENABLED
MGCP T.38 Fax ECM is DISABLED
MGCP T.38 Fax NSF Override is DISABLED
MGCP T.38 Fax Low Speed Redundancy: 0
MGCP T.38 Fax High Speed Redundancy: 0
```

The following example shows NSF overridden and the code that is being used:

```
Router# show mgcp
.
.
```

```
MGCP T.38 Fax NSF Override is ENABLED: AC04D3
```

Troubleshooting Tips for MGCP T.38 Fax Relay

To troubleshoot MGCP fax relay, perform the following steps:

-
- Step 1** Make sure that you have a working MGCP network and that you can make a voice call.
- Step 2** Make sure that T.38 fax relay for MGCP is configured on both the originating and terminating gateways.
- Step 3** Use the following commands to debug problems while making the call:
- The **show mgcp [connection | endpoint | statistics]** command displays information about MGCP calls.
 - The **show voice call summary** command indicates, during a T.38 fax transmission, a change of state from S_CONNECT to S_FAX in the VTSP STATE column and a change from the codec name to a numeric fax rate in the CODEC column (for example, g711u changes to 14400).
 - The **debug mgcp packets** command displays the MGCP side of the call flow.
- Step 4** For CA-controlled T.38 fax relay, you can verify the MGCP side of the call flow by using the **debug mgcp packets** command. You should see the following output:
- CRCX from the call agent with “fxr/fx:t38-loose” or “fxr/fx:t38” parameter
 - RQNT from the call agent with “R: fxr/t38” parameter
 - NTFY from the gateway with “O: fxr/t38(start)” parameter (optionally)
 - MDCX from the call agent with either “m=image” in the SDP message, or “a:image/t38” in the Local Connection Options message, or both.
- Step 5** For CA-controlled T.38 fax relay, you should see the following messages in the output from a **show voice call summary** command on the MGCP gateway during a T.38 fax transmission:
- Change of state from S_CONNECT to S_FAX in the VTSP STATE column
 - Change from codec name to numeric fax rate (such as “g711u” to 14400”) in the CODEC column
-

Configuration Examples for T.38 Fax Relay

This section contains the following examples:

- [T.38 Fax Relay: Example](#)
- [T.38 Fax Relay with ECM Disabled: Example](#)
- [Gateway-Controlled MGCP T.38 Fax Relay: Example](#)
- [CA-Controlled MGCP T.38 Fax Relay: Example](#)

T.38 Fax Relay: Example

This example shows configuration of T.38 fax relay in an H.323 network with ECM enabled:

```
.
.
.
voice service voip
  fax protocol t38
.
.
.
interface Ethernet0/0
  ip address 10.0.47.47 255.255.0.0
  h323-gateway voip interface
  h323-gateway voip id ipaddr 10.0.47.36 1719
  h323-gateway voip h323-id 36402
.
.
.
dial-peer voice 14151 voip ! Uses t38 fax from voice service voip.
  destination-pattern 14151..
  session target ras

dial-peer voice 14152 voip ! Uses Cisco fax for a specific dial peer.
  destination-pattern 14152..
  session target ras
  fax protocol cisco

gateway
end
```

T.38 Fax Relay with ECM Disabled: Example

This example shows ECM disabled on dial peer 50:

```
.
.
.
dial-peer voice 100 pots
  destination-pattern 5550919
  port 2/0:D
  prefix 9548973
!
dial-peer voice 50 voip
  incoming called-number 5550919
  codec g711ulaw
  fax-relay ecm disable
  fax rate 9600
  fax protocol t38 ls-redundancy 0 hs-redundancy 0
.
.
.
```

Gateway-Controlled MGCP T.38 Fax Relay: Example

The following example shows a configuration for gateway-controlled T.38 fax in an MGCP network. This configuration uses the defaults for the **mgcp fax t38** command and the **mgcp timer nse-response t38** commands, so they do not appear in the running configuration presented in the example.

```

.
.
.
!
mgcp
mgcp call-agent 172.18.195.147 2427 service-type mgcp version 0.1
mgcp dtmf-relay voip codec all mode nse
mgcp modem passthrough voip mode ca
mgcp package-capability dtmf-package
mgcp default-package mo-package
mgcp tse payload 110
no mgcp timer receive-rtcp
mgcp timer net-nse-rsp 300
.
.
.

```

CA-Controlled MGCP T.38 Fax Relay: Example

The following is a sample configuration of the Cisco IOS Fax Services over IP Application Guide feature on a Cisco 2600 gateway. Commands that appear in the configuration task tables for this feature but that do not appear in the running configuration output are configured for their default settings.

```

!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname tyler
!
boot system tftp project/c2600-is-mz.0711 172.16.222.10
no logging buffered
no logging rate-limit
enable password mary
!
ip subnet-zero
!
!
no ip domain lookup
ip domain name abctrading.com
ip host jackson 172.16.184.144
ip host lincoln 172.16.222.10
ip name-server 172.24.12.13
ip name-server 172.24.12.134
ip name-server 192.168.222.72
!
!
no voice hpi capture buffer
no voice hpi capture destination
!
mrcp client session history duration 0
mrcp client session history records 0
fax interface-type fax-mail
mta receive maximum-recipients 0
!
!
interface FastEthernet0/0
 ip address 172.16.191.132 255.255.255.0
 duplex auto
 speed auto

```

```

!
interface FastEthernet0/1
  no ip address
  shutdown
  duplex auto
  speed auto
!
ip classless
ip route 0.0.0.0 0.0.0.0 172.16.184.1
ip route 172.16.0.0 255.255.0.0 172.16.184.1
ip http server
ip http port 1111
ip pim bidir-enable
!
!
access-list 101 permit tcp any any
access-list 101 permit udp host 172.16.184.144 any
access-list 101 permit udp host 172.16.222.10 any
access-list 102 permit ip any any
access-list 111 permit udp host 172.16.184.144 any
access-list 111 permit udp host 172.16.191.132 any
access-list 111 permit icmp any any
!
snmp-server packetsize 4096
snmp-server enable traps tty
call rsvp-sync
!
voice-port 1/0/0
!
voice-port 1/0/1
!
voice-port 1/1/0
!
voice-port 1/1/1
!
mgcp
mgcp call-agent 172.16.184.144 3562 service-type mgcp version 0.1
mgcp dtmf-relay voip codec all mode nse
mgcp tse payload 102
no mgcp timer receive-rtcp
!
mgcp profile default
!
dial-peer cor custom
!
!
dial-peer voice 110 pots
  application mgcpapp
  port 1/1/0
!
dial-peer voice 111 pots
  application mgcpapp
  port 1/1/1
!
!
line con 0
  exec-timeout 0 0
line aux 0
  exec-timeout 0 0
line vty 0 4
  exec-timeout 0 0
  password lab
  login
line vty 5 15

```

```
exec-timeout 0 0
password lab
login
!
end
```

