



Configuring Modem Passthrough

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Modem Passthrough over VoIP provides the transport of modem signals through a packet network by using pulse code modulation (PCM) encoded packets. This chapter describes the configuration for modem passthrough.

Your software release may not support all the features documented in this chapter. For the latest feature information and caveats, see the release notes for your platform and software release.

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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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.

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Prerequisites for Configuring Modem Passthrough

Before configuring modem passthrough, perform the following tasks:

- Establish a working VoIP-enabled network.



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- Verify network suitability to pass modem traffic. The key characteristics of the network are packet loss, delay, and jitter. These characteristics can be determined by using the Service Assurance Agent (SAA) feature of Cisco IOS software.
- Configure clock sourcing on the T1 controller on the voice gateway that connects to the PSTN. For modem passthrough to operate correctly, the gateway clock must be synced with the PSTN clock. See the following example configuration:

```
!
controller T1 0
 framing esf
 linecode b8zs
 clock source line
 channel-group 1 timeslots 1-24 speed 64
!
```

**Note**

Configure clock sourcing for all interfaces connected to the PSTN.

Restrictions for Configuring Modem Passthrough

Restrictions for configuring modem passthrough are as follows:

- The **modem passthrough protocol** and **fax protocol** commands cannot be configured at the same time. If you enter either one of these commands when the other is already configured, the command-line interface returns an error message. The error message serves as a confirmation notice because the **modem passthrough protocol** command is internally treated the same as the **fax protocol pass-through** command by the Cisco IOS software. For example, no other mode of fax protocol (for example, fax protocol T.38) can operate if the **modem passthrough protocol** command is configured.
- Even though the **modem passthrough protocol** and **fax protocol pass-through** commands are treated the same internally, be aware that if you change the configuration from the **modem passthrough protocol** command to the **modem passthrough nse** command, the configured **fax protocol pass-through** command is not automatically reset to the default. If default settings are required for the **fax protocol** command, you have to specifically configure the **fax protocol** command.

Information About Modem Passthrough

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Modem Passthrough Functions

Modem passthrough over VoIP performs the following functions:

- Represses processing functions like compression, echo cancellation, high-pass filter, and voice activity detection (VAD).
- Issues redundant packets to protect against random packet drops.
- Provides static jitter buffers of 200 milliseconds to protect against clock skew.

- Discriminates modem signals from voice and fax signals, indicating the detection of the modem signal across the connection, and placing the connection in a state that transports the signal across the network with the least amount of distortion.
- Reliably maintains a modem connection across the packet network for a long duration under normal network conditions.

Passthrough Rollover

When the gateway detects a data modem, both the originating gateway and the terminating gateway roll over to G.711. The roll over to G.711 disables the high-pass filter, disables echo cancellation, and disables VAD. At the end of the modem call, the voice ports revert to the prior configuration and the digital signal processor (DSP) goes back to the state before the rollover.

**Note**

The gateway can detect modems at speeds up to V.90.

Payload Redundancy

Payload redundancy enables the modem passthrough switchover and this causes the gateway to emit redundant packets. When redundancy is enabled, 10-ms sample-sized packets are sent. When redundancy is disabled, 20-ms sample-sized packets are sent.

Redundancy is enabled on one or both of the gateways. When only a single gateway is configured for redundancy, the second gateway receives the packets correctly but does not produce redundant packets.

Clock Slip Buffer Management

When the gateway detects a data modem, both the originating gateway and the terminating gateway switch from dynamic jitter buffers to static jitter buffers of 200-ms depth. The switch from dynamic to static is to compensate for PSTN clocking differences at the originating gateway and the terminating gateway. At the conclusion of a modem call, the voice ports revert to dynamic jitter buffers.

How to Configure Modem Passthrough

Modem passthrough can be configured at two levels:

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

**Note**

You must configure modem passthrough on both the originating and terminating gateways.

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Configuring Modem Passthrough Globally

Use the following steps to configure modem passthrough for all the dial peers on a gateway.

SUMMARY STEPS

- enable
- configure terminal
- voice service voip
- modem passthrough {nse| protocol}[payload-type *number*] codec {g711ulaw | g711alaw} [redundancy [maximum-sessions *sessions*] [sample-duration [10 | 20]]]

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	voice service voip Example: Router(config)# voice service voip	Enters voice-service configuration mode and configures voice service for all gateway connections.

Command or Action	Purpose
Step 4 modem passthrough {nse protocol} [payload-type <i>number</i>] codec {g711ulaw g711alaw} [redundancy [maximum-sessions <i>sessions</i>] [sample-duration [10 20]]] Example: Example: <pre>Router(conf-voi-serv)# modem passthrough nse payload-type 101 codec g711ulaw redundancy maximum- sessions 1</pre>	Configures modem passthrough for all dial peers on the gateway. The default behavior is no modem passthrough. • nse --Specifies that named signaling events (NSEs) are used to communicate codec switchover between gateways. • protocol --Session Initiation Protocol (SIP)/H.323 protocol is used to signal modem pass-through. ◦ payload-type <i>number</i>--(Optional) NSE payload type. Range varies, but is from 96 to 119 on most platforms. For details, refer to command-line interface (CLI) help. Default is 100. Note The payload-type must match on the originating and terminating gateways. • codec --Codec selections for upspeed. ◦ g711ulaw--Codec G.711 u-law, 64000 bits per second for T1. ◦ g711alaw--Codec G.711 a-law, 64000 bits per second for E1. • redundancy --(Optional) Enables a single repetition of packets (using RFC 2198) to improve reliability by protecting against packet loss. • maximum-sessions <i>value</i> --(Optional) Maximum number of simultaneous pass-through sessions. Ranges and defaults vary by platform.

Configuring Modem Passthrough for a Specific Dial Peer

You must configure a VoIP dial peer on both the originating and terminating gateways to match the call--for example, using a destination pattern.

When the **system** keyword is entered, the following parameters are not available: **nse**, **payload-type**, **codec**, and **redundancy**. The configuration is taken from the **modem passthrough nse** command in voice-service configuration mode.



Note

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

Use the following steps to configure modem passthrough for a specific dial peer.

SUMMARY STEPS

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

DETAILED STEPS

Command or Action	Purpose
Step 1 enable Example: Router> enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2 configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3 dial-peer voice tag voip Example: Router(config)# dial-peer voice 20 voip	Enters dial-peer configuration mode and names a specific VoIP dial peer. tag --Digits that define a particular dial peer. Range is from 1 to 2147483647. voip --Indicates that this is a VoIP peer that uses voice encapsulation on the POTS network.
Step 4 modem passthrough {system nse [payload-type number] codec {g711ulaw g711alaw} [redundancy]} Example: Router(config-dial-peer)# modem passthrough nse codec g711ulaw redundancy	Configures modem passthrough for a specific dial peer. The default behavior for modem passthrough in dial-peer configuration mode is modem passthrough system . system --Defaults to the global configuration. nse --Specifies that named signaling events (NSEs) are used to communicate codec switchover between gateways. payload-type number --(Optional) NSE payload type. Range varies by platform, but is from 96 to 119 on most platforms. The default is 100. codec --Codec selections for upspeaking. g711ulaw --Codec G.711 u-law 64000 bits per second for T1. g711alaw --Codec G.711 a-law 64000 bits per second for E1. redundancy --(Optional) Enables a single repetition of packets (using RFC 2198) to improve reliability by protecting against packet loss.

Troubleshooting Tips for Modem Passthrough

Use the following steps to troubleshoot modem passthrough:

- Ensure that you can make a voice call.
- Ensure that modem passthrough over VoIP is configured on both the originating gateway and the terminating gateway.
- Ensure that the originating and terminating gateways have the same NSE payload-type number.
- When two gateways are configured in voice-service configuration mode, ensure that the originating and terminating gateways have the same **maximum-sessions** value.

Use the following commands to troubleshoot modem passthrough:

- **debug voip vtsp** --Displays information about the voice telephony service provider (VTSP).
- **debug vtsp** --Used to trace how the router interacts with the digital signal processor (DSP) based on the signaling indications from the signaling stack and requests from the application. Effective with Cisco IOS Release 12.3(8)T, this command was replaced by the **debug voip vtsp** command.
- **show dial-peer voice** --Used to verify that modem passthrough over VoIP is enabled.
- **show call active voice** --Displays the voice information for the active call table.
- **show call history voice** --Displays the voice information for the call history table.
- **show dial-peer voice** --Displays configuration information for dial peers.

To verify that modem passthrough is configured, you can use the **show call active voice brief** command. In the following sample output, the IP call leg shows the keyword MODEMPASS to signify that the call is in modem passthrough mode:

```
11DD : 1 1565860ms.1 +15340 pid:2 Answer 100 active
dur 00:00:19 tx:864/110008 rx:858/102929
Tele 0/0/0 (1) [0/0/0] tx:12270/12270/0ms g711ulaw noise:-11 acom:6 i/0:-14/-59 dBm
11DD : 2 1570100ms.1 +11090 pid:1 Originate 200 active
dur 00:00:19 tx:858/102929 rx:864/103096
IP 1.1.1.2:16610 SRTP: off rtt:1ms pl:40/0ms lost:0/0/0 delay:60/60/60ms g711ulaw
TextRelay: off
media inactive detected:n media contrl rcvd:n/a timestamp:n/a
long duration call detected:n long duration call duration:n/a timestamp:n/a MODEMPASS nse
buf:0/0 loss 0% 0/0 last 1031s dur:0/0s
```

Configuration Examples for Modem Passthrough

- [Modem Passthrough Configuration for Cisco AS5300 Example, page 7](#)

Modem Passthrough Configuration for Cisco AS5300 Example

The following is sample configuration for the Modem Passthrough over VoIP feature for the Cisco AS5300 universal access servers:

```
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
voice service voip
modem passthrough nse codec g711ulaw redundancy maximum-session 5
!
resource-pool disable
!
ip subnet-zero
ip ftp source-interface Ethernet0
ip ftp username lab
ip ftp password lab
no ip domain-lookup
!
isdn switch-type primary-5ess
cns event-service server
!
mta receive maximum-recipients 0
!
controller T1 0
framing esf
clock source line primary
linecode b8zs
```

```

    pri-group timeslots 1-24
    !
controller T1 1
    shutdown
    clock source line secondary 1
    !
interface Ethernet0
    ip address 10.10.2.2 255.0.0.0
    no ip route-cache
    no ip mroute-cache
    !
interface Serial0:23
    no ip address
    encapsulation ppp
    ip mroute-cache
    no logging event link-status
    isdn switch-type primary-5ess
    isdn incoming-voice modem
    no peer default ip address
    no fair-queue
    no cdp enable
    no ppp lcp fast-start
    !
interface FastEthernet0
    ip address 172.16.0.1 255.0.0.0
    no ip route-cache
    no ip mroute-cache
    load-interval 30
    duplex full
    speed auto
    no cdp enable
    !
ip classless
ip route 192.168.0.0 255.255.0.0 10.10.1.1
no ip http server
!
voice-port 0:D
!
dial-peer voice 1 pots
    incoming called-number 55511..
    destination-pattern 020..
    direct-inward-dial
    port 0:D
    prefix 020
    !
dial-peer voice 2 voip
    incoming called-number 020..
    destination-pattern 55511..
    modem passthrough nse codec g711ulaw redundancy
    session target ipv4:10.10.0.2
    !
line con 0
    exec-timeout 0 0
    transport input none
line aux 0
line vty 0 4
    login
    !

```

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