

SIP-to-SIP Extended Feature Functionality for Session Border Controllers

The SIP-to-SIP Extended Feature Functionality for Session Border Controllers enables SIP-to-SIP functionality to conform with RFC 3261 to interoperate with SIP user agents (UAs). The SIP-to-SIP Extended Feature Functionality includes:

- Call Admission Control (based on CPU, memory, and total calls)
- Delayed Media Call
- ENUM support
- Configuring SIP Error Message Pass-Through
- Interoperability with Cisco Unified Communications Manager 5.0 and BroadSoft
- Lawful Intercept
- Media Inactivity
- [Modem Pass-through over VoIP](#)
- TCP and UDP interworking
- Tcl scripts with SIP NOTIFY VoiceXML with SIP-to-SIP
- Transport Layer Security (TLS)

Prerequisites for SIP-to-SIP Extended Feature Functionality for Session Border Controllers

Cisco Unified Border Element

- Cisco IOS Release 12.4(6)T or a later release must be installed and running on your Cisco Unified Border Element.

Cisco Unified Border Element (Enterprise)

- Cisco IOS XE Release 3.1S or a later release must be installed and running on your Cisco ASR 1000 Series Router.

Modem Pass-through over VoIP

This feature module describes the Modem Passthrough over Voice over IP (VoIP) feature on Cisco Unified Border Element and Cisco Unified Border Element (Enterprise) and includes information in the following sections:

- [Information about Modem Passthrough over VoIP, page 217](#)
- [Restrictions for the Modem Passthrough over VoIP Feature, page 219](#)
- [Prerequisites for the Modem Passthrough over VoIP Feature, page 219](#)
- [How to Configure Modem Passthrough over VoIP, page 219](#)
- [Monitoring and Maintaining Modem Passthrough over VoIP, page 224](#)
- [Configuration Examples, page 224](#)

Information about Modem Passthrough over VoIP

The Modem Passthrough over VoIP feature provides the transport of modem signals through a packet network by using pulse code modulation (PCM) encoded packets.

The Modem Passthrough over VoIP feature 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.

For further details, the functions of the Modem Passthrough over VoIP feature are described in the following sections.

Modem Tone Detection

The gateway is able to detect modems at speeds up to V.90.

Passthrough Switchover

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 switchover. You can configure the codec by selecting the **g711alaw** or **g711ulaw** option of the **codec** command.

See also the [“How to Configure Modem Passthrough over VoIP”](#) section in this document.

Controlled Redundancy

You can enable payload redundancy so that the Modem Passthrough over VoIP switchover causes the gateway to emit redundant packets.

Packet Size

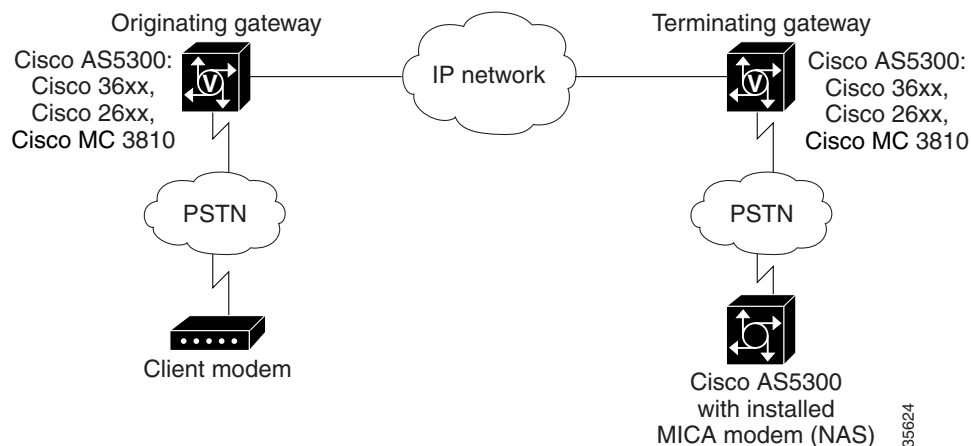
When redundancy is enabled, 10-ms sample-sized packets are sent. When redundancy is disabled, 20-ms sample-sized packets are sent.

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 Public Switched Telephone Network (PSTN) clocking differences at the originating gateway and the terminating gateway. At the conclusion of the modem call, the voice ports revert to dynamic jitter buffers.

[Figure 1](#) illustrates the connection from the client modem to a MICA technologies modem network access server (NAS).

Figure 1 Modem Passthrough Connection



Prerequisites for the Modem Passthrough over VoIP Feature

- VoIP enabled network.
- Cisco IOS Release 12.1(3)T must run on the gateways for the Modem Passthrough over VoIP feature to work.
- Network suitability to pass modem traffic. The key attributes are packet loss, delay, and jitter. These characteristics of the network can be determined by using the Cisco IOS feature Service Assurance Agent.

Cisco Unified Border Element

- Cisco IOS Release 12.4(6)T or a later release must be installed and running on your Cisco Unified Border Element.

Cisco Unified Border Element (Enterprise)

- Cisco IOS XE Release 3.3S or a later release must be installed and running on your Cisco ASR 1000 Series Router.

Restrictions for the Modem Passthrough over VoIP Feature

Cisco Unified Border Element (Enterprise)

- If call started as g729, upon modem tone (2100Hz) detection both the outgoing gateway (OGW) and the trunking gateway (TGW) will generate NSE packets towards peer side and up speed to g711 as Cisco UBE(Enterprise) passes these packets to the peer side.



Note That OGW and TGW display the new codec, but the Cisco UBE (Enterprise) continues to show the original codec g729 in the show commands.

How to Configure Modem Passthrough over VoIP

By default, modem passthrough over VoIP capability and redundancy are disabled.



Tips

You need to configure modem passthrough in both the originating gateway and the terminating gateway for the Modem Passthrough over VoIP feature to operate. If you configure only one of the gateways in a pair, the modem call will not connect successfully.

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

See the following sections for the Modem Passthrough over VoIP feature. The two configuration tasks can configure separately or together. If both are configured, the dial-peer configuration takes precedence over the global configuration. Consequently, a call matching a particular dial-peer will first try to apply the modem passthrough configuration on the dial-peer. Then, if a specific dial-peer is not configured, the router will use the global configuration:

- [Configuring Modem Passthrough over VoIP Globally, page 220](#)
- [Configuring Modem Passthrough over VoIP for a Specific Dial Peer, page 221](#)

Configuring Modem Passthrough over VoIP Globally

For the Modem Passthrough over VoIP feature to operate, you need to configure modem passthrough in both the originating gateway and the terminating gateway so that the modem call matches a voip dial-peer on the gateway.

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

To configure the Modem Passthrough over VoIP feature for all the connections of a gateway, use the following commands beginning in global configuration mode:

SUMMARY STEPS

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

Detailed Steps

	Command	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	voice service voip Example: Router(config)# voice service voip	Enters voice-service configuration mode. Configures voice service for all the connections for the gateways.
Step 3	modem passthrough nse [payload-type <i>number</i>] codec { g711ulaw g711alaw } [redundancy] [maximum-sessions <i>value</i>] Example: Router(config)# Router(conf-voi-serv)# modem passthrough nse	Configures the Modem Passthrough over VoIP feature. The default behavior is no modem passthrough . The payload type is an optional parameter for the nse keyword. Use the same payload-type <i>number</i> for both the originating gateway and the terminating gateway. The payload-type <i>number</i> can be set from 96 to 119. If you do not specify the payload-type <i>number</i> , the <i>number</i> defaults to 100. When the payload-type is 100, and you use the show running-config command, the payload-type parameter does not appear. Use the same codec type for both the originating gateway and the terminating gateway. g711ulaw codec is required for T1, and g711alaw codec is required for E1. The redundancy keyword is an optional parameter for sending redundant packets for modem traffic. The maximum-sessions keyword is an optional parameter for the redundancy keyword. This parameter determines the maximum simultaneous modem passthrough sessions with redundancy .
Step 4	exit Example: Router(conf-voi-serv)# exit	Exits voice-service configuration mode.
Step 5	exit Example: Router(config)# exit	Exits global configuration mode.

Configuring Modem Passthrough over VoIP for a Specific Dial Peer

You can configure the Modem Passthrough over VoIP feature on a specific dial peer in two ways, as follows:

- Globally in the voice-service configuration mode
- Individually in the dial-peer configuration mode on a specific dial peer

The default behavior for the voice-service configuration mode is **no modem passthrough**. This default behavior implies that modem passthrough is disabled for all dial peers on the gateway by default.

To enable Modem Passthrough on the VoIP dial peers on both the originating and terminating gateway, configure modem passthrough globally or explicitly on the dial peer.

For modem passthrough to operate, you must define VoIP dial peers on both gateways to match the call, for example, by using a destination pattern or an incoming called number. The modem passthrough parameters associated with those dial peers then will apply to the call.



Note

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

To configure the Modem Passthrough over VoIP feature for a specific dial peer, use the following commands beginning in global configuration mode:

SUMMARY STEPS

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

DETAILED STEPS

	Command	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none">• Enter your password if prompted.
Step 2	Router(config)# dial-peer voice <i>number</i> voip	Enters dial-peer configuration mode. Configures a specific dial peer in dial-peer configuration mode.

	Command	Purpose
Step 3	<pre>Router(config-dial-peer)# modem passthrough {system nse [payload-type number] codec {g711ulaw g711alaw} [redundancy]}</pre>	<p>Configures the Modem Passthrough over VoIP feature for a specific dial peer. The default behavior for the Modem Passthrough for VoIP feature in dial-peer configuration mode is modem passthrough system. As required, the gateway defaults to no modem passthrough.</p> <p>When the system keyword is enabled, the following parameters are not available: nse, payload-type, codec, and redundancy. Instead the values from the global configuration are used.</p> <p>The payload type is an optional parameter for the nse keyword. Use the same payload-type number for both the originating gateway and the terminating gateway. The payload-type number can be set from 96 to 119. If you do not specify the payload-type number, the <i>number</i> defaults to 100. When the payload-type is 100, and you use the show running-config command, the payload-type parameter does not appear.</p> <p>Use the same codec type for both the originating gateway and the terminating gateway. g711ulaw codec is required for T1, and g711alaw codec is required for E1.</p> <p>The redundancy keyword is an optional parameter for sending redundant packets for modem traffic.</p>
Step 4	<pre>Router(config-dial-peer)# exit</pre>	Exits dial-peer configuration mode and returns to the global configuration mode.
Step 5	<pre>Router(config)# exit</pre>	Exits global configuration mode.

Verifying Modem Passthrough over VoIP

To verify that the Modem Passthrough over VoIP feature is enabled, perform the following steps:

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- Step 1** Enter the **show run** command to verify the configuration.
 - Step 2** Enter the **show dial-peer voice** command to verify that Modem Passthrough over VoIP is enabled.
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Troubleshooting Tips

To troubleshoot the Modem Passthrough over VoIP feature, perform the following steps:

- Make sure that you can make a voice call.
- Make sure that Modem Passthrough over VoIP is configured on both the originating gateway and the terminating gateway.
- Make sure that both the originating gateway and the terminating gateway have the same named signaling event (NSE) **payload-type number**.
- Make sure that both the originating gateway and the terminating gateway have the same **maximum-sessions value** when the two gateways are configured in the voice-service configuration mode.
- Use the **debug vtsp dsp** and **debug vtsp session** commands to debug a problem.

Monitoring and Maintaining Modem Passthrough over VoIP

To monitor and maintain the Modem Passthrough over VoIP feature, use the following commands in privileged EXEC mode:

Command	Purpose
Router# show call active { <i>voice</i> <i>fax</i> } [<i>brief</i>]	Displays information for the active call table or displays the voice call history table. The <i>brief</i> option displays a truncated version of either option.
Router# show dial-peer voice [<i>number</i> <i>summary</i>]	Displays configuration information for dial peers. The <i>number</i> argument specifies a specific dial peer from 1 to 32767. The <i>summary</i> option displays a summary of all dial peers.

Configuration Examples

The following is sample configuration for the Modem Passthrough over VoIP feature:

```
version 12.1
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
!
controller T1 2
    shutdown
```



```

!
controller T1 3
  shutdown
!
!
!
interface Ethernet0
  ip address 1.1.2.2 255.0.0.0
  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 26.0.0.1 255.0.0.0
  no ip route-cache
  no ip mroute-cache
  load-interval 30
  duplex full
  speed auto
  no cdp enable
!
ip classless
ip route 17.18.0.0 255.255.0.0 1.1.1.1
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 ipv4:26.0.0.2
!
!
line con 0
  exec-timeout 0 0
  transport input none
line aux 0
line vty 0 4
  login
!
!
end

```