



## FXO Answer and Disconnect Supervision

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This feature module describes the FXO Answer and Disconnect Supervision feature for analog Foreign Exchange Office (FXO) voice ports. This feature applies to analog FXO voice ports with loop-start signaling connected to Public Switched Telephone Networks (PSTNs), PBXs, or key systems.

FXO disconnect supervision was introduced in Cisco IOS Release 12.1(3)T on the Cisco 2600 and Cisco 3600 series routers and Cisco MC3810 series concentrators.

FXO answer supervision was introduced in Cisco IOS Release 12.2(2)T on the Cisco 1750, Cisco 2600 and Cisco 3600 series routers and Cisco MC3810 series concentrators.

This document includes the following sections:

- Feature Overview, page 1
- Supported Platforms, page 3
- Supported Standards, MIBs, and RFCs, page 3
- Prerequisites, page 3
- Configuration Tasks, page 4
- Configuration Examples, page 13
- Command Reference, page 17
- Glossary, page 51

## Feature Overview

The FXO Answer and Disconnect Supervision feature enables analog FXO ports to monitor call-progress tones, and to monitor voice and fax transmissions returned from a PBX or from the PSTN.

You can configure voice ports to detect either the standard call-progress tones that are preconfigured for certain countries, or you can configure custom call-progress tone detection. Tone detection is performed by the digital signal processor (DSP) and causes a DSP event to be reported to the host software.

Answer supervision can be accomplished in two ways: by detecting battery reversal, or by detecting voice, fax, or modem tones. If an FXO voice port is connected to the PSTN, and battery reversal is supported, use the battery reversal method. Voice ports that do not support battery reversal must use the answer supervision method, in which answer supervision is triggered when the DSP detects voice, modem, or fax transmissions. Configuring answer supervision automatically enables disconnect supervision; however, you can configure disconnect supervision separately if answer supervision is not configured.

Disconnect supervision can be configured to detect call-progress tones sent by the PBX or PSTN (for example, busy, reorder, out-of-service, number-unavailable), or to detect any tone received (for example, busy tone or dial-tone). When an incoming call ends, the DSP detects the associated call-progress tone, causing the analog FXO voice port to go on-hook.

You can configure disconnect tones to be detected either continuously during calls or only during call setup (before calls are answered). If a port is configured to detect any tone received, the tone detection operates only during call setup, and you must also enable echo cancellation to prevent disconnection due to detection of the router's own ringback tone.

## Benefits

Answer supervision allows interoperability with analog PSTN and PBX systems that are incompatible with the answer-supervision and disconnect-supervision features provided by digital trunk interfaces.

Answer supervision provides more accurate billing records by reporting only answered calls as connected. Without answer supervision, all calls are reported as connected, including unanswered calls, calls to busy lines, and calls that fail due to network congestion or other reasons.

Disconnect supervision allows interoperability with PSTN and PBX systems regardless of their ability to transmit supervisory tones. This prevents billing errors that could otherwise result from failure to detect noncompletion or termination of calls.

## Restrictions

The FXO Answer and Disconnect Supervision feature is applicable only to analog FXO ports with loop-start signaling.

Answer supervision is triggered only by the voice and tones that the FXO voice port receives from the called-party end.

FXO answer supervision and disconnect supervision are not supported on local hairpinned calls between analog voice ports (Foreign Exchange Station [FXS] and FXO) on Cisco MC3810 series concentrators, because the DSP is bypassed. If hairpinning is turned off with the **no voice local-bypass** global configuration command, FXO answer supervision and disconnect supervision are supported.

For calls that are not answered before the ringing timeout period, call connection (and, therefore, start of billing) is not supported. Unanswered calls are dropped after the ringing timeout.

Network announcements cannot be interpreted as disconnect tones.

There is no timer function to initiate a disconnection in cases of calls in which there are no detectable supervisory tones, voice, or fax transmissions.

Battery reversal must be used to provide answer supervision on FXO voice ports connected to a PSTN, if the system supports battery reversal. Configuring battery reversal does not enable disconnect supervision.

If interactive voice response (IVR) is configured, false answer supervision can occur due to echo if the calling party speaks. This results in unanswered calls being reported as having been connected.

Cisco MC3810 series concentrators must be equipped with high-performance compression modules (HCMs) to support tone detection. Standard voice compression modules (VCMs) do not support FXO answer and disconnect supervision using tone detection. This restriction does not apply to answer supervision by battery reversal detection.

## Related Documents

- *Cisco IOS Voice, Video, and Fax Configuration Guide*, Release 12.2
- *Cisco IOS Voice, Video, and Fax Command Reference*, Release 12.2
- *Software Configuration Guide for Cisco 3600 Series and Cisco 2600 Series Routers*
- *Cisco MC3810 Multiservice Concentrator Configuration Guide*

## Supported Platforms

- Cisco 1750
- Cisco 2600 series
- Cisco 3600 series
- Cisco MC3810 series

## Supported Standards, MIBs, and RFCs

### Standards

No new or modified standards are supported by this feature.

### MIBs

No new or modified MIBs are supported by this feature.

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB web site on Cisco Connection Online (CCO) at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

### RFCs

No new or modified RFCs are supported by this feature.

## Prerequisites

The FXO Answer and Disconnect Supervision feature described in this document requires Cisco IOS Release 12.2(2)T or later.

# Configuration Tasks

If you are configuring an FXO voice port connected to a PSTN, and the system supports battery reversal, configure answer supervision by battery reversal.



## Note

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Battery reversal does not enable disconnect supervision, which you must configure separately, if it is required.

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If you are configuring a voice port or system that does not support battery reversal, configure answer supervision by detection of call-progress tones. Call-progress tone detection also enables disconnect supervision.



## Caution

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If an FXO port or its peer FXS port does not support battery reversal, avoid configuring **battery-reversal** or **battery-reversal answer** on the FXO port. On FXO ports that do not support battery reversal, the **battery-reversal** command can cause unpredictable behavior, and the **battery-reversal answer** command prevents calls from being answered.

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You can configure a voice port to detect standard call-progress tones for a particular region or country, or you can configure custom tone detection parameters. Use the standard tone-detection procedure if the **cptone** command provides a set of call-progress tones matching your requirements. Use the custom tone-detection capability when the **cptone** command does not provide a preconfigured set of call-progress tones for your region or country.

To configure answer supervision by battery reversal detection, complete the following task:

- Configuring Answer Supervision by Battery Reversal Detection (required)

To configure answer supervision by detection of standard call-progress tones, complete the following task:

- Configuring Voice Ports to Detect Standard Call-Progress Tones (required)

To configure detection of custom call-progress tones, complete the following task:

- Configuring Voice Ports to Detect Custom Call-Progress Tones (required)

To configure a voice port to disconnect when any tone is detected, complete the following task:

- Configuring Voice Ports to Detect Any Tone (Disconnect Supervision Only) (required)

To verify your configuration, complete the following task:

- Verifying Configuration of Call-Progress Tone Detection (optional)

## Configuring Answer Supervision by Battery Reversal Detection

To enable an FXO voice port to detect when calls are answered by detecting battery reversal, complete the following steps beginning in global configuration mode:

	Command	Purpose
<b>Step 1</b>	For Cisco 2600 and Cisco 3600 series analog voice ports: Router(config)# <b>voice-port</b> slot/subunit/port  For Cisco 1750 and Cisco MC3810 series analog voice ports: Router(config)# <b>voice-port</b> slot/port	Identifies the voice port you want to configure and enters voice-port configuration mode.
<b>Step 2</b>	router(config-voiceport)# <b>battery-reversal answer</b>	Configures the voice port to detect when calls are answered.
<b>Step 3</b>	Router(config-voiceport)# <b>exit</b>	Exits from voice-port configuration mode.

## Configuring Voice Ports to Detect Standard Call-Progress Tones

To enable detection of standard call-progress tones for a country or locale, complete the following steps beginning in global configuration mode:

	Command	Purpose
<b>Step 1</b>	For Cisco 2600 and Cisco 3600 series analog voice ports: Router(config)# <b>voice-port</b> slot/subunit/port  For Cisco 1750 and Cisco MC3810 series analog voice ports: Router(config)# <b>voice-port</b> slot/port	Identifies the voice port you want to configure and enters voice-port configuration mode.
<b>Step 2</b>	If both answer supervision and disconnect supervision are required: Router(config-voiceport)# <b>supervisory answer dualtone</b> [sensitivity {high   medium   low}]  If only disconnect supervision is required: Router(config-voiceport)# <b>supervisory disconnect dualtone</b> {mid-call   pre-connect}	Enables answer supervision and enables disconnect supervision preconnect (during call setup).  The <b>sensitivity</b> setting applies to answer supervision, and the default is <b>medium</b> .  Enables disconnect supervision. Specify <b>pre-connect</b> for tone detection only during call setup. Specify <b>mid-call</b> for tone detection during the entire call duration.
<b>Step 3</b>	Router(config-voiceport)# <b>cptone</b> locale	Configures the voice port to detect the standard call-progress tones for the country or region named by the entry for <i>locale</i> . For <i>locale</i> entries, see the <i>Cisco IOS Multiservice Applications Command Reference</i> for your Cisco IOS release.
<b>Step 4</b>	Router(config-voiceport)# <b>no battery-reversal</b>	Ensures that battery reversal is not enabled on this voice port.
<b>Step 5</b>	Router(config-voiceport)# <b>exit</b>	Exits from voice-port configuration mode.

## Configuring Voice Ports to Detect Custom Call-Progress Tones

To enable detection of custom call-progress tones, create a voice class to define the call-progress tones. These call-progress tones have default tolerance limits; to change the tolerance limits, create another voice class to define nondefault tolerance limits for the tone-detection parameters. Finally, associate the call-progress-tone voice class, and the tolerance-limit voice class if required, with the applicable analog FXO voice ports.

To configure a voice port to detect custom call-progress tones, complete the following tasks:

- Creating a Class of Custom Call-Progress Tones
- Creating a Class of Tone-Detection Tolerance Limits
- Assigning Custom Call-Progress Tones and Tone-Detection Tolerance Limits to an FXO Voice Port



### Note

Use this procedure only if there is no set of standard call-progress tones for your application. Standard call-progress tones are defined by the **cptone** command.

## Creating a Class of Custom Call-Progress Tones

To configure a voice port to detect incoming call-progress tones, you need to know the parameters of the tones expected from the PBX or PSTN. This procedure creates a set, or class, of specified tones that can be associated with voice ports. The parameters of the tones need to be precisely specified to prevent unwanted actions due to detection of nonsupervisory tones or noise.

A call-progress tone can consist of a single frequency or a combination of two frequencies, and it can have a cadence with up to four *on* times and four *off* times.



### Caution

If a voice port is configured to detect nondual tones, unwanted disconnects can result from detection of random tone frequencies—the phenomenon of “talkoff.”

To create a voice class that defines the specific tone or tones to be detected, complete the following steps, as required, beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# <b>voice class custom-cptone</b> <i>cptone-name</i>	Defines a class of custom call-progress tones to be detected.  You can create multiple voice classes to define different sets of custom call-progress tones, and you can associate any one of these voice classes to any FXO voice port. Identify each voice class with a unique name.  Choose a <i>cptone-name</i> to match your application.
Step 2	Router(cfg-cptone)# <b>dualtone busy</b>	Enters dualtone configuration mode for busy tone.
Step 3	Router(cfg-cp-dualtone)# <b>cadence</b> { <i>cycle-1-on-time</i> <i>cycle-1-off-time</i> [ <i>cycle-2-on-time cycle-2-off-time</i> ] [ <i>cycle-3-on-time cycle-3-off-time</i> ] [ <i>cycle-4-on-time</i> <i>cycle-4-off-time</i> ]   <b>continuous</b> }	(If required) Specifies the cadence in ms for the busy tone.  The range is 0 to 1000.  The default is continuous.

	<b>Command</b>	<b>Purpose</b>
<b>Step 4</b>	Router(cfg-cp-dualtone)# <b>frequency</b> <i>frequency-1</i> [ <i>frequency-2</i> ]	(If required) Specifies the frequencies (or frequency) in Hz for the busy tone.  The range is 300 to 3600.  The default is 300.
<b>Step 5</b>	Router(cfg-cp-dualtone)# <b>dualtone ringback</b>	(If required) Enters dualtone configuration mode for ringback tone.
<b>Step 6</b>	Router(cfg-cp-dualtone)# <b>cadence</b> { <i>cycle-1-on-time</i> <i>cycle-1-off-time</i> [ <i>cycle-2-on-time</i> <i>cycle-2-off-time</i> ] [ <i>cycle-3-on-time</i> <i>cycle-3-off-time</i> ] [ <i>cycle-4-on-time</i> <i>cycle-4-off-time</i> ]   <b>continuous</b> }	(If required) Specifies the cadence in ms for the ringback tone.  The range is 0 to 1000.  The default is continuous.
<b>Step 7</b>	Router(cfg-cp-dualtone)# <b>frequency</b> <i>frequency-1</i> [ <i>frequency-2</i> ]	(If required) Specifies the frequencies (or frequency) in Hz for the ringback tone.  The range is 300 to 3600.  The default is 300.
<b>Step 8</b>	Router(cfg-cp-dualtone)# <b>dualtone reorder</b>	(If required) Enters dualtone configuration mode for reorder tone.
<b>Step 9</b>	Router(cfg-cp-dualtone)# <b>cadence</b> { <i>cycle-1-on-time</i> <i>cycle-1-off-time</i> [ <i>cycle-2-on-time</i> <i>cycle-2-off-time</i> ] [ <i>cycle-3-on-time</i> <i>cycle-3-off-time</i> ] [ <i>cycle-4-on-time</i> <i>cycle-4-off-time</i> ]   <b>continuous</b> }	(If required) Specifies the cadence in ms for the reorder tone.  The range is 0 to 1000.  The default is continuous.
<b>Step 10</b>	Router(cfg-cp-dualtone)# <b>frequency</b> <i>frequency-1</i> [ <i>frequency-2</i> ]	(If required) Specifies the frequencies (or frequency) in Hz for the reorder tone.  The range is 300 to 3600.  The default is 300.
<b>Step 11</b>	Router(cfg-cp-dualtone)# <b>dualtone out-of-service</b>	(If required) Enters dualtone configuration mode for out-of-service tone.
<b>Step 12</b>	Router(cfg-cp-dualtone)# <b>cadence</b> { <i>cycle-1-on-time</i> <i>cycle-1-off-time</i> [ <i>cycle-2-on-time</i> <i>cycle-2-off-time</i> ] [ <i>cycle-3-on-time</i> <i>cycle-3-off-time</i> ] [ <i>cycle-4-on-time</i> <i>cycle-4-off-time</i> ]   <b>continuous</b> }	(If required) Specifies the cadence in ms for the out-of-service tone.  The range is 0 to 1000.  The default is continuous.
<b>Step 13</b>	Router(cfg-cp-dualtone)# <b>frequency</b> <i>frequency-1</i> [ <i>frequency-2</i> ]	(If required) Specifies the frequencies (or frequency) in Hz for the out-of-service tone.  The range is 300 to 3600.  The default is 300.
<b>Step 14</b>	Router(cfg-cp-dualtone)# <b>dualtone</b> <b>number-unobtainable</b>	(If required) Enters dualtone configuration mode for number-unobtainable tone.
<b>Step 15</b>	Router(cfg-cp-dualtone)# <b>cadence</b> { <i>cycle-1-on-time</i> <i>cycle-1-off-time</i> [ <i>cycle-2-on-time</i> <i>cycle-2-off-time</i> ] [ <i>cycle-3-on-time</i> <i>cycle-3-off-time</i> ] [ <i>cycle-4-on-time</i> <i>cycle-4-off-time</i> ]   <b>continuous</b> }	(If required) Specifies the cadence in ms for the number-unobtainable tone.  The range is 0 to 1000.  The default is continuous.

	Command	Purpose
Step 16	Router(cfg-cp-dualtone)# <b>frequency</b> <i>frequency-1</i> [ <i>frequency-2</i> ]	(If required) Specifies the frequencies (or frequency) in Hz for the number-unobtainable tone. The range is 300 to 3600. The default is 300.
Step 17	Router(cfg-cp-dualtone)# <b>dualtone disconnect</b>	(If required) Enters dualtone configuration mode for disconnect tone.
Step 18	Router(cfg-cp-dualtone)# <b>cadence</b> { <i>cycle-1-on-time</i> <i>cycle-1-off-time</i> [ <i>cycle-2-on-time</i> <i>cycle-2-off-time</i> ] [ <i>cycle-3-on-time</i> <i>cycle-3-off-time</i> ] [ <i>cycle-4-on-time</i> <i>cycle-4-off-time</i> ]   <b>continuous</b> }	(If required) Specifies the cadence in ms for the disconnect tone. The range is 0 to 1000. The default is continuous.
Step 19	Router(cfg-cp-dualtone)# <b>frequency</b> <i>frequency-1</i> [ <i>frequency-2</i> ]	(If required) Specifies the frequencies (or frequency) in Hz for the disconnect tone. The range is 300 to 3600. The default is 300.
Step 20	Router(cfg-cp-dualtone)# <b>exit</b>	Exits from dualtone configuration mode.
Step 21	Router(cfg-cptone)# <b>exit</b>	Exits from cp-tone configuration mode.

## Creating a Class of Tone-Detection Tolerance Limits

To create a voice class that defines a set of nondefault tolerance limits for the frequency, power, and cadence of the tones to be detected, complete the following steps, as required, beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# <b>voice class</b> <b>dualtone-detect-params</b> <i>tag</i>	Creates a voice class that defines a set of tolerance limits for the frequency, power, and cadence of the tones to be detected.  You can create multiple voice classes to define different tolerance limits, and you can associate any one of these voice classes to any FXO voice port. Identify each voice class by a unique tag.
Step 2	Router(cfg-dual-detect)# <b>freq-max-deviation</b> <i>frequency</i>	(If required) The maximum allowed frequency deviation in Hz for call-progress tones. The range is 10 to 125. The default is 10.
Step 3	Router(cfg-dual-detect)# <b>freq-max-power</b> <i>dBm0</i>	(If required) The upper limit of the tone power that is detected, in dBm0. The range is 0 to 20 (0 dBm0 to 20 dBm0). The default is 10 (10 dBm0).
Step 4	Router(cfg-dual-detect)# <b>freq-min-power</b> <i>dBm0</i>	(If required) The lower limit of the tone power that is detected; your <i>dBm0</i> entry represents minus dBm0. The range is 10 to 35 (–10 dBm0 to –35 dBm0). The default is 30 (–30 dBm0).

	Command	Purpose
Step 5	Router(cfg-dual-detect)# <b>freq-power-twist</b> <i>dBm0</i>	(If required) The maximum power difference allowed between the two frequencies of a tone, in dBm0.  The range is 0 to 15. The default is 6.
Step 6	Router(cfg-dual-detect)# <b>freq-max-delay</b> <i>time</i>	(If required) The maximum number of 10-ms time intervals by which the two frequencies in a tone may differ from each other and be detected.  The range is 10 to 100 (100 ms to 1 s). The default is 20 (200 ms).
Step 7	Router(cfg-dual-detect)# <b>cadence-variation</b> <i>time</i>	(If required) The maximum time that the tone onset can vary from the specified onset time and still be detected, in 10-ms increments.  The range is 0 to 200 (0 ms to 2 s). The default is 100 (1 s).
Step 8	Router(cfg-dual-detect)# <b>exit</b>	Exits from voice-class configuration mode.

## Assigning Custom Call-Progress Tones and Tone-Detection Tolerance Limits to an FXO Voice Port


To configure an analog FXO voice port to detect previously configured classes of call-progress tones and tone-detection tolerance limits, complete the following steps, as applicable, beginning in global configuration mode:

	Command	Purpose
Step 1	For Cisco 2600 and Cisco 3600 series analog voice ports:  Router(config)# <b>voice-port</b> <i>slot/subunit/port</i>  For Cisco 1750 and Cisco MC3810 series analog voice ports:  Router(config)# <b>voice-port</b> <i>slot/port</i>	Identifies the voice port you want to configure and enters voice-port configuration mode.
Step 2	If both answer supervision and disconnect supervision are required:  Router(config-voiceport)# <b>supervisory answer dualtone</b> [ <b>sensitivity</b> { <b>high</b>   <b>medium</b>   <b>low</b> }]  If only disconnect supervision is required:  Router(config-voiceport)# <b>supervisory disconnect dualtone</b> { <b>mid-call</b>   <b>pre-connect</b> }	Enables answer supervision and enables disconnect supervision preconnect (during call setup).  The <b>sensitivity</b> setting applies to answer supervision, and the default is <b>medium</b> .  Enables disconnect supervision. Specify <b>pre-connect</b> for tone detection only during call setup. Specify <b>mid-call</b> for tone detection during the entire call duration.
Step 3	Router(config-voiceport)# <b>no battery-reversal</b>	Ensures that battery reversal is not enabled on this voice port.
Step 4	Router(config-voiceport)# <b>supervisory custom-cptone</b> <i>cptone-name</i>	(If required) Configures a voice port to detect the call-progress tones that were defined by the <b>voice class custom-cptone</b> command.  The <i>cptone-name</i> specifies a voice class created in the “Creating a Class of Custom Call-Progress Tones” section.

	Command	Purpose
Step 5	Router(config-voiceport)# <b>supervisory dualtone-detect-params tag</b>	(If required) Associates a set, or class, of tolerance limits for the frequency, power, and cadence of the tones to be detected. The class of tolerance limits was created by the <b>voice class dualtone-detect-params</b> command.  The <i>tag</i> specifies a voice class created in the “Creating a Class of Tone-Detection Tolerance Limits” section.
Step 6	Router(config-voiceport)# <b>timeouts call-disconnect {seconds   infinity}</b>	(If required) Configures a nondefault duration in seconds that a voice port waits before disconnecting an incoming call, after disconnect tones are detected.  The range is 1 to 120. The default is 60.
Step 7	Router(config-voiceport)# <b>timeouts wait-release {seconds   infinity}</b>	(If required) Configures a nondefault duration in seconds that a voice port waits before disconnecting an outgoing call, after disconnect tones are detected.  The range is 1 to 3600. The default is 30.
Step 8	Router(config-voiceport)# <b>exit</b>	Exits from voice-port configuration mode.

## Configuring Voice Ports to Detect Any Tone (Disconnect Supervision Only)

To configure an analog FXO voice port to go on-hook when any tone is received from a PBX or PSTN before the call is answered, complete the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	For Cisco 2600 and Cisco 3600 series analog voice ports: Router(config)# <b>voice-port slot/subunit/port</b>  For Cisco 1750 and Cisco MC3810 series analog voice ports: Router(config)# <b>voice-port slot/port</b>	Identifies the voice port you want to configure and enters voice-port configuration mode.
Step 2	Router(config-voiceport)# <b>supervisory disconnect anytone</b>	Enables disconnect supervision preconnect (during call setup), and specifies disconnection on receipt of any tone. Examples of tones that trigger a disconnect include busy tone, fast busy tone, and dial tone.   <b>Note</b> You must enable echo cancellation to prevent disconnections caused by the router's own ringback tone.
Step 3	Router(config-voiceport)# <b>exit</b>	Exits from voice-port configuration mode.

## Verifying Configuration of Call-Progress Tone Detection

Enter the **show running-config** command to verify that call-progress tone detection has been properly configured on a voice port.

The following example shows part of the output from the **show running-config** command on a Cisco 3600 series router, in which the following configurations are demonstrated:

- Two voice classes for tone-detection tolerance limits (voice class dualtone-detect-params 1 and voice class dualtone-detect-params 2)
- Two voice classes for custom tone detection (us-custom and oz-custom)
- One voice class of each type is associated with voice port 1/1/0: voice class dualtone-detect-params 1 and voice class us-custom

```
Router# show running-config
Building configuration...
.
.
.
voice class dualtone-detect-params 1
  freq-max-power 0
  freq-min-power 35
  freq-power-twist 15
  freq-max-delay 40
  cadence-variation 8
!
voice class dualtone-detect-params 2
  freq-max-power 6
  freq-min-power 25
  freq-power-twist 15
  freq-max-delay 16
  cadence-variation 8
!
!
voice class custom-cptone us-custom
  dualtone busy
    frequency 480 620
    cadence 500 500
  dualtone ringback
    frequency 440 480
    cadence 2000 4000
  dualtone reorder
    frequency 480 620
    cadence 250 250
  dualtone out-of-service
    frequency 950
    cadence 330 330
  dualtone number-unobtainable
    frequency 480 620
    cadence 250 250
  dualtone disconnect
    frequency 600
    cadence 330 330
!
!
voice class custom-cptone oz-custom
  dualtone ringback
    frequency 440 480
    cadence 2000 4000
  dualtone number-unobtainable
    frequency 480 620
```

```

    cadence 250 250
    .
    .
    .
voice-port 1/1/0
    timeouts ringing infinity
    timeouts wait-release 3
    timeouts call-disconnect 1
    supervisory disconnect dualtone pre-connect
    supervisory answer dualtone
    supervisory custom-cptone us-custom
    supervisory dualtone-detect-params 1
    no battery-reversal
    .
    .
    .

```

## Troubleshooting Tips

This section provides solutions to problems that might be encountered when implementing the FXO Answer and Disconnect Supervision feature.

Typical problems with the answer supervision feature are as follows:

- Call-progress tones such as ringback are not heard by the calling party.  
If any call legs have IVR configured, ensure that the IVR version is 2.0.

- Ringback timer is not initiated or ringback is not detected.

The wrong call-progress tone (cptone) is configured on the voice port. Refer to the “Configuring Voice Ports to Detect Standard Call-Progress Tones” section on page 5.

The wrong dualtone detection parameters are configured. Refer to the “Creating a Class of Tone-Detection Tolerance Limits” section on page 8. The variables are described in the “Command Reference” section of this feature module.

If a custom call-progress tones are assigned to the voice port, but the ringback tone has not been configured, the default behavior is not to detect any ringback tones.

- Answer supervision is not triggered  
Answer supervision—either by battery-reversal detection or by call-progress tone detection—is not configured on the voice-port being utilized. See the “Configuration Tasks” section on page 4.
- Excessive delay before answer supervision is activated  
The **sensitivity** level in the **supervisory answer dualtone** command is set too low. Configure the sensitivity for **high**. In the “Command Reference” section of this feature module, refer to the “supervisory answer dualtone” section on page 37.

If incorrect disconnect cause codes are reported, check the following configuration values:

- The values configured for custom call-progress tones could be incorrect. Refer to the “Creating a Class of Custom Call-Progress Tones” section on page 6.
- Overlapping detection frequencies might have been incorrectly specified in the voice class created by the **voice class dualtone-detect-params** command. For example if **freq-max-deviation** is configured to be 20 Hz, and the **busy** and **reorder** frequencies are 350 and 370 respectively, the voice port cannot detect the **reorder** tone, resulting in an incorrect disconnect cause code.



**Note** If the frequencies and cadences (including error deviations as defined in the **voice class dualtone-detect- params** command) are the same for multiple call-progress tones, the order of detection is as follows: **busy, reorder, number-unobtainable, out-of-service, disconnect**.

If calls are not billed correctly, the cause might be that answer supervision is not being triggered. For answer supervision to be triggered, voice/fax/data tones originating at the called-party end must be detected.

## Monitoring and Maintaining

To monitor the status of the FXO Answer and Disconnect Supervision feature, use the **show voice port** command in EXEC mode, for the FXO voice port to be monitored. The following table illustrates the use of the **show voice port** command for monitoring voice port 1/1/0.

Command	Purpose
Router# <b>show voice port 1/1/0</b>	Provides an output that shows a detailed status of the voice port. Under the heading <code>Voice card specific Info Follows:</code> , the status of the FXO Answer and Disconnect Supervision feature is indicated by one of the following outputs: <code>Answer Supervision is active</code> Or <code>Answer Supervision is inactive</code> .

## Configuration Examples

This section provides examples that illustrate basic FXO answer and disconnect supervision configurations:

- Enabling Answer Supervision by Battery-Reversal Detection on FXO Voice Ports
- Enabling and Defining Answer Supervision with Standard Tone Detection on FXO Voice Ports
- Creating a Voice Class to Specify Custom FXO Answer-Supervision Parameters
- Creating a Voice Class to Specify Custom Tone-Detection Tolerance Limits
- Enabling and Defining Answer Supervision with Custom Tone Detection on FXO Voice Ports
- Configuring a Voice Port to Disconnect with Any Detected Tone

### Enabling Answer Supervision by Battery-Reversal Detection on FXO Voice Ports

The following example enables answer supervision by battery reversal detection on FXO voice ports 1/1, 1/2, and 1/3 on a Cisco MC3810:

```
Router(config)# voice-port 1/1
Router(config-voiceport)# battery-reversal answer
Router(config-voiceport)# exit
Router(config)# voice-port 1/2
Router(config-voiceport)# battery-reversal answer
Router(config-voiceport)# exit
Router(config)# voice-port 1/3
Router(config-voiceport)# battery-reversal answer
Router(config-voiceport)# exit
Router(config)#
```

### Enabling and Defining Answer Supervision with Standard Tone Detection on FXO Voice Ports

The following example enables call-progress tone detection on FXO voice ports 1/1, 1/2, and 1/3 on a Cisco MC3810, using the standard call-progress tone parameters for the USA:

```
Router(config)# voice-port 1/1
Router(config-voiceport)# supervisory answer dualtone
Router(config-voiceport)# cptone us
Router(config-voiceport)# no battery-reversal
Router(config-voiceport)# exit
Router(config)# voice-port 1/2
Router(config-voiceport)# supervisory answer dualtone
Router(config-voiceport)# cptone us
Router(config-voiceport)# no battery-reversal
Router(config-voiceport)# exit
Router(config)# voice-port 1/3
Router(config-voiceport)# supervisory answer dualtone
Router(config-voiceport)# cptone us
Router(config-voiceport)# no battery-reversal
Router(config-voiceport)# exit
Router(config)#
```

### Creating a Voice Class to Specify Custom FXO Answer-Supervision Parameters

The following example configures a voice class with the name “country-x” and specifies a set of custom call-progress tone-detection parameters:

```
Router(config)# voice class custom-cptone country-x
Router(cfg-cptone)# dualtone ringback
Router(cfg-cp-dualtone)# cadence 3000 4000
Router(cfg-cp-dualtone)# frequency 420 460
Router(cfg-cp-dualtone)# dualtone busy
Router(cfg-cp-dualtone)# cadence 250 250
Router(cfg-cp-dualtone)# frequency 500 600
Router(cfg-cp-dualtone)# dualtone reorder
Router(cfg-cp-dualtone)# cadence 200 200
Router(cfg-cp-dualtone)# frequency 500 600
Router(cfg-cp-dualtone)# dualtone out-of-service
Router(cfg-cp-dualtone)# cadence 360 360
Router(cfg-cp-dualtone)# frequency 800
Router(cfg-cp-dualtone)# dualtone number-unobtainable
Router(cfg-cp-dualtone)# cadence 200 200
Router(cfg-cp-dualtone)# frequency 500 600
Router(cfg-cp-dualtone)# dualtone disconnect
Router(cfg-cp-dualtone)# cadence 360 360
Router(cfg-cp-dualtone)# frequency 650
Router(cfg-cp-dualtone)# exit
Router(cfg-cptone)# exit
Router(config)#
```

### Creating a Voice Class to Specify Custom Tone-Detection Tolerance Limits

The following example configures a voice class with a tag identification of 100, which defines a set of nondefault tolerance limits for the frequency, power, and cadence of the tones to be detected:

```
Router(config)# voice class dualtone-detect-params 100
Router(cfg-dual-detect)# freq-max-deviation 15
Router(cfg-dual-detect)# freq-max-power 12
Router(cfg-dual-detect)# freq-min-power 25
Router(cfg-dual-detect)# freq-power-twist 10
Router(cfg-dual-detect)# freq-max-delay 100
Router(cfg-dual-detect)# cadence-variation 125
Router(cfg-dual-detect)# exit
Router(config)# exit
```

### Enabling and Defining Answer Supervision with Custom Tone Detection on FXO Voice Ports

The following example enables call-progress tone detection on FXO voice ports 1/1, 1/2, and 1/3 on a Cisco MC3810, defines the tones to be detected, and specifies nondefault tone-detection tolerances:

```
Router(config)# voice-port 1/1
Router(config-voiceport)# supervisory answer dualtone
Router(config-voiceport)# no battery-reversal
Router(config-voiceport)# supervisory custom-cptone country-x
Router(config-voiceport)# supervisory dualtone-detect-params 100
Router(config-voiceport)# timeouts call-disconnect 5
Router(config-voiceport)# timeouts wait-release 10
Router(config-voiceport)# exit
Router(config)# voice-port 1/2
Router(config-voiceport)# supervisory answer dualtone
Router(config-voiceport)# no battery-reversal
Router(config-voiceport)# supervisory custom-cptone country-x
Router(config-voiceport)# supervisory dualtone-detect-params 100
Router(config-voiceport)# timeouts call-disconnect 5
Router(config-voiceport)# timeouts wait-release 10
Router(config-voiceport)# exit
Router(config)# voice-port 1/3
Router(config-voiceport)# supervisory answer dualtone
Router(config-voiceport)# no battery-reversal
Router(config-voiceport)# supervisory custom-cptone country-x
Router(config-voiceport)# supervisory dualtone-detect-params 100
Router(config-voiceport)# timeouts call-disconnect 5
Router(config-voiceport)# timeouts wait-release 10
Router(config-voiceport)# exit
```

The following example enables call-progress tone detection on FXO voice ports 1/1/0, 1/1/1, and 1/2/0 on a Cisco 3600 series router, defines the tones to be detected, and specifies default tone-detection tolerances:

```

Router(config)# voice-port 1/1/0
Router(config-voiceport)# supervisory answer dualtone
Router(config-voiceport)# no battery-reversal
Router(config-voiceport)# supervisory custom-cptone country-x
Router(config-voiceport)# no supervisory dualtone-detect-params

Router(config-voiceport)# exit
Router(config)# voice-port 1/1/1
Router(config-voiceport)# no battery-reversal
Router(config-voiceport)# supervisory answer dualtone
Router(config-voiceport)# supervisory custom-cptone country-x
Router(config-voiceport)# no supervisory dualtone-detect-params

Router(config-voiceport)# exit
Router(config)# voice-port 1/2/0
Router(config-voiceport)# supervisory answer dualtone
Router(config-voiceport)# no battery-reversal
Router(config-voiceport)# supervisory custom-cptone country-x
Router(config-voiceport)# no supervisory dualtone-detect-params

Router(config-voiceport)# exit

```

The following example disables call-progress tone detection on FXO voice port 1/1 on a Cisco MC3810:

```

Router(config)# voice-port 1/1
Router(config-voiceport)# no supervisory answer dualtone
Router(config-voiceport)# exit

```

### Configuring a Voice Port to Disconnect with Any Detected Tone

This example configures voice port 1/1 to go on-hook when any tone is received from a PBX or PSTN, if the caller goes on-hook before the call is answered:

```

Router(config)# voice port 1/1
Router(config-voiceport)# echo-cancel enable
Router(config-voiceport)# connection plar 12
Router(config-voiceport)# supervisory disconnect anytone
Router(config-voiceport)# exit

```

# Command Reference

This section documents new and modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.1 command reference publications.

## New Commands

- **cadence**
- **cadence-variation**
- **dualtone**
- **freq-max-delay**
- **freq-max-deviation**
- **freq-max-power**
- **freq-min-power**
- **freq-power-twist**
- **frequency**
- **supervisory answer dualtone**
- **supervisory custom-cptone**
- **supervisory disconnect anytone**
- **supervisory disconnect dualtone**
- **supervisory dualtone-detect-params**
- **timeouts call-disconnect**
- **voice class custom-cptone**
- **voice class dualtone-detect-params**

## Modified Commands

- **battery-reversal**
- **cptone**

# battery-reversal

To specify battery polarity reversal on an FXO or FXS port, use the **battery-reversal** voice-port configuration command. Use the **no** form of this command to disable battery reversal.

**battery-reversal [answer]**

**no battery-reversal**

Syntax Description	answer	Configures an FXO port to support answer supervision by detection of battery reversal.
--------------------	--------	----------------------------------------------------------------------------------------

**Defaults** Battery reversal is enabled.

**Command Modes** Voice-port configuration

Command History	Release	Modification
	12.0(7)XK	This command was introduced.
	12.2(2)T	The <b>answer</b> keyword was added.

**Usage Guidelines** The **battery-reversal** command applies to FXO and FXS voice ports. On Cisco 2600 and 3600 series routers, only analog voice ports in VIC-2FXO-M1 and VIC-2FXO-M2 voice interface cards are able to detect battery reversal; analog voice ports in VIC-2FXO and VIC-2FXO-EU voice interface cards do not detect battery reversal. On digital voice ports, battery reversal is only supported on E1 MELCAS; it is not supported in T1 channel associated signaling (CAS) or E1 CAS.

FXS ports normally reverse battery upon call connection. If an FXS port is connected to an FXO port that does not support battery reversal detection, you can use the **no battery-reversal** command on the FXS port to prevent unexpected behavior.

FXO ports in loopstart mode normally disconnect calls when they detect a second battery reversal (back to normal). You can use the **no battery-reversal** command on FXO ports to disable this action.

The **battery-reversal** command restores voice ports to their default battery-reversal operation.

If an FXO voice port is connected to the PSTN and supports battery reversal, use the **battery-reversal** command with the **answer** keyword to configure answer supervision. This configures the FXO voice port to detect when a call is answered to provide correct billing information.

If the voice port, PSTN, or PBX does not support battery reversal, do not use the **battery-reversal answer** command, because it prevents outgoing calls from being connected. Use the **supervisory answer dualtone** command instead.

If an FXO port or its peer FXS port does not support battery reversal, avoid configuring **battery-reversal** or **battery-reversal answer** on the FXO port. On FXO ports that do not support battery reversal, the **battery-reversal** command can cause unpredictable behavior, and the

**battery-reversal answer** command prevents calls from being answered. Use the **no battery-reversal** command on FXO ports that do not support battery reversal, to ensure that battery reversal answer is disabled.

### Examples

The following example enables or restores battery reversal on voice port 1/0/0 on a Cisco 2600 or 3600 series router:

```
router(config)# voice-port 1/0/0
router(config-voiceport)# battery-reversal
```

The following example disables battery reversal on voice port 1/1 on a Cisco MC3810:

```
router(config)# voice-port 1/1
router(config-voiceport)# no battery-reversal
```

The following example disables battery reversal on voice port 1/0/0 on a Cisco 2600 or 3600 series router:

```
router(config)# voice-port 1/0/0
router(config-voiceport)# no battery-reversal
```

The following example enables battery reversal to provide answer supervision on voice port 1/0/0 on a Cisco 2600 or 3600 series router:

```
router(config)# voice-port 1/0/0
router(config-voiceport)# battery-reversal answer
```

### Related Commands

Command	Description
<b>show voice port</b>	Displays voice port configuration information.
<b>supervisory answer dualtone</b>	Enables answer supervision on an FXO voice port on which battery reversal is not supported.

# cadence

To define the tone on and off durations for a call-progress tone, use the **cadence** dualtone configuration command. To restore the default cadence, use the **no** form of this command.

**cadence** { *cycle-1-on-time cycle-1-off-time* [*cycle-2-on-time cycle-2-off-time*] [*cycle-3-on-time cycle-3-off-time*] [*cycle-4-on-time cycle-4-off-time*] } | **continuous**

**no cadence**

## Syntax Description

<i>cycle-1-on-time</i>	Tone on duration for the first cycle of the cadence pattern. The range is 0 to 1000 (0 ms to 100 s). The default is 0.
<i>cycle-1-off-time</i>	Tone off duration for the first cycle of the cadence pattern. The range is 0 to 1000 (0 ms to 100 s). The default is 0.
<i>cycle-2-on-time</i>	Tone on duration for the second cycle of the cadence pattern. The range is 0 to 1000 (0 ms to 100 s). The default is 0.
<i>cycle-2-off-time</i>	Tone off duration for the second cycle of the cadence pattern. The range is 0 to 1000 (0 ms to 100 s). The default is 0.
<i>cycle-3-on-time</i>	Tone on duration for the third cycle of the cadence pattern. The range is 0 to 1000 (0 ms to 100 s). The default is 0.
<i>cycle-3-off-time</i>	Tone off duration for the third cycle of the cadence pattern. The range is 0 to 1000 (0 ms to 100 s). The default is 0.
<i>cycle-4-on-time</i>	Tone on duration for the fourth cycle of the cadence pattern. The range is 0 to 1000 (0 ms to 100 s). The default is 0.
<i>cycle-4-off-time</i>	Tone off duration for the fourth cycle of the cadence pattern. The range is 0 to 1000 (0 ms to 100 s). The default is 0.
<b>continuous</b>	Continuous call-progress tone is detected.

## Defaults

Continuous

## Command Modes

cp-dualtone configuration

## Command History

Release	Modification
12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

**Usage Guidelines**

This command specifies the cadence for a class of custom call-progress tones.

You need to define each cadence that you want a voice port to detect. Re-enter the command for each additional cadence to be detected.

You need to associate the class of custom call-progress tones with a voice port for this command to affect tone detection.

**Examples**

The following example defines a cadence for a busy tone in the custom-cptone voice class with the name **country-x**. This example defines 500 ms tone on and 500 ms tone off.

```
Router(config)# voice class custom-cptone country-x
Router(cfg-cptone)# dualtone busy
Router(cfg-cp-dualtone)# cadence 500 500
Router(cfg-cp-dualtone)# exit
Router(cfg-cptone)#
```

The following example configures detection of the default frequency and cadence values for the busy tone in the custom-cptone voice class with the name **country-x**. The default frequency is a 300 Hz tone, and the default cadence is continuous.

```
Router(config)# voice class custom-cptone country-x
Router(cfg-cptone)# dualtone busy
Router(cfg-cp-dualtone)# no cadence
Router(cfg-cp-dualtone)# no frequency
Router(cfg-cp-dualtone)# exit
Router(cfg-cptone)#
```

**Related Commands**

Command	Description
<b>voice class custom-cptone</b>	Creates a voice class for defining custom call-progress tones.
<b>voice class dualtone-detect-params</b>	Modifies the boundaries and limits for custom call-progress tones defined by the <b>voice class custom-cptone</b> command.
<b>supervisory custom-cptone</b>	Associates a class of custom call-progress tones with a voice port.

# cadence-variation

To specify the maximum allowed variation in the call-progress tone cadence, use the **cadence-variation** voice-class configuration command. To restore the default value, use the **no** form of this command.

**cadence-variation** *time*

**no cadence-variation**

## Syntax Description

<i>time</i>	Maximum time that the tone onset can vary from the specified cadence onset time and still be detected, in 10-ms increments. The range is 0 to 200 (0 ms to 2 s). The default is 100 (1 s).
-------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

## Defaults

The onset times of the tones in the cadence can vary from the specified times by 1 second.

## Command Modes

Voice-class configuration

## Command History

Release	Modification
12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

## Usage Guidelines

This command creates a detection limit for one parameter within a voice class. You can apply the detection limit to any voice port.

Cadence minimum *on* times and maximum *off* times are configured automatically.

## Examples

The following example specifies 80 ms (eight 10-ms time intervals) as the maximum allowable cadence variation in voice class 70:

```
Router(config)# voice class dualtone-detect-params 70
Router(cfg-dual-detect)# cadence-variation 8
Router(config)#
```

## Related Commands

Command	Description
<b>supervisory dualtone-detect-params</b>	Assigns the boundary and detection tolerance parameters defined by the <b>voice class dualtone-detect-params</b> command to a voice port.
<b>supervisory answer dualtone</b>	Enables answer supervision on a voice port.

# cptone

To specify a country-standard call-progress tone on an analog voice port, use the **cptone** voice-port command. To disable the selected tone, use the **no** form of this command.

**cptone** *locale*

**no cptone** *locale*

## Syntax Description

<i>locale</i>	Names the country-specific call-progress tone to be detected on a voice port. Valid entries are listed in Table 1 for: <ul style="list-style-type: none"> <li>• Cisco 2600 series</li> <li>• Cisco 3600 series</li> <li>• Cisco MC3810 with Cisco IOS Release 12.0(4)T and later</li> </ul> The 2-letter codes listed in Table 1 comply with the ISO 3166 country name standards. Valid entries for the Cisco MC3810 with Cisco IOS releases prior to 12.0(4)T are: <b>argentina, australia, austria, belgium, brazil, canada, china, colombia, czechrepublic, denmark, finland, france, germany, greatbritain, greece, hongkong, hungary, iceland, india, indonesia, ireland, israel, italy, japan, korea, luxembourg, malaysia, mexico, netherlands, newzealand, norway, peru, philippines, poland, portugal, russia, singapore, slovakia, slovenia, southafrica, spain, sweden, switzerland, taiwan, thailand, turkey, unitedstates, venezuela.</b>
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**Table 1** Valid Command Entries for locale

Country	cptone Command Entry
Argentina	<b>ar</b>
Australia	<b>au</b>
Austria	<b>at</b>
Belgium	<b>be</b>
Brazil	<b>br</b>
Canada	<b>ca</b>
China	<b>cn</b>
Colombia	<b>co</b>
Czech Republic	<b>cz</b>
Denmark	<b>dk</b>
Egypt	<b>eg</b>
Finland	<b>fi</b>
France	<b>fr</b>
Germany	<b>de</b>
Ghana	<b>gh</b>

**Table 1** Valid Command Entries for locale (continued)

<b>Country</b>	<b>cptune Command Entry</b>
Great Britain	<b>gb</b>
Greece	<b>gr</b>
Hong Kong	<b>hk</b>
Hungary	<b>hu</b>
Iceland	<b>is</b>
India	<b>in</b>
Indonesia	<b>id</b>
Ireland	<b>ie</b>
Israel	<b>il</b>
Italy	<b>it</b>
Japan	<b>jp</b>
Jordan	<b>jo</b>
Kenya	<b>ke</b>
Korea Republic	<b>kr</b>
Lebanon	<b>lb</b>
Luxembourg	<b>lu</b>
Malaysia	<b>my</b>
Mexico	<b>mx</b>
Nepal	<b>np</b>
Netherlands	<b>nl</b>
New Zealand	<b>nz</b>
Nigeria	<b>ng</b>
Norway	<b>no</b>
Pakistan	<b>pk</b>
Panama	<b>pa</b>
Peru	<b>pe</b>
Philippines	<b>ph</b>
Poland	<b>pl</b>
Portugal	<b>pt</b>
Russian Federation	<b>ru</b>
Saudi Arabia	<b>sa</b>
Singapore	<b>sg</b>
Slovakia	<b>sk</b>
Slovenia	<b>si</b>
South Africa	<b>za</b>
Spain	<b>es</b>

**Table 1** Valid Command Entries for locale (continued)

Country	cptone Command Entry
Sweden	<b>se</b>
Switzerland	<b>ch</b>
Taiwan	<b>tw</b>
Thailand	<b>th</b>
Turkey	<b>tr</b>
United States	<b>us</b>
Venezuela	<b>ve</b>
Zimbabwe	<b>zw</b>

**Defaults**

The call-progress tone for **northamerica** is enabled on the Cisco MC3810 with Cisco IOS releases prior to 12.0(4)T and for ISDN PRI. The call-progress tone for **us** is enabled on the Cisco MC3810 with Cisco IOS Releases 12.0(4)T and later, on the Cisco 2600 and Cisco 3600 series, and for E1 R2 signaling.

**Command Modes**

Voice-port configuration

**Command History**

Release	Modification
11.3(1)T	This command was introduced.
11.3(1)MA	The full keyword names for the countries were first supported on the Cisco MC3810.
12.0(4)T	Support was added for the ISO 3166 two-letter country codes on the Cisco MC3810.
12.1(5)XM	Support was added for <b>eg, gh, jo, ke, lb, np, ng, pk, pa, sa,</b> and <b>zw</b> .
12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

**Usage Guidelines**

This command defines the detection of call-progress tones generated at the local interface. It does not affect any information passed to the remote end of a connection, and it does not define the detection of tones generated at the remote end of a connection.

If your device is configured to support E1 R2 signaling, the E1 R2 signaling type (whether ITU, ITU variant, or local variant as defined by the **cas-custom** command) needs to match the appropriate pulse code modulation (PCM) encoding type as defined by the **cptone** command. For countries for which a **cptone** value has not yet been defined, you can try the following:

- If the country uses a-Law E1 R2 signaling, use the **gb** value for the **cptone** command.
- If the country uses mu-Law E1 R2 signaling, use the **us** value for the **cptone** command.
- You can specify custom call-progress tones with the **voice class custom-cptone** command.

---

**Examples**

The following example configures United States standard call-progress tones on voice port 1/0/0 on a Cisco 3600 series router, beginning in global configuration mode:

```
Router(config)# voice-port 1/0/0  
Router(config-voiceport)# cptone us
```

The following example configures Singapore standard call-progress tones on a Cisco MC3810, beginning in global configuration mode:

```
Router(config)# voice-port 1/1  
Router(config-voiceport)# cptone sg
```

---

**Related Commands**

Command	Description
<b>voice class custom-cptone</b>	Creates a voice class for defining custom call-progress tones.

# dualtone

To enter the cp-dualtone configuration mode for specifying a custom call-progress tone, use the **dualtone** custom-cptone configuration command. To configure a custom-cptone voice class not to detect a call-progress tone, enter the **no** form of this command.

```
dualtone { ringback | busy | reorder | out-of-service | number-unobtainable | disconnect }
```

```
no dualtone { ringback | busy | reorder | out-of-service | number-unobtainable | disconnect }
```

## Syntax Description

<b>ringback</b>	Enters dualtone configuration mode for specifying a ringback tone.
<b>busy</b>	Enters dualtone configuration mode for specifying a busy tone.
<b>reorder</b>	Enters dualtone configuration mode for specifying a reorder tone.
<b>out-of-service</b>	Enters dualtone configuration mode for specifying an out-of-service tone.
<b>number-unobtainable</b>	Enters dualtone configuration mode for specifying a number-unavailable tone.
<b>disconnect</b>	Enters dualtone configuration mode for specifying a disconnect tone.

## Defaults

No call-progress tones are defined within the custom-cptone voice class.

## Command Modes

custom-cptone voice-class configuration

## Command History

Release	Modification
12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

## Usage Guidelines

The **dualtone** command enters the cp-dualtone configuration mode and specifies a call-progress tone to be detected. You can specify additional call-progress tones without exiting from the cp-dualtone configuration mode.

Any call-progress tones that are not specified are not detected.

To delete a call-progress tone from this custom-cptone voice class, enter the **no** form of this command and the keyword for the tone that should not be detected, for example: **no dualtone busy**.

After you finish specifying tones to be detected, use the **exit** command to exit the cp-dualtone configuration mode.

You need to associate the class of custom call-progress tones with a voice port for this command to affect tone detection.

**Examples**

The following example enters the cp-dualtone configuration mode and specifies a busy tone and a ringback tone, in the custom-cptone voice class with the name **country-x**.

```
Router(config)# voice class custom-cptone country-x
Router(cfg-cptone)# dualtone busy
Router(cfg-cp-dualtone)# frequency 440 480
Router(cfg-cp-dualtone)# cadence 500 500
Router(cfg-cp-dualtone)# dualtone ringback
Router(cfg-cp-dualtone)# frequency 400 440
Router(cfg-cp-dualtone)# cadence 2000 4000
Router(cfg-cp-dualtone)# exit
Router(cfg-cptone)# exit
Router(config)#
```

The following example deletes the ringback tone from the custom-cptone voice class with the name **country-x**.

```
Router(config)# voice class custom-cptone country-x
Router(cfg-cptone)# no dualtone ringback
Router(cfg-cptone)# exit
Router(config)#
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>cadence</b>	Defines the tone on and off durations for a call-progress tone.
<b>frequency</b>	Defines the frequency components for a call-progress tone.
<b>supervisory custom-cptone</b>	Associates a class of custom call-progress tones with a voice port.
<b>voice class custom-cptone</b>	Creates a voice class for defining custom call-progress tones.

# freq-max-delay

To specify the maximum onset-time difference for the two frequencies in a call-progress tone, use the **freq-max-delay** voice-class configuration command. To restore the default value, use the **no** form of this command.

**freq-max-delay** *time*

**no freq-max-delay**

<b>Syntax Description</b>	<i>time</i>	Maximum number of 10-ms time intervals by which the start times of the two frequencies in a tone can differ from each other and be detected. The range is 10 to 100 (100 ms to 1 s). The default is 20 (200 ms).
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**Defaults** The onset times of the two frequencies may vary by 200 ms.

**Command Modes** Voice-class configuration

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
	12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

**Usage Guidelines** This command creates a detection limit for one parameter within a voice class that you can apply to any voice port.

**Examples** The following example specifies 160 ms (sixteen 10-ms time intervals) as the maximum time difference allowed between the onset times of the two tone frequencies in voice class 70:

```
Router(config)# voice class dualtone-detect-params 70
Router(cfg-dual-detect)# freq-max-delay 16
Router(config)#
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<b>supervisory dualtone-detect-params</b>	Assigns the boundary and detection tolerance parameters defined by the <b>voice class dualtone-detect-params</b> command to a voice port.
	<b>dualtone</b>	Defines the tone and cadence for a custom call-progress tone.
	<b>supervisory answer dualtone</b>	Enables answer supervision on a voice port.

# freq-max-deviation

To specify the maximum cycles per second that the tone frequencies can deviate from the configured frequencies and be detected, use the **freq-max-deviation** voice-class configuration command. To restore the default value, use the **no** form of this command.

**freq-max-deviation** *frequency*

**no freq-max-deviation**

## Syntax Description

<i>frequency</i>	Maximum cycles per second that the tone frequencies can deviate from the configured frequencies, in Hz, and be detected. The value applies to both frequencies of a dual tone.  The range is 10 to 125. The default is 10.
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## Defaults

10 Hz

## Command Modes

Voice-class configuration

## Command History

Release	Modification
12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

## Usage Guidelines

This command creates a detection limit for one parameter within a voice class that you can apply to any voice port.

Be sure that the frequency deviation is less than the smallest frequency difference between any two call-progress tones, to prevent overlapping of detectable frequencies. If detectable frequencies overlap, one of the call-progress tones will not be detected.

## Examples

The following example configures a maximum frequency deviation of 20 Hz in voice class 70:

```
Router(config)# voice class dualtone-detect-params 70
Router(cfg-dual-detect)# freq-max-deviation 20
Router(cfg-dual-detect)#
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>supervisory dualtone-detect-params</b>	Assigns the boundary and detection tolerance parameters defined by the <b>voice class dualtone-detect-params</b> command to a voice port.
<b>dualtone</b>	Defines the tone and cadence for a custom call-progress tone.
<b>supervisory answer dualtone</b>	Enables answer supervision on a voice port.

# freq-max-power

To specify the upper limit of the tone power that will be detected, use the **freq-max-power** voice-class configuration command. To restore the default value, use the **no** form of this command.

**freq-max-power** *dBm0*

**no freq-max-power**

<b>Syntax Description</b>	<i>dBm0</i>	Upper limit of the tone power that will be detected, in dBm0. The range is 0 to 20. The default is 10.
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<b>Defaults</b>	10 dBm0
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<b>Command Modes</b>	Voice-class configuration
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
	12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

<b>Usage Guidelines</b>	This command creates a detection limit for one parameter within a voice class that you can apply to any voice port.
-------------------------	---------------------------------------------------------------------------------------------------------------------

<b>Examples</b>	The following example specifies 6 dBm0 as the maximum tone power that will be detected in voice class 70:
-----------------	-----------------------------------------------------------------------------------------------------------

```
Router(config)# voice class dualtone-detect-params 70
Router(cfg-dual-detect)# freq-max-power 6
Router(cfg-dual-detect)#
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<b>supervisory dualtone-detect-params</b>	Assigns the boundary and detection tolerance parameters defined by the <b>voice class dualtone-detect-params</b> command to a voice port.
	<b>dualtone</b>	Defines the tone and cadence for a custom call-progress tone.
	<b>supervisory answer dualtone</b>	Enables answer supervision on a voice port.

# freq-min-power

To specify the lower limit of the tone power that will be detected, use the **freq-min-power** voice-class configuration command. To restore the default value, use the **no** form of this command.

**freq-min-power** *dBm0*

**no freq-min-power**

<b>Syntax Description</b>	<i>dBm0</i>	Lower limit of the tone power that will be detected, in minus dBm0. The range is 10 to 35 (–10 to –35 dBm0). The default is 30 (–30 dBm0).
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<b>Defaults</b>	30 (–30 dBm0)
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<b>Command Modes</b>	Voice-class configuration
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
	12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

<b>Usage Guidelines</b>	This command creates a detection limit for one parameter within a voice class that you can apply to any voice port.
-------------------------	---------------------------------------------------------------------------------------------------------------------

<b>Examples</b>	The following example specifies –25 dBm0 as the minimum tone power that will be detected in voice class 70:
-----------------	-------------------------------------------------------------------------------------------------------------

```
Router(config)# voice class dualtone-detect-params 70
Router(cfg-dual-detect)# freq-min-power 25
Router(cfg-dual-detect)#
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<b>supervisory dualtone-detect-params</b>	Assigns the boundary and detection tolerance parameters defined by the <b>voice class dualtone-detect-params</b> command to a voice port.
	<b>dualtone</b>	Defines the tone and cadence for a custom call-progress tone.
	<b>supervisory answer dualtone</b>	Enables answer supervision on a voice port.

# freq-power-twist

To specify the maximum power difference allowed between the two frequencies of a call-progress tone, use the **freq-power-twist** voice-class configuration command. To restore the default value, use the **no** form of this command.

**freq-power-twist** *dBm0*

**no freq-power-twist**

## Syntax Description

<i>dBm0</i>	Maximum power difference allowed between the two frequencies of a call-progress tone. The range is 0 to 15. The default is 6.
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## Defaults

6 dBm0

## Command Modes

Voice-class configuration

## Command History

Release	Modification
12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

## Usage Guidelines

This command creates a detection limit for one parameter within a voice class that you can apply to any voice port.

## Examples

The following example specifies 15 dBm0 as the maximum power difference allowed between the two tone frequencies in voice class 70:

```
Router(config)# voice class dualtone-detect-params 70
Router(cfg-dual-detect)# freq-power-twist 15
Router(config)#
```

## Related Commands

Command	Description
<b>supervisory dualtone-detect-params</b>	Assigns the boundary and detection tolerance parameters defined by the <b>voice class dualtone-detect-params</b> command to a voice port.
<b>dualtone</b>	Defines the tone and cadence for a custom call-progress tone.
<b>supervisory answer dualtone</b>	Enables answer supervision on a voice port.

# frequency

To define the frequency components for a call-progress tone, use the **frequency** dualtone configuration command. To restore the default frequency components, use the **no** form of this command.

**frequency** *frequency-1* [*frequency-2*]

**no frequency**

## Syntax Description

<i>frequency-1</i>	One frequency component of the tone to be detected, in Hz. The range is 300 to 3600. The default is 300 Hz.
<i>frequency-2</i>	A second frequency component of the tone to be detected, in Hz. The range is 300 to 3600 or you can specify 0. The default is that no second frequency component is detected.

## Defaults

300 Hz single tone

## Command Modes

cp-dualtone configuration

## Command History

Release	Modification
12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

## Usage Guidelines

This command specifies the frequency component for a class of custom call-progress tones.

You need to define the frequency that you want a voice port to detect. Re-enter the command for each additional frequency to be detected.

You need to associate the class of custom call-progress tones with a voice port for this command to affect tone detection.

## Examples

The following example defines the frequency components for the busy tone in the custom-cptone voice class with the name **country-x**.

```
Router(config)# voice class custom-cptone country-x
Router(cfg-cptone)# dualtone busy
Router(cfg-cp-dualtone)# frequency 480 620
Router(cfg-cp-dualtone)#
```

Related Commands	Command	Description
	<b>voice class custom-cptone</b>	Creates a voice class for defining custom call-progress tones.
	<b>voice class dualtone-detect-params</b>	Modifies the boundaries and limits for custom call-progress tones defined by the <b>voice class custom-cptone</b> command.
	<b>supervisory custom-cptone</b>	Associates a class of custom call-progress tones with a voice port.

# supervisory answer dualtone

To enable answer supervision on an FXO voice port, use the **supervisory answer dualtone** voice-port configuration command. To disable answer supervision on a voice port, use the **no** form of this command.

**supervisory answer dualtone** [**sensitivity** {**high** | **medium** | **low**}]

**no supervisory answer dualtone**

## Syntax Description

<b>sensitivity</b>	Configures a specific detection sensitivity for answer supervision.
<b>high</b>	Increases the detection sensitivity for answer supervision.
<b>medium</b>	Sets the detection sensitivity for answer supervision to its default value.
<b>low</b>	Decreases the detection sensitivity for answer supervision.

## Defaults

Answer supervision is not enabled on voice ports.

## Command Modes

Voice-port configuration

## Command History

Release	Modification
12.2(2)T	This command was introduced on the Cisco 1750 and Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.

## Usage Guidelines

This command configures the FXO voice port to detect voice, fax, and modem traffic when calls are answered. If answer supervision is enabled, calls are not recorded as connected until answer supervision is triggered.

This command enables a ring-no-answer timeout which drops calls after a specified period of ringback. The period of ringback can be configured using the **timeouts ringing** command.

This command automatically enables disconnect supervision in the preconnect mode on the voice port if disconnect supervision is not already enabled with the **supervisory disconnect dualtone** command.

This feature is applicable to analog FXO voice ports with loop-start signaling.

If false answering is detected, decrease the **sensitivity** setting. If answering detection is failing, increase the **sensitivity** setting.

## Examples

The following example enables answer supervision on voice port 1/5:

```
Router(config)# voice-port 1/5
Router(config-voiceport)# supervisory answer dualtone
Router(config-voiceport)#
```

The following example enables answer supervision on voice port 0/1/1:

```
Router(config)# voice-port 0/1/1
Router(config-voiceport)# supervisory answer dualtone
Router(config-voiceport)#
```

#### Related Commands

Command	Description
<b>voice class custom-cptone</b>	Creates a voice class for defining custom call-progress tones.
<b>supervisory custom-cptone</b>	Associates a class of custom call-progress tones with a voice port.
<b>voice class dualtone-detect-params</b>	Modifies the frequency, power, and cadence tolerances of call-progress tones.
<b>timeouts ringing</b>	Specifies the time that the calling voice port allows ringing to continue if a call is not answered.

# supervisory custom-cptone

To associate a class of custom call-progress tones with a voice port, use the **supervisory custom-cptone** voice-port configuration command. To restore the default call-progress tones on a voice port, use the **no** form of this command.

**supervisory custom-cptone** *cptone-name*

**no supervisory custom-cptone**

## Syntax Description

*cptone-name*

The descriptive identifier of the class of custom call-progress tones to be detected by a voice port.

This name must match the *cptone-name* of a class of tones defined by the **voice class custom-cptone** command.

## Defaults

The United States standard call-progress tones are associated with a voice port.

## Command Modes

Voice-port configuration

## Command History

Release	Modification
12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

## Usage Guidelines

This command associates a class of custom call-progress tones, defined by the **voice class custom-cptone** command, with a voice port.

You can associate the same custom call-progress tones to multiple voice ports.

You can associate only one class of custom call-progress tones with a voice port. If you associate a second class of custom call-progress tones with a voice port, the second class of custom tones replaces the one previously assigned.

This feature is applicable to analog FXO voice ports with loop-start signaling.

## Examples

The following example associates the call-progress tone with the name **country-x** with voice ports 1/4 and 1/5:

```
Router(config)# voice-port 1/4
Router(config-voice-class)# supervisory custom-cptone country-x
Router(config-voiceport)# exit
Router(config)# voice-port 1/5
Router(config-voice-class)# supervisory custom-cptone country-x
Router(config-voice-class)# exit
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<b>dualtone</b>	Defines a call-progress tone to be detected.
	<b>supervisory answer dualtone</b>	Enables answer supervision on an FXO voice port.
	<b>supervisory disconnect dualtone</b>	Enables disconnect supervision on an FXO voice port.

# supervisory disconnect anytone

To configure an FXO voice port to go on-hook if the router detects any tone from a PBX or PSTN before an outgoing call is answered, use the **supervisory disconnect anytone** voice-port configuration command. To restore the default, use the **no** form of this command.

**supervisory disconnect anytone**

**no supervisory disconnect anytone**

## Syntax Description

This command has no arguments or keywords.

## Defaults

The supervisory disconnect function is not enabled on voice ports.

## Command Modes

Voice-port configuration

## Command History

Release	Modification
12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

## Usage Guidelines

The **supervisory disconnect anytone** voice-port command can be used to provide the disconnect function in cases where the PBX or PSTN does not provide a supervisory tone.

This function is enabled only during call setup (before the call is answered); examples of tones that trigger a disconnect include busy tone, fast busy tone, and dial tone.

You must enable echo cancellation; otherwise, the router's own ringback tone can trigger a disconnect.

This command replaces the **no supervisory disconnect signal** command.

If you enter the **no supervisory disconnect signal** command, the supervisory disconnect anytone feature will be enabled, and `supervisory disconnect anytone` will be displayed when **show** commands are entered.

If either the **supervisory disconnect anytone** command or the **no supervisory disconnect signal** command is entered, answer supervision will be automatically disabled.

**Examples**

The following example configures voice ports 1/4 and 1/5 to go on hook if any tone from the PBX or PSTN is detected before the call is answered:

```
Router(config)# voice-port 1/4
Router(config-voice-class)# supervisory disconnect anytone
Router(config-voice-class)# exit
Router(config)# voice-port 1/5
Router(config-voice-class)# supervisory disconnect anytone
Router(config-voice-class)# exit
```

The following example disables the disconnect function on voice port 1/5:

```
Router(config)# voice-port 1/5
Router(config-voice-class)# no supervisory disconnect anytone
Router(config-voice-class)# exit
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>supervisory answer dualtone</b>	Enables answer supervision on an FXO voice port.
<b>timeouts call-disconnect</b>	Specifies the timeout value for releasing an FXO voice port when an incoming call is not answered.
<b>supervisory disconnect dualtone</b>	Enables disconnect supervision on an FXO voice port.

# supervisory disconnect dualtone

To enable disconnect supervision on an FXO voice port, use the **supervisory disconnect dualtone** voice-port configuration command. To disable disconnect supervision on a voice port, use the **no** form of this command.

**supervisory disconnect dualtone {mid-call | pre-connect}**

**no supervisory disconnect dualtone**

## Syntax Description

<b>mid-call</b>	Configures disconnect supervision to operate throughout the duration of the call.
<b>pre-connect</b>	Configures disconnect supervision to operate during call setup, and to stop when the called telephone goes off-hook.

## Defaults

Disconnect supervision is not enabled on voice ports.

## Command Modes

Voice-port configuration

## Command History

Release	Modification
12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

## Usage Guidelines

This command configures an FXO voice port to disconnect calls when the router detects call-progress tones from a PBX or from the PSTN. The disconnection occurs after the wait-release time specified on the voice port.

Disconnect supervision is automatically enabled in the preconnect mode on the voice port if the **supervisory answer dualtone** command is entered.

This feature is applicable to analog FXO voice ports with loop-start signaling.

## Examples

The following example specifies tone detection during the entire call duration:

```
Router(config)# voice-port 1/5
Router(config-voiceport)# supervisory disconnect dualtone mid-call
Router(config-voiceport)# exit
```

The following example specifies tone detection only during call setup:

```
Router(config)# voice-port 0/1/1
Router(config-voiceport)# supervisory disconnect dualtone pre-connect
Router(config-voiceport)# exit
```

Related Commands	Command	Description
	<b>supervisory custom-cptone</b>	Associates a class of custom call-progress tones with a voice port.
	<b>timeouts call-disconnect</b>	Specifies the timeout value for releasing an FXO voice port when an incoming call is not answered.
	<b>timeouts wait-release</b>	Specifies the timeout value for releasing a voice port when an outgoing call is not answered.
	<b>voice class dualtone-detect-params</b>	Modifies the frequency, power, and cadence tolerances of call-progress tones.

# supervisory dualtone-detect-params

To associate a class of modified tone-detection tolerance limits with a voice port, use the **supervisory dualtone-detect-params** voice-port configuration command. To restore the default tone-detection tolerance limits to a voice port, use the **no** form of this command.

**supervisory dualtone-detect-params** *tag*

**no supervisory dualtone-detect-params**

## Syntax Description

<i>tag</i>	Tag number of the set of modified tone-detection tolerance limits to be associated with this voice port. The tag number must match the tag number of a voice class configured by the <b>voice class dualtone-detect-params</b> global configuration command.  The range is 1 to 10000. There is no default.
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## Defaults

The default tone-detection tolerance limits are associated with voice ports.

## Command Modes

Voice-port configuration

## Command History

Release	Modification
12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

## Usage Guidelines

This command associates a specific set of modified tone-detection tolerance limits, defined by the **voice class dualtone-detect-params** command, to a voice port.

You can associate the same class of modified tone-detection tolerance limits to multiple voice ports.

You can associate only one class of modified tone-detection tolerance limits to a voice port. If you associate a second class of modified tone-detection tolerance limits with a voice port, the second class replaces the one previously assigned.

This feature is applicable to analog FXO voice ports with loop-start signaling.

**Examples**

The following example associates the class of modified tone-detection tolerance limits with the tag 70 with voice ports 1/5 and 1/6.

```
Router(config)# voice-port 1/5
Router(config-voiceport)# supervisory dualtone-detect-params 70
Router(config-voiceport)# exit
Router(config)# voice-port 1/6
Router(config-voiceport)# supervisory dualtone-detect-params 70
Router(config-voiceport)# exit
```

The following example restores the default tone-detection parameters to voice port 1/5.

```
Router(config)# voice-port 1/5
Router(config-voiceport)# no supervisory dualtone-detect-params
Router(config-voiceport)# exit
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>voice class dualtone-detect-params</b>	Creates a voice class for call-progress tone-detection tolerance parameters.
<b>supervisory answer dualtone</b>	Enables answer supervision on an FXO voice port.
<b>supervisory disconnect dualtone</b>	Enables disconnect supervision on an FXO voice port.

# timeouts call-disconnect

To configure the delay time that an FXO voice port waits before disconnecting an incoming call, after disconnect tones are detected, use the **timeouts call-disconnect** voice-port configuration command. Use the **no** form of this command to restore the default value.

**timeouts call-disconnect** {*seconds* | **infinity**}

**no timeouts call-disconnect**

Syntax Description		
	<i>seconds</i>	The duration in seconds that an FXO voice port stays in the connected state after the voice port detects a disconnect tone. The range is 1 to 120. The default is 60.
	<b>infinity</b>	The voice port does not disconnect when a disconnect tone is detected. This keyword disables disconnect supervision.

**Defaults** 60 seconds

**Command Modes** Voice-port configuration

Command History	Release	Modification
	11.3(9)T and 12.0(4)T	This command was introduced on the Cisco 3600 series routers.
	12.2(2)T	This command was integrated into Cisco IOS Release 12.2(2)T on the Cisco 1750 and Cisco 2600 series routers and Cisco MC3810 series concentrators, and the keyword <b>infinity</b> was added.

**Usage Guidelines** Use this command to change the time that an FXO voice port remains connected after the calling party hangs up, when a call is not answered. Use of the **infinity** keyword is not recommended for disabling the disconnect supervision feature.

**Examples** The following example configures voice port 1/1 on a Cisco MC3810 to remain connected for 2 seconds while a disconnect tone is received by the voice port:

```
router(config)# voice-port 1/1
router(config-voiceport)# timeouts call-disconnect 2
```

The following example configures voice port 0/0/1 on a Cisco 3600 to remain connected for 3 seconds while a disconnect tone is received by the voice port:

```
router(config)# voice-port 0/0/1
router(config-voiceport)# timeouts call-disconnect 3
```

Related Commands	Command	Description
	<b>timeouts wait-release</b>	Specifies the delay time for releasing the calling voice port after a disconnect tone is received from the called voice port.

# voice class custom-cptone

To create a voice class for defining custom call-progress tones to be detected, use the **voice class custom-cptone** global configuration command. To delete the voice class, use the **no** form of this command.

```
voice class custom-cptone cptone-name
```

```
no voice class custom-cptone cptone-name
```

<b>Syntax Description</b>	<i>cptone-name</i>	Descriptive identifier for this class of custom call-progress tones.
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**Defaults** No voice class of custom call-progress tones is created.

**Command Modes** Global configuration

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
	12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

**Usage Guidelines** Use this command to define a custom-cptone voice class and enter voice class configuration mode. The *cptone-name* tag is used to associate this set of custom call-progress tones with voice ports.

After you create the custom-cptone voice class, you need to define the custom call-progress tones for this voice class, using the **dualtone** command.

**Examples** The following example creates a custom-cptone voice class named **country-x**.

```
Router(config)# voice class custom-cptone country-x
Router(cfg-cptone)#
```

The following example deletes the custom-cptone voice class named **country-x**.

```
Router(config)# no voice class custom-cptone country-x
Router(config)#
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<b>dualtone</b>	Defines the tone and cadence for a custom call-progress tone.
	<b>voice class dualtone-detect-params</b>	Modifies the boundaries and limits for call-progress tones.
	<b>supervisory custom-cptone</b>	Associates a class of custom call-progress tones with a voice port.

# voice class dualtone-detect-params

To create a voice class for defining a set of tolerance limits for the frequency, power, and cadence parameters of the tones to be detected, use the **voice class dualtone-detect-params** global configuration command. To delete a voice class, use the **no** form of this command.

```
voice class dualtone-detect-params tag
```

```
no voice class dualtone-detect-params tag
```

## Syntax Description

*tag* Unique tag identification number assigned to this voice class. The range is 1 to 10000.

## Defaults

No voice class is configured for defining answer-supervision tolerance limits.

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(5)XM	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 series.
12.2(2)T	This command was introduced on the Cisco 1750 and integrated into Cisco IOS Release 12.2(2)T.

## Usage Guidelines

Use this command to create a voice class in which you can define maximum and minimum call-progress tone tolerance parameters that you can apply to any voice port. These parameters further define the call-progress tones defined by the **voice class custom-cptone** command. Use the **supervisory dualtone-detect-params** command to apply these tolerance parameters to a voice port.

## Examples

The following example creates **cfg-dual-detect** voice class 70, in which you can specify modified boundaries and limits for call-progress tone detection.

```
Router(config)# voice class dualtone-detect-params 70
Router(cfg-dual-detect)# freq-max-deviation 25
Router(cfg-dual-detect)# freq-max-power -5
Router(cfg-dual-detect)# freq-min-power -20
Router(cfg-dual-detect)# freq-power-twist 10
Router(cfg-dual-detect)# freq-max-delay 50
Router(cfg-dual-detect)# cadence-variation 80
Router(cfg-dual-detect)# exit
Router(config)#
```

## Related Commands

Command	Description
<b>supervisory dualtone-detect-params</b>	Assigns the boundary and detection tolerance parameters defined by the <b>voice class dualtone-detect-params</b> command to a voice port.

# Glossary

**ABCD signaling**—Four-bit telephony line signaling coding in which each letter of “ABCD” represents one of the four bits. This is often associated with CAS or robbed-bit signaling on a T1 or E1 telephony trunk.

**AIS**—alarm indication signal.

**AVBO**—Advanced Voice Busy Out.

**Cisco trunk (private line) call**—A Cisco trunk (private line) call is established by the forced connection of a dynamic switched call. A Cisco trunk call is established during configuration of the trunk and stays up for the duration of the configuration. Optionally, it provides a pass-through connection path to pass signaling information between the two telephony interfaces at either end of the connection.

**CLI**—command-line interface.

**codec**—coder-decoder. An integrated circuit device that typically uses pulse code modulation to transform analog signals into a digital bit stream, and digital signals back into analog signals. In Voice over IP, Voice over Frame Relay, and Voice over ATM, a DSP software algorithm used to compress/decompress speech or audio signals.

**CPtone**—call-progress tone. Tones sent from a PBX or from the PSTN to support answer supervision and disconnect supervision by voice ports.

**DLCI**—data-link connection identifier.

**dial peer**—An addressable call endpoint that contains configuration information, including voice protocol, a codec type, and a telephone number associated with the call endpoint. There are five kinds of dial peers: POTS, VoIP, VoFR, VoATM, and VoHDLc.

**DSP**—digital signal processor.

**DTMF**—dual tone multifrequency. Uses two simultaneous voice-band tones for dial such as touch tone.

**DTMF relay**—Enables the generation of FRF.11 Annex A frames for a VoFR dial peer. The DSP generates Annex A frames instead of passing a DTMF tone through the network as a voice sample.

**dynamic switched call**—A telephone call dynamically established across a packet data network based on a dialed telephone number. In the case of VoFR, a Cisco proprietary session protocol similar to Q.931 is used to achieve call switching and negotiation between calling endpoints. The proprietary session protocol runs over FRF.11-compliant subchannels.

**E&M**—Refers to 2-wire or 4-wire interfaces with separate signaling paths (from “Ear and Mouth,” also “recEive and transMit”). E&M is a trunking arrangement generally used for two-way switch-to-switch or switch-to-network connections. The Cisco analog E&M interface is an RJ-48 connector that allows connections to PBX trunk lines (tie lines). E&M is also available on E1 and T1 digital interfaces.

**E1**—European equivalent of T1. Thirty-two 64-kbps channels include one channel for framing and one channel for D-channel information. The clock rate is 2.048 MHz.

**FRF**—Frame Relay Forum. An association of corporate members consisting of vendors, carriers, users, and consultants committed to implementing Frame Relay in accordance with national and international standards. See <http://www.frforum.com>.

**FRF.11**—Frame Relay Forum implementation agreement for Voice over Frame Relay (v1.0 May 1997). This specification defines multiplexed data, voice, fax, DTMF digit-relay, and CAS/robbed-bit signaling frame formats, but does not include call setup, routing, or administration facilities. See <http://www.frforum.com>.

**FRF.11 Annex C**—See FRF.12.

**FRF11-trunk**—A point-to-point permanent voice connection (private line) conforming to the FRF.11 specification.

**FRF.12**—The FRF.12 Implementation Agreement (also known as FRF.11 Annex C) was developed to allow long data frames to be fragmented into small pieces and interleaved with real-time frames. In this way, real-time voice and non-real-time data frames can be carried together on low-speed links without causing excessive delay to the real-time traffic.

**FXO**—Foreign Exchange Office. An FXO interface connects to the Public Switched Telephone Network (PSTN) central office and is the interface offered on a standard telephone. The Cisco FXO interface is an RJ-11 connector that allows an analog connection to be directed to the PSTN central office or to a station interface on a PBX.

**FXS**—Foreign Exchange Station. An FXS interface connects directly to a standard telephone and supplies ring, voltage, and dial tone. The Cisco FXS interface is an RJ-11 connector that allows connections to basic telephone service equipment, keysets, and PBXs.

**ICPIF**—Calculated Planning Impairment Factor.

**LVBO**—Local Voice Busy Out.

**MEL CAS**—Mercury Exchange Limited (MEL) channel associated signaling (CAS). A voice signaling protocol used primarily in the United Kingdom.

**OOS**—out of service state of the call or trunk.

**PBX**—private branch exchange. A privately owned central switching office.

**permanent calls**—Permanent calls are private line calls used for fixed point-to-point calls, connections between PBXs (E&M to E&M), or for remote telephone extensions (FXO to FXS).

**POTS**—plain old telephone service. Basic telephone service supplying standard single-line telephones, telephone lines, and access to the PSTN.

**POTS dial peer**—Dial peer connected by a traditional telephony network. POTS peers point to a particular voice port on a voice network device.

**PSTN**—Public Switched Telephone Network. PSTN refers to the local telephone company.

**RTR**—Response Time Reporter.

**switched calls**—Switched calls are normal telephone calls when a user picks up a phone, hears a dial tone, and enters the destination phone number to reach the other phone. Switched calls can also be private line, automatic ringdown (PLAR) calls, or tie-line calls for fixed point-to-point connections.

**T1**—Digital WAN carrier facility. T1 transmits DS1-formatted data at 1.544 Mbps through the telephone-switching network by using AMI or B8ZS coding.

**tandem switching**—The dynamic switching of voice calls between VoFR, VoATM, or VoHDL PVCs and subchannels; also called tandeming. Tandem switching is often encountered in multihop VoFR call-connection paths.

**trunk**—Service that allows quasi-transparent connections between two PBXs, a PBX and a local extension, or some other combination of telephony interfaces with signaling passed transparently through the packet data network.

**VoFR**—Voice over Frame Relay.

**VoFR dial peer**—Dial peer connected by a Frame Relay network. VoFR peers point to specific VoFR devices.

**Voice over Frame Relay**—Voice over Frame Relay enables a router to carry voice traffic, for example, telephone calls and faxes, over a Frame Relay network. When sending voice traffic over Frame Relay, the voice traffic is segmented and encapsulated for transit across the Frame Relay network by using FRF.12 encapsulation.

**Voice over IP (VoIP)**—Voice over IP enables a router to carry voice traffic, for example, telephone calls and faxes, over an IP network. In Voice over IP, the DSP segments the voice signal into frames that are then coupled in groups of two and stored in voice packets that are transported by using IP in compliance with ITU-T specification H.323.

