NextPort Voice Tuning and Background Noise Statistics with NextPort Dual-Filter G.168 Echo Cancellation

This feature allows you to dynamically configure voice services on the NextPort-based platforms: Cisco AS5350, Cisco AS5400, Cisco AS5400HPX, and Cisco AS5850. This feature also provides improved voice quality and statistics reporting and adds dual-filter G.168 echo canceller capability in NextPort SPE firmware (SPEware) version 10.2.2 and later with Cisco IOS Release 12.3(11)T and later.

Feature History for the NextPort Voice Tuning and Background Noise Statistics with NextPort Dual-Filter G.168 Echo Cancellation Feature

Release	Modification
12.3(4)T	This feature was introduced.
12.3(11)T	NextPort dual-filter G.168 echo canceller functionality was added. NextPort SPE firmware is bundled with Cisco IOS Release 12.3(11)T.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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Prerequisites for NextPort Voice Tuning and the NextPort Dual-Filter G.168 Echo Canceller

To use the NextPort Voice Tuning and Background Noise Statistics feature, you must be running NextPort service processing element (SPE) firmware version 8.8.1 or a later version and Cisco IOS Release 12.3(4)T or a later release.

To use the NextPort dual-filter G.168 echo canceller, you must be running SPE firmware version 10.2.2 or a later version and Cisco IOS Release 12.3(11)T or a later release.

Information About NextPort Voice Tuning and the NextPort Dual-Filter G.168 Echo Canceller

To configure the features presented in this document, you should understand the following concepts:

NextPort Dual-Filter G.168 Echo Canceller

Dual-filter G.168 echo canceller capability has been added to the CSMV6 dial feature card (DFC) for NextPort platforms. The NextPort dual-filter G.168 echo canceller (EC) improves voice quality in VoIP connections by providing relatively less residual echo leakage, better non-linear processing (NLP) timing, less clipping, and better comfort noise generation (CNG) in most environments.

The dual-filter G.168 echo canceller features two concurrently operating adaptive filters (which control echo tail coverage) and two double-talk detection functions. In addition, the comfort noise model uses “Hoth noise” spectrum shaping to better replicate the true noise spectrum.

The NextPort dual-filter G.168 echo canceller uses the same voice-tuning (VCtune) interface for configuring voicecap parameters as the Cisco-proprietary G.164 echo canceller. Adjusting the dual-filter echo canceller is carried out by using a voicecap or by using the Cisco IOS command-line interface (CLI) during configuration. You can also adjust settings while the system is running by using the **show port log** and **show port operational-status** commands. However because of the differences in internal operation of these ECs, there are some changes in the set of available parameters for voice tuning.

See the **echo-cancel coverage** command for updated Cisco IOS command usage with this feature. For information about voicecaps that are used with this feature, see the *NextPort Dual-Filter G.168 Echo Canceller Whitepaper*. For more information about the G.168 echo canceller, see the “Configuring Echo Cancellation” section of the *Voice Port Configuration* document in the Cisco IOS Voice Configuration Library.

The NextPort dual-filter G.168 echo canceller adds the following benefits on NextPort platforms:

- Configurable parameters—Range checking that is performed on the voicecap parameters in the I960 NextPort layer has been updated. (Voicecap parameters in "raw mode" are never range-checked.)
- Up to 64 ms of echo tail coverage—The NextPort dual-filter G.168 echo canceller supports echo tails from 8-ms to 64-ms in 8-ms increments. The **echo-cancel coverage** command limits the echo canceller coverage to 64-ms on NextPort platforms. For backwards compatibility, a voicecap used in "raw mode" will still configure older SPEware to settings greater than 64-ms when used with newer releases of Cisco IOS software. For situations when new SPEware is loaded onto an older Cisco IOS release, the NextPort dual-filter G.168 echo canceller automatically sets coverage time to 64 ms.
- Updated set of reported statistics—Text in the **show voice port** command output has been changed to describe voicecap parameters and reported statistics. The **show port operational-status** command output has been updated to report TX/RX mean speech level statistics.
- Power statistics (RX and TX)—These statistics average only the power that is received during signal periods that are classified as speech.
- Unchanged configuration steps—Use voicecaps and the **echo-cancel coverage** command to configure this feature. See the "Voicecap Strings" section on page 4.
- SPE firmware and Cisco IOS software packaging support—The SPEware that contains the dual-filter G.168 echo canceller is field-upgradeable and can be used interchangeably with previous firmware versions with no effect on platform call density. The new SPEware interoperates with any Cisco IOS software release that supports voicecaps.

Note When older Cisco IOS software releases are used, voicecaps must be used in raw mode for some parameters. Some statistics may not be displayed or recorded properly with older software releases.

NextPort SPE Firmware

NextPort SPE firmware is software that drives the digital signal processor (DSP) portion of the NextPort dial feature cards (DFCs). NextPort firmware is bundled with Cisco IOS software.

NextPort SPE firmware runs on the NextPort DFC60, DFC108, 1 CT3_UPC 216, and UPC324 DFCs on the Cisco AS5350, Cisco AS5400, Cisco AS5400HPX, and Cisco AS5850 platforms. The ports on these modules can support modem, voice, fax, and digital services and can be aggregated at any of the following levels:

- Slot level of the NextPort module
- SPE level within the NextPort module
- Individual port level

Note To use the NextPort Voice Tuning and Background Noise Statistics feature, you must use the default bundled NextPort SPE firmware code that runs with Cisco IOS software. The Voice Tuning and Background Noise feature uses SPE firmware version 8.8.1 or a later version. The NextPort dual-filter G.168 echo canceller uses NextPort firmware version 10.2.2, which is bundled with Cisco IOS release 12.3(11)T. NextPort firmware version 10.2.2 can be used with Cisco IOS 12.3(7)T, 12.3(10), and later releases. Firmware can be downloaded from the Software Center on Cisco.com.

For more information about NextPort SPE firmware, see the NextPort SPE Release Notes on Cisco.com.

Voicecap Strings

Additional configuration of voice services on NextPort DFCs is achieved by configuring the voice tuning configuration capability (called voicecaps) using voicecap strings. Voicecap strings are created with the the **voicecap entry** command and are applied with the **voicecap configure** command.

Voice Tuning

Note You must have specific knowledge of the behavior of the telephone network in order to use these voicecap capabilities. See the *NextPort Voice Tuning White Paper* on Cisco.com for a brief description of telephone network behavior.

This feature allows the following parameters, among others, to be configured:

- PSTN gains—PSTN gains adjust the power levels at the PSTN side of a VoIP connection to make up for loss plan imbalances and to ensure minimum echo return losses (ERLs) in a call. PSTN gain is configured with the CLI rather than with voicecaps.
- IP gains—IP gains adjust IP-side levels and are applied to the signal before it is propagated through the echo canceller. This point is also known as the reference signal.
- Dynamic attenuation—Dynamic attenuation mitigates low volume calls when attenuation has been added on the PSTN call leg to compensate for low ERL calls.
- Comfort noise generation (CNG)—CNG enables and disables echo canceller (EC) comfort noise.
- Minimum ERL—Minimum ERL switches off near-end talker clipping and poor echo canceller performance.

Background Noise

The NextPort Voice Tuning and Background Noise Statistics feature reports EC background noise level, voice activity detection (VAD) background noise level, ERL level, and Acombined (ACOM) statistics by averaging the combined values that are computed over the duration of the call. These new statistics have been appended to the end of each entry in the voice log, which you can see in the output from **show port operational-status** and **show port log** commands.

How to Configure NextPort Voice Tuning and the NextPort Dual-Filter G.168 Echo Canceller

This section contains the following tasks:

Configuring NextPort Voice Tuning

This section contains tasks to configure the NextPort Voice Tuning and Background Noise Statistics feature.

Downloading NextPort SPE Firmware

To download NextPort SPE firmware, use the following commands.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **spe** {*slot* | *slot*/*spe*}
4. **firmware location** [*IFS*:[/]]*filename*
5. **end**
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**spe** {*slot* | *slot*/*spe*} **Example:** `Router(config)# spe 1 1/17`	Enters SPE configuration mode and sets the range of SPEs. • *slot*—All ports on the specified slot. For the Cisco AS5350 ,slot values range from 1 to 3. For the Cisco AS5400, slot values range from 1 to 7. • *slot*/*spe*—All ports on the specified slot and SPE. For the Cisco AS5350, slot values range from 1 to 3. For the Cisco AS5400, slot values range from 1 to 7. SPE values range from 1 to 17. You must include the slash mark.

	Command or Action	Purpose
Step 4	**firmware location** [*IFS*:[/]]*filename* **Example:** `Router(config-spe)# firmware location flash:np.8.8.1.spe`	Downloads SPE modem code to all modems in a particular slot (that is, all modems on a feature card that contains eighteen 6-port modem modules). • *IFS*—(Optional) IOS file specification (IFS), which can be any valid IFS on any local file system. Examples of legal specifications include: – **bootflash:**—Loads the firmware from a separate flash memory device. – **flash:**—Loads the firmware from the flash NVRAM located within the router. – **system:/**—Loads the firmware from a built-in file within the Cisco IOS image. The optional forward slash (/) and system path must be entered with this specification. • *filename*—The firmware filename. When the filename is entered without an IFS specification, this name defaults to the file in flash memory. • Use the **dir all-filesystems** EXEC command to display legal IFSs. • The **no** form of the command reverts the router back to the system-embedded default. When the access server is booted, the **firmware location** command displays the location for the firmware that is embedded in the Cisco IOS image. If the **firmware location** command is issued to download a firmware image from flash and then the **no** version of the exact command is subsequently issued, then the **firmware location** command downloads the embedded firmware in Cisco IOS software.
Step 5	**end** **Example:** `Router(config-spe)# end`	Completes the download and exits SPE configuration mode.
Step 6	**copy running-config startup-config** **Example:** `Router# copy running-config startup-config`	Copies the configuration from running RAM into NVRAM. • The download occurs when the modems become available and the display shows the SPE firmware upgrade option defined (default: busyout). • The **spe** command generates NVRAM modem download and configuration file entries. **Note** If the configuration is not saved as described above, download of the firmware specified with the **spe** command will not occur after the next reboot. • For detailed information on the **spe** command, see the following Cisco document *SPE and Firmware Download Enhancements*.

Creating and Applying Voicecaps

The steps in this section allow you to configure a voicecap in global configuration mode on a single voice port. Although voicecaps can be used to configure any of the voice service parameters, voicecaps are primarily used to configure only those parameters that do not have associated Cisco IOS commands.

Restrictions

- Voicecaps are configured in global configuration mode. A maximum of five voicecap entries can be defined.
- Applying a voicecap is possible only in voice-port configuration mode. Once applied to a voice port, the voicecap affects all calls associated with that voice port.
- To achieve the specified functionality, an SPE image capable of voice tuning must be used in conjunction with the Cisco IOS software and module controller software.
- For backwards compatibility, a voicecap used in "raw mode" will configure older SPEware to allow echo canceller coverage settings greater than 64 ms when used with newer releases of Cisco IOS software. For situations when new SPEware is loaded onto an older Cisco IOS software release, the NextPort dual-filter G.168 echo canceller automatically sets coverage time to 64 ms.

Note Voicecap parameters in "raw mode" are never range-checked.

For a list of available voicecap parameters and code words that are used with the NextPort dual-filter G.168 echo canceller feature, see the *NextPort Dual-Filter G.168 Echo Canceller Whitepaper*.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voicecap entry** *name string*
4. **voice-port** *slot*/*port*:**D**
5. **voicecap configure** *name*
6. **exit**

DETAILED STEPS

	Command or Action	Purpose

Step 1	`enable`
	
	Example:
	`Router> enable`
		Enables privileged EXEC mode.
		• Enter your password if prompted.

Step 2	`configure terminal`
	
	Example:
	`Router# configure terminal`
		Enters global configuration mode.

	Command or Action	Purpose
Step 3	**voicecap entry** *name string* **Example:** `Router(config)# voicecap entry qualityERL v270=120`	Creates a voicecap. • The *name* argument is a word that uniquely identifies this voicecap. • The *string* argument is a string of characters composed of a series of voicecap register entries, similar to a modemcap. Each entry is of the form vINDEX=VALUE, where INDEX refers to a specific V register, and VALUE designates the value to set that V register to. • The example creates a simple voicecap string named "qualityERL" with V register 270 set to 120.
Step 4	**voice-port** *slot*/*port*:**D** **Example:** `Router(config)# voice-port 3/0:D`	Enters voice-port configuration mode on the selected slot and port.
Step 5	**voicecap configure** *name* **Example:** `Router(config-voiceport)# voicecap configure qualityERL`	Applies a voicecap. • The *name* argument designates which of the newly created voicecaps to use on this voice port. This character value must be identical to the value entered when you created the voicecap entry. In this case, the value is "qualityERL." **Note** To configure multiple voice ports, repeat Step 4 and Step 5 for each voice port.
Step 6	**exit** **Example:** `Router(config-voiceport)# exit`	Exits voice-port configuration mode and completes the configuration.

Setting Voice Tuning Parameters with V Registers

The following sections contain information about setting voice tuning parameters with V registers.

Note All data specified in dB is entered in the form (dB * 10). So, for example, to specify 6.0 dB, 60 must be entered.

- Setting PSTN Gains, page 9
- Setting IP Gains, page 9
- Setting Dynamic Attenuation, page 9
- Setting Comfort Noise Generation, page 9
- Setting Minimum ERL, page 10

Setting PSTN Gains

Note Too much attenuation may cause some calls to have low volume speech. For more information, see the dynamic attenuation feature described in the *NextPort Voice Tuning White Paper*.

To fix poor loss plans and to ensure minimum ERLs, use PSTN gains to adjust the power levels on the PSTN call leg. To adjust these levels, make sure that the sum of the output attenuation, the input attenuation, and the lowest expected functional ERL is greater than the MinERL parameter setting described below. You should balance the power levels of the far-end talker and near-end talker as seen at the echo canceller.

Note Use the CLI, not voicecap indices, to set PSTN gains.

Setting IP Gains

To adjust IP-side levels that are applied to the signal before it is propagated through the echo canceller, use IP gains. IP gains are controlled with the following V registers. The valid range for both input and output gain is -14 dB to 14 dB.

- v261—IP output gain.
- v263—IP input gain.

Note There have been some instances where the IP-side power has been too high. Using index v263 can mitigate this problem.

Setting Dynamic Attenuation

To mitigate low volume calls when attenuation has been added on the PSTN call leg to compensate for low ERL calls, use dynamic attenuation. Dynamic attenuation is controlled with the following V registers:

- v289—Dynamic EC Attenuation Feature Enable. Set to 1 to enable. Set to 0 to disable.
- v290—Dynamic EC Attenuation Minimum ERL Value. Valid range is from 0 dB to 60 dB.
- v291—Dynamic EC Attenuation Final Rout Gain. Set to the lowest level desired for PSTN output attenuation. This value is usually set to 0. Valid range is from –14 dB to 6 dB.
- v292—Dynamic EC Attenuation Final Sin Gain. Set to the lowest level desired for PSTN input attenuation. This value is usually set to 0. Valid range is from –14 dB to 6 dB.

Setting Comfort Noise Generation

During periods of far-end single talk, the echo canceller engages the non-linear processor (NLP) to suppress residual echo. However, it will also suppress any noise signal that is coming from the near-end side. This can lead to dead silence, which the listener may confuse with a dropped call. To overcome this condition, comfort noise generation (CNG) is added.

To choose between NLP silence or background noise reproduction, use comfort noise generation. CNG is controlled with the following V register:

- v294—CNG Enable. Set to 1 to enable. Set to 0 to disable.

Setting Minimum ERL

The echo canceller uses the minimum ERL (MinERL) value to decide whether the incoming signal on the PSTN call leg is an echo or a near-end talker. If this value is too high, the echo canceller will not properly identify echo and will not adapt. If this value is too low, clipping of the near-end talker may occur.

To reduce near-end talker clipping and poor echo canceller performance, use minimum ERL. MinERL is controlled with the following V register:

- v270—Sets the level that the echo canceller expects the lowest ERL of the PSTN to be. The valid range is from 0 dB to 20 dB. The default is 6.

Verifying Voicecap Configurations

Use the following **show** commands in privileged EXEC mode to verify your configuration. Relevant fields are shown in bold.

SUMMARY STEPS

1. **show voice port**
2. **show port operational-status** *slot/port*
3. **show port voice log**

DETAILED STEPS

Step 1 **show voice port**

Use this command to display configured voicecaps, for example:

```
Router# show voice port

ISDN 2/0:D - 2/0:D
 Type of VoicePort is ISDN
 Operation State is DORMANT
 Administrative State is UP
 No Interface Down Failure
 Description is not set
.
.
.
 Station name None, Station number None
 Translation profile (Incoming):
 Translation profile (Outgoing):
 Voicecap:EXAMPLE
```

Step 2 **show port operational-status** *slot/port*

Use this command to display background noise level information on current calls. Significant fields are shown in bold in the following example:

```
Router# show port operational-status 1/0

Slot/SPE/Port -- 1/0
Service Type                          :Voice service
Voice Codec                           :G.711 u-law
Echo Canceler Length                  :8 ms
Echo Cancellation Control             :Echo cancellation       - enabled
                                        Echo update            - enabled
```

```
                                        Non-linear processor    - enabled
                                        Echo reset coefficients - disabled
                                        High pass filter enable - disabled
Digit detection enable                 :DTMF signaling          - enabled
Voice activity detection               :Disabled
Comfort noise generation               :Generate comfort noise
Digit relay enable                     :OOB Digit relay         - disabled
                                        IB Digit relay          - disabled
Information field size                 :20 ms
Playout de-jitter mode                 :adaptive
Encapsulation protocol                 :RTP
Input Gain                             :0.0 dB
Output Gain                            :0.0 dB
Tx/Rx SSRC                             :20/0
Current playout delay                  :65 ms
Min/Max playout delay                  :65/105 ms
Clock offset                           :142003 ms
Predictive concealment                 :0 ms
Interpolative concealment              :0 ms
Silence concealment                    :0 ms
Buffer overflow discards               :1
End-point detection errors             :0
Tx/Rx Voice packets                    :1337/1341
Tx/Rx signaling packets                :0/0
Tx/Rx comfort noise packets            :0/0
Tx/Rx duration                         :26745/26745 ms
Tx/Rx voice duration                   :0/0 ms
Out of sequence packets                :0
Bad protocol headers                   :0
Num. of late packets                   :0
Num. of early packets                  :1
Tx/Rx Power                           :-87.0/-57.3 dBm
Tx/Rx Talker Level                     :-86.3/-57.0 dBm
TX/RX Mean Speech level                :-86.3/-57.0 dBm
VAD Background noise level             :6.2 dBm
ERL level                              :127.0 dB
ACOM level                             :127.0 dB
Tx/Rx current activity                 :silence/silence
Tx/Rx byte count                       :213920/214240
ECAN Background noise level            :-83.4 dBm
Latest SSRC value                      :391643394
Number of SSRC changes                 :1
Number of payload violations           :0
```

Step 3 show port voice log

Use this command to display background noise level information on completed calls. Significant fields are shown in bold in the following example:

```
Router# show port voice log

Port 1/00 Events Log
  *Aug 22 07:59:27.515:Voice Terminate event:
    Disconnect Reason                 :  normal call clearing (16)
    Call Timer                        :  57  secs
    Current playout delay             :  65  ms
    Min/Max playout delay             :  65/105  ms
    Clock offset                      :  142003  ms
    Predictive concealment            :  0  ms
    Interpolative concealment         :  0  ms
    Silence concealment               :  0  ms
    Buffer overflow discards          :  1
    End-point detection errors        :  0
    Tx/Rx Voice packets               :  2813/2816
```

```
    Tx/Rx signaling packets            :  0/0
    Tx/Rx comfort noise packets        :  0/0
    Tx/Rx duration                     :  56260/56260  ms
    Tx/Rx voice duration               :  0/0  ms
    Out of sequence packets            :  0
    Bad protocol headers               :  0
    Num. of late packets               :  0
    Num. of early packets              :  1
    Tx/Rx Power                        :  -87.0/-57.3  dBm
    Tx/Rx Mean Speech Level            :  -86.7/-57.0  dBm
    Tx/Rx Talker Level                 :  -86.3/-57.0 dBm
    Average VAD Background noise level :  6.2  dBm
    Average ERL level                  :  127.0  dB
    Average ACOM level                 :  127.0  dB
    Tx/Rx current activity             :  silence/silence
    Tx/Rx byte count                   :  450080/450240
    Average ECAN Background noise level:  -83.4  dBm
   *Aug 22 07:59:27.515:Voice SSRC change events:
    Latest ssrc value                  :  391643394
    Total ssrc changes                 :  1
```

Troubleshooting NextPort Voicecaps

Use the following **debug** and **show** commands in privileged EXEC mode to debug the application of a voicecap and to check debugging output:

SUMMARY STEPS

1. **debug nextport vsmgr detail**
2. **debug dspapi detail**
3. **show debug**

DETAILED STEPS

Step 1 **debug nextport vsmgr detail**

Use this command to turn on debugging for NextPort voice services, for example:

```
Router# debug nextport vsmgr detail

NextPort Voice Service Manager:
  NP Voice Service Manager Detail debugging is on
.
.
.
```

Step 2 **debug dspapi detail**

Use this command to turn on debugging for DSP API message event details, for example:

```
Router# debug dspapi detail

DSP API:
  DSP API Command debugging is on
  DSP API Detail debugging is on
.
.
.
```

Step 3 **show debug**

Use this command to check voicecap application debugging. The significant field in the output is highlighted in bold in the following example:

```
Router# show debug

NextPort Voice Service Manager:
  NP Voice Service Manager Detail debugging is on

DSP API:
  DSP API Command debugging is on
  DSP API Detail debugging is on
*Aug 22 08:34:47.399:dspapi [2/1:1 (4)] dsp_init
*Aug 22 08:34:47.399:dspapi [2/1:1 (4)] dsp_voice_config_params:10 params
*Aug 22 08:34:47.399:  [0] ENCAP RTP:t_ssrc=20 r_ssrc=0 t_vpxcc=0 r_vpxcc=0
                        ifp_payload_type=122 sid_support=19 tse_payload=101
seq_num_start=6303 redundancy=0 cc_payload_typ
Router# e=125 fax_payload_type=122 alaw_pcm_switchover=8 mulaw_pcm_switchover=0
dtmf_payload_type=121, nte_rcv_payload_type=101dynamic_payload=0, codec=5
*Aug 22 08:34:47.399:  [1] PO_JITTER:mode=2 initial=60 max=200 min=40 fax_nom=300
*Aug 22 08:34:47.399:  [2] INBAND_SIG:mode=0x1 enable
*Aug 22 08:34:47.399:  [3] ECHO_CANCEL:flags=0x17 echo_len=256
*Aug 22 08:34:47.399:  [4] IDLE_CODE_DET:enable = 0 code=0x0 duration=6000
*Aug 22 08:34:47.403:  [5] GAIN:input=0 output=0
*Aug 22 08:34:47.403:  [6] CNG:
Router# 1
*Aug 22 08:34:47.403:  [7] INFO_FIELD_SIZE:160
*Aug 22 08:34:47.403:  [8] DIGIT_RELAY:2
*Aug 22 08:34:47.403:  [9] VOICECAP:EXAMPLE
*Aug 22 08:34:47.403:dspapi [2/1:1 (4)] dsp_start_service:G711_U (5)
*Aug 22 08:34:47.403:Matched voicecap:v0=0 v1=1
*Aug 22 08:34:47.403:msg length = 0x001D
*Aug 22 08:34:47.403:session ID = 0x006D
*Aug 22 08:34:47.403:   msg tag = 0x0000
*Aug 22 08:34:47.403:    msg ID = 0xF201
```

Configuring the NextPort Dual-Filter G.168 Echo Canceller

The NextPort dual-filter G.168 echo canceller is enabled by default on NextPort platforms in Cisco IOS Release 12.3(11)T and later. You can set the echo canceller tail coverage time at the voice-port interface:

```
Router(config-voiceport)# echo-cancel coverage ?

  128  128 milliseconds echo canceller coverage
  16   16 milliseconds echo canceller coverage
  24   24 milliseconds echo canceller coverage
  32   32 milliseconds echo canceller coverage
```

```
  64    64 milliseconds echo canceller coverage
  8     8 milliseconds echo canceller coverage

Router(config-voiceport)# echo-cancel coverage 64
```

The default coverage time is 32 ms for both 8.x and 10.2.2 SPEware versions.

Note The maximum possible coverage for SPEware version 8.x is 128 ms. The maximum possible coverage for SPEware version 10.2.2 is 64 ms.

Troubleshooting the NextPort Dual-Filter G.168 Echo Canceller Tail Length

Echo cancel coverage cannot be set to more than 64 ms if you are using SPEware version 10.2.2 or later. A query with the **echo-cancel coverage** command fails to show 128 ms as an option, and the system will issue an invalid input warning if 128 ms is entered, as shown in the following example:

```
Router(config-voiceport)# echo-cancel coverage ?

  16    16 milliseconds echo canceller coverage
  24    24 milliseconds echo canceller coverage
  32    32 milliseconds echo canceller coverage
  64    64 milliseconds echo canceller coverage
  8     8 milliseconds echo canceller coverage

Router(config-voiceport)# echo-cancel coverage 128
                                               ^
% Invalid input detected at '^' marker.

Router(config-voiceport)#
```

Configuration Examples for NextPort Voice Tuning and the NextPort Dual-Filter G.168 Echo Canceller

The following sections contain examples that could be used to optimize a NextPort-based gateway for a given telephone network:

High ERL in the Network: Example

Register v270 is used to set the limit for the minimum expected ERLs that the gateway will encounter. If the gateway encounters ERLs that are lower than the v270 setting, the echo canceller performance will be suboptimal.

The default setting for v270 is 6 dB. This setting should work well for usual telephone networks. However, when the gateway is used on a well-managed telephone network with organized loss plans in place, the ERL is often greater than 6 dB. In these cases, v270 can be raised. Making this change reduces any clipping of the near-end signal; however, it will under-perform if a low ERL is encountered.

In this example, the network is designed to have an ERL of 12 dB or greater. In this case, the following voicecap may improve performance. Notice that the value for v270 is entered as decibels multiplied by 10.

```
Router> enable
Router# configure terminal
Router(config)# voicecap entry qualityERL v270=120
Router(config)# end
```

Low ERL in the Network: Example

Unlike the scenario described in the example above, some telephone networks may not always produce sufficient ERLs to meet the default setting of 6 dB. The best way to solve this problem would be to institute better loss plans on the telephone network. However, since this is not always possible, a voicecap can be used to alleviate the problem.

A low ERL means that the echo canceller must do a much deeper cancellation to remove sufficient echo. Also, lowering the minimum ERL can increase the incidence of clipping. The best way to improve this situation is to make up for the telephone network's lack of loss plan by adding some loss in the gateway. If the lowest ERL seen is 4 dB, adding 1 dB of output attenuation and –1 dB of input gain will ensure that the echo canceller never sees more than a 6-dB effective ERL.

Adding this attenuation can be done by entering a voicecap, but using the CLI is the recommended approach in this example. The following commands set the gains that are needed for this example:

```
Router> enable
Router# configure terminal
Router(config)# voice-port 3/0:D
Router(config-voiceport)# output attenuation 1
Router(config-voiceport)# input gain -1
Router(config-voiceport)# end
```

Clipped or Squelched Speech and Low ERL in the Network: Example

In this example, a network in which signal level imbalance is already causing clipping to occur with a MinERL setting of 6 dB and in which ERLs of less than 6 dB are already occurring, a dual approach must be taken. To stop the clipping, the MinERL setting should be lowered to 12 dB. If 4-dB ERLs are occurring, 4 dB of attenuation must be added to the input and the output to ensure that there is 12 dB of effective ERL at the echo canceller (4 dB of real ERL, plus 4 dB of output attenuation, plus 4 dB of input attenuation equals 12 dB of effective ERL). To create these settings, the following commands are used:

```
Router> enable
Router# configure terminal
Router(config)# voicecap entry qualityERL v270=120
Router(config)# voice-port 3/0:D
Router(config-voiceport)# voicecap configure qualityERL
Router(config-voiceport)# output attenuation 4
Router(config-voiceport)# input gain -4
Router(config-voiceport)# end
```

Dynamic Attenuation: Example

It is possible that worst-case settings are only required when the primary telephone circuits are all used and an alternate carrier with a poor loss plan must be used instead. For these cases, the dynamic attenuation feature removes the attenuation when the ERL is sufficient. In the following example, 4 dB of input and output attenuation is to be removed when it is not necessary to ensure the minimum ERL setting. To do this, the dynamic attenuation feature (using v289) is enabled. The required ERL must be set before attenuation is removed (using v290), and minimum attenuation levels for the input and output (using v291 and v292) must also be set. In this example, attenuation is set to 15 dB and then removed.

```
Router> enable
Router# configure terminal
Router(config)# voicecap entry dynatten v270=120 v289=1 v290=15 v291=0 v292=0
Router(config)# voice-port 3/0:D
Router(config-voiceport)# voicecap configure dynatten
Router(config-voiceport)# output attenuation 4
Router(config-voiceport)# input gain -4
Router(config-voiceport)# end
```

Echo Canceller Tail Coverage: Example

The following example adjusts echo canceller tail coverage to 64 ms on the Cisco AS5400:

```
Router(config) voice-port 1/0:0
Router(config-voiceport)# echo-cancel coverage 64
```

Additional References

The following sections provide references related to the NextPort Voice Tuning and Background Noise Statistics feature.

Related Documents

Related Topic	Document Title
How to configure QoS for Cisco features	*Cisco IOS Quality of Service Solutions Configuration Guide*, Release 12.3
Cisco IOS Release 12.3 mainline roadmap	Cisco IOS Release 12.3 Configuration Guides and Command References
Cisco AS5350 NextPort platform	Cisco AS5350 documentation index
Cisco AS5400 NextPort platform	Cisco AS5400 documentation index
Cisco AS5800 NextPort platform	Cisco AS5800 documentation index
Cisco AS5850 NextPort platform	Cisco AS5850 documentation index
How to configure your Cisco router or access server to support voice, video, and fax applications	*Cisco IOS Voice Configuration Library*, Release 12.3
How to use Cisco IOS commands to support voice, video, and fax applications	*Cisco IOS Voice, Video, and Fax Command Reference*, Release 12.3
How to use echo analysis for VoIP	*Echo Analysis for Voice over IP*

Related Topic	Document Title
How to use the G.168 echo canceller on voice platforms	*Enhanced ITU-T Echo Cancellation*
How to use the NextPort dual-filter G.168 echo canceller	*NextPort Dual-Filter G.168 Echo Canceller Whitepaper*
How to configure NextPort SPE firmware	NextPort SPE Release Notes
How to use Cisco MGCs	Cisco Media Gateway Controllers documentation index
How to configure NextPort SPE firmware	*Combined Release Notes for Cisco NextPort SPE Firmware Version 8.x*
How to configure MGCP	*Configuring Media Gateway Control Protocol and Related Protocols*
How to configure QoS for voice applications	*Configuring Quality of Service for Voice*
How to configure voice ports	*Configuring Voice Ports*, Release 12.2
Enabling basic management protocols on Cisco access platforms	*Enabling Management Protocols: NTP, SNMP, and Syslog*
Information about the G.168 echo canceller	*Enhanced ITU-T G.168 Echo Cancellation*
Understanding telephone network behavior	*NextPort Voice Tuning White Paper*
Cisco IOS Release 12.3	Release notes index, Cisco IOS Release 12.3
How to use the **spe** command	*SPE and Firmware Download Enhancements*

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/public/support/tac/home.shtml

Command Reference

This section documents new and modified commands.

New Commands

- **voicecap configure**
- **voicecap entry**

Modified Commands

- **echo-cancel coverage**
- **show port log**
- **show port operational-status**

echo-cancel coverage

To adjust the size of the echo canceller (EC) and to select the extended EC when the Cisco default EC is present, use the **echo-cancel coverage** command in voice-port configuration mode. To reset this command to the default value (64 ms), use the **no** form of this command.

echo-cancel coverage {**8** | **16** | **24** | **32** | **48** | **64**}

no echo-cancel coverage

Syntax Description

8	Specifies an EC size of 8 milliseconds.
16	Specifies an EC size of 16 milliseconds.
24	Specifies an EC size of 24 milliseconds.
32	Specifies an EC size of 32 milliseconds.
48	Specifies an EC size of 48 milliseconds.
64	Specifies an EC size of 64 milliseconds. This is the default.

Defaults

64 milliseconds

Command Modes

Voice-port configuration

Command History

Release	Modification
11.3(1)T	This command was introduced on the Cisco 3600 series.
11.3(1)MA	This command was implemented on the Cisco MC3810.
12.0(5)XK	The command was modified to add the 8-millisecond option.
12.0(5)XE	The command was implemented on the Cisco 7200 series.
12.1(1)T	This command was integrated into Cisco IOS Release 12.1(1)T.
12.2(13)T	This command was modified to provide a new set of size options when the extended EC is configured. This command is supported on all T1 Digital Signal Processor (DSP) platforms.
12.3(11)T	This command was modified for use on NextPort platforms for use with the dual-filter G.168 echo canceller.

Usage Guidelines

Use the **echo-cancel coverage** command to adjust the coverage size of the EC. This command enables cancellation of voice that is sent out the interface and received on the same interface within the configured amount of time. If the local loop (the distance from the interface to the connected equipment that is producing the echo) is greater than this amount of time, the configured value of this command should be increased.

If you configure a greater value for this command, the EC takes longer to converge. In this case, you might hear a slight echo when the connection is initially set up. If the configured value for this command is too short, you might hear some echo for the duration of the call because the EC is not canceling the longer delay echoes.

There is no echo or echo cancellation on the network side (for example, the non-POTS side) of the connection.

Note This command is valid only if the echo cancellation feature has been enabled. For more information, see the **echo-cancel enable** command.

The NextPort dual-filter G.168 echo canceller feature supports echo tails from 8ms to 64 ms in 8-ms increments. Use the echo-cancel coverage command to limit the echo canceller coverage to 64 ms on NextPort platforms. Tail length values greater than 64 ms are not accepted with the NextPort dual-filter G.168 echo canceller feature. For more information about the NextPort dual0filter G.168 echo canceller, see the NextPort Voice Tuning and Background Noise Statistics with NextPort Dual-Filter G.168 Echo Cancellation document on Cisco.com.

Examples

The following example enables the extended echo cancellation feature and adjusts the size of the echo canceller to 16 milliseconds:

```
voice-port 1/0/0
 echo-cancel coverage 16
```

Related Commands

Command	Description
echo-cancel enable (controller)	Enables echo cancellation on a controller.
echo-cancel enable	Enables echo cancellation on a voice port.

show port log

To display the service events generated by the sessions, use the **show port log** command in privileged EXEC mode.

show port [**fax** | **voice**] **log** [**reverse** *slot*/*port*] [*slot* | *slot*/*port*]

Syntax Description

fax	(Optional) Displays the fax data event log.
voice	(Optional) Displays the voice data event log.
reverse	(Optional) Displays the port history event log with the most recent event first (reverse chronological order).
slot/*port*	(Optional) All ports on the specified slot and service processing element (SPE). Slot values range from 1 to 7, and port values range from 0 to 107. You must include the slash mark.
slot	(Optional) All ports on the specified slot. Slot values range from 1 to 7.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(1)XD	This command was introduced on the Cisco AS5400.
12.1(3)T	This command was integrated into Cisco IOS Release 12.1(3)T and implemented on the Cisco AS5400 and Cisco AS5800.
12.1(5)XM2	This command was integrated into Cisco IOS Release 12.1(5)XM2.
12.2(11)T	This command was integrated into Cisco IOS Release 12.2(11)T and implemented on the Cisco AS5350 and Cisco AS5400.
12.3(4)T	Voice activity detection (VAD) background noise, echo return loss (ERL) level, and Acombined (ACOM) level were replaced with average values for each statistic in the output. A new field was added for the average echo canceller (ECAN or EC) background noise.
12.3(11)T	Command output was modified for use on NextPort platforms with the dual-filter G.168 echo canceller.

Examples

The following example shows value averages for VAD background noise, ERL level, ACOM level, and EC background noise level. Relevant fields in the output are shown in bold.

```
Router# show port voice log 1/0

Port 1/00 Events Log
  *Aug 22 07:59:27.515:Voice Terminate event:
    Disconnect Reason                 :  normal call clearing (16)
    Call Timer                        :  57  secs
    Current playout delay             :  65  ms
    Min/Max playout delay             :  65/105  ms
    Clock offset                      :  142003  ms
    Predictive concealment            :  0  ms
    Interpolative concealment         :  0  ms
```

```
 Silence concealment                :  0  ms
 Buffer overflow discards           :  1
 End-point detection errors         :  0
 Tx/Rx Voice packets                :  2813/2816
 Tx/Rx signaling packets            :  0/0
 Tx/Rx comfort noise packets        :  0/0
 Tx/Rx duration                     :  56260/56260  ms
 Tx/Rx voice duration               :  0/0  ms
 Out of sequence packets            :  0
 Bad protocol headers               :  0
 Num. of late packets               :  0
 Num. of early packets              :  1
 Tx/Rx Power                        :  -87.0/-57.3  dBm
 Tx/Rx Mean                         :  -86.7/-57.0  dBm
 Average VAD Background noise level :  6.2  dBm
 Average ERL level                  :  127.0  dB
 Average ACOM level                 :  127.0  dB
 Tx/Rx current activity             :  silence/silence
 Tx/Rx byte count                   :  450080/450240
 Average ECAN Background noise level:  -83.4  dBm
*Aug 22 07:59:27.515:Voice SSRC change events:
 Latest ssrc value                  :  391643394
 Total ssrc changes                 :  1
```

The following example shows output for the Cisco AS5400 with the universal port dial feature card (DFC). The example shows the port voice history event log for slot 4, port 0.

```
Router# show port voice log 4/0

03:36:26: incoming caller number: 11001
03:36:26: incoming called number: 21001
03:36:26: Voice Connect event:
Voice Codec : G.711 a-law
Echo Canceler Length : 64 taps
Digit detection enable : DTMF signaling - enabled
Echo Cancellation Control : Echo cancellation - enabled
Echo update - enabled
Non-linear processor - enabled
Echo reset coefficients -
disabled
High pass filter enable -
disabled
Comfort noise generation : Generate comfort noise
Voice activity detection : Disabled
Information field size : 20 ms
Digit relay enable : OOB Digit relay -
disabled
IB Digit relay -
disabled
Encapsulation protocol : RTP
Playout de-jitter mode : adaptive
Input Gain : 0 dB
Output Gain : 0 dB
Tx/Rx SSRC : 0/0
03:36:27: Voice Terminate event:
Disconnect Reason : Non-specific host disconnect
Call Timer : 122 secs
Current playout delay : 30 ms
Min/Max playout delay : 25/45 ms
Clock offset : 528623613 ms
Predictive concealment : 0 ms
Interpolative concealment : 0 ms
Silence concealment : 0 ms
Buffer overflow discards : 0
```

```
End-point detection errors : 0
Tx/Rx Voice packets : 6130/6130
Tx/Rx signaling packets : 0/0
Tx/Rx comfort noise packets : 0/0
Tx/Rx duration : 122615/122615
Tx/Rx voice duration : 90000/82000
:
Out of sequence packets : 0
Bad protocol headers : 0
Num. of late packets : 0
Num. of early packets : 0
Tx/Rx Power : 932/101 dBm
Tx/Rx Mean : 364/325 dBm
:
Background noise level : -1 dBm
ERL level : 623 dB
ACOM level : 586 dB
Tx/Rx current activity : silence/silence
```

The following example shows output for the Cisco AS5400 with the universal port DFC. The example shows the port fax history event log for slot 1, port 0.

```
Router# show port fax log 1/0

Port 1/00 Events Log
Port 1/01 Events Log
Port 1/02 Events Log
  *Jan  1 18:39:30.499 UTC: Fax-relay Connect event:
    Max. transmission rate             :   4800 bps
    Information field size             :   20  ms
    TCF generation                     :   transparent
    Transmit level                     :   -10  dBm
    Encapsulation protocol             :   UDPTL
    IFP Payload Type                   :
    ECM Disable                        :   Disabled
```

Table 1 describes the significant fields shown in the display. Voice output descriptions appear first. Fax output descriptions appear last.

Table 1 show port log Field Descriptions

Field	Description
Voice Output Field Descriptions	
incoming caller number	The incoming caller number.
incoming called number	The incoming called number.
Voice Codec	Codec used for the current call.
Echo Canceler Length	Length of the echo canceler, in number of taps. Range is from 1 to 1024 (128 milliseconds).
Digit detection enable	Bit mask where 1 = enabled, 0 = disabled, Bit 0 = DTMF signaling detection.

Table 1 show port log Field Descriptions (continued)

Field	Description
Echo Cancellation Control	Bit mask where 1 = enabled, 0 = disabled: • Bit 0: Echo cancellation enable. • Bit 1: Echo update enable. • Bit 2: Non-linear processor enable. • Bit 3: Echo reset coefficients (single shot). • Bit 4: High pass filter disable. • Bits 5 to 15: reserved (set to 0).
Echo update	Bit 1: Echo update enable.
Non-linear processor	Bit 2: Non-linear processor enable.
Echo reset coefficients	Bit 3: Echo reset coefficients (single shot).
High pass filter enable	Bit 4: High pass filter disable.
Comfort noise generation	0 = generate silence (G.711 only), 1 = generate comfort noise.
Voice activity detection	0 = disabled, 1 = enabled.
Information field size	Maximum size (in milliseconds) of information field in fax relay packets. The range is from 0 to 90.
Digit relay enable	Bit mask where 1 = enabled, 0 = disabled, Bit 0 = Digit Passthrough suppression.
IB Digit relay	Bit 1 = IB Digit Relay.
Encapsulation protocol	1 = RTP (VoIP), 2 = FRF.11 (VoFR), 3 = VoATM.
Playout de-jitter mode	0 = fixed, 1 = adaptive.
Input Gain	–6.0 to 6.0, in 0.1-decibel (dB) increments.
Output Gain	0 to –14.0, in 0.1-dB increments.
Disconnect Reason	Disconnect reason.
Call Timer	Call timer value, in seconds.
Current playout delay	Current playout delay estimate, in ms.
Min/Max playout delay	Minimum and maximum playout delay encountered, in ms.
Clock offset	Clock offset value, in ms.
Predictive concealment	Cumulative duration, in ms.
Interpolative concealment	Cumulative duration, in ms.
Silence concealment	Cumulative duration, in ms.
Buffer overflow discards	Cumulative number of buffer overflow errors.
End-point detection errors	Cumulative number of endpoint detection errors.
Tx/Rx Voice packets	Cumulative count of voice packets sent and received.
Tx/Rx signaling packets	Cumulative count of signaling packets sent and received.

Table 1 show port log Field Descriptions (continued)

Field	Description
Tx/Rx comfort noise packets	Cumulative count of comfort noise packets sent and received.
Tx/Rx voice duration	Total duration of voice transmission and reception, in ms.
Out of sequence packets	Cumulative count of packets received out of sequence.
Bad protocol headers	Cumulative count of packets received with bad protocol headers.
Num. of late packets	Cumulative count of packets received late.
Num. of early packets	Cumulative count of packets received early.
Tx/Rx Power	Current power of sent and received signal (to TDM), in 0.1-dBm increments.
Tx/Rx Mean	Average power of sent and received signal (to TDM), in 0.1-dBm increments.
Background noise level	Current background noise level estimate, in 0.1-dB increments.
ERL level	Current ERL level estimate, in 0.1-dB increments.
ACOM level	Current ACOM level estimate, in 0.1-dB-increments. The term ACOM is used in G.165, *General Characteristics of International Telephone Connections and International Telephone Circuits: Echo Cancellers*. ACOM is the combined loss achieved by the echo canceller, which is the sum of the echo return loss, echo return loss enhancement, and non-linear processing loss for the call.
Tx/Rx current activity	0 = silence, 1 = voice.
Fax Output Field Descriptions	
Max. transmission rate	0: No Limit. 1: 2400 bits per second (bps). 2: 4800 bps. 3: 7200 bps. 4: 9600 bps. 5: 12000 bps. 6: 14400 bps.
Information field size	Maximum size of information field in fax relay packets. The range is from 0 to 90 ms.
TCF generation	0: transparent (remote). 1: controlled (local).
Transmit level	Transmit level of remodulator (in dBm): –10 to –21.
Encapsulation protocol	1: UDPTL (T.38—VoIP) (default). 2: FRF.11 (VoFR). 3: RTP (IFP in RTP).

Table 1 show port log Field Descriptions (continued)

Field	Description
IFP Payload Type	Negotiated payload type for fax relay over RTP. (Valid only when the encapsulation protocol is RTP.) Range is from 0 to 127.
ECM Disable	0: Error Correction Mode (ECM) is not disabled. 1: ECM is disabled.

Related Commands

Command	Description
clear port log	Clears all port log events.
show port operational-status	Displays active session statistics.

show port operational-status

To display the active session statistics of a specific port or port range, use the **show port operational-status** command in privileged EXEC mode.

Cisco AS5350 and Cisco AS5400 with the NextPort Dial Feature Card

show port operational-status {*slot* | *slot*/*port*}

Cisco AS5800 with the Universal Port Card

show port operational-status {*shelf*/*slot* | *shelf*/*slot*/*port*}

Syntax Description

slot	All ports on the specified slot. For the Cisco AS5350, slot values range from 1 to 3. For the Cisco AS5400, slot values range from 1 to 7.
slot/*port*	All ports on the specified slot and service processing element (SPE). For the Cisco AS5350, slot values range from 1 to 3. For the Cisco AS5400, slot values range from 1 to 7. Port values range from 0 to one less than the number of ports supported by the card. You must include the slash mark.
shelf/*slot*	All ports on the specified shelf and slot. For the Cisco AS5800, shelf values range from 0 to 1, and universal port card (UPC) slot values range from 2 to 11. You must include the slash mark.
shelf/*slot*/*port*	All ports on the specified SPE. For the Cisco AS5800, shelf values range from 0 to 1, slot values range from 2 to 11, and port values range from 0 to one less than the number of ports supported by the card. You must include the slash mark.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(1)XD	This command was introduced on the Cisco AS5400.
12.1(3)T	This command was integrated into Cisco IOS Release 12.1(3)T and implemented on the Cisco AS5800.
12.1(5)XM1	This command was implemented on the Cisco AS5350.
12.2(2)XA	Disconnect reasons and states information were added.
12.2(2)XB1	This command was integrated into Cisco IOS Release 12.2(2)XB1.
12.2(11)T	This command was integrated into Cisco IOS Release 12.2(11)T and implemented on the Cisco AS5350.
12.3(4)T	Configuration output was modified to show voice activity detection (VAD) background noise and echo canceller (EC or ECAN) background noise statistics.
12.3(11)T	Command output was modified for use on NextPort platforms with the dual-filter G.168 echo canceller.

Usage Guidelines

The port should have an associated active modem session when the command is executed. The **show port operational-status** command is equivalent to the **show modem operational-status** Cisco MICA technologies modem command.

Examples

The following example shows new VAD background noise and ECAN background noise statistics:

```
Router# show port operational-status 1/0

Slot/SPE/Port -- 1/0/0
Service Type                          :Voice service
Voice Codec                           :G.711 u-law
Echo Canceler Length                  :8 ms
Echo Cancellation Control             :Echo cancellation       - enabled
                                        Echo update            - enabled
                                        Non-linear processor   - enabled
                                        Echo reset coefficients - disabled
                                        High pass filter enable - disabled
Digit detection enable                :DTMF signaling          - enabled
Voice activity detection              :Disabled
Comfort noise generation              :Generate comfort noise
Digit relay enable                    :OOB Digit relay         - disabled
                                        IB Digit relay         - disabled
Information field size                :20 ms
Playout de-jitter mode                :adaptive
Encapsulation protocol                :RTP
Input Gain                            :0.0 dB
Output Gain                           :0.0 dB
Tx/Rx SSRC                            :20/0
Current playout delay                 :65 ms
Min/Max playout delay                 :65/105 ms
Clock offset                          :142003 ms
Predictive concealment                :0 ms
Interpolative concealment             :0 ms
Silence concealment                   :0 ms
Buffer overflow discards              :1
End-point detection errors            :0
Tx/Rx Voice packets                   :1337/1341
Tx/Rx signaling packets               :0/0
Tx/Rx comfort noise packets           :0/0
Tx/Rx duration                        :26745/26745 ms
Tx/Rx voice duration                  :0/0 ms
Out of sequence packets               :0
Bad protocol headers                  :0
Num. of late packets                  :0
Num. of early packets                 :1
Tx/Rx Power                           :-87.0/-57.3 dBm
Tx/Rx Mean                            :-86.3/-57.0 dBm
VAD Background noise level            :6.2 dBm
ERL level                             :127.0 dB
ACOM level                            :127.0 dB
Tx/Rx current activity                :silence/silence
Tx/Rx byte count                      :213920/214240
ECAN Background noise level           :-83.4 dBm
Latest SSRC value                     :391643394
Number of SSRC changes                :1
Number of payload violations          :0
```

The following is sample output from the **show port operational-status** command on the Cisco AS5400 with the NextPort dial feature card (DFC). This example displays operational status for slot 2, SPE 0, port 1.

```
Router# show port operational-status 2/1

slot/spe/Port -- 2/0/1
Service Type                            :Modem service
Disconnect Reason Info                  :0x0
Type (=0  ): <unknown>
Class (=0  ): Other
Reason (=0  ): no disconnect has yet occurred
Modulation Standard                     :V.34+
TX/RX Bit Rate                          :31200/14400
Connect Protocol                        :LAP-M
Compression                             :V.42bis
Call Timer                              :47 secs
Link Signal Quality                     :7
SNR                                     :37 dB
TX/RX Symbol Rate                       :3429/3429
TX/RX Carrier Frequency                 :1959/1959
TX/RX Trellis Coding                    :16/16
TX/RX Preemphasis Index                 :0/1
TX/RX Constellation Shaping             :On-Active/On-Active
TX/RX Nonlinear Encoding                :On-Active/On-Active
TX/RX Precoding                         :On-Active/On-Active
TX/RX Xmit Level Reduction              :3/1 dBm
Receive Level                           :-15 dBm
Frequency Offset                        :0 Hz
Phase Jitter Frequency                  :2 Hz
Phase Jitter Level                      :2 degrees
Far End Echo Level                      :-90 dBm
Phase Roll                              :0 degrees
Round Trip Delay                        :0 msecs
>Total Retrains                          :0
Self Test Error count                   :0
EC Retransmission count                 :0
EC packets transmitted/received OK      :11/12
EC packets (Received BAD/ABORTED)       :0
Characters transmitted/received         :76/13
Characters received BAD                 :0
PPP/SLIP packets transmitted/received   :0/0
PPP/SLIP packets received (BAD/ABORTED) :0
RBS Pattern                             :0
Digital Pad                             :0
Digital Pad Compensation                :0
```

The following example displays operational status for a V.110 digital service for the Cisco AS5400 on slot 2, SPE 3, port 23:

```
Router# show port operational-status 2/23

slot/spe/Port -- 2/3/23
Service Type                            : Digital service
Connect Protocol                        : V110
Data Bits                               : 8
Parity                                  : 0
Stop Bits                               : 1
TX/RX Bit Rate                          : 19200/19200
Call Timer                              : 116 secs
EC packets transmitted/received OK      : 0/0
EC packets (Received BAD/ABORTED)       : 0
```

```
PPP/SLIP packets transmitted, received  : 8/8
PPP/SLIP packets received (BAD/ABORTED) : 0
Sync Loss                               : 0
```

The following example shows output from the **show port operational-status** command for the Cisco AS5800 on shelf 1, slot 8:

```
Router# show port operational-status 1/8

Shelf/Slot/SPE/Port -- 1/8/32/194
Service Type                            : Modem service
Disconnect Reason Info                  : 0x0
     Type (=0  ):  <unknown>
    Class (=0  ):  Other
   Reason (=0  ):  no disconnect has yet occurred
Modulation Standard                     : V.34+
TX/RX Bit Rate                          : 31200/31200
Connect Protocol                        : LAP-M
Compression                             : V.42bis
Call Timer                              : 18 secs
Link Signal Quality                     : 6
SNR                                     : 38 dB
TX/RX Symbol Rate                       : 3429/3429
TX/RX Carrier Frequency                 : 1959/1959
TX/RX Trellis Coding                    : 16/16
TX/RX Preemphasis Index                 : 0/1
TX/RX Constellation Shaping             : Off-None/On-Active
TX/RX Nonlinear Encoding                : Off-None/On-Active
TX/RX Precoding                         : Off-None/On-Active
TX/RX Xmit Level Reduction              : 6/5 dBm
Receive Level                           : -15 dBm
Frequency Offset                        : 0 Hz
Phase Jitter Frequency                  : 5 Hz
Phase Jitter Level                      : 2 degrees
Far End Echo Level                      : -90 dBm
Phase Roll                              : 0 degrees
Round Trip Delay                        : 1 msecs
Total Retrains                          : 0
Self Test Error count                   : 0
EC Retransmission count                 : 1
EC packets transmitted/received OK      : 34/14
EC packets (Received BAD/ABORTED)       : 0
Characters transmitted/received         : 9393/355
Characters received BAD                 : 0
PPP/SLIP packets transmitted/received   : 0/0
PPP/SLIP packets received (BAD/ABORTED) : 0
RBS Pattern                             : 0
Digital Pad                             : 0
Digital Pad Compensation                : 0
.
.
.
```

Table 2 describes the significant fields shown in the displays. The fields appear in alphabetical order.

Table 2 show port operational-status Field Descriptions

Field	Description
Compression	Compression protocol used for the current connection, which can be None, V.42bis TX, V.42bis RX, V.42bis both, or MNP5 data compression.
Connect Protocol	Connect protocol for the current session, which can be SYNC mode, ARA1.0, ARA2.0, LAP-M, MNP, FAX mode, SS7/COT, or V.110.
Disconnect Reason Info	Displays the reason for disconnection.
EC packets transmitted/received OK	Error correction (EC) packets transmitted is the number of TX frames that the client modem accepted. EC packets received is the number of data RX frames accepted.
EC packets (Received BAD/ABORTED)	This is identical to the EC Retransmission count field.
EC Retransmission count	The number of times the NextPort has gone into error recovery in the TX direction for a particular connection. The larger the number, the worse the connection. However, this parameter should be weighed against the count produced by EC packets transmitted and received in order to determine if there should really be a concern.
ECAN Background noise level	ECAN background noise level, in –83.4-dBm increments.
Far End Echo Level	Over long connections, an echo is produced by impedance mismatches at 2-wire-to-4-wire and 4-wire-to-2-wire hybrid circuitry. The far end echo level (that portion of the sent analog signal that has bounced off of the remote modem analog front end) may range from 0 to –90, in decibels per milliwatt (dBm).
Frequency Offset	The difference (in hertz) between the modulation carriers (frequency shift in the receive spectrum) and the expected RX carrier frequency and the actual RX carrier frequency.
Link Signal Quality	Measure of line quality for a given bit rate, where 0 is the worst and 3 is steady state. If a 1 or 2 is present, the modem must shift down to a lower rate. Likewise, if the value is 4 to 7, the modem speeds shift up to a higher rate. If the value is high (for example, 7) and the bit rate is low, then there may be a problem at the remote end receiver.
Modulation Standard	Modulation standard can be V.21, Bell03, V.22, V.22bis, Bell212, V.23, V.32, V.32bis, V.32turbo, V.34, V.34+, K56Flex, or V.90.
Phase Jitter Frequency	Peak to peak differential (in hertz) between two signal points. Uncanceled phase jitter looks like “rocking” of the baseband quadrature amplitude modulation (QAM) constellation. The points look like arcs with the outer points having longer arcs.
Phase Jitter Level	Amount of phase jitter measured and indicates how large the “rocking” is in degrees. On an oscilloscope, the constellation points would look like crescent moons. Values can range up to 15 degrees. The typical value is zero (that is, phase jitter is not normally present).

Table 2 show port operational-status Field Descriptions (continued)

Field	Description
Phase Roll	Phase roll affects the echo signal coming back. A certain constellation pattern is sent from a modem and arrives at the central office. Some echoed form of this signal/constellation pattern is sent back. However, the constellation shape may be rotated from 0 to 359 degrees. This rotation is called the phase roll.
PPP/SLIP packets transmitted/received	Total count of PPP/Serial Line Internet Protocol (SLIP) packets transmitted and received. This total could include all PPP/SLIP packets, including BAD/ABORTED packets.
PPP/SLIP packets received (BAD/ABORTED)	Total count of the bad or aborted PPP/SLIP packets, which is a subset of PPP/SLIP packets received. A counted PPP packet has a bad frame check sequence (FCS), or the SLIP packet has a transparency error.
RBS Pattern	Reports the number of robbed bits detected in the connection. The robbed bits are used for inband signaling. This information is reported only for K56Flex (by the analog modem) and is found only on a channelized line such as T1 or E1. The six least significant bits (LSBs) of the returned value indicate the periodic Robbed Bit Signaling (RBS) pattern where a 1 denotes a pulse code modulation (PCM) sample with a robbed bit.
Receive Level	The power of the received signal in dBm steps. It ranges from 0 to –128. Typically the range in the United States is about –22 dBm, and in Europe it is –12 dBm. A good range is from –12 dBm to –24 dBm.
Round Trip Delay	Total round trip propagation delay of the link (in milliseconds). This is important for proper echo cancellation.
Self Test Error count	Total errors generated during a self-test run.
Service Type	Indicates the type of service: data, fax, or modem.
Shelf/Slot/SPE/Port	Displays the shelf, slot, and port designation for the SPE card location.
SNR	The ratio measurement (in dB) of the desired signal to noise. This value can range from 0 to 70 dB and changes in 1 dB steps. Note that a 28.8-kbps connection demands an SNR of about 37 dB. Any values lower than this level result in a diminished quality of connection. A 33.6-kbps connection demands an SNR of 38 to 39 dB. Also note that a “clean” line has an SNR of about 41 dB.
Total Retrains	Count of total retrains and speed shifts.
TX/RX Bit Rate	TX is the bit rate from the local DCE to the remote DCE. RX is the bit rate from the remote DCE to the local DCE. These rates may be asynchronous.
TX/RX Carrier Frequency	For TX, carrier frequency used by the local DCE. For RX, carrier frequency used by the remote DCE.
TX/RX Symbol Rate	TX is the symbol rate used to send samples to the line. RX is the symbol rate used to receive samples off of the line. The rates are synchronous with each other.

Table 2 show port operational-status Field Descriptions (continued)

Field	Description
TX/RX Trellis Coding	Adds dependency between symbols in order to make the detection in noise more robust (Forward Error Correction). Modems may use 8 (V.32, V.32bis, V.17), 16, 32, 64 (V.34, V.34+, V.90, K56flex), or no trellis coding (V.22, V.22bis, V.21, Bell212, Bell103, V.29, V.27).
TX/RX Preemphasis Index	Involves shaping the raw transmit spectrum in order to deal with spectrum roll-offs. The preemphasis index can take on the values 0 to 10. A zero denotes no reshaping. Typical values usually fall in the ranges from 0 to 2 or from 6 to 7. This technique is used with V.34 and V.34+ standards.
TX/RX Constellation Shaping	A method for improving noise immunity by using a probability distribution for sent signal points. The signal states used to predict the sensitivity to certain transmission impairments. Values may be either none or active. This technique is used with V.34 and V.34+ standards.
TX/RX Nonlinear Encoding	Occurs during the training phase and moves the outer points of the constellation away in order to deal with nonlinear distortion. Nonlinear distortion (0 to 200 Hz) tends to affect the higher power signals. Moving the outer constellation points out reduces the chance of error. Values may be either none or active. MICA modems support nonlinear coding in both directions. This technique is used with V.34 and V.34+ standards.
TX/RX Precoding	Serves the same purpose as the preemphasis index but instead manages the bits and not the raw transmit signals. This is done only when requested and therefore will occur in the RX mode. The values may be either none or active. This technique is used with V.34 and V.34+ standards.
TX/RX Xmit Level Reduction	Affects the transmit signal with 0 to 15 in dBm of reduction. If nonlinear distortion is detected, the modem prompts the client for a lower-powered TX signal. If the remote end detects nonlinear distortion, it may request that the sender lower the TX signal. This technique is used with V.34 and V.34+ standards.
VAD Background noise level	VAD background noise level, in 6.2-dBm increments.

Related Commands

Command	Description
port modem autotest	Automatically and periodically performs a modem diagnostics test for modems inside the access server or router.
show modem operational-status	Displays the operational status of a specific port or port range.
show spe modem active	Displays active modem statistics of all SPEs, a specified SPE, or the specified range of SPEs.
test port modem back-to-back	Tests two specified ports back-to-back and transfers a specified amount of data between the ports.
voicecap configure	Applies a voicecap on NextPort platforms.

voicecap configure

To apply a voicecap on NextPort platforms, use the **voicecap configure** command in voice-port configuration mode. To remove a voicecap, use the **no** form of this command.

voicecap configure *name*

no voicecap configure *name*

Syntax Description

name	Designates which voicecapsto use on this voice port.

Defaults

No default values or behavior

Command Modes

Voice-port configuration

Command History

Release	Modification
12.3(4)T	This command was introduced.
12.3(11)T	This command was integrated into Cisco IOS Release 12.3(11)T.

Usage Guidelines

The character value for the *name* argument must be identical to the value entered when you created the voicecap using the **voicecap entry** command.

Examples

The following example creates and applies a voicecap with the name qualityERL:

```
Router> enable
Router# configure terminal
Router(config)# voicecap entry qualityERL v270=120
Router(config)# voice-port 3/0:D
Router(config-voiceport)# voicecap configure qualityERL
```

Related Commands

Command	Description
voicecap entry	Creates a voicecap on NextPort platforms.

voicecap entry

To create a voicecap on NextPort platforms, use the **voicecap entry** command in global configuration mode. To disable a voicecap, use the **no** form of this command.

voicecap entry *name string*

no voicecap entry *name string*

Syntax Description

name string	Specifies a word and a string of characters that uniquely identify this voicecap. • The *string* argument specifies one or more voicecap register entries, similar to a modemcap. Each entry is of the form vINDEX=VALUE, where INDEX refers to a specific V register, and VALUE designates the value to set that V register to.

Defaults

No default values or behavior

Command Modes

Global configuration

Command History

Release	Modification
12.3(4)T	This command was introduced.
12.3(11)T	This command was integrated into Cisco IOS Release 12.3(11)T.

Usage Guidelines

This command configures NextPort service processing element (SPE) firmware through voicecap strings. This command allows you to assign values to specific registers. Voicecaps are applied to specific voice ports at system startup.

The voicecap values can be entered in a DSP-recognizable format called *raw format*. They can also be entered in *standard format*, which allows you to use commonly accessible values, such as decibels. Cisco recommends that you use the standard format when configuring NextPort SPE firmware.

Examples

The following example creates a simple voicecap string named “qualityERL” with V register 270 set to 120:

```
Router> enable
Router# configure terminal
Router(config)# voicecap entry qualityERL v270=120
```

The following example sets the G.168 echo canceller echo tail length to 128 ms by setting the V5 voicecap register (in this case to the value 1024). This entry is only necessary with NextPort SPE firmware (SPEware) version 8.x and Cisco IOS Release 12.3(11)T or later.

```
Router> enable
```

```
Router# configure terminal
Router(config)# voicecap entry myvoicecap v5=1024
Router(config)# voice-port 3/0:D
Router(config-voiceport)# voicecap configure myvoicecap
```

Related Commands

Command	Description
voicecap configure	Applies a voicecap to the NextPort platforms.

Glossary

ACOM—Acombined. Total ERL seen across the terminals of the echo canceller. ACOM is the sum of ERL and ERLE, or the total ERL seen by the network.

CLI—command-line interface.

CNG—comfort noise generation.

DFC—dial feature card.

DSP—digital signal processor.

ECM—Error Correction Mode.

ERL—echo return loss.

ERLE—echo return loss enhancement.

Hoth noise—Used to model indoor ambient noise when evaluating communications systems such as telephones. The official definition of Hoth noise is IEEE Standard 269-2001 (revision of IEEE Standard 269-1992), "Draft Standard Methods for Measuring Transmission Performance of Analog and Digital Telephone Sets, Handsets and Headsets."

NLP—non-linear processor.

SPE—service processing element.

RTP—Routing Table Protocol.

VAD—voice activity detection.

Note See *Internetworking Terms and Acronyms* for terms not included in this glossary.