Implementing Enhanced Serviceability

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This module describes how to perform line tests and connectivity checks on analog Foreign Exchange Station (FXS) voice ports using the Enhanced Serviceability features.

The Enhanced Serviceability feature provides analog FXS line measurement support for analog voice ports that use Infineon Vinetic PEB3304HL or Silicon Lab Pro SLIC si3241 chipset. The analog FXS line measurements supported by this feature include:

- AC/DC line voltage
- AC/DC foreign voltage
- AC/DC transversal and longitudinal current
- AC/DC current
- AC ring voltage
- AC ring current
- Loop resistance
- REN detection
- Receiver offhook detection
- Analog phone detection

The Enhanced Serviceability feature also provides digital signal processor (DSP)-level signaling and media connectivity checks of analog FXS voice ports. The feature enables troubleshooting of large deployments by cyclically establishing test calls to each port in the gateway.

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the "Feature Information for Enhanced Serviceability" section on page 244.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Contents

Prerequisites for Enhanced Serviceability

- Cisco IOS Release 15.1(3)T or a later version.
- The Cisco voice gateway (VG) is set up and configured for operation. For information, see the appropriate Cisco configuration documentation.
- The analog FXS voice ports are set up and configured for operation. For information, see *Cisco IOS Voice Port Configuration Guide*.
- The analog FXS voice ports must use the Vinetic chipset version 2.1 from Infineon Technologies or the Pro SLIC Si3241 chipset from Silicon Laboratories.
- Cisco Unified Communications Manager 6.1.2 or a later version.

Information About Enhanced Serviceability

To configure the Cisco voice gateway to implement the enhanced serviceability features, you should understand the following concepts:

Benefits of Analog FXS Line Measurements

Analog FXS Line Measurements are a set of tests used to monitor and diagnose a variety of failures in voice gateways. These tests involve measurements of resistance, capacitance, leakage, and interfering currents and voltages that reduce network quality.

Among the different types of line measurements that can be performed on analog FXS lines include the following:

- AC/DC line voltage – measures the voltage generated by the chip on tip-ring, tip-to-ground, and ring-to-ground
- AC/DC foreign voltage – it measures the unknown/dangerous voltage on tip-ring, tip-to-ground, and ring-to-ground
- AC/DC transversal and longitudinal current – measures the current on tip-ring (transversal) and tip/ring-to-ground (longitudinal)
- AC/DC current – measures the current on tip-ring, tip-to-ground and ring-to-ground
- Loop resistance – measures the resistance on tip-ring, tip-to-ground and ring-to-ground
- Ringer Equivalent Number (REN) detection – measures the REN required by the analog phone
- Receiver offhook detection – detects whether the port is in onhook or offhook state
- Analog phone detection – detects whether the analog phone is plugged in or not

Benefits of Analog FXS Connectivity Checks

Analog FXS connectivity checks are tests done on analog voice ports to verify signaling and media path quality. These tests can be implemented one port at a time or by cyclically establishing test calls to each port in a gateway which is critical in troubleshooting errors in large deployments.

Among the different types of connectivity tests that can be performed using analog FXS connectivity checks include the following:

- Sequential verification of end-to-end connectivity for signalling and media for each VG end-point through test calls from each end-point to a test verification phone
- Sequential verification of end-to-end connectivity after an image upgrade or image change
- Sequential verification of end-to-end connectivity after of a specific port during troubleshooting of voice quality issues
- Verification of full-duplex connectivity by putting the end-point in loopback so that any digit depressed by the test verification phone is relayed back to the VG

Supported Gateways, Modules, and Voice Interface Cards

Table 1 lists Cisco voice gateways, modules, and voice interface cards (VICs) on which line measurements for FXS ports are supported

Table 1 Gateways, Modules, VICs and their Supported Line Measurements

Voice Port chipset	Gateways	Modules and VICs	Supported Line Measurements
• Infineon Vinetic PEB3304HL	• Cisco VG224 Analog Voice Gateway • Cisco IAD2430 Integrated Access Device	—	• AC/DC voltage • AC ring voltage • AC/DC foreign voltage • AC/DC current • AC ring current • Loop resistance • REN detection • Phone detection
• Silicon Lab Pro SLIC si3241	• Cisco VG202 Analog Voice Gateway • Cisco VG204 Analog Voice Gateway • Cisco Unified Communications 500 Series • Cisco 880 Integrated Services Router (ISR) • Other ISR platforms that support Tenor VIC and EM V3-8FXS-DID modules (e.g. C28xx, C29xx, C38xx, C39xx)	• Venom EM V3-8FXS-DID • 3 Tenor FXS VICs • Onboard analog FXS on VG202 and VG204 platforms • Onboard analog FXS on C880 platform • Onboard analog FXS on UC500 platform	• AC/DC foreign voltage • AC/DC current • Loop resistance • REN detection • Receiver Off-hook detection • Phone detection

Table 2 lists Cisco voice gateways, modules, and VICs on which connectivity checks for FXS ports are supported.

Table 2 Gateways, Modules, VICs and their Supported Connectivity Checks

Gateways	Modules and VICs	Supported Connectivity Checks
All ISR platforms that support analog FXS voice ports	—	• Tone Originate • Tone Terminate • COT

How to Configure Enhanced Serviceability Features on Analog Voice Gateways

Note This document does not contain details about configuring Cisco Unified CM. See the documentation for this products for installation and configuration instructions.

This section contains the following procedures:

- Performing Analog FXS Line Measurements on Voice Ports Using Vinetic PEB3304HL Chipsets, page 229
- Performing Analog FXS Line Measurements on Voice Ports Using Pro SLIC si3241 Chipsets, page 232
- Performing Connectivity Checks on a Single Analog FXS Port, page 234
- Performing Connectivity Checks on All Analog FXS Ports in a Router, page 239

Performing Analog FXS Line Measurements on Voice Ports Using Vinetic PEB3304HL Chipsets

The onboard voice ports on the Cisco VG224 Analog Voice Gateway and the Cisco IAD2430 Integrated Access Device use the Vinetic PEB3304HL chipset from Infineon Technologies AG. The chipset has a set of integrated test and diagnostic functions that can perform various line measurements.

Prerequisites

The line measurements described in this task are only supported in the Vinetic PEB3304HL chipset version 2.1.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice-port** *2/port*
4. **shutdown**
5. **end**
6. **test voice port** *2/port* **line-test type-of-line-test**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**voice-port** *2/port* **Example:** `Router(config)# voice-port 2/2`	Enters voice-port configuration mode. • *2/port*—The address of the port to be tested.
Step 4	**shutdown** **Example:** `Router(config-voiceport)# shutdown`	Takes the specified voice port offline and triggers deregistration of the device with Cisco Unified Communications Manager.
Step 5	**end** **Example:** `Router(config-voiceport)# end`	Exits the voice port configuration mode and returns to privileged EXEC mode.

	Command or Action	Purpose
Step 6	**test voice port** *2/port* **line-test dc-voltage** or **test voice port** *2/port* **line-test ac-voltage** or **test voice port** *2/port* **line-test ac-ring-voltage** or **test voice port** *2/port* **line-test dc-foreign-voltage** or **test voice port** *2/port* **line-test ac-foreign-voltage** or **test voice port** *2/port* **line-test dc-current** or **test voice port** *2/port* **line-test ac-current** or **test voice port** *2/port* **line-test ac-ring-current** or **test voice port** *2/port* **line-test loop-resistance** or **test voice port** *2/port* **line-test REN-detection** or **test voice port** *2/port* **line-test phone-detection** **Example:** `Router# test voice port 2/1 line-test phone-detection`	Measures the DC voltage generated by the specified port on tip-ring, tip-to-ground, ring-to-ground. or Measures the AC voltage generated by the specified port on tip-ring, tip-to-ground, ring-to-ground. or Measures the AC ring voltage generated by the specified port on tip-ring, tip-to-ground, ring-to-ground. **Note** The analog phone is rung. or Measures the DC foreign voltage generated by the specified port on tip-ring, tip-to-ground, ring-to-ground. or Measures the AC foreign voltage generated by the specified port on tip-ring, tip-to-ground, ring-to-ground. or Measures the DC Transversal and Longitudinal current generated by the specified port. or Measures the AC Transversal and Longitudinal current generated by the specified port. or Measures the AC ring current generated by the specified port between tip-ring. **Note** The analog phone is rung. or Measures the loop resistance generated by the specified port between tip-ring. or Measures the REN value on the specified port. **Note** The analog phone is rung. or Checks if there is a phone connected to the specified port. **Note** The analog phone is rung silently. • *2/port*—The address of the port to be tested.

What to Do Next

To perform analog FXS line measurements on analog voice ports that uses Silicon Lab Pro SLIC si3241 chipset, proceed to the "Performing Analog FXS Line Measurements on Voice Ports Using Pro SLIC si3241 Chipsets" section on page 232.

Performing Analog FXS Line Measurements on Voice Ports Using Pro SLIC si3241 Chipsets

The onboard voice ports on the Cisco VG202/204 Analog Voice Gateway, Cisco Unified Communications 500 Series, C880 module, Venom EM V3-8FXS-DID, and Tenor FXS VICs use the Pro SLIC si3241 chipset from Silicon Laboratories. The chipset includes functionalities for performing various line fault testing.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice-port** *slot-number/subunit-number/port*
4. **shutdown**
5. **end**
6. **test voice port** *slot-number/subunit-number/port* **line-test type-of-line-test**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**voice-port** *slot-number/subunit-number/port* **Example:** `Router(config)# voice-port 1/1/1`	Enters voice-port configuration mode. • *slot-number/subunit-number/port*—The address of the port to be tested.
Step 4	**shutdown** **Example:** `Router(config-voiceport)# shutdown`	Takes the specified voice port offline and triggers deregistration of the device with Cisco Unified Communications Manager.

	Command or Action	Purpose
Step 5	**end** **Example:** `Router(config-voiceport)# end`	Exits the voice port configuration mode and returns to privileged EXEC mode.
Step 6	**test voice port** *slot-number/subunit-number/port* **line-test dc-foreign-voltage** or **test voice port** *slot-number/subunit-number/port* **line-test ac-foreign-voltage** or **test voice port** *slot-number/subunit-number/port* **line-test dc-current** or **test voice port** *slot-number/subunit-number/port* **line-test ac-current** or **test voice port** *slot-number/subunit-number/port* **line-test loop-resistance** or **test voice port** *slot-number/subunit-number/port* **line-test REN-detection** or **test voice port** *slot-number/subunit-number/port* **line-test receiver-offhook-detection** **Example:** `Router# test voice port 1/1/1 line-test receiver-offhook-detection`	Measures the DC foreign voltage generated by the specified port on tip-ring, tip-to-ground, ring-to-ground. or Measures the AC foreign voltage generated by the specified port on tip-ring, tip-to-ground, ring-to-ground. or Measures the DC current generated by the specified port on tip-ring, tip-to-ground, ring-to-ground. or Measures the AC current generated by the specified port on tip-ring, tip-to-ground, ring-to-ground. or Measures the loop resistance generated by the specified port between tip-ring. or Measures the REN value on the specified port. **Note** The analog phone is rung. or Checks if the phone connected to the specified port is onhook, offhook, or has a resistive fault on tip-ring. • *slot-number/subunit-number/port*—The address of the port to be tested.

What to Do Next

To perform analog FXS line measurements on analog voice ports that uses Vinetic PEB3304HL chipsets, proceed to the "Performing Analog FXS Line Measurements on Voice Ports Using Vinetic PEB3304HL Chipsets" section on page 229.

Performing Connectivity Checks on a Single Analog FXS Port

To test the signaling and media path quality of a single analog FXS port, the user needs to perform the following tasks:

- Performing Tone Originate Checks on a Single Analog FXS Port, page 235
- Performing Tone Terminate Checks on a Single Analog FXS Port, page 236
- Performing Continuity Tests, page 237

Performing Tone Originate Checks on a Single Analog FXS Port

To perform tone originate checks on a single port, the user needs 2 routers or 1 router and 1 phone on a Public Switched Telephone Network (PSTN). The user first issues a test CLI on the router where the port to be tested is located. The tested port then sends a call to a voice port/phone either on the other router or on a phone on a PSTN. The user answers the test call to check for the sound of 7 test tones. The user confirms hearing the test tones by pressing any key on the phone's digit pad. The user can also verify the signaling and media path quality by using a test equipment. The test is completed when the user places the phone onhook.

SUMMARY STEPS

1. **enable**
2. **test voice port** *slot-number/subunit-number/por*t **connectivity tone originate** *phone-number*
3. Answer the test call.
4. Verify the test tones.
5. Confirm the sound of the test tones.
6. End connectivity check.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**test voice port** *slot-number/subunit-number/port* **connectivity tone originate** *phone-number* **Example:** `Router# test voice port 1/1/1 connectivity tone originate 4085251234`	Tests the signaling and media path quality of a call originating from the tested port to the test phone number. • *slot-number/subunit-number/port*—The address of the port to be tested. • *phone-number*—The number of port/phone on the other router or on a phone on a PSTN that receives the test call. **Note** The user issues the command on the router where the port to be tested is located. The tested port then sends a call to a voice port/phone on the other router or on a phone on a PSTN.
Step 3	Answer the test call.	The user answers the test call.
Step 4	Verify the test tone.	The user checks for the sound of 7 test tones, each lasting 1 second, on the test call.
Step 5	Confirm the sound of the test tones.	The user confirms hearing the test tones by pressing any key on the phone's digit pad. The user can also verify the signaling and media path quality by using a test equipment.
Step 6	End Connectivity check.	The user places the test call onhook to end the test.

Performing Tone Terminate Checks on a Single Analog FXS Port

To perform tone terminate checks on a single port, the user needs 2 routers or 1 router and 1 phone on a PSTN. The user first issues a test CLI on the router where the port to be tested is located. Using a phone on the other router or a phone on a PSTN, the user calls the voice port/phone to be tested. The tested port will then send 7 test tones to the calling party. The user confirms hearing the test tones by pressing any key on the phone's digit pad. The test is completed when the user places the phone onhook.

SUMMARY STEPS

1. **enable**
2. **test voice port** *slot-number/subunit-number/port* **connectivity tone terminate**
3. Call the tested port.
4. Verify the test tones.
5. Confirm the sound of the test tones.
6. End connectivity check.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**test voice port** *slot-number/subunit-number/port* **connectivity tone terminate** **Example:** `Router# test voice port 1/1/1 connectivity tone terminate`	Configures the port to receive a test call from a test port/phone on another router or a phone on a PSTN. • *slot-number/subunit-number/port*—The address of the port to be tested.
Step 3	Call the tested port.	The user calls the voice port/phone to be tested using a phone on the other router or a phone on a PSTN. No ring is generated on the tested port. The tested port will then send 7 test tones to the calling party.
Step 4	Verify the test tone.	The user checks for the sound of 7 test tones, each lasting 1 second, on the test call.
Step 5	Confirm the sound of the test tones.	The user confirms hearing the test tones by pressing any key on the phone's digit pad.
Step 6	End Connectivity check.	The user places the test call onhook to end the test.

Performing Continuity Tests

To perform a Continuity Test (COT) on a single port, the user needs 2 routers. The user first issues a COT terminate command on the router where the first port to be tested for COT terminate is located. The user then issues a COT originate command on the other router where the port to be tested for COT originate is located. After the COT originate command is issued, the port tested for COT originate makes a test call to the port tested for COT terminate. The test proceeds automatically and the test call is disconnected after the test is done. The results of the test is displayed on the screen.

SUMMARY STEPS

1. **enable**
2. **test voice port** *slot-number/subunit-number/port* **connectivity cot terminate**
3. **test voice port** *slot-number/subunit-number/port* **connectivity cot originate** *phone-number*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**test voice port** *slot-number/subunit-number/port* **connectivity cot terminate** **Example:** `Router# test voice port 1/1/1 connectivity cot terminate`	Configures the port to receive a test call from a test port on another router. • *slot-number/subunit-number/port*—The address of the port to be tested. **Note** The command is issued on the router where the port to be tested for COT terminate is located.
Step 3	**test voice port** *slot-number/subunit-number/port* **connectivity cot originate** *phone-number* **Example:** `Router# test voice port 2/2/2 connectivity cot originate 4085251234`	Configures a port in another router to send a test call to the port that was configured for COT terminate. • *slot-number/subunit-number/port*—The address of the port to be tested. • *phone-number*—The number of the phone that is connected to the port configured for COT terminate. **Note** The command is issued on the router where the port to be tested for COT originate is located.

What to Do Next

To perform connectivity checks on all analog FXS ports in a router, proceed to the "Performing Connectivity Checks on All Analog FXS Ports in a Router" section on page 239.

Performing Connectivity Checks on All Analog FXS Ports in a Router

To test the signaling and media path quality of all analog FXS ports in a router, the user needs to perform the following tasks:

- Performing Tone Originate Connectivity Checks, page 239
- Performing Continuity Tests, page 240
- Displaying Results of Connectivity Checks, page 241

Performing Tone Originate Connectivity Checks

To perform tone originate checks on all analog FXS ports in a router, the user needs 2 routers or 1 router and 1 phone on a PSTN. The user first issues a test CLI on the router where the ports to be tested are located. The CLI configures all analog FXS ports on the router to make a call one at a time to a specified phone on another router or to a phone on a PSTN. The user answers the test call to check for the sound of 7 test tones. The user confirms hearing the test tones by pressing any key on the phone's digit pad. The test is completed for one voice port when the user places the phone onhook. The next voice port on the router automatically makes a call to the specified number and the test process is repeated. The test is completed after all the ports in the router are tested.

SUMMARY STEPS

1. **enable**
2. **test voice port all connectivity tone originate** *phone-number*
3. Answer the test call.
4. Verify the test tones.
5. Confirm the sound of the test tones.
6. End connectivity check for the port.
7. Repeat steps 3 to 6 until the last port has been tested.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**test voice port all connectivity tone originate** *phone-number* **Example:** `Router# test voice port all connectivity tone originate 4085251234`	Configures all analog FXS ports on the router to make a call one at a time to a specified phone on another router or to a phone on a PSTN. • *phone-number*—The number of the phone on another router or a phone on a PSTN that will receive the test calls from the tested ports. **Note** The command is issued on the router where the ports to be tested for COT originate is located.
Step 3	Answer the test call.	The user answers the test call.
Step 4	Verify the test tones.	The user checks for the sound of 7 test tones, each lasting 1 second, on the test call.
Step 5	Confirm the sound of the test tones.	The user confirms hearing the test tones by pressing any key on the phone's digit pad.
Step 6	End connectivity check for the port.	The test ends for each voice port when the user places the phone onhook.
Step 7	Repeat steps 3 to 6 until the last port has been tested.	The next voice port on the router automatically makes a call to the specified number and the test process is repeated. The test is completed after all the ports in the router are tested.

Performing Continuity Tests

To perform COT on all analog FXS ports in a router, the user needs 2 routers. The user first issues a test CLI on any voice port on the first router. The CLI configures the port to receive test calls and remain in COT receive mode after the test is complete. The user then issues a CLI on the other router. The CLI configures all ports on the router to make test calls one at a time to the port on the first router that is configured to accept test calls. The test proceeds automatically and the test result for each port is displayed after every call is completed. After all the ports have been tested, the user issues a CLI on the port receiving the test call to place the port back in to normal mode.

SUMMARY STEPS

1. **enable**
2. **test voice port** *slot-number/subunit-number/port* **connectivity cot terminate remain-in-test-mode**
3. **test voice port all connectivity cot originate** *phone-number*
4. **test voice port** *slot-number/subunit-number/port* **connectivity terminate-cancel**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**test voice port** *slot-number/subunit-number/port* **connectivity cot terminate remain-in-test-mode** **Example:** `Router# test voice port 1/1/1 connectivity cot terminate remain-in-test-mode`	Configures the port to receive test calls from all ports on another router and remain in COT receive mode after the test. • *slot-number/subunit-number/port*—The address of the port to be tested. **Note** The CLI is issued on the router where the port receiving the test calls is located.
Step 3	**test voice port all connectivity cot originate** *phone-number* **Example:** `Router# test voice port all connectivity cot originate 4085251234`	Configures all ports on another router to send a test call to the port that was configured for COT terminate. • *phone-number*—The number of the phone that is connected to the port configured to receive test calls. **Note** The CLI is issued on the router where the ports sending test calls is located.
Step 4	**test voice port** *slot-number/subunit-number/port* **connectivity terminate-cancel** **Example:** `Router# test voice port 1/1/1 connectivity terminate-cancel`	Places the port receiving the test calls back on normal mode. • *slot-number/subunit-number/port*—The address of the port to be tested. **Note** This CLI should only be used when all analog FXS ports have been tested.

Displaying Results of Connectivity Checks

Use this command to display the results of the last connectivity checks performed on all analog FXS ports on a router.

SUMMARY STEPS

1. **enable**
2. **show voice connectivity summary**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show voice connectivity summary** **Example:** `Router# show voice connectivity summary`	Displays the results of the last connectivity checks performed on all analog FXS ports on a router.

What to Do Next

To perform connectivity checks on a single analog FXS port, proceed to the "Performing Connectivity Checks on a Single Analog FXS Port" section on page 234.

Configuration Examples for Enhanced Serviceability

This section provides the following configuration examples:

Example: Performing a DC Voltage Line Test on an Analog FXS Port

The following example shows a partial output of a DC Voltage line test performed on an analog FXS port using a Vinetic PEB3304HL chipset:

```
Router> enable
Router# configure terminal
Router(config)# voice-port 2/1
Router (config-voiceport)# shutdown
Router (config-voiceport)# end
!
! Performs a DC voltage line test on the specified voice port
Router# test voice port 2/1 line-test dc-voltage
Router#
    DC voltage measurement between tip-ring: xx.xx V
    DC voltage measurement on tip-to-ground: xx.xx V
    DC voltage measurement on ring-to-ground: xx.xx V
```

Example: Performing a Connectivity Checks on an Analog FXS Port

The following example shows a partial output of a COT performed on all analog FXS ports in a router:

```
Router> enable
!
! Configure the port to receive test calls from all analog voice ports on another router
Router# test voice port 1/1/1 connectivity cot terminate remain-in-test-mode
!
```

```
! Configure all analog voice ports to send test calls to the port/phone configured to
! receive test calls
Router# test voice port all connectivity cot originate 4085251234
.
.
.
! End the COT terminate CLI and place the terminated port back to normal mode.
Router# test voice port 1/1/1 connectivity terminate-cancel
```

Additional References

The following sections provide references related to SCCP analog phone support for FXS ports on the Cisco voice gateway.

Related Documents

Related Topic	Document Title
Cisco Unified Communications Manager	*Cisco Unified Communications Manager*
Cisco Unified Communications Manager Express	*Cisco Unified Communications Manager Express*
Cisco IOS debugging	*Cisco IOS Debug Command Reference*
Cisco IOS voice commands	*Cisco IOS Voice Command Reference*
Cisco IOS voice configuration	*Cisco IOS Voice Configuration Library*
Cisco voice gateway	• *Cisco VG200 Series Gateways* • *Cisco Unified 500 Series for Small Business*

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/techsupport

Feature Information for Enhanced Serviceability

Table 3 lists the features in this module and provides links to specific configuration information. Only features that were introduced or modified in Cisco IOS Release 15.1(3)T or a later release appear in the table.

For information on a feature in this technology that is not documented here, see the "Supplementary Services Features Roadmap" section on page 1.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 3 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 3 Feature Information for Enhanced Serviceability

Feature Name	Releases	Feature Information
Enhanced Serviceability	15.1(3)T	Provides line measurement and connectivity check support for analog voice ports. The following sections provide information about this feature: • Information About Enhanced Serviceability, page 226 • How to Configure Enhanced Serviceability Features on Analog Voice Gateways, page 229. The following commands were introduced or modified: **show voice connectivity summary**.