

Voice over IP on Cisco 1750 Routers

This document describes the Voice-over-IP (VoIP) feature on Cisco 1750 routers.

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Feature Overview

The Cisco 1750 router is a voice-and-data capable router that provides VoIP functionality and can carry voice traffic (for example, telephone calls and faxes) over an Internet Protocol (IP) network. Cisco voice support is implemented using voice packet technology.

In VoIP, the digital signal processor (DSP) segments the voice signal into frames and stores them in voice packets. These voice packets are transported by using IP in compliance with the International Telecommunications Union-Telecommunications (ITU-T) specification H.323, the specification for transmitting multimedia (voice, video, and data) across a network.

Because VoIP is a delay-sensitive application, you need to have a well-engineered, end-to-end network to use it successfully. Fine-tuning your network to adequately support VoIP involves using a series of protocols and features to improve quality of service (QoS). Traffic shaping considerations must also be considered to ensure the reliability of the voice connection.

To use the VoIP feature, you must have voice interface cards (VICs) installed in the Cisco 1750 router. For information about installing a VIC in the router, see the *Cisco WAN Interface Cards Hardware Installation Guide*.

Benefits

- Toll bypass: cost savings on intracompany voice calls, faxes, voice-mail storage and retrieval over the company intranet or the global Internet
- Maintenance and management cost savings by using a single network to carry voice and data

- Access to new business applications:
 - Intranet/Internet telephone
 - Web call centers and desktop video conferencing
 - Application or document sharing
 - Integrated messaging
- Interoperability with existing telephony infrastructure: phones, fax machines, KTS, and PBX
- Interoperability with H.323 clients such as Microsoft Netmeeting

Restrictions

The command **session target loopback:rtp** is disabled because it causes an unexpected router reload on a Cisco 1750 router. This command loops all voice data back to the originating source using Real-Time Transport Protocol [RTP] for VoIP dial peers. This error is documented as caveat number CSCdm62047.

Note If you have an account with CCO, you can use Bug Navigator II to find caveats of any severity for any release. From CCO, log in and click on this path: **Service & Support: Online Technical Support: Software Bug Toolkit**. You can also find Bug Navigator II at <http://www.cisco.com/support/bugtools>.

Supported Platforms

The VoIP feature is supported on the Cisco 1750 router.

Configuration Tasks

Complete VoIP configuration instructions are described in the *Cisco 1750 Router Voice over IP Configuration Guide* and the *Voice-over-IP Quick Start Guide*. These documents are available on CCO and the Documentation CD-ROM as follows:

- To reach these publications from CCO, click on this path:
Service & Support: Documentation Home Page: Access Servers and Access Routers: Modular Access Routers: Cisco 1750 Router
- To reach these publications on the Documentation CD-ROM, click on this path:
Cisco Product Documentation: Access Servers and Access Routers: Modular Access Routers: Cisco 1750 Router

In Cisco IOS Release 12.0(1)T or later, you can search and filter the output for **show** and **more** commands. This functionality is useful when you need to sort through large amounts of output, or if you want to exclude output that you do not need to see.

To use this functionality, enter a **show** or **more** command followed by the “pipe” character (|), one of the keywords **begin**, **include**, or **exclude**, and an expression that you want to search or filter on:

```
command | {begin | include | exclude} regular-expression
```

Following is an example of the **show atm vc** command in which you want the command output to begin with the first line where the expression “PeakRate” appears:

```
show atm vc | begin PeakRate
```

For more information on the search and filter functionality, refer to the Cisco IOS Release 12.0(1)T feature module titled *CLI String Search*.

Configuration Examples

See the “Examples” headings in the section “Command Reference” for samples of the commands **show controllers voice**, **show diag**, and **show voice dsp**.

Command Reference

This section documents new and modified commands that configure the VoIP feature. All other commands used with this feature are documented in the *Cisco 1750 Router Voice over IP Configuration Guide* and the *Cisco IOS Release 12.0 Command Reference* publications.

show controllers voice

To display information about voice related hardware, use the **show controllers voice** privileged EXEC command.

```
show controllers voice
```

Syntax Description

This command contains no arguments or keywords.

Command Mode

Privileged EXEC.

Command History

Release	Modification
Cisco IOS Release 12.0(5)XQ	The command show voice dsp was introduced on the Cisco 1750 router.

Usage Guidelines

This command displays interface status information that is specific to voice-related hardware, such as, the registers of the TDM switch, the host port interface of the DSP, and the DSP firmware versions. The information displayed is generally only useful for diagnostic tasks performed by technical support.

Examples

The following is an example of the output from the **show controllers voice** command:

```
router# show controllers voice
EPIC Switch registers:
STDA 0xFF STDB 0xFF SARA 0xAD SARB 0xFF SAXA 0xFF SAXB 0x0 STCR 0x3F
MFAIR 0x3F
STAR 0x65 OMDR 0xE2 VNSR 0x0 PMOD 0x4C PBNR 0xFF POFD 0xF0 POFU 0x18
PCSR 0x1 PICM 0x0 CMD1 0xA0 CMD2 0x70 CBNR 0xFF CTAR 0x2 CBSR 0x20 CSCR
0x0

DSP 0 Host Port Interface:
HPI Control Register 0x202
InterfaceStatus 0x2A MaxMessageSize 0x80
RxRingBufferSize 0x6 TxRingBufferSize 0x9
pInsertRx 0x4 pRemoveRx 0x4 pInsertTx 0x6 pRemoveTx 0x6

Rx Message 0:
packet_length 100 channel_id 2 packet_id 0 process id 0x1
0000: 0000 4AC7 5F08 91D1 0000 0000 7DF1 69E5 63E1 63E2
0020: 6E7C ED67 DE5D DB5C DC60 EC7E 6BE1 58D3 50CD 4DCE
0040: 50D2 5AE5 7868 DA52 CE4A C746 C647 C94B D25A EAF4
0060: 5DD7 4FCD 4ACA 4ACC 4FD3 5DE8 F769 DC58 D352 D253
0080: D65B E573 6CDF 59D3 4ECF 4FD0

Rx Message 1:
packet_length 100 channel_id 1 packet_id 0 process id 0x1
0000: 0000 1CDD 3E48 3B74 0000 0000 3437 3D4C F0C8 BBB5
0020: B2B3 B7BF D25B 4138 3331 3339 435F CFBD B6B2 B1B4
0040: BBC8 7E48 3B34 3131 363D 4FDE C3B9 B3B1 B3B8 C2DB
0060: 533F 3833 3235 3B48 71CC BDB7 B4B5 B8BF CF67 483D
0080: 3836 383C 455B DAC6 BDB9 B9BB

Rx Message 2:
packet_length 100 channel_id 2 packet_id 0 process id 0x1
0000: 0000 4AC8 5F08 9221 0000 0000 54DA 61F5 EF60 DA53
0020: CF4F CD4E D256 DB63 FCEE 5FDA 55D1 50CF 4FD3 56D8
0040: 5DE1 6E7C EC60 DC59 D655 D456 D85D DF6A F4F4 69E2
0060: 5CDD 5BDC 5BDE 61E9 6DF1 FF76 F16D E96A E566 EA6A
0080: EB6F F16D EF79 F776 F5F5 73F0

Rx Message 3:
packet_length 100 channel_id 1 packet_id 0 process id 0x1
0000: 0000 1CDE 3E48 3BC4 0000 0000 C0CC EC54 453E 3C3C
0020: 3F47 56F3 D1C7 C1BF C0C6 CEE1 6752 4A46 4648 4E59
0040: 6FE4 D6CF CDCE D2DA E57E 675E 5B5B 5E62 6B76 FCF6
0060: F6FA 7D75 7373 7BF5 EAE1 DCDA DADD E6FE 6559 514D
0080: 4D4E 5563 EFD9 CDC8 C5C6 CAD1

Rx Message 4:
packet_length 100 channel_id 2 packet_id 0 process id 0x1
0000: 0000 4AC6 5F08 9181 0000 0000 DD5B DC5E E161 E468
0020: FAFD 6CE1 5AD3 53D1 53D7 61EC EA59 CF4A C644 C344
0040: CA4E D86C 60D0 48C2 3EBD 3CBD 3EC0 47CF 5976 DF4F
0060: C945 C242 C146 C94E D668 73DB 54CE 4DCC 4DCE 53DB
0080: 64F9 ED63 DC59 DA58 DC5D E46C

Rx Message 5:
packet_length 100 channel_id 1 packet_id 0 process id 0x1
0000: 0000 1CDC 3E48 3B24 0000 0000 5B5B 5D62 6A76 FCF5
0020: F5F9 7D78 7374 7CF5 EAE1 DDDA DBDD E7FE 6559 514E
0040: 4D4F 5663 EFD8 CDC8 C6C6 CAD1 E760 4E46 403F 4047
0060: 5173 D5C7 BFBC BCBE C5D4 6D4C 3F3B 3939 3D46 5ADB
0080: C5BC B7B6 B8BD C8E8 4F3F 3835
```

Tx Message 0:

```
packet_length 100 channel_id 1 packet_id 0 process id 0x1
0000: 0000 4AC6 5F08 9181 0000 003C DD5B DC5E E161 E468
0020: FAFD 6CE1 5AD3 53D1 53D7 61EC EA59 CF4A C644 C344
0040: CA4E D86C 60D0 48C2 3EBD 3CBD 3EC0 47CF 5976 DF4F
0060: C945 C242 C146 C94E D668 73DB 54CE 4DCC 4DCE 53DB
0080: 64F9 ED63 DC59 DA58 DC5D E46C
```

Tx Message 1:

```
packet_length 100 channel_id 2 packet_id 0 process id 0x1
0000: 0000 1CDC 3E48 3B24 0000 003C 5B5B 5D62 6A76 FCF5
0020: F5F9 7D78 7374 7CF5 EAE1 DDDA DBDD E7FE 6559 514E
0040: 4D4F 5663 EFD8 CDC8 C6C6 CAD1 E760 4E46 403F 4047
0060: 5173 D5C7 BFBC BCBE C5D4 6D4C 3F3B 3939 3D46 5ADB
0080: C5BC B7B6 B8BD C8E8 4F3F 3835
```

Tx Message 2:

```
packet_length 100 channel_id 1 packet_id 0 process id 0x1
0000: 0000 4AC7 5F08 91D1 0000 003C 7DF1 69E5 63E1 63E2
0020: 6E7C ED67 DE5D DB5C DC60 EC7E 6BE1 58D3 50CD 4DCE
0040: 50D2 5AE5 7868 DA52 CE4A C746 C647 C94B D25A EAF4
0060: 5DD7 4FCD 4ACA 4ACC 4FD3 5DE8 F769 DC58 D352 D253
0080: D65B E573 6CDF 59D3 4ECF 4FD0
```

Tx Message 3:

```
packet_length 100 channel_id 2 packet_id 0 process id 0x1
0000: 0000 1CDD 3E48 3B74 0000 003C 3437 3D4C F0C8 BBB5
0020: B2B3 B7BF D25B 4138 3331 3339 435F CFBD B6B2 B1B4
0040: BBC8 7E48 3B34 3131 363D 4FDE C3B9 B3B1 B3B8 C2DB
0060: 533F 3833 3235 3B48 71CC BDB7 B4B5 B8BF CF67 483D
0080: 3836 383C 455B DAC6 BDB9 B9BB
```

Tx Message 4:

```
packet_length 100 channel_id 1 packet_id 0 process id 0x1
0000: 0000 4AC8 5F08 9221 0000 003C 54DA 61F5 EF60 DA53
0020: CF4F CD4E D256 DB63 FCEE 5FDA 55D1 50CF 4FD3 56D8
0040: 5DE1 6E7C EC60 DC59 D655 D456 D85D DF6A F4F4 69E2
0060: 5CDD 5BDC 5BDE 61E9 6DF1 FF76 F16D E96A E566 EA6A
0080: EB6F F16D EF79 F776 F5F5 73F0
```

Tx Message 5:

```
packet_length 100 channel_id 2 packet_id 0 process id 0x1
0000: 0000 1CDE 3E48 3BC4 0000 003C C0CC EC54 453E 3C3C
0020: 3F47 56F3 D1C7 C1BF C0C6 CEE1 6752 4A46 4648 4E59
0040: 6FE4 D6CF CDCE D2DA E57E 675E 5B5B 5E62 6B76 FCF6
0060: F6FA 7D75 7373 7BF5 EAE1 DCDA DADD E6FE 6559 514D
0080: 4D4E 5563 EFD9 CDC8 C5C6 CAD1
```

Tx Message 6:

```
packet_length 100 channel_id 2 packet_id 0 process id 0x1
0000: 0000 1CDA 3E48 3A84 0000 003C E75F 4E46 403F 4147
0020: 5174 D5C7 BFBC BCBE C5D4 6C4C 3F3B 3939 3D46 5BDA
0040: C5BC B7B6 B8BD C8E9 4F3F 3834 3437 3D4C EEC8 BBB5
0060: B2B3 B8BF D35A 4138 3331 3339 435F CEBD B6B1 B1B4
0080: BBC9 7C48 3B34 3131 363D 4FDE
```

Tx Message 7:

```
packet_length 100 channel_id 1 packet_id 0 process id 0x1
0000: 0000 4AC5 5F08 9131 0000 003C 66DE 66EB 67EE FE6E
0020: F7E7 6B68 E068 EE6A DF5C DF62 EDF1 6FF2 7A78 67DC
0040: 5EDF 62E7 64E6 66E0 7071 EA69 F86E E260 DE5D E665
0060: EB75 F0FB 6DE9 64E4 69E3 66EA 67E9 6DF9 F177 EC6E
0080: EB6E F876 F875 7D6E E966 E05D
```

show controllers voice

```
Tx Message 8:
packet_length 100 channel_id 2 packet_id 0 process id 0x1
0000: 0000 1CDB 3E48 3AD4 0000 003C C2B9 B3B1 B3B8 C2DC
0020: 523F 3733 3235 3C49 72CB BDB7 B4B5 B8BF CF67 483C
0040: 3836 373C 455C DAC6 BDB9 B9BB C0CC EE54 453E 3C3C
0060: 3F47 56F1 D1C7 C1BF C0C6 CEE1 6651 4A46 4648 4D59
0080: 70E3 D6CF CDCE D2D9 E67E 675E

Bootloader 1.8, Appn 3.1
Application firmware 3.1.8, Built by claux on Thu Jun 17 11:00:05 1999

VIC Interface Foreign Exchange Station 0/0, DSP instance (0x19543C0)
Singalling channel num 128 Signalling proxy 0x0 Signaling dsp 0x19543C0
tx outstanding 0, max tx outstanding 32
ptr 0x0, length 0x0, max length 0x0
dsp_number 0, Channel ID 1
received 0 packets, 0 bytes, 0 gaint packets
0 drops, 0 no buffers, 0 input errors 0 input overruns
650070 bytes output, 4976 frames output, 0 output errors, 0 output
underrun
0 unaligned frames

VIC Interface Foreign Exchange Station 0/1, DSP instance (0x1954604)
Singalling channel num 129 Signalling proxy 0x0 Signaling dsp 0x1954604
tx outstanding 0, max tx outstanding 32
ptr 0x0, length 0x0, max length 0x0
dsp_number 0, Channel ID 2
received 0 packets, 0 bytes, 0 gaint packets
0 drops, 0 no buffers, 0 input errors 0 input overruns
393976 bytes output, 3982 frames output, 0 output errors, 0 output
underrun
0 unaligned frames
```

Related Commands

Command	Description
show dial-peer voice	Display the configuration information for dial peers.
show diag	Display hardware information for the router.
show voice dsp	Display the current status of all DSP voice channels.
show voice call summary	Display the call status for all voice ports on the Cisco 1750 router.
show voice port	Display configuration information about a specific voice port.

show diag

To display hardware information for the router, use the **show diag** privileged EXEC command.

show diag

Syntax Description

This command contains no arguments or keywords.

Command Mode

Privileged EXEC.

Command History

Release	Modification
Cisco IOS Release 11.1 CA	The command show diag first appeared in Cisco IOS Release 11.1 CA.
Cisco IOS Release 11.2 P	The command show diag was modified to update the sample display for the port adapters PA-12E/2FE, PA-E3, and PA-T3.
Cisco IOS Release 11.3 XA	The command show diag was made available for Cisco IOS Release 11.3 XA.
Cisco IOS Release 12.0(5)XQ	The command show diag was enhanced and made available for the Cisco 1750 router.

Usage Guidelines

This command displays information for the electrically erasable programmable read-only memory (EEPROM), the motherboard, and the WAN interface cards and voice interface cards (WICs and VICs).

Examples

The following is sample output from the **show diag** command:

```
router# show diag
Slot 0:
C1750 1FE VE Mainboard port adapter, 6 ports
Port adapter is analyzed
Port adapter insertion time unknown
EEPROM contents at hardware discovery:
Hardware revision 0.0          Board revision UNKNOWN
Serial number 1314672220      Part number 00-0000-00
Test history 0x0              RMA number 00-00-00
EEPROM format version 1
EEPROM contents (hex):
0x20:01 C9 00 00 4E 5C 4E 5C 00 00 00 00 00 00 00 00
0x30:00 00 00 04 00 00 00 00 00 00 00 00 00 00 00 00
```

show diag

```
Packet Voice DSP Module:
Hardware Revision      :1.0
Board Revision        :01
Processor type        :02
Part Number           :73-3933-01
Number of DSP's       :2
Type of DSP           :TMS320C549
EEPROM format version 4
EEPROM contents (hex):
0x00: 04 FF 40 01 5B 41 01 00 42 30 31 09 02 82 49 0F
0x10: 5D 01 FF

WIC Slot 0:
BRI U - 2091 WAN daughter card
Hardware revision 1.3   Board revision A0
Serial number 0004147773 Part number 800-01834-01
Test history 0x00      RMA number 00-00-00
Connector type WAN Module
EEPROM format version 1
EEPROM contents (hex):
0x20: 01 09 01 03 00 3F 4A 3D 50 07 2A 01 00 00 00 00
0x30: 50 00 00 00 96 11 06 01 FF FF FF FF FF FF FF FF

WIC Slot 1:
Dual FXS Voice Interface Card WAN daughter card
Hardware revision 1.1   Board revision C0
Serial number 0010377882 Part number 800-02493-01
Test history 0x00      RMA number 00-00-00
Connector type WAN Module
EEPROM format version 1
EEPROM contents (hex):
0x20: 01 0E 01 01 00 9E 5A 9A 50 09 BD 01 00 00 00 00
0x30: 60 00 00 00 98 09 10 01 FF FF FF FF FF FF FF FF

WIC Slot 2:
Dual EAM Voice Interface Card WAN daughter card
Hardware revision 1.1   Board revision C0
Serial number 0009886880 Part number 800-02497-01
Test history 0x00      RMA number 00-00-00
Connector type WAN Module
EEPROM format version 1
EEPROM contents (hex):
0x20: 01 0F 01 01 00 96 DC A0 50 09 C1 01 00 00 00 00
0x30: 60 00 00 00 98 08 26 01 FF FF FF FF FF FF FF FF
```

Related Commands

Command	Description
show controllers voice	Display information about voice related hardware.
show dial-peer voice	Display the configuration information for dial peers.
show voice dsp	Display the current status of all DSP voice channels.
show voice call summary	Display the call status for all voice ports on the Cisco 1750 router.
show voice port	Display configuration information about a specific voice port.

show voice dsp

To show the current status of all DSP voice channels, use the privileged EXEC command **show voice dsp**.

show voice dsp

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC.

Command History

Release	Modification
Cisco IOS Release 11.3 MA	The command show voice dsp was introduced on the Cisco MC3810 router.
Cisco IOS Release 12.0(5)XQ	The command show voice dsp was introduced on the Cisco 1750 router.

Usage Guidelines

This command also applies to Voice over Frame Relay, Voice over ATM, and Voice over HDLC on the Cisco MC3810 router.

Examples

Following is an example of the output from the command **show voice dsp** for the Cisco 1750 router.

```
router# show voice dsp
DSP#0: state IN SERVICE, 2 channels allocated
channel#0: voice port 1/0, codec G711 ulaw, state UP
channel#1: voice port 1/1, codec G711 ulaw, state UP
DSP#1: state IN SERVICE, 2 channels allocated
channel#0: voice port 2/0, codec G711 ulaw, state UP
channel#1: voice port 2/1, codec G711 ulaw, state UP
DSP#2: state RESET, 0 channels allocated
```

Table 1 explains the fields in the example output.

Table 1 Show Voice DSP Command Field Descriptions

Field	Description
DSP	Number of the DSP.
Channel	Number of the channel and its status.

show voice dsp

Related Commands

Command	Description
show controllers voice	Display information about voice related hardware.
show dial-peer voice	Display the configuration information for dial peers.
show diag	Display hardware information for the router.
show voice call summary	Display the call status for all voice ports on the Cisco 1750 router.
show voice port	Display configuration information about a specific voice port.