CDR Accounting for Cisco IOS Voice Gateways

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CONTENTS

CHAPTER 1

CDR Accounting Overview

This document describes the format and configuration of the call detail records (CDRs) generated by Cisco IOS voice gateways. You can use this information for postprocessing activities such as generating billing records and network analysis. This document describes how to access the CDR files, how to interpret fields in the files, and how to filter the CDR output to meet your specific needs.

Accounting is the method for collecting information used for billing, auditing, and reporting, such as user identities, start and stop times, number of packets, and number of bytes. Accounting enables you to track the services users are accessing, as well as the amount of network resources they are consuming.

Each accounting record contains accounting attribute-value (AV) pairs. Accounting packets for voice calls consist of standard and voice-specific attributes. This document focuses only on voice-specific attributes.

Cisco IOS voice gateways can generate CDRs using three different accounting methods. Table 1-1 compares the different accounting methods available for generating CDRs on Cisco IOS voice gateways.

Table 1-1   *Accounting Methods Comparison*

Accounting Method	Benefits	Restrictions
File Accounting	• FTP and SFTP servers are inexpensive and easy to setup • Commonly available applications like Microsoft Excel can be used to parse and generate reports • Supports all CDR fields • Compact CDR format option	• No support for real-time applications
RADIUS	• RADIUS is an AAA server, you get AAA services along with the CDR collection • Supports real-time applications • Supports all CDR fields • Retries built-in	• RADIUS servers are generally more expensive than other methods
syslog	• Less expensive than RADIUS • One syslog server can support both error monitoring and CDRs	• No support for real-time applications • Limited attributes supported • No retries built-in (UDP based) • If many debugs are enabled, server performance might be impacted

Configuring RADIUS Accounting

This chapter describes Cisco vendor-specific attributes (VSAs) for Remote Authentication Dial-in User Services (RADIUS) in support of VoIP products. It covers VSA usage for the Cisco gateway, the RADIUS server, and the Cisco SIP proxy server, and also VSA formats and purposes.

Cisco has multiple categories of VSAs. This chapter describes the voice-specific VSAs used by a voice gateway, and one nonvoice VSA—Cisco NAS Port. The VSA set is constantly evolving as new software features are being developed. This chapter describes all VSAs used with Cisco voice and fax features.

The audience for this chapter includes RADIUS vendors and developers who write application software that interoperates with Cisco voice interfaces. It also includes independent software vendors (ISVs), VoIP service providers, system integrators, and original equipment manufacturers (OEMs).

Contents

Prerequisites for RADIUS Accounting

Familiarize yourself with the following Internet Engineering Task Force (IETF) RADIUS standards:

- Remote Authentication Dial-In User Service (RADIUS), RFC 2865
- RADIUS Accounting, RFC 2866

Feature VSA
- Cisco IOS Release 12.4(9)T or a later release.
- Cisco IOS XE Release 16.3.1 or a later release.

T.38 Fax Statistics

- Cisco IOS Release 12.3(14)T or a later release.

- Authentication, Authorization, and Accounting (AAA) RADIUS server is enabled for VoIP calls.

Restrictions for RADIUS Accounting

Feature VSA

- Supports correlating call records for a single gateway only. Correlating call records across multiple gateways is not supported.

- Drops call detail record (CDR) attributes that are greater than 4 KB. When the gateway is configured to collect feature-vsa and Basic Automatic Call Distribution (B-ACD) call queueing is enabled, the additional records generated when the call is in queue may create a RADIUS packet that exceeds the 4-KB limit.

- Does not support conferencing features.

- Supports output to a syslog server using the **gw-accounting syslog** command. Limitations on the length of syslog messages, however, can restrict the amount of feature-vsa information that is collected.

T.38 Fax Statistics

- Supports VSA parsing only on those voice gateways that are configured for AAA.

- Supports only those fax calls made by SIP and H.323 signaling; does not support MGCP fax relay signaling statistics.

Information About RADIUS Accounting

Before you configure a gateway to recognize VSAs, you should understand the following concepts:

- Overview of RADIUS Accounting, page 2-4

- VSA Format, page 2-6

- Generation of h323-incoming-conf-id and h323-conf-id Values, page 2-7

- Customized Accounting Records, page 2-8

- Gateway Timeout During Digit Collection, page 2-9

Note The term "RADIUS client" is used when referring to the voice gateway in the VoIP telephony network.

Overview of RADIUS Accounting

A RADIUS server can be configured to collect accounting data during the accounting process for each call leg created on the Cisco voice gateway. An integration partner can use this information for postprocessing activities such as generating billing records and network analysis. Voice gateways can send accounting data in the form of call detail records (CDRs) to the RADIUS server in one of two ways:

- VSAs (RADIUS Attribute 26)

- Acct-Session-ID (RADIUS Attribute 44)

VSAs (RADIUS Attribute 26)

A vendor-specific attribute (VSA) is an attribute-value (AV) pair that is implemented by a particular vendor. The IETF RADIUS standards (RFC 2865 and RFC 2866) specify that you can use attribute 26 for communicating vendor-specific information between the voice gateway (RADIUS client) and an authentication/accounting server (RADIUS server). VSAs allow vendors to create their own extended attributes without going through the standards committee.

In Cisco IOS Release 12.2(11)T and later releases, the gateway generates CDRs using VSAs when you enable accounting using the **gw-accounting aaa** command.

For more information on enabling VSAs, see the "Configuring the Voice Gateway as a RADIUS Client" section on page 2-9.

Acct-Session-ID (RADIUS Attribute 44)

The Acct-Session-ID, RADIUS attribute 44, is a unique identifier that allows the RADIUS server to link all packets associated with a specific call. For per-call accounting records, the association of start, update, and stop records is done with the Accounting Session ID. Attributes that cannot be mapped to standard RADIUS attributes can be packed into the Acct-Session-ID attribute field.

Before Cisco IOS Release 12.2(11)T, the gateway packed all vendor-specific CDR information into RADIUS attribute 44. This was the default behavior when accounting was enabled using the **gw-accounting h323** command. Attribute 44 however, supports only a limited amount of CDR information. To capture complete CDR information, you must enable VSAs as described in the "Configuring the Voice Gateway as a RADIUS Client" section on page 2-9.

To send CDR information by overloading attribute 44, use the **attribute acct-session-id overloaded** command. For information about this command, see the *Cisco IOS Voice Command Reference*.

Voice Call Legs

A voice call leg is a logical connection between the router and either a telephony endpoint over a bearer channel or another endpoint using a session protocol. It is a discrete segment of a call connection that lies between two points in the connection. An end-to-end call consists of four call legs, two from the perspective of the source originating gateway and two from the perspective of the destination terminating gateway (see Figure 2-1).

Each call processed through a gateway consists of an incoming and an outgoing call leg. The call legs from a gateway can be correlated by a globally unique identifier (the value in VSA h323-conf-id).

Figure 2-1   Call Legs Example
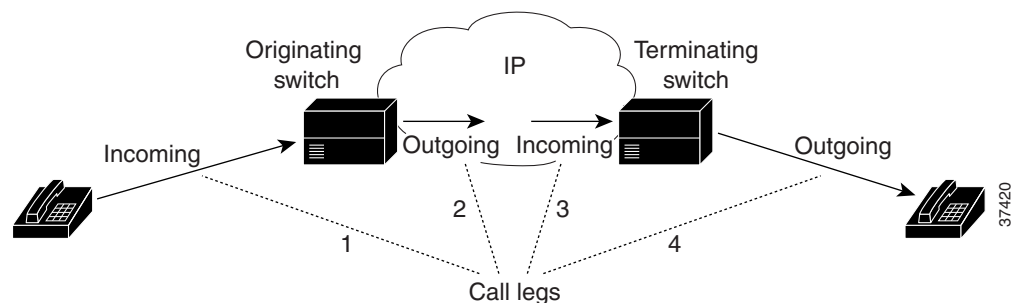
VSA Format

Each Cisco VSA conforms to the RADIUS specification for attribute 26. All VSAs used in CDRs for Cisco voice features conform to this standard format.

Note The Cisco-NAS-port VSA is not a voice-specific VSA and does not use the AV pair format. The vendor-string does not have an AV pair; it has only the value, not the attribute or the equal sign(=).

Figure 2-2 shows the format of RADIUS VSAs and the specific Cisco voice VSAs.

Figure 2-2   VSA Format Example
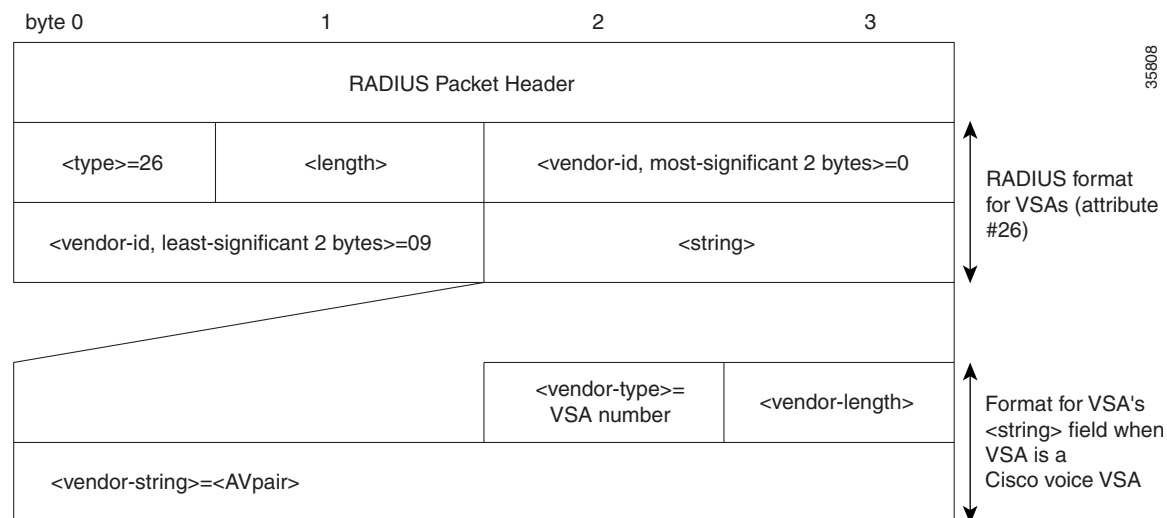
Table 2-1 describes the fields within the VSA.

Table 2-1   VSA Field Descriptions

VSA Field	Description
Type	26 (vendor-specific).
Length	7 or more bytes (the vendor-string field must be at least 1 byte).
Vendor-ID	9 (or, in binary, 0000 0000 0000 1001). The high-order octet is 0; the low-order three octets are the structure of management information (SMI) network-management private-enterprise code of the vendor in network byte order, as defined in Assigned Numbers RFC 1700.
String	Field of one or more octets. The actual format of the information is site- or application-specific. A robust implementation should support the field as undistinguished octets. • Vendor-type = VSA number • Vendor-length = Up to 247 bytes • Vendor-string = AV pair sent as an ASCII string

The format for the attribute-value (AV) pair is *attribute=value*. For example, *h323-billing-model=credit* is an AV pair in which *h323-billing-model* identifies the attribute, = separates the attribute from the value, and *credit* is the value. The *attribute* is one of the Cisco-defined attributes. See "" on page 63 for lists of these values and their formats.

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Note   This chapter refers to each VSA with its AV pair string notation. The gateway recognizes only the AV pair string.

Generation of h323-incoming-conf-id and h323-conf-id Values

Figure 2-3 shows how the gateway generates the h323-incoming-conf-id and h323-conf-id values when a Tcl script that authenticates the call is running on the originating gateway.

Figure 2-3   *Gateway Operation When Tcl Script Runs on Originating Gateway: Example*

	First Call		**Second Call**	
	in-conf	**conf**	**in-conf**	**conf**
OGW leg 1	1111	1111	1111	1111
	authorization occurs		authorization occurs	
leg2	1111	1111	1111	2222
	conf is sent to TGW↓		conf is sent to TGW↓	
TGW leg 3	1111	1111	2222	2222
leg 4	1111	1111	2222	2222

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Figure 2-4 shows how the gateway generates the h323-incoming-conf-id and h323-conf-id values when the Tcl script that authenticates the call is running on the terminating gateway.

Figure 2-4   *Gateway Operation When Tcl Script Runs on Terminating Gateway: Example*

	First Call		**Second Call**	
	in-conf	**conf**	**in-conf**	**conf**
OGW leg 1	1111	1111	1111	1111
leg2	1111	1111	1111	1111
	conf is sent to TGW↓		conf is sent to TGW↓	
TGW leg 3	1111	1111	1111	1111
	authorization occurs		authorization occurs	
leg 4	1111	1111	1111	2222

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The examples above illustrate the following points of interest:

- A new h323-conf-id can be created for an outgoing call-leg by setting callInfo(newGuid) before placeCall. For example:
  - set callInfo(newGuid) 1

– set event [placeCall $destination callInfo info]

- Because the h323-conf-id used on the originating gateway is communicated to the terminating gateway through H.323, the conf-id is the same in legs 2 and 3.

- On each gateway (both originating and terminating), the h323-incoming-conf-id is created by making a persistent and static copy of the h323-conf-id. After this h323-incoming-conf-id is created, it is never updated or changed for the duration of the session.

- The h323-incoming-conf-id value is always the same for legs 1 and 2, or for legs 3 and 4, and it need not be the same for all four legs of a call.

Customized Accounting Records

You can create accounting templates to customize your accounting records based on your billing needs. For example, to target different accounting servers for incoming calls from different trunks, you can define multiple accounting templates and associate them with different sets of incoming dial peers. An accounting template is a text file that defines the specific VSAs that are applicable to your accounting needs and helps reduce billing traffic from the gateway to the accounting server.

When you enable voice accounting, a default set of attributes, which includes both standard and voice-specific attributes, is automatically sent by the gateway to the accounting server. To send all voice VSAs to the accounting server use the **acct-template callhistory-detail** command. For a list of all the voice VSAs, see the "Cisco Voice VSAs" section on page 4-64.

The **show call accounting-template voice attrList** command displays all the voice attributes that can be filtered by accounting templates. Templates can contain only voice-specific VSAs. Non-voice specific attributes cannot be controlled through accounting templates.

To define a template, create a standard text file, listing the desired attributes, one per line. You can paste the output from the **show call accounting-template voice attrList** command into your text file and remove any attributes that are not applicable. To remove an attribute, either delete the attribute from the template or add the # sign in front of the attribute name. A custom accounting template acts as a filter, allowing only the defined attributes to be sent to the accounting server.

For a sample accounting template, see the "Customized Accounting Template: Example" section on page 2-24.

Session applications use some VSAs for authentication and authorization which are not controlled by the accounting template. For example, h323-ivr-out, h323-credit-amount, h323-credit-time, and h323-billing-model are only controlled by a Tcl script. These VSAs are sent as AV pairs through the *avlistSend* argument of the TCL verbs used in the script. You also cannot control h323-conf-id and h323-incoming-conf-id; they are mandatory VSAs required for co-relating accounting messages on the incoming and outgoing legs. If you specify these VSAs in the accounting template, they are ignored and no error messages are reported.

After creating a template, you must load the template to the gateway and then apply the template either globally or to specific dial peers. For configuration information, see the "Using an Accounting Template to Filter Output" section on page 2-12.

Gateway Timeout During Digit Collection

The presence of a "T" at the end of a phone number, such as a destination number or a called number, indicates that the gateway uses a timeout to determine that the digit collection from the user is complete instead of using a digit count.

For example, in the United States all phone numbers are 10 digits (xxx-xxx-xxxx). So, the gateway collects 10 digits and considers the number complete. In some other countries, the number of digits can vary. Numbers can be 9, 10, or 11 digits long. In such cases, the gateway waits to see if another digit is entered by the user. If no more digits are entered by the user, a timeout occurs. The gateway considers the number complete and stops listening for more digits. In this situation, the gateway appends a T at the end of the number.

How to Implement RADIUS Accounting

This section contains the following procedures:

Configuring the Voice Gateway as a RADIUS Client

To configure the voice gateway as a RADIUS client, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **aaa new-model**
4. **aaa authentication login h323 group radius**
5. **aaa authorization exec h323 group radius**
6. **aaa accounting connection h323 start-stop radius**
7. **radius-server host**
8. **radius-server host non-standard**
9. **radius-server key**
10. **exit**

DETAILED STEPS

	Command	Purpose
Step 1	**enable** **Example:** Router> enable	Enters privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** Router# config term	Enters global configuration mode.
Step 3	**aaa new-model** **Example:** Router(config)# aaa new-model	Enables AAA.
Step 4	**aaa authentication login h323 group radius** **Example:** Router(config)# aaa authentication login h323 group radius	Creates a named list that checks the RADIUS server for authentication details for H.323 calls. • When you use this and the previous command together, the gateway authenticates any access to it except console access. • When you Telnet into the gateway with AAA authentication enabled, you must enter a username and password. You can override this by creating a method list that bypasses authentication.
Step 5	**aaa authorization exec h323 group radius** **Example:** Router(config)# aaa authorization exec h323 group radius	Creates named lists that configure RADIUS as the method for H.323 authorization.
Step 6	**aaa accounting connection h323 start-stop radius** **Example:** Router(config)# aaa accounting connection h323 start-stop radius	Specifies use of connection-based accounting and H.323.
Step 7	**radius-server host** *IP-address* **auth-port** *number* **acct-port** *number* **Example:** Router(config)# radius-server host 172.16.39.46 auth-port 1612 acct-port 1616	Specifies a RADIUS server host. • *IP-address*—IP address of the RADIUS server host • **auth-port** *number*—UDP destination port number for authentication requests. If set to 0, the host is not used for authentication. Default: 1645.
Step 8	**radius-server host non-standard** **Example:** Router(config)# radius-server host non-standard	Identifies that the security server is using a vendor-proprietary implementation of RADIUS. • Enables Cisco IOS software to support nonstandard RADIUS attributes.

	Command	Purpose
Step 9	`radius-server key` *password* **Example:** `Router(config)# radius-server key thisismypw`	Sets the password (key) to use for authenticating to the RADIUS server. • This password is used between the gateway and the RADIUS server.

Step 10	`exit`
	
	Example:
	`Router(config)# exit`
		Exits the current mode.

Enabling the Voice Gateway to Use VSAs

To enable the voice gateway to recognize and capture VSAs in RADIUS attribute 26, perform the following steps.

Prerequisites

Enable accounting and authentication (as described in the "Configuring the Voice Gateway as a RADIUS Client" section on page 2-9).

SUMMARY STEPS

1. **enable**

2. **configure terminal**

3. **radius-server vsa send accounting**

4. **gw-accounting aaa**

5. **acct-template** {*template-name* | **callhistory-detail**}

6. **end**

DETAILED STEPS

	Command	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enters privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**radius-server vsa send accounting** **Example:** `Router(config)# radius-server vsa send accounting`	Enables the gateway to recognize and use accounting VSAs as defined by RADIUS attribute 26.
Step 4	**gw-accounting aaa** **Example:** `Router(config)# gw-accounting aaa`	Enables the gateway to send accounting CDRs to the RADIUS server using VSAs (attribute 26). **Note** Releases before Cisco IOS Release 12.2(11)T used the **gw-accounting h323 vsa** command.
Step 5	**acct-template** {*template-name* | **callhistory-detail**} **Example:** `Router(config-gw-accounting-aaa)# acct-template custom1`	(Optional) Selects the voice attributes to collect. • *template-name*—Name of custom accounting template that defines the attributes to collect. Template must be loaded to voice gateway. See "Using an Accounting Template to Filter Output" section on page 2-12. • **callhistory-detail**—Collects all voice VSAs for accounting.
Step 6	**end** **Example:** `Router(config-gw-accounting-aaa)# end`	Exits to Privileged EXEC mode.

Using an Accounting Template to Filter Output

To use a custom accounting template to filter the voice attributes captured in call records, perform the following steps.

Prerequisites

- Cisco IOS Release 12.2(11)T or a later release.
- Cisco IOS XE Release 16.3.1 or a later release.
- Template file containing the names of the required attributes must be created:
  - Filename must have a .cdr extension
  - File must be stored in a location accessible to the router

SUMMARY STEPS

1. **enable**

2. **configure terminal**

3. **call accounting template voice** *template-name url*

4. **call accounting template voice reload** *template-name*

5. **exit**

6. **show call accounting-template voice** *template-name*

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	**call accounting template voice** *template-name* *url* **Example:** Router(config)# call accounting template voice custom1 tftp://sample/mycustom.cdr	Specifies the name and location of the custom accounting template to use for collecting accounting data. • *template-name*—Name assigned to the template file. • *url*—Location of the template file. **Note** After bootup, if the template file fails to load from the TFTP server, the system automatically tries to reload the file at five minute intervals.
Step 4	**call accounting template voice reload** *template-name* **Example:** Router(config)# call accounting template voice reload mycustom	(Optional) Forces a reload of the specified accounting template. • *template-name*—Name assigned to the template file.
Step 5	**exit** **Example:** Router(config)# exit	Exits to privileged EXEC mode.
Step 6	**show call accounting-template voice** *template-name* **Example:** Router# show call accounting template voice custom1	(Optional) Displays the status of a specific template and the attributes that are defined for that template.

Applying a Customized Accounting Template to a Dial Peer

To apply a customized accounting template to a dial peer, perform the following steps.

Prerequisites

- Cisco IOS Release 12.2(11)T or a later release.
- Cisco IOS XE Release 16.3.1 or a later release.
- The template file containing the names of the required attributes must be created and loaded to the gateway:

      – Filename must have a .cdr extension

      – File must be stored in a location accessible to the router

SUMMARY STEPS

1. **enable**

2. **configure terminal**

3. **voice class aaa** *tag*

4. **accounting template** *template-name*

5. **exit**

6. **dial peer voice** *tag* {**pots** | **voip**}

7. **voice-class aaa** *tag*

8. end

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 class aaa** *tag* **Example:** Router(config)# voice class aaa 2	Defines a voice service class for dial-peer-based AAA configurations. • *tag*—Unique number that identifies the voice class.
Step 4	**accounting template** *template-name* [**out-bound**] **Example:** Router(config-class)# accounting template custom2	Assigns the specified accounting template to the voice class. • *template-name*—Name of the template file. • **out-bound**—(Optional) Specifies the outbound call leg.
Step 5	**exit** **Example:** Router(config-class)# exit	Exits to global configuration mode.
Step 6	**dial-peer voice** *tag* {**pots** | **voip**} **Example:** Router(config)# dial-peer voice 20 pots	Defines a dial peer.
Step 7	**voice-class aaa** *tag* **Example:** Router(config-dial-peer)# voice-class aaa 2	Assigns a voice service class to the dial peer. • *tag*—Unique number that identifies the voice class.
Step 8	**end** **Example:** Router(config-dial-peer)# end	Exits to privileged EXEC mode.

Verifying Voice VSA Implementation

To verify the implementation of voice VSAs, including VSA T.38 fax statistics, perform the following steps as appropriate (commands are listed in alphabetical order).

> **Note** Perform these steps on both originating and terminating gateways.

SUMMARY STEPS

    1. **show running-config**

    2. **show aaa attributes** [**protocol radius**]

    3. **show call active fax**

    4. **show call active voice**

    5. **show call history fax**

    6. **show call history voice**

    7. **show port fax log**

    8. **show port operational-status**

DETAILED STEPS

Step 1   **show running-config**

Use this command to display the gateway running configuration, including RADIUS and Cisco VSA configuration.

Step 2   **show aaa attributes** [**protocol radius**]

Use this command to display the mapping between the AAA attribute number and the corresponding attribute name.

Step 3   **show call active fax**

Use this command to display call information for fax transmission in progress.

Step 4   **show call history fax**

Use this command to display the call-history table for fax calls.

Troubleshooting Tips

- Make sure the voice gateway is running the appropriate releases of Cisco IOS software and Cisco VCWare.

- Use the following **debug aaa** commands to display AAA debugging information:

    – **debug aaa accounting**

    – **debug aaa authentication**

    – **debug aaa authorization**

    – **debug voip aaa**

- Use the **debug radius accounting** command to display RADIUS debugging information.

- Use the **debug voip application accounting** command to display feature VSA debugging information.

- Use the **debug voip dspapi** command to display digital-signal-processor (DSP) application-programming-interface (API) message events.

- Use the **debug voip ivr** command to display IVR debugging information.

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>
> **Note** IVR debug messages are displayed when a call is being actively handled by the IVR scripts. Error output occurs only if something is not working or an error condition has been raised. States output supplies information about the current status of the IVR script and the different events that are occurring in that state.

- Use the **debug voip vtsp** command to display the state of the gateway and call events.

Sending VSAs to a Syslog Server

To enable the voice gateway to send call detail records to a syslog server, perform the following steps.

Restrictions

Limitations on the length of syslog messages can restrict the amount of information that is collected. If VSA information exceeds the size limit for a syslog message, some of the information is not collected.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **gw-accounting syslog**
4. **exit**

DETAILED STEPS

	Command	Purpose

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

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

Step 3	`gw-accounting syslog`
	
	Example:
	`Router(config)# gw-accounting syslog`
		Enables the gateway to send accounting CDRs to the syslog server.

Step 4	`exit`
	
	Example:
	`Router(config)# exit`
		Exits to Privileged EXEC mode.

Configuration Examples for RADIUS Accounting

This section provides the following configuration examples:

Cisco IOS Voice Gateway as RADIUS Client: Example

The following example shows how to configure RADIUS support and enable the use of VSAs on the Cisco voice gateway.

```
Router# show running-config

Building configuration...

Current configuration : 3711 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname 2800_cme1
!
boot-start-marker
boot-end-marker
!
card type t1 1 0
logging buffered 10000000 debugging
no logging console
enable password abc
!
aaa new-model
!
!
aaa accounting connection h323 start-stop broadcast group radius
!
aaa session-id common
!
resource policy
!
no network-clock-participate slot 1
!
!
ip cef
!
!
no ip domain lookup
!
!
voice-card 0
 no dspfarm
!
!
voice service voip
 allow-connections h323 to h323
 supplementary-service h450.12
 h323
!
!
!
username root
!
!
controller T1 1/0/0
 framing esf
 clock source internal
 linecode b8zs
 ds0-group 1 timeslots 1-5 type e&m-immediate-start
```

```
gw-accounting syslog
gw-accounting aaa
 acct-template sample
!
!
!
interface GigabitEthernet0/0
 ip address 10.3.32.55 255.255.0.0
 no ip proxy-arp
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
ip route 0.0.0.0 0.0.0.0 10.3.0.1
!
ip http server
!
!
radius-server host 10.3.105.214 auth-port 1612 acct-port 1616
radius-server vsa send accounting
radius-server vsa send authentication
!
control-plane
!
call accounting-template voice sample flash:test.cdr
!
!
voice-port 1/0/0:1
 timing digit 50
 timing inter-digit 50
!
!
!
dial-peer voice 2100 voip
 destination-pattern 201100....
 session target ipv4:10.3.32.58
 dtmf-relay h245-alphanumeric
!
dial-peer voice 99 voip
 incoming called-number 101.......
 dtmf-relay h245-alphanumeric
!
dial-peer voice 2101 voip
 destination-pattern 201101....
 session target ipv4:10.3.32.58
 dtmf-relay h245-alphanumeric
!
dial-peer voice 2201 pots
 destination-pattern 201201....
 incoming called-number 101201....
 port 1/0/0:1
 forward-digits all
!
!
!
telephony-service
 max-ephones 30
 max-dn 60
 ip source-address 10.3.32.55 port 2000
```

```
 max-conferences 8 gain -6
 call-forward pattern .T
 transfer-system full-consult
 transfer-pattern ..........
 create cnf-files version-stamp Jan 01 2002 00:00:00
!
!
ephone-dn  1  dual-line
 number 1011001001
!
ephone-dn  2  dual-line
 number 1011001002

ephone-dn  3  dual-line
 number 1011001003
!
ephone-dn  4
 number 1011001004
!
ephone-dn  5
 number 1011001005
!
ephone-dn  6  dual-line
 number 1011011006
!
ephone-dn  7  dual-line
 number 1011011007
!
ephone-dn  8  dual-line
 number 1011011008
!
ephone-dn  9
 number 1011011009
!
ephone-dn  10
 number 1011011010
!
ephone-dn  16  dual-line
 number 1012011016
!
ephone-dn  17  dual-line
 number 1012011017
!
ephone-dn  18  dual-line
 number 1012011018
!
ephone-dn  19
 number 1012011019
!
ephone-dn  20
 number 1012011020
!
!
ephone  1
 mac-address 1111.0001.1001
 button  1:1
!
ephone  2
 mac-address 1111.0001.1002
 button  1:2
!
ephone  3
 mac-address 1111.0001.1003
 button  1:3
```

```
!
ephone  4
 mac-address 1111.0001.1004
 button  1:4
!
ephone  5
 mac-address 1111.0001.1005
 button  1:5

ephone  6
 mac-address 1111.0001.1006
 button  1:6
!
ephone  7
 mac-address 1111.0001.1007
 button  1:7
!
ephone  8
 mac-address 1111.0001.1008
 button  1:8
!
ephone  9
 mac-address 1111.0001.1009
 button  1:9
!
ephone  10
 mac-address 1111.0001.1010
 button  1:10
!
ephone  16
 mac-address 1111.0001.1016
 button  1:16
!
ephone  17
 mac-address 1111.0001.1017
 button  1:17
!
ephone  18
 mac-address 1111.0001.1018
 button  1:18
!
ephone  19
 mac-address 1111.0001.1019
 button  1:19
!
ephone  20
 mac-address 1111.0001.1020
 button  1:20
!
line con 0
 exec-timeout 0 0
line aux 0
line vty 0 4
!
scheduler allocate 20000 1000
!
end
```

Customized Accounting Template: Example

The following example shows an accounting template file named sample.cdr that defines 35 attributes.

```
h323-gw-id
h323-call-origin
h323-call-type
h323-setup-time
h323-connect-time
h323-disconnect-time
h323-disconnect-cause
h323-remote-address
h323-voice-quality
subscriber
acom-level
noise-level
voice-tx-duration
tx-duration
charged-units
disconnect-text
peer-if-index
logical-if-index
codec-type-rate
codec-bytes
session-protocol
vad-enable
remote-udp-port
hiwater-playout-display
lowater-playout-display
receive-delay
round-trip-delay
ontime-rv-playout
gapfill-with-silence
gapfill-with-prediction
gapfill-with-interpolation
gapfill-with-redundancy
lost-packets
early-packets
late-packets
```

Start Record for Basic Two-Way Call: Example

The following example shows an accounting start record with the CDR information including the feature VSA for a two-way call. Display this output by using the **debug radius accounting** command or the **gw-accounting syslog** command.

```
1d01h: RADIUS (00000066): Send Accounting-Request to 10.7.157.1:1646 id 1646/201, len 419
1d01h: RADIUS:  authenticator 82 CF 2F 5E 9B 45 AB 98 - BD AA F3 0D 5D D3 4E 4A
1d01h: RADIUS:  Acct-Session-Id    [44] 10  "000000C2"
1d01h: RADIUS:  Calling-Station-Id [31] 5   "557"
1d01h: RADIUS:  Vendor, Cisco      [26] 56
1d01h: RADIUS:   h323-setup-time   [25] 50  "h323-setup-time=*05:03:25.017 UTC Sun Aug 4
2002"
1d01h: RADIUS:  Vendor, Cisco      [26] 28
1d01h: RADIUS:   h323-gw-id        [33] 22  "h323-gw-id=ragdeCME."
1d01h: RADIUS:  Vendor, Cisco      [26] 56
1d01h: RADIUS:   Conf-Id           [24] 50  "h323-conf-id=57166451 A69E11D6 808D87CA
50D5D35A"
1d01h: RADIUS:  Vendor, Cisco      [26] 31
*Sep 12 23:19:59.167: RADIUS:   Cisco AVpair      [1]   130
"feature-vsa=fn:TWC,ft:09/12/2005
23:19:59.159,cgn:1001,cdn:1002,frs:0,fid=49,fcid:8FE4F346231A11DA8029C01C71395D27,legID:12
"
*S1d01h: RADIUS:  h323-call-origin  [26] 25  "h323-call-origin=answer"
1d01h: RADIUS:  Vendor, Cisco      [26] 32
1d01h: RADIUS:   h323-call-type    [27] 26  "h323-call-type=Telephony"
1d01h: RADIUS:  Vendor, Cisco      [26] 65
1d01h: RADIUS:   Cisco AVpair      [1]  59  "h323-incoming-conf-id=57166451 A69E11D6
808D87CA 50D5D35A"
1d01h: RADIUS:  Vendor, Cisco      [26] 30
1d01h: RADIUS:   Cisco AVpair      [1]  24  "subscriber=RegularLine"
1d01h: RADIUS:  User-Name          [1]  5   "557"
1d01h: RADIUS:  Vendor, Cisco      [26] 32
1d01h: RADIUS:   Cisco AVpair      [1]  26  "connect-progress=Call Up"
1d01h: RADIUS:  Acct-Status-Type   [40] 6   Start                   [1]
1d01h: RADIUS:  NAS-Port-Type      [61] 6   802.11 wireless         [19]
1d01h: RADIUS:  NAS-Port           [5]  6   5
1d01h: RADIUS:  NAS-Port-Id        [87] 13  "EFXS 50/0/5"
1d01h: RADIUS:  Service-Type       [6]  6   Login                   [1]
1d01h: RADIUS:  NAS-IP-Address     [4]  6   10.5.20.8
1d01h: RADIUS:  Acct-Delay-Time    [41] 6   0
...
```

Stop Record for Basic Two-Way Call: Example

The following example shows an accounting stop record with the CDR information including the feature VSA for a two-way call.

```
1d01h: RADIUS:   authenticator D3 95 9B 87 37 32 C5 16 - 49 CA 38 04 56 4D DD 1C
1d01h: RADIUS:   Acct-Session-Id   [44] 10  "000000C3"
1d01h: RADIUS:   Calling-Station-Id [31] 5   "557"
1d01h: RADIUS:   Called-Station-Id [30] 5   "560"
1d01h: RADIUS:   Vendor, Cisco      [26] 51
1d01h: RADIUS:    Cisco AVpair      [1]  45  "call-id=57170079 A69E11D6 808F87CA50D5D35A"
1d01h: RADIUS:   Vendor, Cisco      [26] 56
1d01h: RADIUS:    h323-setup-time   [25] 50  "h323-setup-time=*05:03:25.337 UTC Sun Aug 4
2002"
1d01h: RADIUS:   Vendor, Cisco      [26] 28
1d01h: RADIUS:    h323-gw-id        [33] 22  "h323-gw-id=ragdeCME."
1d01h: RADIUS:   Vendor, Cisco      [26] 56
1d01h: RADIUS:   Vendor, Cisco      [26] 31
*Sep 12 23:19:59.167: RADIUS:    Cisco AVpair      [1]   130
"feature-vsa=fn:TWC,ft:09/12/2005
23:19:59.159,cgn:1001,cdn:1002,frs:0,fid=49,fcid:8FE4F346231A11DA8029C01C71395D27,legID:12
"
*S1d01h: RADIUS:    Conf-Id         [24]  50  "h323-conf-id=57166451 A69E11D6 808D87CA
50D5D35A"
1d01h: RADIUS:   Vendor, Cisco      [26] 34
1d01h: RADIUS:    h323-call-origin  [26] 28  "h323-call-origin=originate"
1d01h: RADIUS:   Vendor, Cisco      [26] 27
1d01h: RADIUS:    h323-call-type    [27] 21  "h323-call-type=VoIP"
1d01h: RADIUS:   Vendor, Cisco      [26] 65
1d01h: RADIUS:    Cisco AVpair      [1]  59  "h323-incoming-conf-id=57166451 A69E
11D6 808D87CA 50D5D35A"
1d01h: RADIUS:   Vendor, Cisco      [26] 30
1d01h: RADIUS:    Cisco AVpair      [1]  24  "subscriber=RegularLine"
1d01h: RADIUS:   Vendor, Cisco      [26] 30
1d01h: RADIUS:    Cisco AVpair      [1]  24  "session-protocol=cisco"
1d01h: RADIUS:   Acct-Input-Octets  [42] 6   0
1d01h: RADIUS:   Acct-Output-Octets [43] 6   0
1d01h: RADIUS:   Acct-Input-Packets [47] 6   0
1d01h: RADIUS:   Acct-Output-Packets [48] 6  0
1d01h: RADIUS:   Acct-Session-Time  [46]
1d01h: RADIUS:   Vendor, Cisco      [26] 58
1d01h: RADIUS:    h323-connect-time [28] 52  "h323-connect-time=*05:03:28.427 UTC Sun Aug
4 2002"
1d01h: RADIUS:   Vendor, Cisco      [26] 61
1d01h: RADIUS:    h323-disconnect-tim[29] 55  "h323-disconnect-time=*05:03:28.427 UTC Sun
Aug 4 2002"
1d01h: RADIUS:   Vendor, Cisco      [26] 32
1d01h: RADIUS:    h323-disconnect-cau[30] 26  "h323-disconnect-cause=10"
1d01h: RADIUS:   Vendor, Cisco      [26] 37
1d01h: RADIUS:    h323-remote-address[23] 31  "h323-remote-address=10.5.20.11"
1d01h: RADIUS:   Vendor, Cisco      [26] 24
1d01h: RADIUS:    Cisco AVpair      [1]  18  "release-source=7"
1d01h: RADIUS:   Vendor, Cisco      [26] 28
1d01h: RADIUS:    h323-voice-quality [31] 22  "h323-voice-quality=0"
1d01h: RADIUS:   Vendor, Cisco      [26] 56
1d01h: RADIUS:    Cisco AVpair      [1]  50  "alert-timepoint=*05:03:25.397 UTC Sun Aug
2002
1d01h: RADIUS:   Vendor, Cisco      [26] 22
1d01h: RADIUS:    Cisco AVpair      [1]  16  "lost-packets=0"
1d01h: RADIUS:   User-Name          [1]  5   "557"^M
1d01h: RADIUS:   Acct-Status-Type   [40] 6   Stop                  [2]
1d01h: RADIUS:   Service-Type       [6]  6   Login                 [1]
1d01h: RADIUS:   NAS-IP-Address     [4]  6   10.5.20.8
```

```
1d01h: RADIUS:  Acct-Delay-Time    [41]  6   0
1d01h: RADIUS: no sg in radius-timers: ctx 0x6697ACCC sg 0x0000
...
```

RADIUS Client Debug Log: Example

The following is a sample output of a RADIUS client's log. The call legs are not in order because RADIUS uses User Datagram Protocol (UDP) for its transactions and does not guarantee message delivery. Comments explaining the commands are in bold.

legs 1 and 2

```
AS5300_5#
AS5300_5#deb radius
Radius protocol debugging is on
AS5300_5#deb aaa acc
AAA Accounting debugging is on
AS5300_5#
May 26 02:03:22.817:AAA:parse name=ISDN 0:D:8 idb type=-1 tty=-1
May 26 02:03:22.817:AAA/MEMORY:create_user (0x62379D54) user='101000' ruser='200000'
port='ISDN 0:D:8' rem_addr='101000/200000' authen_type=NONE service=H323_VSA priv=0
May 26 02:03:22.817:AAA/ACCT/CONN:Found list "h323"
```

!Client prepares Leg 1, Accounting_request_START
!Note 7 Cisco VSAs
```
May 26 02:03:22.817:AAA/ACCT/CONN/START User 101000, Port ISDN 0:D:8, Location "unknown"
May 26 02:03:22.817:AAA/ACCT/CONN/START User 101000, Port ISDN 0:D:8,
         task_id=2 start_time=959335402 timezone=PST service=connection protocol=h323
May 26 02:03:22.833:AAA/ACCT:user 101000, acct type 1 (2853992933):Method=radius (radius)
May 26 02:03:22.833:RADIUS:ustruct sharecount=3
May 26 02:03:22.833:RADIUS:added cisco VSA 2 len 10 "ISDN 0:D:8"
May 26 02:03:22.833:RADIUS:added cisco VSA 33 len 20 "h323-gw-id=AS5300_5."
May 26 02:03:22.833:RADIUS:added cisco VSA 24 len 38 "h323-conf-id=99936522 D14C0003 0
2A7CC"
May 26 02:03:22.833:RADIUS:added cisco VSA 1 len 29 "h323-incoming-conf-id=0 0 0 0"
May 26 02:03:22.837:RADIUS:added cisco VSA 26 len 23 "h323-call-origin=answer"
May 26 02:03:22.837:RADIUS:added cisco VSA 27 len 24 "h323-call-type=Telephony"
May 26 02:03:22.837:RADIUS:added cisco VSA 25 len 48 "h323-setup-time=02:03:22.817 PST Fri
May 26 2000"
```

!Client sends Leg 1, Accounting_request_START
!Note7 Cisco VSAs (attribute 26s)
```
May 26 02:03:22.837:RADIUS:Initial Transmit ISDN 0:D:8 id 0 10.13.84.100:1646,
Accounting-Request, len 332
May 26 02:03:22.837:        Attribute 4 6 010D4A05
May 26 02:03:22.837:        Attribute 26 18 00000009020C4953
May 26 02:03:22.837:        Attribute 61 6 00000000
May 26 02:03:22.837:        Attribute 1 8 31303130
May 26 02:03:22.837:        Attribute 30 8 32303030
May 26 02:03:22.837:        Attribute 31 8 31303130
May 26 02:03:22.837:        Attribute 40 6 00000001
May 26 02:03:22.837:        Attribute 6 6 00000001
May 26 02:03:22.837:        Attribute 26 28 0000000921166833
May 26 02:03:22.837:        Attribute 26 46 0000000918286833
May 26 02:03:22.837:        Attribute 26 37 00000009011F6833
May 26 02:03:22.837:        Attribute 26 31 000000091A196833
May 26 02:03:22.837:        Attribute 26 32 000000091B1A6833
May 26 02:03:22.837:        Attribute 26 56 0000000919326833
May 26 02:03:22.837:        Attribute 44 10 30303030
May 26 02:03:22.837:        Attribute 41 6 00000000
May 26 02:03:27.837:RADIUS:Retransmit id 0
May 26 02:03:27.837:RADIUS:acct-delay-time for 402DBE9C (at 402DBFE2) now 5
```

!Client receives Leg 1 Accounting_response to start_request
!Note 1 Cisco VSA (h323-return-code)
```
May 26 02:03:27.881:RADIUS:Received from id 1 10.13.84.100:1646, Accounting-response, len
46
```

```
May 26 02:03:27.885:         Attribute 26 26 0000000967146833
May 26 02:03:45.587:AAA:parse name=<no string> idb type=-1 tty=-1
```

!Client prepares first Access_request
!Note 1 Cisco VSA
```
May 26 02:03:45.587:AAA/MEMORY:create_user (0x624E9550) user='001234' ruser='' port=''
rem_addr='101000' authen_type=ASCII service=LOGIN priv=0
May 26 02:03:45.587:RADIUS:authenticating to get author data
May 26 02:03:45.587:RADIUS:ustruct sharecount=2
May 26 02:03:45.587:RADIUS:added cisco VSA 24 len 38 "h323-conf-id=99936522 D14C0003 0
2A7CC"
```

!Client sends first Access_request
!Note 1 Cisco VSA
```
May 26 02:03:45.587:RADIUS:Initial Transmit  id 2 10.13.84.100:1645, Access-Request, len
112
May 26 02:03:45.587:         Attribute 4 6 010D4A05
May 26 02:03:45.587:         Attribute 61 6 00000000
May 26 02:03:45.587:         Attribute 1 8 30303132
May 26 02:03:45.587:         Attribute 26 46 0000000918286833
May 26 02:03:45.587:         Attribute 31 8 31303130
May 26 02:03:45.587:         Attribute 2 18 021848D3
```

!Client receives Access_response_ACCEPT to first Access_request
!Note 5 Cisco VSAs
```
May 26 02:03:45.615:RADIUS:Received from id 2 10.13.84.100:1645, Access-Accept, len 160
May 26 02:03:45.615:         Attribute 26 26 0000000967146833
May 26 02:03:45.615:         Attribute 26 30 000000096B186833
May 26 02:03:45.615:         Attribute 26 36 00000009651E6833
May 26 02:03:45.615:         Attribute 26 23 000000096D116269
May 26 02:03:45.615:         Attribute 26 25 000000096E136375
May 26 02:03:45.615:RADIUS:saved authorization data for user 624E9550 at 62512AA8
May 26 02:03:45.615:RADIUS:cisco AVPair ":h323-return-code=0"
May 26 02:03:45.615:RADIUS:cisco AVPair ":h323-preferred-lang=en"
May 26 02:03:45.615:RADIUS:cisco AVPair ":h323-credit-amount=100000.00"
May 26 02:03:45.615:RADIUS:cisco AVPair ":h323-billing-model=1"
May 26 02:03:45.615:RADIUS:cisco AVPair ":h323-currency=USD"
May 26 02:03:45.615:AAA/MEMORY:free_user (0x624E9550) user='001234' ruser='' port=''
rem_addr='101000' authen_type=ASCII service=LOGIN priv=0
```

!Client prepares second Access_request
!Note 1 Cisco VSA
```
May 26 02:03:57.924:AAA:parse name=<no string> idb type=-1 tty=-1
May 26 02:03:57.924:AAA/MEMORY:create_user (0x623D3968) user='001234' ruser='' port=''
rem_addr='101000/200000' authen_type=ASCII service=LOGIN priv=0
May 26 02:03:57.924:RADIUS:authenticating to get author data
May 26 02:03:57.924:RADIUS:ustruct sharecount=2
May 26 02:03:57.924:RADIUS:added cisco VSA 24 len 38 "h323-conf-id=99936522 D14C0003 0
2A7CC"
```

!Client sends second Access_request
!Note 1 Cisco VSA
```
May 26 02:03:57.924:RADIUS:Initial Transmit  id 3 10.13.84.100:1645, Access-Request, len
120
May 26 02:03:57.924:         Attribute 4 6 010D4A05
May 26 02:03:57.924:         Attribute 61 6 00000000
May 26 02:03:57.924:         Attribute 1 8 30303132
May 26 02:03:57.924:         Attribute 26 46 0000000918286833
May 26 02:03:57.928:         Attribute 30 8 32303030
May 26 02:03:57.928:         Attribute 31 8 31303130
May 26 02:03:57.928:         Attribute 2 18 FA2D6DD9
```

!Client receives Access_response_ACCEPT to second Access_request
!Note 2 VSAs

```
May 26 02:03:58.028:RADIUS:Received from id 3 10.13.84.100:1646, Access-Accept, len 78
May 26 02:03:58.028:         Attribute 26 26 0000000967146833
May 26 02:03:58.028:         Attribute 26 32 00000009661A6833
May 26 02:03:58.028:RADIUS:saved authorization data for user 623D3968 at 625319E8
May 26 02:03:58.028:RADIUS:cisco AVPair ":h323-return-code=0"
May 26 02:03:58.028:RADIUS:cisco AVPair ":h323-credit-time=5999999"
May 26 02:03:58.028:AAA/MEMORY:free_user (0x623D3968) user='001234' ruser='' port=''
rem_addr='101000/200000' authen_type=ASCII service=LOGIN priv=0
May 26 02:04:10.041:AAA:parse name=<no string> idb type=-1 tty=-1
May 26 02:04:10.041:AAA/MEMORY:create_user (0x628A9878) user='001234' ruser='200000'
port='' rem_addr='101000/200000' authen_type=NONE service=H323_VSA priv=0

!Client prepares Leg 2, Accounting_request_START
!Note 6 Cisco VSAs
May 26 02:04:10.041:AAA/ACCT/CONN:Found list "h323"
May 26 02:04:10.041:AAA/ACCT/CONN/START User 001234, Port, Location "unknown"
May 26 02:04:10.041:AAA/ACCT/CONN/START User 001234, Port,
        task_id=3 start_time=959335450 timezone=PST service=connection protocol=h323
May 26 02:04:10.041:AAA/ACCT:user 001234, acct type 1 (751892777):Method=radius (radius)
May 26 02:04:10.041:RADIUS:ustruct sharecount=3
May 26 02:04:10.041:RADIUS:added cisco VSA 33 len 20 "h323-gw-id=AS5300_5."
May 26 02:04:10.041:RADIUS:added cisco VSA 24 len 38 "h323-conf-id=99936522 D14C0003 0
2A7CC"
May 26 02:04:10.041:RADIUS:added cisco VSA 1 len 29 "h323-incoming-conf-id=0 0 0 0"
May 26 02:04:10.041:RADIUS:added cisco VSA 26 len 26 "h323-call-origin=originate"
May 26 02:04:10.041:RADIUS:added cisco VSA 27 len 19 "h323-call-type=VoIP"
May 26 02:04:10.041:RADIUS:added cisco VSA 25 len 48 "h323-setup-time=02:04:10.037 PST Fri
May 26 2000"

!Client sends Leg 2, Accounting_request_START
!Note 6 Cisco VSAs
May 26 02:04:10.045:RADIUS:Initial Transmit  id 4 10.13.84.100:1646, Accounting-Request,
len 312
May 26 02:04:10.045:         Attribute 4 6 010D4A05
May 26 02:04:10.045:         Attribute 61 6 00000000
May 26 02:04:10.045:         Attribute 1 8 30303132
May 26 02:04:10.045:         Attribute 30 8 32303030
May 26 02:04:10.045:         Attribute 31 8 31303130
May 26 02:04:10.045:         Attribute 40 6 00000001
May 26 02:04:10.045:         Attribute 6 6 00000001
May 26 02:04:10.049:         Attribute 26 28 0000000921166833
May 26 02:04:10.049:         Attribute 26 46 0000000918286833
May 26 02:04:10.049:         Attribute 26 37 00000009011F6833
May 26 02:04:10.049:         Attribute 26 34 000000091A1C6833
May 26 02:04:10.049:         Attribute 26 27 000000091B156833
May 26 02:04:10.049:         Attribute 26 56 0000000919326833
May 26 02:04:10.049:         Attribute 44 10 30303030
May 26 02:04:10.049:         Attribute 41 6 00000000

!Client receives Leg 2, Accounting_response to start_request
!Note 1 Cisco VSA (h323-return-code)
May 26 02:04:10.061:RADIUS:Received from id 4 10.13.84.100:1646, Accounting-response, len
46
May 26 02:04:10.061:         Attribute 26 26 0000000967146833

!Client prepares Leg 2, Accounting_request_STOP
!Note 11 Cisco VSAs
May 26 02:04:59.190:AAA/ACCT:no attribute "pre-bytes-in" to replace, adding it
May 26 02:04:59.190:AAA/ACCT:no attribute "pre-bytes-out" to replace, adding it
May 26 02:04:59.190:AAA/ACCT:no attribute "pre-paks-in" to replace, adding it
May 26 02:04:59.190:AAA/ACCT:no attribute "pre-paks-out" to replace, adding it
May 26 02:04:59.190:AAA/ACCT:no attribute "bytes_in" to replace, adding it
May 26 02:04:59.190:AAA/ACCT:no attribute "bytes_out" to replace, adding it
May 26 02:04:59.190:AAA/ACCT:no attribute "paks_in" to replace, adding it
```

```
May 26 02:04:59.190:AAA/ACCT:no attribute "paks_out" to replace, adding it
May 26 02:04:59.190:AAA/ACCT:no attribute "elapsed_time" to replace, adding it
May 26 02:04:59.194:AAA/ACCT/CONN/STOP:cannot retrieve modem speed
May 26 02:04:59.194:AAA/ACCT/CONN/STOP User 001234, Port unknown:
task_id=3 start_time=959335450 timezone=PST service=connection protocol=h323
h323-gw-id=AS5300_5. h323-conf-id=99936522 D14C0003 0 2A7CC h323-incoming-conf-id=0 0 0 0
h323-call-origin=originate h323-call-type=VoIP h323-setup-time=02:04:10.037 PST Fri May 26
2000 h323-connect-time=02:04:10.780 PST Fri May 26 2000 h323-disconnect-time=02:04:59.190
PST Fri May 26 2000 h323-disconnect-cause=10 h323-voice-quality=0
h323-remote-address=20.20.20.1 pre-bytes-in=0 pre-bytes-out=0 pre-paks-in=0 pre-p...
May 26 02:04:59.194:AAA/ACCT:user 001234, acct type 1 (1758133853):Method=radius (radius)
May 26 02:04:59.194:RADIUS:ustruct sharecount=2
May 26 02:04:59.194:RADIUS:added cisco VSA 33 len 20 "h323-gw-id=AS5300_5."
May 26 02:04:59.194:RADIUS:added cisco VSA 24 len 38 "h323-conf-id=99936522 D14C0003 0
2A7CC"
May 26 02:04:59.194:RADIUS:added cisco VSA 1 len 29 "h323-incoming-conf-id=0 0 0 0"
May 26 02:04:59.194:RADIUS:added cisco VSA 26 len 26 "h323-call-origin=originate"
May 26 02:04:59.194:RADIUS:added cisco VSA 27 len 19 "h323-call-type=VoIP"
May 26 02:04:59.198:RADIUS:added cisco VSA 25 len 48 "h323-setup-time=02:04:10.037 PST Fri
May 26 2000"
May 26 02:04:59.198:RADIUS:added cisco VSA 28 len 50 "h323-connect-time=02:04:10.780 PST
Fri May 26 2000"
May 26 02:04:59.198:RADIUS:added cisco VSA 29 len 53 "h323-disconnect-time=02:04:59.190
PST Fri May 26 2000"
May 26 02:04:59.198:RADIUS:added cisco VSA 30 len 24 "h323-disconnect-cause=10"
May 26 02:04:59.198:RADIUS:added cisco VSA 31 len 20 "h323-voice-quality=0"
May 26 02:04:59.198:RADIUS:added cisco VSA 23 len 30 "h323-remote-address=20.20.20.1"

!Client sends Leg 2, Accounting_request_STOP
!Note 11 Cisco VSAs
May 26 02:04:59.202:RADIUS:Initial Transmit  id 5 10.13.84.100:1646, Accounting-Request,
len 691
May 26 02:04:59.202:         Attribute 4 6 010D4A05
May 26 02:04:59.202:         Attribute 61 6 00000000
May 26 02:04:59.202:         Attribute 1 8 30303132
May 26 02:04:59.202:         Attribute 30 8 32303030
May 26 02:04:59.202:         Attribute 31 8 31303130
May 26 02:04:59.202:         Attribute 40 6 00000002
May 26 02:04:59.202:         Attribute 6 6 00000001
May 26 02:04:59.202:         Attribute 26 28 0000000921166833
May 26 02:04:59.202:         Attribute 26 46 0000000918286833
May 26 02:04:59.202:         Attribute 26 37 00000009011F6833
May 26 02:04:59.202:         Attribute 26 34 000000091A1C6833
May 26 02:04:59.202:         Attribute 26 27 000000091B156833
May 26 02:04:59.202:         Attribute 26 56 0000000919326833
May 26 02:04:59.202:         Attribute 26 58 000000091C346833
May 26 02:04:59.202:         Attribute 26 61 000000091D376833
May 26 02:04:59.202:         Attribute 26 32 000000091E1A6833
May 26 02:04:59.202:         Attribute 26 28 000000091F166833
May 26 02:04:59.202:         Attribute 26 38 0000000917206833
May 26 02:04:59.202:         Attribute 44 10 30303030
May 26 02:04:59.202:         Attribute 42 6 00036F7A
May 26 02:04:59.202:         Attribute 43 6 00036349
May 26 02:04:59.202:         Attribute 47 6 000005A1
May 26 02:04:59.202:         Attribute 48 6 0000058A
May 26 02:04:59.202:         Attribute 46 6 00000030
May 26 02:04:59.206:         Attribute 41 6 00000000

!Client prepares Leg 1, Accounting_request_STOP
!Note 11 Cisco VSAs
May 26 02:04:59.206:AAA/ACCT:no attribute "pre-bytes-in" to replace, adding it
May 26 02:04:59.206:AAA/ACCT:no attribute "pre-bytes-out" to replace, adding it
May 26 02:04:59.206:AAA/ACCT:no attribute "pre-paks-in" to replace, adding it
May 26 02:04:59.206:AAA/ACCT:no attribute "pre-paks-out" to replace, adding it
```

```
May 26 02:04:59.206:AAA/ACCT:no attribute "bytes_in" to replace, adding it
May 26 02:04:59.206:AAA/ACCT:no attribute "bytes_out" to replace, adding it
May 26 02:04:59.206:AAA/ACCT:no attribute "paks_in" to replace, adding it
May 26 02:04:59.206:AAA/ACCT:no attribute "paks_out" to replace, adding it
May 26 02:04:59.206:AAA/ACCT:no attribute "elapsed_time" to replace, adding it
May 26 02:04:59.206:AAA/ACCT/CONN/STOP:cannot retrieve modem speed
May 26 02:04:59.210:AAA/ACCT/CONN/STOP User 101000, Port ISDN 0:D:8:
task_id=2 start_time=959335402 timezone=PST service=connection protocol=h323
h323-gw-id=AS5300_5. h323-conf-id=99936522 D14C0003 0 2A7CC h323-incoming-conf-id=0 0 0 0
h323-call-origin=answer h323-call-type=Telephony h323-setup-time=02:03:22.817 PST Fri May
26 2000 <obsolete>=ISDN 0:D:8 h323-connect-time=02:03:23.086 PST Fri May 26 2000
h323-disconnect-time=02:04:59.206 PST Fri May 26 2000 h323-disconnect-cause=10
h323-voice-quality=0 <obsolete>=ISDN 0:D:8 pre-bytes-in=0 pre-bytes-out=0 pre-...
May 26 02:04:59.210:AAA/ACCT:user 101000, acct type 1 (3162356262):Method=radius (radius)
May 26 02:04:59.210:RADIUS:ustruct sharecount=2
May 26 02:04:59.210:RADIUS:added cisco VSA 2 len 10 "ISDN 0:D:8"
May 26 02:04:59.210:RADIUS:added cisco VSA 33 len 20 "h323-gw-id=AS5300_5."
May 26 02:04:59.210:RADIUS:added cisco VSA 24 len 38 "h323-conf-id=99936522 D14C0003 0
2A7CC"
May 26 02:04:59.210:RADIUS:added cisco VSA 1 len 29 "h323-incoming-conf-id=0 0 0 0"
May 26 02:04:59.210:RADIUS:added cisco VSA 26 len 23 "h323-call-origin=answer"
May 26 02:04:59.210:RADIUS:added cisco VSA 27 len 24 "h323-call-type=Telephony"
May 26 02:04:59.210:RADIUS:added cisco VSA 25 len 48 "h323-setup-time=02:03:22.817 PST Fri
May 26 2000"
May 26 02:04:59.210:RADIUS:added cisco VSA 28 len 50 "h323-connect-time=02:03:23.086 PST
Fri May 26 2000"
May 26 02:04:59.210:RADIUS:added cisco VSA 29 len 53 "h323-disconnect-time=02:04:59.206
PST Fri May 26 2000"
May 26 02:04:59.214:RADIUS:added cisco VSA 30 len 24 "h323-disconnect-cause=10"
May 26 02:04:59.214:RADIUS:added cisco VSA 31 len 20 "h323-voice-quality=0"

!Client sends Leg 1, Accounting_request_STOP
!Note 11 Cisco VSAs
May 26 02:04:59.214:RADIUS:Initial Transmit ISDN 0:D:8 id 6 10.13.84.100:1646,
Accounting-Request, len 673
May 26 02:04:59.214:        Attribute 4 6 010D4A05
May 26 02:04:59.214:        Attribute 26 18 00000009020C4953
May 26 02:04:59.214:        Attribute 61 6 00000000
May 26 02:04:59.214:        Attribute 1 8 31303130
May 26 02:04:59.214:        Attribute 30 8 32303030
May 26 02:04:59.214:        Attribute 31 8 31303130
May 26 02:04:59.214:        Attribute 40 6 00000002
May 26 02:04:59.214:        Attribute 6 6 00000001
May 26 02:04:59.214:        Attribute 26 28 0000000921166833
May 26 02:04:59.214:        Attribute 26 46 0000000918286833
May 26 02:04:59.214:        Attribute 26 37 00000009011F6833
May 26 02:04:59.214:        Attribute 26 31 000000091A196833
May 26 02:04:59.214:        Attribute 26 32 000000091B1A6833
May 26 02:04:59.214:        Attribute 26 56 0000000919326833
May 26 02:04:59.218:        Attribute 26 58 000000091C346833
May 26 02:04:59.218:        Attribute 26 61 000000091D376833
May 26 02:04:59.218:        Attribute 26 32 000000091E1A6833
May 26 02:04:59.218:        Attribute 26 28 000000091F166833
May 26 02:04:59.218:        Attribute 44 10 30303030
May 26 02:04:59.218:        Attribute 42 6 0003A5C1
May 26 02:04:59.218:        Attribute 43 6 00048C42
May 26 02:04:59.218:        Attribute 47 6 0000058A
May 26 02:04:59.218:        Attribute 48 6 000007D3
May 26 02:04:59.218:        Attribute 46 6 00000060
May 26 02:04:59.218:        Attribute 41 6 00000000

!Client receives Leg 2, Accounting_response
May 26 02:04:59.286:RADIUS:Received from id 5 10.13.84.100:1646, Accounting-response, len
46
```

```
May 26 02:04:59.290:AAA/MEMORY:free_user (0x628A9878) user='001234' ruser='200000' port=''
rem_addr='101000/200000' authen_type=NONE service=H323_VSA priv=0
```

!Client receives Leg 1, Accounting_response
```
May 26 02:04:59.358:RADIUS:Received from id 6 10.13.84.100:1646, Accounting-response, len
46
May 26 02:04:59.358:AAA/MEMORY:free_user (0x62379D54) user='101000' ruser='200000'
port='ISDN 0:D:8' rem_addr='101000/200000' authen_type=NONE service=H323_VSA priv=0
AS5300_5#
AS5300_5#
```

legs 3 and 4
!Client prepares Leg 3, Accounting_request_START
!Note the 6 Cisco VSAs
```
May 26 02:04:10.052:AAA/ACCT/CONN:Found list "h323"
May 26 02:04:10.052:AAA/ACCT/CONN/START User 101000, Port, Location "unknown"
May 26 02:04:10.052:AAA/ACCT/CONN/START User 101000, Port,
        task_id=2 start_time=959335450 timezone=PST service=connection protocol=h323
May 26 02:04:10.052:AAA/ACCT:user 101000, acct type 1 (3870523452):Method=radius (radius)
May 26 02:04:10.052:RADIUS:ustruct sharecount=3
May 26 02:04:10.052:RADIUS:added cisco VSA 33 len 20 "h323-gw-id=AS5300_4."
May 26 02:04:10.052:RADIUS:added cisco VSA 24 len 38 "h323-conf-id=99936522 D14C0003 0
2A7CC"
May 26 02:04:10.052:RADIUS:added cisco VSA 1 len 29 "h323-incoming-conf-id=0 0 0 0"
May 26 02:04:10.052:RADIUS:added cisco VSA 26 len 23 "h323-call-origin=answer"
May 26 02:04:10.052:RADIUS:added cisco VSA 27 len 19 "h323-call-type=VoIP"
May 26 02:04:10.052:RADIUS:added cisco VSA 25 len 48 "h323-setup-time=02:04:10.052 PST Fri
May 26 2000"
```

!Client sends Leg 3, Accounting_request_START
!Note the 6 Cisco VSAs
```
May 26 02:04:10.056:RADIUS:Initial Transmit  id 0 10.13.84.100:1646, Accounting-Request,
len 309
May 26 02:04:10.056:        Attribute 4 6 010D4A04
May 26 02:04:10.056:        Attribute 61 6 00000000
May 26 02:04:10.056:        Attribute 1 8 31303130
May 26 02:04:10.056:        Attribute 30 8 32303030
May 26 02:04:10.056:        Attribute 31 8 31303130
May 26 02:04:10.056:        Attribute 40 6 00000001
May 26 02:04:10.056:        Attribute 6 6 00000001
May 26 02:04:10.056:        Attribute 26 28 0000000921166833
May 26 02:04:10.056:        Attribute 26 46 0000000918286833
May 26 02:04:10.056:        Attribute 26 37 00000009011F6833
May 26 02:04:10.056:        Attribute 26 31 000000091A196833
May 26 02:04:10.056:        Attribute 26 27 000000091B156833
May 26 02:04:10.056:        Attribute 26 56 0000000919326833
May 26 02:04:10.056:        Attribute 44 10 30303030
May 26 02:04:10.056:        Attribute 41 6 00000000
```

!Client prepares Leg 4, Accounting_request_START
!Note the 7 Cisco VSAs
```
May 26 02:04:10.284:AAA:parse name=ISDN 0:D:23 idb type=-1 tty=-1
May 26 02:04:10.284:AAA/MEMORY:create_user (0x625D6B6C) user='101000' ruser='200000'
port='ISDN 0:D:23' rem_addr='101000/200000' authen_type=NONE service=H323_VSA priv=0
May 26 02:04:10.284:AAA/ACCT/CONN:Found list "h323"
May 26 02:04:10.284:AAA/ACCT/CONN/START User 101000, Port ISDN 0:D:23, Location "unknown"
May 26 02:04:10.284:AAA/ACCT/CONN/START User 101000, Port ISDN 0:D:23,
        task_id=3 start_time=959335450 timezone=PST service=connection protocol=h323
May 26 02:04:10.284:AAA/ACCT:user 101000, acct type 1 (1531329072):Method=radius (radius)
May 26 02:04:10.284:RADIUS:ustruct sharecount=3
May 26 02:04:10.284:RADIUS:added cisco VSA 2 len 11 "ISDN 0:D:23"
May 26 02:04:10.284:RADIUS:added cisco VSA 33 len 20 "h323-gw-id=AS5300_4."
May 26 02:04:10.284:RADIUS:added cisco VSA 24 len 38 "h323-conf-id=99936522 D14C0003 0
```

```
2A7CC"
May 26 02:04:10.284:RADIUS:added cisco VSA 1 len 29 "h323-incoming-conf-id=0 0 0 0"
May 26 02:04:10.288:RADIUS:added cisco VSA 26 len 26 "h323-call-origin=originate"
May 26 02:04:10.288:RADIUS:added cisco VSA 27 len 24 "h323-call-type=Telephony"
May 26 02:04:10.288:RADIUS:added cisco VSA 25 len 48 "h323-setup-time=02:04:10.284 PST Fri
May 26 2000"
```

!Client sends Leg 4, Accounting_request_START
!Note the 7 Cisco VSAs

```
May 26 02:04:10.288:RADIUS:Initial Transmit ISDN 0:D:23 id 1 10.13.84.100:1646,
Accounting-Request, len 336
May 26 02:04:10.288:        Attribute 4 6 010D4A04
May 26 02:04:10.288:        Attribute 26 19 00000009020D4953
May 26 02:04:10.288:        Attribute 61 6 00000000
May 26 02:04:10.288:        Attribute 1 8 31303130
May 26 02:04:10.288:        Attribute 30 8 32303030
May 26 02:04:10.288:        Attribute 31 8 31303130
May 26 02:04:10.288:        Attribute 40 6 00000001
May 26 02:04:10.288:        Attribute 6 6 00000001
May 26 02:04:10.288:        Attribute 26 28 0000000921166833
May 26 02:04:10.288:        Attribute 26 46 0000000918286833
May 26 02:04:10.288:        Attribute 26 37 00000009011F6833
May 26 02:04:10.288:        Attribute 26 34 000000091A1C6833
May 26 02:04:10.288:        Attribute 26 32 000000091B1A6833
May 26 02:04:10.288:        Attribute 26 56 0000000919326833
May 26 02:04:10.288:        Attribute 44 10 30303030
May 26 02:04:10.288:        Attribute 41 6 00000000
```

!Client receives Leg 3, Accounting_response
```
May 26 02:04:10.304:RADIUS:Received from id 1 10.13.84.100:1646, Accounting-response, len
46
May 26 02:04:15.061:RADIUS:Retransmit id 0
May 26 02:04:15.061:RADIUS:acct-delay-time for 402DC558 (at 402DC687) now 5
```

!Client receives Leg 4, Accounting_response
```
May 26 02:04:15.121:RADIUS:Received from id 2 10.13.84.100:1646, Accounting-response, len
46
```

!Client prepares Leg 4, Accounting_request_STOP
!Note the 11 Cisco VSAs
```
May 26 02:04:59.211:AAA/ACCT/CONN/STOP User 101000, Port ISDN 0:D:23:
  task_id=2 start_time=959335450 timezone=PST service=connection protocol=h323
h323-gw-id=AS5300_4. h323-conf-id=99936522 D14C0003 0 2A7CC h323-incoming-conf-id=0 0 0 0
h323-call-origin=answer h323-call-type=VoIP h323-setup-time=02:04:10.052 PST Fri May 26
2000 h323-connect-time=02:04:10.775 PST Fri May 26 2000 h323-disconnect-time=02:04:59.195
PST Fri May 26 2000 h323-disconnect-cause=10 h323-voice-quality=0
h323-remote-address=20.20.20.2 pre-bytes-in=0 pre-bytes-out=0 pre-paks-in=0 pre-paks...
May 26 02:04:59.199:AAA/ACCT:user 101000, acct type 1 (1079962383):Method=radius (radius)
May 26 02:04:59.199:RADIUS:ustruct sharecount=2
May 26 02:04:59.199:RADIUS:added cisco VSA 33 len 20 "h323-gw-id=AS5300_4."
May 26 02:04:59.199:RADIUS:added cisco VSA 24 len 38 "h323-conf-id=99936522 D14C0003 0
2A7CC"
May 26 02:04:59.199:RADIUS:added cisco VSA 1 len 29 "h323-incoming-conf-id=0 0 0 0"
May 26 02:04:59.199:RADIUS:added cisco VSA 26 len 23 "h323-call-origin=answer"
May 26 02:04:59.199:RADIUS:added cisco VSA 27 len 19 "h323-call-type=VoIP"
May 26 02:04:59.199:RADIUS:added cisco VSA 25 len 48 "h323-setup-time=02:04:10.052 PST Fri
May 26 2000"
May 26 02:04:59.199:RADIUS:added cisco VSA 28 len 50 "h323-connect-time=02:04:10.775 PST
Fri May 26 2000"
May 26 02:04:59.199:RADIUS:added cisco VSA 29 len 53 "h323-disconnect-time=02:04:59.195
PST Fri May 26 2000"
May 26 02:04:59.199:RADIUS:added cisco VSA 30 len 24 "h323-disconnect-cause=10"
May 26 02:04:59.199:RADIUS:added cisco VSA 31 len 20 "h323-voice-quality=0"
```

```
May 26 02:04:59.199:RADIUS:added cisco VSA 23 len 30 "h323-remote-address=20.20.20.2"
```

!Client sends Leg 4, Accounting_request_STOP
!Note the 11 Cisco VSAs

```
May 26 02:04:59.203:RADIUS:Initial Transmit  id 3 10.13.84.100:1646, Accounting-Request,
len 688
May 26 02:04:59.203:         Attribute 4 6 010D4A04
May 26 02:04:59.203:         Attribute 61 6 00000000
May 26 02:04:59.203:         Attribute 1 8 31303130
May 26 02:04:59.203:         Attribute 30 8 32303030
May 26 02:04:59.203:         Attribute 31 8 31303130
May 26 02:04:59.203:         Attribute 40 6 00000002
May 26 02:04:59.203:         Attribute 6 6 00000001
May 26 02:04:59.203:         Attribute 26 28 0000000921166833
May 26 02:04:59.203:         Attribute 26 46 0000000918286833
May 26 02:04:59.203:         Attribute 26 37 00000009011F6833
May 26 02:04:59.203:         Attribute 26 31 000000091A196833
May 26 02:04:59.203:         Attribute 26 27 000000091B156833
May 26 02:04:59.203:         Attribute 26 56 0000000919326833
May 26 02:04:59.203:         Attribute 26 58 000000091C346833
May 26 02:04:59.203:         Attribute 26 61 000000091D376833
May 26 02:04:59.203:         Attribute 26 32 000000091E1A6833
May 26 02:04:59.203:         Attribute 26 28 000000091F166833
May 26 02:04:59.203:         Attribute 26 38 0000000917206833
May 26 02:04:59.203:         Attribute 44 10 30303030
May 26 02:04:59.207:         Attribute 42 6 00036349
May 26 02:04:59.207:         Attribute 43 6 00036F7A
May 26 02:04:59.207:         Attribute 47 6 0000058A
May 26 02:04:59.207:         Attribute 48 6 000005A1
May 26 02:04:59.207:         Attribute 46 6 00000030
May 26 02:04:59.207:         Attribute 41 6 00000000
```

!Client prepares Leg 3, Accounting_request_STOP
!Note the 11 Cisco VSAs

```
May 26 02:04:59.211:AAA/ACCT/CONN/STOP User 101000, Port ISDN 0:D:23:
task_id=3 start_time=959335450 timezone=PST service=connection protocol=h323
h323-gw-id=AS5300_4. h323-conf-id=99936522 D14C0003 0 2A7CC h323-incoming-conf-id=0 0 0 0
h323-call-origin=originate h323-call-type=Telephony h323-setup-time=02:04:10.284 PST Fri
May 26 2000 <obsolete>=ISDN 0:D:23 h323-connect-time=02:04:10.767 PST Fri May 26 2000
h323-disconnect-time=02:04:59.207 PST Fri May 26 2000 h323-disconnect-cause=10
h323-voice-quality=0 <obsolete>=ISDN 0:D:23 pre-bytes-in=0 pre-bytes-out=0...
May 26 02:04:59.211:AAA/ACCT:user 101000, acct type 1 (3621579115):Method=radius (radius)
May 26 02:04:59.215:RADIUS:ustruct sharecount=2
May 26 02:04:59.215:RADIUS:added cisco VSA 2 len 11 "ISDN 0:D:23"
May 26 02:04:59.215:RADIUS:added cisco VSA 33 len 20 "h323-gw-id=AS5300_4."
May 26 02:04:59.215:RADIUS:added cisco VSA 24 len 38 "h323-conf-id=99936522 D14C0003 0
2A7CC"
May 26 02:04:59.215:RADIUS:added cisco VSA 1 len 29 "h323-incoming-conf-id=0 0 0 0"
May 26 02:04:59.215:RADIUS:added cisco VSA 26 len 26 "h323-call-origin=originate"
May 26 02:04:59.215:RADIUS:added cisco VSA 27 len 24 "h323-call-type=Telephony"
May 26 02:04:59.215:RADIUS:added cisco VSA 25 len 48 "h323-setup-time=02:04:10.284 PST Fri
May 26 2000"
May 26 02:04:59.215:RADIUS:added cisco VSA 28 len 50 "h323-connect-time=02:04:10.767 PST
Fri May 26 2000"
May 26 02:04:59.215:RADIUS:added cisco VSA 29 len 53 "h323-disconnect-time=02:04:59.207
PST Fri May 26 2000"
May 26 02:04:59.215:RADIUS:added cisco VSA 30 len 24 "h323-disconnect-cause=10"
May 26 02:04:59.215:RADIUS:added cisco VSA 31 len 20 "h323-voice-quality=0"
```

!Client sends Leg 3, Accounting_request_STOP
!Note the 11 Cisco VSAs

```
May 26 02:04:59.219:RADIUS:Initial Transmit ISDN 0:D:23 id 4 10.13.84.100:1646,
Accounting-Request, len 677
May 26 02:04:59.219:        Attribute 4 6 010D4A04
May 26 02:04:59.219:        Attribute 26 19 00000009020D4953
May 26 02:04:59.219:        Attribute 61 6 00000000
May 26 02:04:59.219:        Attribute 1 8 31303130
May 26 02:04:59.219:        Attribute 30 8 32303030
May 26 02:04:59.219:        Attribute 31 8 31303130
May 26 02:04:59.219:        Attribute 40 6 00000002
May 26 02:04:59.219:        Attribute 6 6 00000001
May 26 02:04:59.219:        Attribute 26 28 0000000921166833
May 26 02:04:59.219:        Attribute 26 46 0000000918286833
May 26 02:04:59.219:        Attribute 26 37 00000009011F6833
May 26 02:04:59.219:        Attribute 26 34 000000091A1C6833
May 26 02:04:59.219:        Attribute 26 32 000000091B1A6833
May 26 02:04:59.219:        Attribute 26 56 0000000919326833
May 26 02:04:59.219:        Attribute 26 58 000000091C346833
May 26 02:04:59.219:        Attribute 26 61 000000091D376833
May 26 02:04:59.219:        Attribute 26 32 000000091E1A6833
May 26 02:04:59.219:        Attribute 26 28 000000091F166833
May 26 02:04:59.219:        Attribute 44 10 30303030
May 26 02:04:59.219:        Attribute 42 6 0003B306
May 26 02:04:59.219:        Attribute 43 6 00031FBD
May 26 02:04:59.219:        Attribute 47 6 000005A1
May 26 02:04:59.219:        Attribute 48 6 0000058A
May 26 02:04:59.219:        Attribute 46 6 00000030
May 26 02:04:59.219:        Attribute 41 6 00000000

!Client receives Leg 4, Accounting_response
May 26 02:04:59.347:RADIUS:Received from id 3 10.13.84.100:1646, Accounting-response, len
46
May 26 02:04:59.347:AAA/MEMORY:free_user (0x6230E384) user='101000' ruser='200000' port=''
rem_addr='101000/200000' authen_type=NONE service=H323_VSA priv=0

!Client receives Leg 3, Accounting_response
May 26 02:04:59.359:RADIUS:Received from id 4 10.13.84.100:1646, Accounting-response, len
46
May 26 02:04:59.359:AAA/MEMORY:free_user (0x625D6B6C) user='101000' ruser='200000'
port='ISDN 0:D:23' rem_addr='101000/200000' authen_type=NONE service=H323_VSA priv=0
AS5300_4#
```

Additional References

This following sections provide additional references.

Standards

Standard	Title
E.164	ITU E.164 Telephone numbering
G.723	ITU G.723 Speech coders
G.729	ITU G.729 Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear-prediction (CS-ACELP)
H.323	ITU-T H.323 Packet-based multimedia communications systems
ISO 639-1	ISO 639-1 Codes for the representation of names of languages
ISO 4217	ISO 4217 Type currency code list
Q.931	ITU-T Q.931 (and related standards)—ISDN user-network interface layer 3 specification for basic call control
T.35 Annex A	ITU T.35 Procedure for the allocation of ITU-T defined codes for non-standard facilities

MIBs

MIB	MIBs Link
—	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

RFC	Title
RFC 1700	*RFC 1700 - Assigned Numbers*
RFC 2543	*RFC 2543 - SIP: Session Initiation Protocol*
RFC 2865	RFC 2865 - Remote Authentication Dial In User Service (RADIUS)
RFC 2866	RFC 2866 - RADIUS Accounting

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.	https://www.cisco.com/c/en/us/support/index.html
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.	

Feature Information for RADIUS Accounting

Table 2-2 lists the features in this chapter and provides links to specific configuration information.

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 2-2 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 2-2   Feature Information for Voice VSAs

Feature Name	Releases	Feature Information
Call Detail Records (CDR) Feature Correlation ID for Supplementary Features	12.4(9)T 12.4(4)XC	Captures information about supplementary features. Added 1 new VSA. The following sections provide information about this feature: • Feature VSA for Supplementary Services, page 4-82 • Feature Correlation ID, page 4-86
SIP: Configurable Hostname in Locally Generated SIP Headers	12.4(2)T	Implements support for host or domain names in SIP headers for outbound SIP calls. Added 1 new VSA. The following section provides information about this feature: • Cisco Voice VSAs, page 4-64

Table 2-2   Feature Information for Voice VSAs (continued)

Feature Name	Releases	Feature Information
T.38 Fax Statistics	12.3(14)T	Provides detailed statistics and a fax success indicator for T.38 (fax relay) calls for voice gateways with NextPort DSPs (Cisco AS5350, Cisco AS5400 and Cisco AS5850). Added 14 new T.38 fax statistics VSAs.
		The following section provides information about this feature:
		• T.38 Fax Statistics VSAs, page 4-90
VoIP Internal Error Codes	12.3(4)T	Supports VoIP Internal Error Codes. Added 1 new VSA.
		The following sections provide information about this feature:
		• Internal Error Codes, page 4-92
Call Release Source Reporting in Gateway-Generated Call Accounting Records	12.2(13)T	Identifies the source of a call release in a Voice over IP (VoIP) network. Added 1 new VSA.
		The following section provides information about this feature:
		• Cisco Voice VSAs, page 4-64
Fax Relay Accounting Enhancement (CSCdu41005)	12.2(10) 12.2(11)T	Allows accounting differentiation for fax and voice calls. Supports billing for fax services by indicating the fax start and stop times when a voice call transitions to fax mode. Added 2 VSAs.
		The following section provides information about this feature:
		• T.38 Fax Statistics VSAs, page 4-90
GTD for RADIUS using SS7 Interconnect for Voice Gateways version 2.0	12.2(11)T	Exposes ISUP parameters to the RADIUS record when using the SS7 Interconnect for Voice Gateways, version 2.0 feature.
		The following section provides information about this feature:
		• Cisco Voice VSAs, page 4-64
IVR: Customizing Accounting Templates	12.2(11)T	Enhancements to authentication, authorization, and accounting (AAA).
		The following sections provide information about this feature:
		• Customized Accounting Records, page 2-8
		• Enabling the Voice Gateway to Use VSAs, page 2-11
		The following commands were introduced or modified by this feature: **attribute acct-session-id overloaded**, **call accounting-template voice**, **gw-accounting**.

Table 2-2 ***Feature Information for Voice VSAs (continued)***

Feature Name	Releases	Feature Information
RADIUS Number Translation VSAs for VoIP	12.2(11)T	Enables voice gateways to export translated called and calling numbers as generic VSAs. The following section provides information about this feature: • Cisco Voice VSAs, page 4-64
VoIP Trunk Group Label Routing Enhancement	12.2(11)T	Permits a routing tag for trunk group label to co-exist with Carrier ID routing tag on the gateway, gatekeeper, GKTMP, and GKAPI. The following section provides information about this feature: • Cisco Voice VSAs, page 4-64
SIP - Enhanced Billing Support for Gateways	12.2(8)T 12.2(2)XB	Provides the ability to effectively bill for traffic transported over SIP networks. Added 12 new VSAs for MSN billing and remote media. The following section provides information about this feature: • Cisco Voice VSAs, page 4-64
Interface-Descriptor VSAs	12.2(2)T	Captures description assigned to incoming and outgoing telephony ports used on the call legs. Added 2 new VSAs. The following section provides information about this feature: • Cisco Voice VSAs, page 4-64

Configuring File Accounting

This chapter describes the method of capturing accounting records in comma separated value (.csv) format and storing the records to a file in internal flash or to an external FTP server.

Contents

Prerequisites for File Accounting

- Cisco IOS XE Release 16.3.1 or a later release.
- Cisco IOS XE Cupertino 17.9.1a or a later release for transfer of call detail records (CDRs) using SFTP.

Restrictions for File Accounting

- This feature does not support Media Gateway Control Protocol (MGCP).

Information About File Accounting

To configure file accounting, you should understand the following concepts:

File Accounting Method

The file accounting feature provides a method for capturing accounting records in comma separated value (.csv) format and storing the records to a file in internal flash or to an external FTP server. It expands gateway accounting support which also includes the AAA and syslog mechanisms of logging accounting information.

The accounting process collects accounting data for each call leg created on a Cisco voice gateway. You can use this information for postprocessing activities such as generating billing records and network analysis. Cisco voice gateways capture accounting data in the form of call detail records (CDRs) containing attributes defined by Cisco. The gateway can send CDRs to a RADIUS server, syslog server, and with the new file method, to flash or an FTP server in .csv format.

Note   For redundant solutions that use HSRP, CDRs are only generated by the active router.

CDRs in .csv format use the following conventions to capture accounting attributes:

- Each CDR has a fixed number and order of predefined attribute fields. Fields with no data are included as empty fields.

- Twelve fields are generic and are used to capture feature-related information. For a basic call, the call record is generated with basic call information in the feature part of the fields. The fields are static in terms of their position, however, the definitions of the feature_vsa fields are determined by the type of feature.

- A CDR is generated for each feature that is invoked. For example, if a call leg has a basic call and then a call transfer, two CDRs are generated for the following:

  – CDR with feature fields representing the basic feature

  – CDR with feature fields representing the supplementary service, for example, call transfer

The following output is an example of a CDR for a call generated using file accounting to capture records in .csv format:

```
1,48,964484051,"12345","TWC",1234,2345, "09/01/2006 15:39:44.747"
1,49,964484062,"12345","CXFER",1234,2345,3456, "09/01/2006 15:39:44.747"
```

Configuring file accounting includes defining the primary and secondary file location for storing call records. If the file transfer to the primary device fails, the gateway retries the primary device up to the configured number of times before automatically switching over to the secondary device. You can initiate a manual switchback to the primary device when it is restored. If the secondary device also fails, the accounting process ends and the system logs an error. New CDRs are dropped until one device comes back online and you manually reset.

The gateway holds call records in memory temporarily before writing the records to the specified accounting file. It appends call records to the accounting file after a configured flush-timer limit or whenever the memory buffer becomes full. The gateway closes the accounting file and opens a new file after a configured file-close time limit or you can initiate an immediate close. Other options allow you to select the specific attributes captured in the accounting record.

For configuration information, see the "Configuring File Accounting" section on page 3-47.

File Accounting Filtering

CDRs generated by the file accounting process can be filtered using one of the following three methods, depending on your data collection needs.

Detailed File Accounting Format

Table 3-1 lists the name and order of the complete set of voice attribute fields generated in the detailed version of file accounting CDRs using the **cdr-format detailed** command.

> **Note** Fields 0 to 22 are included in the compact version of the CDR.

Table 3-1   Detailed File Accounting Attributes

Field No.	Field Name	Type	Description
0	unix_time	Long	System time stamp when CDR is captured.
1	call-id	Long	Value of the Call-ID header.
2	cdr-type	Long	Template used: 0=None 1=Call history detail 2=Custom template
3	leg-type	Long	Call leg type: 1= Telephony 2=VoIP 3=MMOIP 4=Frame Relay 5=ATM
4	h323-conf-id	String	Unique call identifier generated by the gateway. Used to identify the separate billable events (calls) within a single calling session.
5	peer-address	String	Number that this call was connected to in E.164 format.
6	peer-sub-address	String	Subaddress configured under a dial peer.
7	h323-setup-time	String	Setup time in Network Time Protocol (NTP) format: hour, minutes, seconds, microseconds, time_zone, day, month, day_of_month, year.
8	alert-time	String	Time at which call is alerting.
9	h323-connect-time	String	Connect time in NTP format: hour, minutes, seconds, microseconds, time_zone, day, month, day_of_month, year.
10	h323-disconnect-time	String	Disconnect time in NTP format: hour, minutes, seconds, microseconds, time_zone, day, month, day_of_month, year.
11	h323-disconnect-cause	String	Q.931 disconnect cause code retrieved from Cisco IOS call-control application programming interface (Cisco IOS CCAPI).
12	disconnect-text	String	ASCII text describing the reason for call termination.
13	h323-call-origin	String	Gateway's behavior in relation to the connection that is active for this leg. `answer`= Legs 1 and 3 `originate`= Legs 2 and 4 `callback` = Legs 1 and 3

Table 3-1   Detailed File Accounting Attributes (continued)

Field No.	Field Name	Type	Description
14	charged-units	Long	Number of charged units for this connection. For incoming calls or if charging information is not supplied by the switch, the value is zero.
15	info-type	String	Type of information carried by media. 1=Other 9 not described 2=Speech 3=UnrestrictedDigital 4=UnrestrictedDigital56 5=RestrictedDigital 6- audio31 7=Audio7 8=Video 9=PacketSwitched
16	paks-out	Long	Total number of transmitted packets.
17	bytes-out	Long	Total number of transmitted bytes.
18	paks-in	Long	Total number of packets received.
19	bytes-in	Long	Total number of bytes received.
20	username	String	Username for authentication. Usually this is the same as the calling number.
21	clid	String	Calling number.
22	dnis	String	Called number.
23	gtd-orig-cic	String	Originating carrier identification code, used in routing to identify the network.
24	gtd-term-cic	String	Terminating carrier identification code.
25	tx-duration	String	Duration, in ms, of transmit path open from this peer to the voice gateway for the call.
26	peer-id	Long	ID value of the peer table entry to which this call was made. If a peer table entry for this call does not exist, the value of this object is zero.
27	peer-if-index	Long	ifIndex value of the peer table entry to which this call was made. If a peer table entry for this call does not exist, the value of this object is zero.
28	logical-if-index	Long	ifIndex value of the logical interface through which this call was made. For ISDN media, this is the ifIndex of the B channel that was used for this call.
29	acom-level	Long	Average ACOM level, in dB, for the call (ACOM is the combined loss achieved by the echo canceler). 1 indicates that the level cannot be determined or level detection is disabled.
30	noise-level	Long	Average noise level for the call, in dBm.
31	voice-tx-duration	String	Duration, in ms, for this call.
32	account-code	String	Account code entered using the **Acct** soft key during call setup or when connected to an active call.
33	codec-bytes	Long	Payload size of the voice packet.
34	codec-type-rate	String	Negotiated coder rate. Transmit rate of voice/fax compression to its associated call leg for the call.
35	ontime-rv-playout	Long	Duration, in ms, of voice playout from data received on time for this call.

Table 3-1   Detailed File Accounting Attributes (continued)

Field No.	Field Name	Type	Description
36	remote-udp-port	Long	Remote system UDP listener port to which voice packets are transmitted.
37	remote-media-udp-port	Long	Remote-media gateway UDP port.
38	vad-enable	String	Whether or not voice-activity detection (VAD) is enabled for the voice call.
39	receive-delay	String	Average playout FIFO delay plus the decoder delay during the voice call.
40	round-trip-delay	String	Voice-packet round-trip delay, in ms, between local and remote devices on the IP backbone during a call.
41	hiwater-playout-delay	String	High-water mark voice playout FIFO delay during the voice call.
42	lowater-playout-delay	String	Low-water mark voice playout FIFO delay during the voice call.
43	gapfill-with-interpolation	String	Duration, in ms, of the voice signal played out with the signal synthesized from parameters or samples of data preceding and following in time because of voice data not received on time (or lost) from the voice gateway for this call.
44	gapfill-with-redundancy	String	Duration, in ms, of the voice signal played out with signal synthesized from redundancy parameters available because of voice data not received on time (or lost) from the voice gateway for this call.
45	gapfill-with-silence	String	Duration, in ms, of the voice signal replaced with the signal played out during silence because of voice data not received on time (or lost) from the voice gateway for this call
46	gapfill-with-prediction	String	Duration, in ms, of voice signal played out with signal synthesized from parameters or samples of data preceding in time because of voice data not received on time (or lost) from voice gateway for this call.
47	early-packets	Long	Number of received voice packets that arrived too early to store in the jitter buffer during the call.
48	late-packets	Long	Number of received voice packets that arrived too late to play out with the codec during the call.
49	lost-packets	Long	Number of lost voice packets during the call.
50	max-bitrate	Long	Maximum bandwidth used by the video call.
51	faxrelay-start-time	String	Fax start time in a call. Multiple fax start/stop time stamps can exist in one call. Recorded for both VoIP and telephony call legs.
52	faxrelay-stop-time	String	Fax stop time in a call. Multiple fax start/stop time stamps can exist in one call. Recorded for both VoIP and telephony call legs.
53	faxrelay-max-jit-buf-depth	String	Depth of the jitter buffer, in ms.
54	faxrelay-jit-buf-ovflow	String	Number of jitter buffer overflow events during the call.
55	faxrelay-init-hs-mod	String	Initial high-speed modulation and baud rate negotiated at the time the call is connected.
56	faxrelay-mr-hs-mod	String	Most recent high-speed modulation and baud rate.
57	faxrelay-num-pages	String	Total number of transmitted and received fax pages.
58	faxrelay-tx-packets	String	Number of packets transmitted.
59	faxrelay-rx-packets	String	Number of packets received.

Table 3-1   Detailed File Accounting Attributes (continued)

Field No.	Field Name	Type	Description
60	faxrelay-direction	String	Whether a fax was originated (transmitted) or terminated (received) by this gateway.
61	faxrelay-pkt-conceal	String	Packet loss concealment; number of white scan lines inserted (nonzero for outbound gateway only).
62	faxrelay-ecm-status	String	Whether error correction mode is enabled.
63	faxrelay-encap-protocol	String	Encapsulation protocol used for fax transfer.
64	faxrelay-nsf-country-code	String	NSF country code of the local fax device; country name per T.35, Annex A.
65	faxrelay-nsf-manuf-code	String	NSF manufacturer code of the local fax device.
66	faxrelay-fax-success	String	Whether fax transfer was successful, the transfer failed, or indeterminate.
67	override-session-time	Long	Override session time.
68	h323-ivr-out	String	AV pairs sent from the voice gateway to the RADIUS server that you can define. You can set (write) the value with a customized Tcl IVR script.
69	internal-error-code	String	Cause of failed calls. For more information, see the "Internal Error Codes" section on page 4-92.
70	h323-voice-quality	String	Value representing impairment/calculated planning impairment factor (ICPIF) of the voice quality on the connection provided by lower-layer drivers (such as the digital-signal-processor). Low numbers represent better quality.
71	remote-media-address	String	Remote-media gateway IP address.
72	remote-media-id	Long	Remote-media gateway DNS name.
73	carrier-id	Long	ISUP carrier ID.
74	calling-party-category	String	Best-fit calling party category value extracted from the Generic Transparency Descriptor (GTD). Sent in start and stop accounting messages for call legs 1 and 4. Optionally, this field also contains: • 3-character country code representing the country variant extracted from the GTD Protocol Name (PRN) country field. • National value extracted from the GTD Field Compatibility Information (FDC) data field.
75	originating-line-info	Long	Sent in start and stop accounting messages for call legs 1 and 4.
76	charge-number	String	Charge number used for call.
77	transmission-medium-req	Long	Sent in start and stop accounting records for call legs 1 and 4.
78	service-descriptor	String	Gatekeeper-related.
79	outgoing-area	String	Gatekeeper identifier, or the destination zone or area, of the outgoing VoIP call.
80	incoming-area	String	Gatekeeper identifier, or the source zone or area, of the incoming VoIP call.
81	out-trunkgroup-label	String	Trunk-group label associated with the group of voice ports from which the outgoing TDM call leaves the gateway.
82	out-carrier-id	String	Carrier ID of the trunk group through which the call leaves the gateway or the partnering voice services provider identifier of the outgoing VoIP call.

Table 3-1   Detailed File Accounting Attributes (continued)

Field No.	Field Name	Type	Description
83	dsp-id	String	DSP ID used for the current call.
84	in-trunkgroup-label	String	Trunk group label associated with the group of voice ports from which the incoming TDM call arrived on the gateway.
85	in-carrier-id	String	Carrier ID of the trunk group through which the call arrived or the partnering voice service provider identifier of the incoming VoIP call.
86	cust-biz-grp-id	String	SIP business group ID.
87	supp-svc-xfer-by	String	Transferor information in the REFER/BYE/ALSO of SIP call. Used only in SIP call transfer.
88	voice-feature	String	Type of feature: BXFER = Blind transfer CFA = Call forward all CFBY = Call forward busy CFNA = Call forward no answer CXFER = Consultative transfer TWC = Two-way call
89	feature-operation	String	Feature operation.
90	feature-op-status	String	Success (0) or failure (1).
91	feature-op-time	String	Feature operation time. Time stamp of the operation start and stop time, if applicable for a given feature.
92	feature-id	String	Feature ID of the invocation. Identifies a unique instance of a feature attribute within a gateway. This number is incremented for each added feature attribute.
93	gw-rxd-cdn	String	Called number received in the incoming signaling message before any translation rules are applied.
94	gw-rxd-cgn	String	Calling number received in the incoming signaling message before any translation rules are applied.
95	gtd-gw-rxd-ocn	String	Original calling number received by the gateway.
96	gtd-gw-rxd-cnn	String	GTD connected number.
97	gw-rxd-rdn	String	Redirection number received by the gateway.
98	gw-final-xlated-cdn	String	Called number to be sent out of the gateway.
99	gw-final-xlated-cgn	String	Calling number to be sent out of the gateway.
100	gw-final-xlated-rdn	String	Final translated received number.
101	gk-xlated-cdn	String	Called number presented by the gatekeeper in the ACF RAS message. GK/GKTMP could modify the called number by appending a prefix or leave it unchanged.
102	gk-xlated-cgn	String	Calling number presented by the gatekeeper in the ACF RAS message. The GK/GKTMP could modify the calling number which is carried in the ACF nonstandard parameter.
103	gw-collected-cdn	String	Destination number collected by the gateway (application) that is used to route the call. Only applicable for 2-stage calls.

Table 3-1   Detailed File Accounting Attributes (continued)

Field No.	Field Name	Type	Description			
104	ip-hop	String	Maximum number of hops in the SIP invite message.			
105	redirected-station	String	Redirecting number extracted from the redirect number parameter. Sent in start accounting messages for all call legs. noa=Nature of address npi=Numbering plan indicator pi=Presentation indicator #=Address of the redirecting number			
106	subscriber	String	T1/channel associated signaling (CAS) or E1/R2 signal information about a subscriber.			
107	in-intrfc-desc	String	Description assigned to the voice port of the incoming call.			
108	out-intrfc-desc	String	Description assigned to the voice port of the outgoing call.			
109	session-protocol	String	Session protocol used for calls between the local and remote router through the IP backbone. Always equal to "sip" for SIP or "Cisco" for H.323.			
110	local-hostname	String	Local hostname that would be accessed or used by the SNMP MIBs. **Note** Only if hostname is configured under localhost in voice service voip/sip, local hostname field in CDR is generated.			
111	backward-call-id	String	Sent in stop accounting messages for call legs 1 and 4. Also included in interim-update packets.			
112	feature-id_field1	String	Feature name. Two-Way Call (TWC), Call Forward All (CFA), Call Forward Busy (CFBY), Call Forward No Answer (CFNA), Blind Transfer (BXFER), Consultive Transfer (CXFER), Hold (HOLD), Resume (RESUME).			
113	feature-id_field2	String	Feature invocation time.			
			TWC	**CFA, CFNA, CFBY**	**BXFER, CXFER**	**HOLD/RESUME**
114	feature-id_field3	String	calling number	feature status (frs)	frs	frs
115	feature-id_field4	String	called number	feature ID (fid)	fid	fid
116	feature-id_field5	String	frs	fcid	fcid	fcid
117	feature-id_field6	String	fid	legID	XconsID	legID
118	feature-id_field7	String	fcid	frson	legID	hrson
119	feature-id_field8	String	legID	fdcnt	frson	holding
120	feature-id_field9	String	Not used	fwder	xsts	held
121	feature-id_field10	String	Not used	fwdee	Xor	sl
122	feature-id_field11	String	Not used	fwdto	Xee	usr
123	feature-id_field12	String	Not used	frm	Xto	tag
124	ip-phone-info	String	Information about the ip-phone that is initiating the call			
125	ip-pbx-mode	String	Indication is the CDR was generated by CME or SRST			

Table 3-1   Detailed File Accounting Attributes (continued)

Field No.	Field Name	Type	Description
126	in-lpcor-group	String	Incoming LPCOR group number
127	out-lpcor-group	String	Outgoing LPCOR group number
128	fac-digit	String	Forced Authorization Code
129	fac-status	String	Forced Authorization Status
130	MOSQe (conversational quality MOS)	String	The conversational quality MOS. Conversational quality indicates the impact of the quality of the transmission on the dynamics of conversational exchanges between two parties; such metrics take into account delay, echo, and recency.
131	Packet-Loss-Rate	String	The total number of packets lost by the jitter buffer in the RTP stream.
132	Out-of-Order-Rate	String	The total number of packets that arrive at the jitter buffer out of sequence.

Note   For description of fields 114 to 123, see the "Feature VSA Attributes" section on page 4-84.

Compact File Accounting Format

If you do not need the complete set of voice attributes supported by the file accounting process, a smaller, compact set is configurable using the **cdr-format compact** command. The compact version of the CDR captures the first 23 attributes (0 to 22) listed in Table 3-1, in the order listed.

Customized Accounting Templates

You can create accounting templates to customize your CDRs based on your billing needs. You create a template by using a text file that lists the names of the desired attributes. Only those attribute values defined in the template are sent to the accounting server.

Note   For file accounting, you cannot delete attribute fields or change the order of the attributes using an accounting template. Any attribute not included in the template appears as a blank field in the CDR.

To use a customized template for filtering the specific voice attributes included in CDRs, see the "Customized Accounting Records" section on page 2-8.

How to Configure File Accounting

This section contains the following tasks:

Configuring File Accounting

To generate CDRs in file format (.csv), perform the following steps.

Note From Cisco IOS XE Cupertino 17.9.1a onwards, both FTP and SFTP passwords are encrypted.

Prerequisites

- Cisco IOS XE Release 16.3.1 or a later release.

Restrictions

FTP or SFTP servers in Cisco IOS software are not supported because they cannot append CDRs to a file, so every flush would create a new file.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **gw-accounting file**
4. **primary** {{**ftp** | **sftp** } *path/filename* **username** *username* **password** *password* | **ifs** *device***:***filename*}
5. **secondary** {{**ftp** | **sftp**} *path/filename* **username** *username* **password** *password* | **ifs** *device***:***filename*}
6. **maximum retry-count** *number*
7. **maximum buffer-size** *kbytes*
8. **maximum fileclose-timer** *minutes*
9. **maximum cdrflush-timer** *minutes*
10. **cdr-format** {**compact** | **detailed**}
11. **acct-template** {*template-name* | **callhistory-detail**}
12. **end**

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	**gw-accounting file** **Example:** Router(config)# gw-accounting file	Enables the file method of accounting.
Step 4	**primary** {{**ftp** | *sftp} path/filename* **username** *username* **password** *password* | **ifs** *device:filename*} **Example:** Router(config-gw-accounting-file)# primary ftp server1/cdrtest1 username bob password mypass **Example:** Router(config-gw-accounting-file)# primary sftp server1/cdrtest1 username bob password mypass	(Optional) Sets the primary location for storing the CDRs generated for file accounting. • **ftp** *path/filename*—Name and location of the file on an FTP server. • **sftp** *path/filename*—Name and location of the file on an SFTP server. • **ifs** *device***:***filename*—Name and location of the file in flash memory or other internal file system on this router. Values depend on the storage devices available on the router, for example flash or slot0. • **username** *username*—User ID for authentication. • **password** *password*—Password user enters for authentication. • Default: **flash:cdr**.
Step 5	**secondary** {{**ftp** | sftp} *path/filename* **username** *username* **password** *password* | **ifs** *device:filename*} **Example:** Router(config-gw-accounting-file)# secondary ifs flash:cdrtest2	(Optional) Sets the backup location for storing CDRs if the primary location becomes unavailable. • **ftp** *path/filename*—Name and location of the backup file on an FTP server. • **sftp** *path/filename*—Name and location of the file on an SFTP server. • **ifs** *device***:***filename*—Name and location of the backup file in flash memory or other internal file system on this router. Values depend on the storage devices available on the router, for example flash or slot0. • **username** *username*—User ID for authentication. • **password** *password*—Password user enters for authentication. • Default: **flash:cdr**.

	Command or Action	Purpose
Step 6	**maximum retry-count** *number* **Example:** Router(config-gw-accounting-file)# maximum retry-count 3	(Optional) Sets the maximum number of times the router attempts to connect to the primary file device before switching to the secondary device. • *number*—Number of connection attempts. Range:1 to 5. Default: 2.
Step 7	**maximum buffer-size** *kbytes* **Example:** Router(config-gw-accounting-file)# maximum buffer-size 25	(Optional) Sets the maximum size of the file accounting buffer. • *kbytes*—Maximum buffer size, in kilobytes. Range: 6 to 40. Default: 20.
Step 8	**maximum fileclose-timer** *minutes* **Example:** Router(config-gw-accounting-file)# maximum fileclose-timer 300	(Optional) Sets the maximum time for writing records to an accounting file before closing it and creating a new file. • *minutes*—Maximum time, in minutes, to write records to an accounting file. Range: 60 to 1,440. Default: 1,440 (24 hours). • Set this file close timer to at least five minutes longer than the flush timer set with the **maximum cdrflush-timer** command.
Step 9	**maximum cdrflush-timer** *minutes* **Example:** Router(config-gw-accounting-file)# maximum cdrflush-timer 245	(Optional) Sets the maximum time to hold call records in the buffer before appending the records to the accounting file. • *minutes*—Maximum time, in minutes, to hold call records in the accounting buffer. Range: 1 to 1,435. Default: 60 (1 hour). • Set this flush timer to at least five minutes less than the file close timer set with the **maximum fileclose-timer** command.
Step 10	**cdr-format** {**compact**	**detailed**} **Example:** Router(config-gw-accounting-file)# cdr-format compact	(Optional) Selects the format of the CDRs generated for file accounting. • **compact**—Compact set of voice attributes is generated in CDRs. • **detailed**—Full set of voice attributes is generated in CDRs. Default value.
Step 11	**acct-template** {*template-name*	**callhistory-detail**} **Example:** Router(config-gw-accounting-file)# acct-template custom1	(Optional) Selects the voice attributes to collect. • *template-name*—Name of custom accounting template that defines the attribute values to collect. • **callhistory-detail**—Collects all voice VSAs for accounting.
Step 12	**end** **Example:** Router(config-gw-accounting-file)# end	Exits to privileged EXEC mode.

Manually Initiating File Processes

To manually flush the buffer or to force a switch back to the primary file device from the secondary device, perform the following steps.

Prerequisites

- Cisco IOS XE Release 16.3.1 or a later release.

SUMMARY STEPS

1. **enable**
2. **file-acct flush** {**with-close** | **without-close**}
3. **file-acct reset**

DETAILED STEPS

	Command or Action	Purpose

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

Step 2	`file-acct flush {with-close	without-close}`  **Example:** `Router# file-acct flush with-close`	(Optional) Flushes pending accounting records to the file and closes the file.

Step 3	`file-acct reset`
	
	Example:
	`Router# file-acct reset`
		(Optional) Switches back to the primary file location after flushing records to the active location.

Troubleshooting File Accounting

To troubleshoot the file accounting configuration, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **debug voip fileacct**
3. **debug voip dump-file-acct**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**debug voip fileacct** **Example:** Router# debug voip fileacct	Displays debugging messages related to generating attributes for file accounting.
Step 3	**debug voip dump-file-acct** **Example:** Router# debug voip dump-file-acct	Displays debugging messages related to file accounting flushing processes.

Configuration Examples for File Accounting

This section contains the following examples:

File Accounting Configuration: Example

```
Router# show running-config | section gw-accounting

gw-accounting file
 primary ftp [server]/cdrtest1 username bob password 6 TI[^VcViOKEXJbU_I^UWNYBfHQbKfOAAB
 secondary ifs flash:cdrtest2
 maximum buffer-size  15
 maximum retry-count 3
 maximum fileclose-timer 300
 maximum cdrflush-timer 245
 cdr-format compact

gw-accounting file
 primary sftp 203.0.113.13/cdrtest username bob password 6 P^AV^_3
 secondary ifs flash:cdrtest2
 maximum buffer-size  15
 maximum retry-count 3
 maximum fileclose-timer 300
 maximum cdrflush-timer 245
 cdr-format compact

gw-accounting file
 primary sftp [2001:420:54ff:13::312:175]//cdrtest username bob password 6 P^AV^_3
 secondary ifs flash:cdrtest2
 maximum buffer-size  15
 maximum retry-count 3
 maximum fileclose-timer 300
 maximum cdrflush-timer 245
 cdr-format compact
```

File Accounting Filename: Example

The following examples show how the accounting file is given a unique name when it is created. The router hostname and time stamp are appended to the filename that you assign with the **primary** command at the time the accounting file is created.

```
cme-2821(config)# primary ftp server1/cdrtest1 username bob password temp
cme-2821(config)# primary sftp server1/cdrtest1 username bob password temp
```

The name of the accounting file that is created uses the *filename.hostname.timestamp* format:

```
cdrtest1.cme-2821.06_04_2007_18_44_51.785
```

File Accounting Detailed CDR: Example

The following example shows a CDR captured by file accounting using the detailed format. Because file accounting records are in .csv format, fields with no data are included as empty fields.

```
1746114646, 26529506, 1, 2, 7138BE00 10000 60D2A 4211A845, 6158626400, 15:46:29.800 UTC Thu May 1 2025,
15:46:35.470 UTC Thu May 1 2025, 15:50:46.640 UTC Thu May 1 2025, 10, normal call clearing (16), originate,
0, speech, 12703, 2540600, 12731, 2546200, 6153918077, 6153918077, 6158626400, "", "", 25117ms, 1102, 11, 0,
"", "", "", "", 160, g711ulaw, 0, 5060, 13088, disable, 0 ms, 11870 ms, 0 ms, 0 ms, 0 ms, 0 ms, 0 ms, 0 ms,
0, 0, 0, "", "", "", "", "", "", "", "", "", "", "", "", "", "", "", "", 251, "", "", 0, 192.168.224.196,
"", "", "", "", "", "", "", "", "", "", "", "", "", "", "", "", "", "", "", "",
ton:0,npi:0,#:+16158626400, ton:0,npi:0,pi:0,si:1,#:6153918077, "", "", "", ton:0,npi:0,#:6158626400,
ton:0,npi:0,pi:0,si:1,#:6153918077, "", "", "", "", "", "", Unknown, "", "", sipv2, "", "", TWC, 46:29.8,
6153918077, 6158626400, 0, 20768387, 7138BE00 10000 60D2A 4211A845, 194CEE2, "", "", "", "", "", "", "", "",
"", "", 1, 0.00%, 0.00%
```

```
11780434730,8,1,1,"9D4B0CA F74711DB 800D96DB A749148A","0163","","11:17:23.413 pdt Tue May 1
2007","11:17:23.413 pdt Tue May 1 2007","11:17:26.023 pdt Tue May 1 2007","11:17:53.243 pdt Tue May 1
2007","10  ","normal call clearing (16)","",0,"",0,0,0,0,"5105550160","5105550160","0163","","","0
ms",20005,29,28,0,0,"0
ms","","","g711ulaw","","","","","","","","","","","","","","","","","","","","","","","","","","","","","
","","","27,"Tariff:Unknown","","0","","","","","","","","","","","","","","","","","","","","","","","ton:
0,npi:0,pi:0,si:0,#:5105550160","","","","","ton:0,npi:0,pi:0,si:0,#:5105550160","","","","0163","","","Regul
arLine","","","","","","CXFER","05/01/2007 11:17:53.239",0,17,9D4B0CA F74711DB 800D96DB
A749148A,"1BD61",8,0,5,"5105550163","5105550160","3002"

11780434730,8,1,1,"9D4B0CA F74711DB 800D96DB A749148A","0163","","11:17:23.413 pdt Tue May 1
2007","11:17:23.413 pdt Tue May 1 2007","11:17:26.023 pdt Tue May 1 2007","11:17:53.243 pdt Tue May 1
2007","10  ","normal call clearing (16)","",0,"",0,0,0,0,"5105550160","5105550160","0163","","","0
ms",20005,29,28,0,0,"0
ms","","","g711ulaw","","","","","","","","","","","","","","","","","","","","","","","","","","","","","
","","","27,"Tariff:Unknown","","0","","","","","","","","","","","","","","","","","","","","","","","ton:
0,npi:0,pi:0,si:0,#:5105550160","","","","","ton:0,npi:0,pi:0,si:0,#:5105550160","","","","0163","","","Regul
arLine","","","","","","TWC","05/01/2007 11:17:23.407","5105550160","0163",0,14,9D4B0CA F74711DB 800D96DB
A749148A,8,"","","",""

11780434730,9,1,1,"1B795560 F74711DB 801296DB A749148A","5105550163","","11:17:51.323 pdt Tue May 1
2007","","11:17:53.263 pdt Tue May 1 2007","11:17:53.263 pdt Tue May 1 2007","10  ","normal call clearing
(16)","",0,"",0,0,0,0,"5105550163","5105550163","","","","0 ms",20006,30,28,0,0,"0
ms","","","None","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","
","",0,"Tariff:Unknown","","0","","","","","","","","","","","","","","","","","","","","","","ton:0,npi
:0,pi:0,si:0,#:5105550163","","","","","","","","","3002","","","RegularLine","","","","","","CXFER","05/01/2
007 11:17:53.251",0,22,9D4B0CA F74711DB 800D96DB A749148A,"1BD61",9,0,2,"5105550163","5105550160","3002"

11780434730,9,1,1,"1B795560 F74711DB 801296DB A749148A","5105550163","","11:17:51.323 pdt Tue May 1
2007","","11:17:53.263 pdt Tue May 1 2007","11:17:53.263 pdt Tue May 1 2007","10  ","normal call clearing
(16)","",0,"",0,0,0,0,"5105550163","5105550163","","","","0 ms",20006,30,28,0,0,"0
ms","","","None","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","
","",0,"Tariff:Unknown","","0","","","","","","","","","","","","","","","","","","","","","","ton:0,npi
:0,pi:0,si:0,#:5105550163","","","","","","","","","3002","","","RegularLine","","","","","","TWC","05/01/200
7 11:17:51.323","5105550163","",0,15,1B795560 F74711DB 801296DB A749148A,9,"","","",""
```

File Accounting Compact CDR: Example

The following example shows a CDR captured by file accounting using the compact format.

```
11783007890,16,1,1,"36CDEBEC F99E11DB 8025D2A3 19FAB826","6002","","10:46:26.329 pdt Fri May 4
2007","10:46:26.329 pdt Fri May 4 2007","10:46:27.149 pdt Fri May 4 2007","10:46:29.899 pdt Fri May 4
2007","10  ","normal call clearing (16)","",0,"",0,0,0,0,"5105550160","5105550160","6002","TWC","05/04/2007
10:46:26.333","5105550160","6002",0,16,36CDEBEC F99E11DB 8025D2A3 19FAB826,10,"","","",""
11783007890,15,1,1,"36CDEBEC F99E11DB 8025D2A3 19FAB826","5105550160","","10:46:25.709 pdt Fri May 4
2007","","10:46:27.159 pdt Fri May 4 2007","10:46:29.909 pdt Fri May 4 2007","10  ","normal call clearing
(16)","",0,"",0,0,0,0,"5105550160","5105550160","","TWC","05/04/2007
10:46:25.717","5105550160","",0,15,36CDEBEC F99E11DB 8025D2A3 19FAB826,F,"","","",""
```

Hold and Resume CDR: Example

The following example shows CDR stop records captured by file accounting for Hold and Resume. Because file accounting records are in .csv format, fields with no data are included as empty fields.

In this example, extension 3000 calls extension 5000, which is a shared line. Extension 5000 is shared by phone 5 (mbrown) and phone 7 (jsmith). The Hold record shows that Phone 7 answered the call and put the call on hold. Phone 5 then resumed the call as shown in the Resume record.

```
1194293905,6,0,1,"9C7B4D61 8B1311DC 8010A883 AC60BEF4","","","12:18:00.365 pst Mon Nov 5 2007","12:18:00.375
pst Mon Nov 5 2007","12:18:02.015 pst Mon Nov 5 2007","12:18:25.205 pst Mon Nov 5
2007","","","",0,"",0,0,1145,183200,"1.5.10.7","3000","5000","","","","","","","","","","","","","","","","","",",
","","","","","","","","","","","","","","","","","","","","","","","","","","","","",
23,"Tariff:Unknown","","0","","","","","","","","","","","","","","","","","","","","","","","",
"ton:0,npi:0,#:5000","ton:0,npi:0,#:3000","","","","","ton:0,npi:0,#:3000","","","","","","",
"Unknown","","","","","","HOLD","11/05/2007 12:18:13.179",0,31,11B2208B 8B1311DC 8010F5E9
5DD6F9BF,6,1,"5000","3000","sl:1,usr:jsmith,tag:7","dn:shared,usr:jsmith,tag:7","cme"

1194293905,6,0,1,"9C7B4D61 8B1311DC 8010A883 AC60BEF4","","","12:18:00.365 pst Mon Nov 5 2007","12:18:00.375
pst Mon Nov 5 2007","12:18:02.015 pst Mon Nov 5 2007","12:18:25.205 pst Mon Nov 5
2007","","","",0,"",0,0,1145,183200,"1.5.10.7","3000","5000","","","","","","","","","","","",
"","","","","","","","","","","","","","","","","","","","","","","","","","","","","","",""
,"",23,"Tariff:Unknown","","0","","","","","","","","","","","","","","","","","","","","","","",
"","ton:0,npi:0,#:5000","ton:0,npi:0,#:3000","","","","","ton:0,npi:0,#:3000","","","","","","","Unknown","",
"","","","","RESUME","11/05/2007 12:18:11.043",0,28,106C3341 8B1311DC 800FF5E9
5DD6F9BF,6,0,"5000","3000","sl:1,usr:mbrown,tag:5","dn:shared,usr:jsmith,tag:7","cme"
```

Feature Information for File Accounting

Table 3-2 lists the release history for this feature.

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 3-2 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 3-2   *Feature Information for File Accounting with FTP and Flash Storage*

Feature Name	Releases	Feature Information
Call Detail Records Comma Separated Value Format with FTP and Flash Storage	12.4(20)T 12.4(15)XY	Adds file accounting method that stores call records in .csv format. The following commands were introduced or modified by this feature: **acct-template**, **debug voip dump-file-acct**, **debug voip fileacct**, **file-acct flush**, **file-acct reset**, **gw-accounting**, **maximum buffer-size**, **maximum cdr-format**, **maximum cdrflush-timer**, **maximum fileclose-timer**, **maximum retry-count**, **primary**, **secondary**.

VSA Definitions

This chapter lists the VSAs supported by Cisco voice products.

Contents

Note

- VSAs are platform-independent and comply with voice gateways supported by Cisco.
- Cisco voice-specific VSAs have been developed for VoIP features during the span of numerous Cisco IOS releases. See the "VSA Release History" section on page 4-93 to find the Cisco IOS release in which specific VSAs were introduced.

Cisco Voice VSAs

Table 4-1 lists (in alphabetical order) the VSAs used by Cisco voice calls.

Table 4-1   *VSAs Supported by Cisco Voice Calls*

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
account-code	1	String	`56222`	Account code entered using the Acct soft key during call setup or when connected to an active call.
acom-level	1	Integer -1 to 45 (dB)	`42`	Average ACOM level, in dB, for the call (ACOM is the combined loss achieved by the echo canceler). The value -1 indicates that the level cannot be determined or level detection is disabled.
authorized-services	1	`1`: Framed `2`: Voice `3`: Fax `4`: Modem passthru	`2`	Services that are authorized for the user by the RPMS server. There can be multiple instances of this VSA in an access-accept packet.
backward-call-indicators=*text*	1	`cha:t1,sta:t2,cpc:t3,e2ei:t4,e2em:t5,inter:t6,iupu:t7,h:t8,acc:t9,eco:t10,sccpm:t11` where: `t1`: Charge indicator `t2`: Called-party status indicator `t3`: Called-party category indicator `t4`: End-to-end information indicator `t5`: End-to-end method indicator `t6`: Interworking indicator `t7`: ISDN user part indicator `t8`: Hold indicator `t9`: ISDN access indicator `t10`: Echo control device indicator `t11`: SCCP method indicator	`cha:y,sta:f,cpc:o,e2ei:n,e2em:n,inter:y,iupi:n,h:n,acc:n,eco:n,sccpm:u`	The BCI VSA is generated by the gateway's RADIUS client and, where available, is sent to the RADIUS server in stop accounting messages for call legs 1 and 4. The BCI VSA is also included in interim-update packets.

Table 4-1   VSAs Supported by Cisco Voice Calls (continued)

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
call-id=*value*	1	String. Syntax is per RFC 2543.	`CBA33553-65FC0702-0-1F4D0B30@198.78.252.51 or 82BABC3E-720311D8-801D8402F4B51A50@yahoo.com`	Value of the Call-ID header.
calling-party-category=*text1* [,country:*text2*,national-value: *text3*]	1	String: `[,country:<country code>,national-value: national code]`	`calling-party-category=29,country:TH*,national-value:FA`	The CPC VSA is generated by the gateway's RADIUS client and, where available, is sent to the RADIUS server in start and stop accounting messages for call legs 1 and 4. *text1* contains the best-fit calling party category value extracted from the Generic Transparency Descriptor (GTD) CPC and stored in a *TDUserContainer*. If Field Compatibility Information (FDC) is populated and the FDC parameter value is *CPC* and the FDC field value is *cpc*, then the optional fields enclosed in [ ] are added to the CPC VSA. *country* contains the 3-character country code representing the country variant extracted from the GTD Protocol Name (PRN) country field and stored in a *TDUserContainer*. *text2* contains the national value extracted from the GTD FDC data field and stored in a *TDUserContainer*.
call-origin-endpt	1	String	`192.168.1.1`	Originating gateway or gatekeeper of a leg 3 VoIP call. Contains either the IP address of the originating gateway or the interzone ClearToken (IZCT) of the originating gatekeeper zone.
call-origin-endpt-type	1	`1`: IP address `2`: IZCT	`1`	Type of information contained in call-origin-endpt.

Table 4-1   *VSAs Supported by Cisco Voice Calls (continued)*

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
charge-number=*text*	1	Integer	3035550199	The CHN VSA is generated by the gateway's RADIUS client and, where available, is sent to the RADIUS server in start and stop accounting messages for call legs 1 and 4.
charged-units	1	Unsigned integer	0	Number of charged units for this connection. For incoming calls or if charging information is not supplied by the switch, the value of this object is zero.
Cisco-NAS-port	2	String of characters and numbers	BRI0/0:1	Incoming port identification on NAS or gateway. The syntax is as follows: `signalling type controller: timeslot group/control channel: bearer channel` This VSA has the same function as RADIUS attribute 5, and uses strings assigned by Cisco IOS software to its hardware ports.
codec-bytes	1	Unsigned integer	160	Payload size of the voice packet.

Table 4-1   VSAs Supported by Cisco Voice Calls (continued)

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description

coder-type-rate=*string*	1	String
		
		For voice calls:
		
		`g729r8`
		`g729br8`
		`g729ar8`
		`g729abr8`
		`g729br8`
		`g726r16`
		`g726r24`
		`g726r32`
		`g711alaw`
		`g711ulaw`
		`g728`
		`g723r63`
		`g723r53`
		`g723ar63`
		`g723ar53`
		`clear-channel`
		`gsm`
		`gsmfr`
		`gsmefr`
		`transparent`
		`no-upspeed`
		`voice`
		`none`
		
		For fax calls:
		
		`2400`
		`4800`
		`7200`
		`9600`
		`12000`
		`14400`
		`disable`
			`g711ulaw`	Negotiated coder rate. Specifies the transmit rate of voice/fax compression to its associated call leg for the call.

disconnect-text	1	String	`normal call clearing`	ASCII text describing the reason for call termination.
early-packets	1	Unsigned integer	`1`	Number of received voice packets that arrived too early to store in jitter buffer during the call.
feature-vsa	1	String	`"feature-vsa=fn :TWC,ft:10/28/2 005 01:30:27.775,cg n:1011011006,cd n:1011011007,fr s:0,fid=36,fcid :411CC18B468911 DA801DE37EC374A 8C6, legID:13"`	Captures feature-specific information. There can be multiple instances of this VSA in a start or stop record. For information, see the "Feature VSA for Supplementary Services" section on page 4-82.

Table 4-1   *VSAs Supported by Cisco Voice Calls (continued)*

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
gapfill-with-interpolation	1	`## ms`	`0 ms`	Duration, in ms, of voice signal played out with signal synthesized from parameters or samples of data preceding and following in time because of voice data not received on time (or lost) from the voice gateway for this call.
gapfill-with-prediction	1	`## ms`	`0 ms`	Duration, in ms, of voice signal played out with signal synthesized from parameters or samples of data preceding in time because of voice data not received on time (or lost) from the voice gateway for this call. An example of such playout is frame-erasure or frame-concealment strategies in G.729 and G.723.1 compression algorithms. This counter object locks at the maximum value, which is approximately two days.
gapfill-with-redundancy	1	`## ms`	`0 ms`	Duration, in ms, of voice signal played out with signal synthesized from redundancy parameters available because of voice data not received on time (or lost) from the voice gateway for this call.
gapfill-with-silence	1	`## ms`	`0 ms`	Duration, in ms, of voice signal replaced with signal played out during silence because of voice data not received on time (or lost) from voice gateway for this call.
gk-xlated-cdn	1	String	`8539663`	The gatekeeper presented called number in the ACF RAS message. The GK/GKTMP could modify the called number by appending a prefix or it could be left unchanged.
gk-xlated-cgn	1	String	`7324501661`	The gatekeeper presented calling number in the ACF RAS message. The GK/GKTMP could modify the calling number which is carried in the ACF nonstandard parameter.

Table 4-1   VSAs Supported by Cisco Voice Calls (continued)

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description

gtd-gw-rxd-cnn	1	Integer
		
		Values:
		
		`noa:ff`
		`npi:g, pi:h`
		`si:i, #:e`
		
		where:
		`ff`: 0–34
		`g`: 0,1
		`h`: 0–3
		`i`: 1,2,3,4,252
		`e`: number in E.164 format
			4505550121	GTD connected number.

gw-collected-cdn	1	String	4088539663	The gateway (application) collected destination number that will eventually be used for routing the call. Only applicable for 2-stage calls.

gw-final-xlated-cdn	1	Integer
		
		Values:
		
		`ton:d`
		`npi:aa`
		`#:e`
		
		where:
		`d` = 0–7
		`aa` = 0–15
		`e` = number in E.164 format
			8539663	Called number to be sent out of the gateway.

gw-final-xlated-cgn	1	Integer
		
		Values:
		
		`ton:d`
		`npi:aa`
		`pi:b`
		`si:c`
		`#:e`
		
		where:
		`d` = 0–7
		`aa` = 0–15
		`b` = 0–3
		`c` = 0–3
		`e` = number in E.164 format
			7324501661	Calling number to be sent out of the gateway.

Table 4-1   VSAs Supported by Cisco Voice Calls (continued)

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description

gw-rxd-cdn	1	Integer
		
		Values:
		
		`ton:d`
		`npi:aa`
		`#:e`
		
		where:
		`d` = 0–7
		`aa` = 0–15
		`e` = Number in E.164 format
			`18008567335`	Called number as received by the gateway in the incoming signaling message before any translation rules are applied.

gw-rxd-cgn	1	Integer
		
		Values:
		
		`ton:d`
		`npi:aa`
		`pi:b`
		`si:c`
		`#:e`
		
		where:
		`d` = 0–7
		`aa` = 0–15
		`b` = 0–3
		`c` = 0–3
		`e` = Number in E.164 format
			`5102261709`	Calling number as received by the gateway in the incoming signaling message before any translation rules are applied.

h323-billing-model=*value*	109	`0` = Credit customer (post-paid) `1` = Debit card (prepaid) `2` = Limited service (prepaid)	`1`	Type of billing service for a specific call.
h323-call-origin=*value*	26	`answer`=Legs 1 and 3 `originate`=Legs 2 and 4 `callback`=Legs 1 and 3	`answer`	Gateway's behavior in relation to the connection that is active for this leg. For example, answer on leg 1; originate on leg 2; callback on leg 1.

h323-call-type=*value*	27	`Telephony`
		`VOIP`
		`VOFR`
			`VOIP`	Protocol type or family used on this leg of the call.

Table 4-1   VSAs Supported by Cisco Voice Calls (continued)

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
h323-conf-id=*value*	24	16-byte number in hexadecimal notation with one space between each 4-byte integer	`0f332211 0a332255 89767673 898783ff`	Unique call identifier generated by the gateway. Used to identify the separate billable events (calls) within a single calling session. In Cisco IOS call-control application programming interface (Cisco IOS CCAPI), this value is called the globally unique identifier (GUID). The h323-conf-id is different from the h323-incoming-conf-id. For example, in long pound calls (calls in which you press the # key to make a new call) with a prepaid application, a new h323-conf-id value is generated for each new call. The new value is generated in the leg following authorization (either leg 2 or leg 4) and is subsequently passed to each downstream leg. Gateway-retries because of a connection request failure do not result in a new value; each retry uses the same h323-conf-id value.
h323-connect-time=*value*[1]	28	`hh:mm:ss:mmm ZON DDD MMM ## YYYY`	`18:27:30:094 PST Fri Aug 25 2000`	Connect time in Network Time Protocol (NTP) format: hour, minutes, seconds, microseconds, time_zone, day, month, day_of_month, and year.
h323-credit-amount=*value*	101	Decimal digits in format `n.nn or n`	`1000.00` = one thousand; `1000` = 1000 cents or 10.00	Amount of credit (in currency) that the account contains.
h323-credit-time=*value*	102	Integer in decimal notation	`300`	Number of seconds for which the call is authorized.
h323-currency=*value*	110	3-character value from ISO 4217	`USD`	Currency for use with h323-credit-amount.
h323-disconnect-cause=*value*	30	2-character, ASCII-encoded hexadecimal number representing a Q.931 code. Range: `01` to `A0` (which is 1 to 160 decimal)	`4`	Q.931 disconnect cause code retrieved from CCAPI. The source of the code is the disconnect location such as a PSTN, terminating gateway, or SIP.

Table 4-1   VSAs Supported by Cisco Voice Calls (continued)

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
h323-disconnect-time=*value*	29	`hh:mm:ss:mmm ZON DDD MMM ## YYYY`	`18:27:30.094 PST Fri Aug 25 2000`	Disconnect time in NTP format: hour, minutes, seconds, microseconds, time_zone, day, month, day_of_month, year.
h323-gw-id=*value*	33	Character string	`bowie.cisco.com, AS5300_5`	Domain name server (DNS) name or local name of the voice gateway that is sending the VSA.
h323-incoming-conf-id=*value*	1	16-byte number in hexadecimal notation with one space between each 4-byte integer	`57166451 A69E11D6 808D87CA 50D5D35A`	Unique number for identifying a calling session on a gateway, where a session is closed when the calling party hangs up. Is used to do the following: • Match the outbound and inbound call legs for a session on a particular gateway • Collect and match all records for multiple calls placed (within the bounds of a session) on the gateway The value used for legs 1 and 2 on the originating gateway can differ from that for legs 3 and 4 on a terminating gateway. The h323-incoming-conf-id is different from h323-conf-id. For example, the h323-incoming-conf-id value remains the same in the start/stop records for long pound calls.
h323-ivr-in=*value_1*:*value_2*	1	Customer defined	`color:red`	User-definable AV pairs sent from the RADIUS server to the voice gateway. You can read and use the value at the gateway with a customized Tcl IVR script.
h323-ivr-out=*value_1*:*value_2*	1	Customer defined	`color:blue`	User-definable AV pairs sent from the voice gateway to the RADIUS server. You can set (write) the value with a customized Tcl IVR script.
h323-preferred-lang=*value*	107	2-character code from ISO 639-1	`en`	Language to use when playing the audio prompt specified by the h323-prompt-id.
h323-prompt-id=*value*	104	Integer in decimal notation	`27`	Index into an array that selects prompt files used at the gateway.
h323-redirect-ip-address=*value*	108	Numerals in dotted decimal notation	`192.168.175.16`	IP address for an alternate or redirected call.

Table 4-1   VSAs Supported by Cisco Voice Calls (continued)

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
h323-redirect-number=*value*	106	E.164 format (decimal digits with no spacing characters)	14085550111	Phone number to which the call is redirected; for example, to a toll-free number or a customer service number.
h323-remote-address=*value*	23	Numerals in dotted decimal notation: nnn.nnn.nnn.nnn	10.10.17.128	IP address of the remote gateway.
h323-remote-id=*value*	1	String	joshi4.mydomain	DNS name or locally defined hostname of the remote gateway.
h323-return-code=*value*	103	Decimal numbers	0	Return codes are instructions from the RADIUS server to the voice gateway.
h323-setup-time=*value*	25	hh:mm:ss.mmm ZON DDD MMM ## YYYY	18:27:28.032 UTC Wed Dec 9 1998	Setup time in NTP format: hour, minutes, seconds, microseconds, time_zone, day, month, day_of_month, year.
h323-time-and-day=*value*	105	Decimal number: hh:mm:ss	10:36:57	Time of day at the dialed number or at the remote gateway in the format: hour, minutes, seconds.
h323-voice-quality=*value*	31	Decimal numbers from ICPIF table of G.113	5	Value representing impairment/calculated planning impairment factor (ICPIF) of the voice quality on the connection provided by lower-layer drivers (such as the digital signal processor). Low numbers represent better quality.
hiwater-playout-delay	1	## ms	65 ms	High-water mark Voice Playout FIFO Delay during the voice call.
in-carrier-id	1	String	carrier A	Carrier ID of the trunk group through which the call arrived or the partnering voice service provider identifier of the incoming VoIP call.
incoming-area	1	String	ingress-zone	Gatekeeper identifier, or the source zone or area, of the incoming VoIP call.
incoming-req-uri=*value*	1	String. Syntax is as per RFC 2543.	sip:5550112@cisco.com;user=phone	Request-URI as given in the incoming request-line, including any url-parameters.

Table 4-1   VSAs Supported by Cisco Voice Calls (continued)

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
info-type	1	String. Values are: 1=other (not described) 2=speech 3=unrestrictedDigital 4=unrestrictedDigital56 5=restrictedDigital 6=audio31 7=audio7 8=video 9=packetSwitched	`2`	Type of information carried by media.
in-intrfc-desc	1	String (replaces `in-portgrp-id`)	`desc-A`	Description assigned to the voice port of the incoming call.
in-portgrp-id=*text*	1	ASCII string associated with the port on the gateway used by this call.	<Service Provider ID>	Description associated with the incoming hardware telephony port that is used with this leg of the call. **Note** This VSA was replaced by in-intrfc-desc in Cisco IOS Release 12.2(11)T.
internal-error-code	1	String	`1.1.179.2.37.0`	Cause of failed calls. For more information, see the "Internal Error Codes" section on page 4-92.
in-trunkgroup-label	1	String	`trunk-1`	Contains the trunk group label associated with the group of voice ports from which the incoming time-division multiplexing (TDM) call arrived on the gateway.

ip-pbx-mode	1	String. Values:
		`cme`
		`srst`
			`srst`	Identifies whether call record is generated by a Cisco Unified SRST or Cisco Unified CME router.

ip-phone-info	1	String	`"ip-phone-info=dn:shared,usr:jsmith,tag:7"`	SCCP phone involved in a call on a shared line. For information, see the "IP Phone Information Attribute for Shared Lines" section on page 4-81.
isup-carrier-id=*text*	1	String	`1212`	The CID VSA is generated by the gateway's RADIUS client and, where available, is sent to the RADIUS server in start and stop accounting messages for call legs 1 and 4.
late-packets	1	Unsigned integer	`0`	Number of received voice packets that arrived too late to play out with codec during the call.

Table 4-1   VSAs Supported by Cisco Voice Calls (continued)

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
local-hostname	1	String	`hostname.com`	Local hostname accessed or used by the SNMP MIBs.
logical-if-index	1	Integer	`30`	ifIndex value of the logical interface through which this call was made. For ISDN media, this is the ifIndex of the B channel that was used for this call.
lost-packets	1	Unsigned integer	`0`	Number of lost voice packets during the call.
lowater-playout-delay	1	`## ms`	`25 ms`	Low-water mark Voice Playout FIFO Delay during the voice call.
max-bit-rate	1	Integer		Maximum bandwidth used by video call.
Mos-Con	1	Integer	`4.4072`	MOSQe (conversational quality MOS). Conversational quality indicates the impact of the quality of the transmission on the dynamics of conversational exchanges between two parties; such metrics take into account delay, echo, and recency. **Note:** This VSA was introduced in Cisco IOS Release 16.3.1
method=*value*	1	String	`INVITE`	Method name as specified in the request-line.
next-hop-dn=*value*	1	String of the form `FQDN[:port] [/protocol]` where FQDN is a host, domain name, or dotted IP address (for other field descriptions, see prev-hop-ip)	`next-hop-dn= company.com`	Domain name (DN) or fully qualified domain name (FQDN) where the request is forwarded. When DNS SRV is used to resolve the address, then this contains the DN name. (Note that this means that the FQDN is not included.) If only a DNS A query is used to resolve the next hop IP address, then this is the FQDN name. If no resolution is needed, meaning that a dotted IP address was found in a static route entry or the request-uri, then this attribute is not included in the accounting message.
next-hop-ip=*value*	1	String (same syntax as prev-hop-ip)	`192.168.16.2`	Next-hop IP address where the request is forwarded.
noise-level	1	`Integer -100..8`	`-74`	Average noise level for the call, in dBm.

Table 4-1   *VSAs Supported by Cisco Voice Calls (continued)*

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
ontime-rv-playout	1	Unsigned integer (ms)	`27460`	Duration, in ms, of voice playout from data received on time for this call, in ms. This plus the durations for the GapFills entries provides the Total Voice Playout Duration for Active Voice.
originating-line-info=*text*	1	String	`0`	The OLI VSA is generated by the gateway's RADIUS client and, where available, is sent to the RADIUS server in start and stop accounting messages for call legs 1 and 4.
outgoing-area	1	String	`egress-zone`	Gatekeeper identifier, or the destination zone or area, of the outgoing VoIP call.
outgoing-req-uri=*value*	1	String. Syntax is as per RFC 2543.	`sip:5550112@ cisco.com; user=phone`	Request-URI used in the outgoing request-line, including any url-parameters.
out-carrier-id	1	String	`carrier B`	Carrier ID field of the trunk group through which the call leaves the gateway or the partnering voice services provider identifier of the outgoing VoIP call.
out-intrfc-desc	1	String (replaces `out-portgrp-id`)	`desc-B`	Description assigned to the voice port of the outgoing call.
out-portgrp-id=*text*	1	ASCII string associated with the port on the gateway used by this call.	`<Service Provider ID>`	Description associated with the outgoing hardware telephony port that is used with this leg of the call. **Note** Replaced by out-intrfc-desc in Cisco IOS Release 12.2(11)T.
out-trunkgroup-label	1	String	`trunk-2`	Trunk-group label associated with the group of voice ports from which the outgoing TDM call leaves on the gateway.
peer-address	1	E.164 format (decimal digits with no spacing characters)	`4085550164`	Number that this call was connected to. If the number is not available, then it has a length of zero.
peer-id	1	Integer	`1`	ID value of the peer table entry to which this call was made. If a peer table entry for this call does not exist, the value of this object is zero.

Table 4-1   *VSAs Supported by Cisco Voice Calls (continued)*

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
peer-if-index	1	Integer	`84`	ifIndex value of the peer table entry to which this call was made. If a peer table entry for this call does not exist, the value is zero.
prev-hop-ip=*value*	1	String of the form `ip-address[:port][/protocol]` where "port" is an optional parameter giving the transport layer port number and the default is 5060. where "protocol" is an optional parameter giving the transport layer protocol and the default is UDP. Valid values: `TCP` and `UDP`; because the proxy does not support TCP, this parameter is never included.	`10.10.16.2:5061/UDP`	Previous hop IP address, as seen by the proxy. What would normally be placed in the "received" parameter when the proxy detected that the sender does not agree with the top-most via.
prev-hop-via=*value*	1	String. Syntax is as per RFC 2543.	`10.10.137.18:5060`	"Sent-by" portion of topmost via when the request arrived at the proxy.
receive-delay	1	`## ms`	`25 ms`	Average Playout FIFO Delay plus the decoder delay during the voice call.

Table 4-1   VSAs Supported by Cisco Voice Calls (continued)

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
redirecting-number=text	1	noa=t1,npi=t2,pi=t3,#=t4	`noa=3,npi=5,pi=1,#=3035550112`	The RGN VSA is generated by the gateway RADIUS client and, where available, is sent to the RADIUS server in start accounting messages for all call legs. The *text* contains the redirecting number extracted from the redirect number parameter. The redirecting number is encoded in the *text* value. For example, redirecting-number=noa=*t1*,npi=*t2*,pi=*t3*,#=*t4* where: • *t1*–Type of address • *t2*–Numbering plan indicator • *t3*–Presentation indicator • *t4*–Address of the redirecting number

Table 4-1 *VSAs Supported by Cisco Voice Calls (continued)*

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
release-source	1	1: Calling party located in PSTN 2: Calling party located in VoIP network 3: Called party located in PSTN 4: Called party located in VoIP network 5: Internal release in POTS leg 6: Internal release in VOIP leg 7: Internal call-control application (Tcl or VoiceXML script) 8: Internal release in VoIP AAA 9: Console command line (CLI or MML) 10: External RADIUS server 11: External network management application 12: External call control agent	1	If a call was released by the calling party, called party, or an internal or external source.
remote-media-address	1	String	remote-media-address	Remote-media gateway IP address.
remote-media-id	1	String	remote-media-id	Remote-media gateway DNS name.
remote-media-udp-port	1	Integer 0...65535	19366	Remote-media gateway UDP port.
remote-udp-port	1	Integer 0...65535	19366	Remote system UDP listener port to which voice packets are transmitted.
resource-service	1	1: Reservation 2: Query	2	What the client is requesting from the RPMS server.
round-trip-delay	1	## ms	2 ms	Voice-packet round-trip delay, in ms, between the local and remote device on the IP backbone during the call.

Table 4-1   VSAs Supported by Cisco Voice Calls (continued)

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description

session-protocol	1	Available strings:
		
		`other`
		`cisco`
		`h323`
		`multicast`
		`sipv2`
		`sdp`
		`frf11-trunk`
		`cisco-switched`
		`MarsAnalog`
		`C1000Isdn`
		`aal2-trunk`
			`cisco`	Session protocol used for calls between the local and remote router through the IP backbone. Always equal to "sip" for SIP or "Cisco" for H.323.

subscriber=*value*	1	String from T1/CAS (Channel Associated Signaling) or E1/R2 line/signal.	`Coin`	T1/Channel Associated Signaling (CAS) or E1/R2 signal information about a subscriber.
transmission-medium-req=*text*	1	String	`0`	TMR VSA is generated by the gateway's RADIUS client and, where available, is sent to the RADIUS server in start and stop accounting records for call legs 1 and 4.
tx-duration	1	`### ms`	`300 ms`	Duration, in ms, of transmit path open from this peer to the voice gateway for the call.
vad-enable	1	`enable/disable`	`enable`	Whether or not voice-activity detection (VAD) is enabled for the voice call.
voice-quality-total-packet-loss	1	String	`0.0000%`	The total number of packets lost by the jitter buffer in the RTP stream. **Note:** This VSA was introduced in Cisco IOS Release 16.3.1
voice-tx-duration	1	`### ms`	`100 ms`	Duration, in ms, for this call. This value divided by tx-duration equals the Voice Utilization Rate.

1. A timestamp that is preceded by an asterisk (*) or a dot (.) might not be accurate. An asterisk (*) means that after a gateway reboot, the gateway clock was not manually set and the gateway has not synchronized with an NTP server yet. A dot (.) means the gateway NTP has lost synchronization with an NTP server.

IP PBX Mode Attribute for SRST Mode

The IP PBX Mode attribute (ip-pbx-mode) identifies whether the router generating a call record is either a Cisco Unified SRST or Cisco Unified CME router.

Cisco Unified Communications Manager generates call records for all phones under its control. If the WAN link fails, phones fall back to Cisco Unified SRST or Cisco Unified CME in SRST fallback mode. When the phones register to the Cisco Unified SRST router, the router generates call records with the ip-pbx-mode value reported as either "cme" or "srst" in the stop records for all calls using SCCP.

For Cisco Unified CME in SRST fallback mode, IP phones that automatically learn their configuration from Cisco Unified Communications Manager during fallback are reported as "srst." If an IP phone is manually configured in Cisco Unified CME, the ip-pbx-mode is reported as "cme." Typically, you do not configure IP phones manually on the Cisco Unified SRST router.

The mode is determined at call setup for incoming calls, and at connect for outgoing call legs. You can filter call records on this attribute to identify the CDRs generated by the Cisco Unified SRST router for IP phones that rehomed after the WAN link went down. You can combine the filtered records from the Cisco Unified SRST router with the call records from Cisco Unified Communications Manager to generate a complete report.

If the connection to Cisco Unified Communications Manager is lost after a call is established to an external phone on a PSTN trunk, the ip-pbx-mode attribute is not reported in the call record. The ip-pbx-mode attribute is reported only after the phone registers to the Cisco Unified SRST router.

The router generates the ip-pbx-mode in call records only when there is a SCCP leg involved in the call. For non-SCCP-controlled ports connected to the Cisco Unified SRST router, CDRs are generated regardless of the state of the WAN link to Cisco Unified Communications Manager. The ip-pbx-mode is blank in file-based accounting records and omitted in RADIUS accounting records when the WAN link is up or when the call does not involve SCCP.

IP Phone Information Attribute for Shared Lines

The Shared-Line feature in Cisco Unified CME allows multiple phones to share the same directory number. The IP phone information attribute (ip-phone-info) identifies the phone involved in a call on a shared line. It reports the username associated with the phone as defined by the **name** command and indicates whether the call is going to or from the shared line. Because the username field can be blank, the ephone tag associated with the directory number is also reported.

This information is generated for all calls, whether or not a shared line is involved. It is reported for each call leg as a composite VSA in RADIUS start and stop records and as an attribute in file-based accounting stop records.

Table 4-2 lists (in sequential order) the attribute-value (AV) pairs that are included in ip-phone-info.

✎
Note   For file-based accounting, the ip-phone-info attribute is appended to the feature-vsa record and repeated for every feature-vsa instance.

Table 4-2   AV Pairs in ip-phone-info

AV Pair	Format	Example	Description
dn:	String	`shared`	Directory number type. Value is unique or shared.
usr:	String	`7000-abcd`	Username associated with the phone using the shared line. It could be blank.
tag:	Integer	`7`	Ephone tag of the SCCP phone. Useful for identifying the phone if the usr field is blank.

Feature VSA for Supplementary Services

The feature VSA (feature-vsa) is a composite VSA in CDRs that captures accounting information about the supplementary services used for all the call legs involved in a call. It includes a feature correlation ID that enables you to track each of the supplementary features invoked on the different call legs of a call within a single gateway.

The feature VSA is written as a simple string containing AV pairs separated by commas; each AV pair uses a colon (:) delimiter. The specific AV pairs included in the feature VSA depend on the type of supplementary feature. There can be multiple instances of this VSA in RADIUS start and stop records. File-based accounting generates only stop records.

Cisco IOS Release 12.4(9)T and later releases support the following supplementary features:

- Two-Way Call (TWC)—A basic two-party call within a single gateway.

- Call Forward All (CFA)—A two-party call where the call is forwarded to the configured destination when the call detects call forward all.

- Call Forward Busy (CFBY)—A two-party call where the original called party is configured to forward calls to another destination when it is busy.

- Call Forward No Answer (CFNA)—A two-party call where the original called party is configured to forward calls to another destination when it does not answer for a specific amount of time.

- Blind Transfer (BXFER)—Call transfer that is basically redirecting a connected call. In a blind transfer, the call gets forwarded by the called party in the original call. Blind call transfer does not involve any interaction between the called party (transferee) and the transferred-to party.

- Consultative Transfer (CXFER)—Call transfer that is similar to blind transfer except that it involves consultation between the transferor and transferred-to party. If the transferred-to party responds positively to the consultation request, the call is transferred to the new destination.

Cisco IOS Release 12.4(20)T and later releases support hairpin call transfers using the trunk optimization feature, for the following types of calls:

- Transfer at Alert (HP_XFER_ALERT)—PSTN call to the trunk DN is transfered (consultative transfer) to a local phone that does not share the trunk DN. The call is hairpin transferred through the DN.

- Transfer at Connect (HP_XFER_CONNECT)—PSTN call to the trunk DN is transfered (consultative transfer at alert) to a local phone that does not share the trunk DN. The call is hairpin transferred through the DN.

- Transfer Recall (HP_XFER_RECALL_ALERT)—PSTN call to the trunk DN is transfered (consultative transfer at alert) to a local phone sharing the trunk DN if the transfer-to party does not answer the call. The call is hairpin transferred through the DN. Transferred-to phone does not answer and the call is recalled to the phone that initiated the transfer.

Cisco IOS Release 12.4(22)T and later releases support the Hold and Resume features.

- Hold (HOLD)—Phone user puts a call on hold by pressing the Hold soft key, or it occurs indirectly through features such as Call Transfer, Call Park, or Conferencing.

- Resume (RESUME)—Phone user connects to a call on hold by pressing the Resume soft key.

The feature VSA captures the hold and resume event including the time stamp, the reason for the event based on the user's supplementary service request, and which user put the caller on hold.

The hold duration is determined by the difference between the Hold time stamp and the Resume time stamp. For Call Transfers, the duration is the difference between the hold time stamp and the disconnect time stamp. You can use this information to identify how long a caller is put on hold and help determine the efficiency of your support personnel.

For an example of a CDR for Hold and Resume, see the "Hold and Resume CDR: Example" section on page 3-54.

Note   Hold and Resume information is not supported for VoIP to VoIP hairpin calls.

Feature VSA Examples

The following examples show the format of the feature VSA for different types of calls. Display this output by using the **debug radius accounting** command or the **gw-accounting syslog** command.

Basic Two-Way Call

```
Oct 28 01:30:27.779: RADIUS:   Cisco AVpair     [1]   127
"feature-vsa=fn:TWC,ft:10/28/2005
01:30:27.775,cgn:1011011006,cdn:1011011007,frs:0,fid=36,fcid:411CC18B468911DA801DE37EC374A
8C6,legID:13"
```

Basic Call Transfer

```
Oct 28 01:31:10.271: RADIUS:   Cisco AVpair     [1]   179
"feature-vsa=fn:CXFER,ft:10/28/2005
01:31:10.247,frs:0,fid:40,xconsID:1,fcid:411CC18B468911DA801DE37EC374A8C6,legID:14,
xrson:0,xsts:5,Xor:1011011007,Xee:1011011006,Xto:1011011008"
```

Basic Call Forwarding

```
Oct 28 02:42:03.479: RADIUS:   Cisco AVpair     [1]   191
"feature-vsa=fn:CFNA,ft:10/28/2005
02:42:03.467,frs:0,fid:332,fcid:3E775493469311DA812EE37EC374A8C6,legID:9D,frson:3,fdcnt:1,
fwder:1011011009,fwdee:1011011006,fwdto:1011011008,frm:1011011009"
```

Hold

```
"feature-vsa=fn:HOLD,ft:11/05/2007
12:01:47.747,frs:0,fid:17,fcid:C655249C8B1011DC800AF5E95DD6F9BF,legID:4,hrson:1,holding:50
00,held:3000,sl:1,usr:mbrown,tag:5"
```

Resume

```
"feature-vsa=fn:RESUME,ft:11/05/2007
12:01:52.415,frs:0,fid:20,fcid:C91D6D008B1011DC800BF5E95DD6F9BF,legID:4,hrson:0,holding:50
00,held:3000,sl:1,usr:jsmith,tag:7"
```

Transfer at Alert

```
May 28 22:26:38.706: RADIUS:   Cisco AVpair     [1]   167
"feature-vsa=fn:HP_XFER_ALERT,ft:05/28/2008
14:26:31.106,frs:0,fid:42,xconsID:,fcid:E802FCF32C3B11DD8021A71BF42E2491,legID:14,xrsn:0,
xsts:5,Xor:1001,Xee:C803,Xto:5003"
```

Transfer at Connect

```
May 28 22:26:38.706: RADIUS:   Cisco AVpair      [1]   167
"feature-vsa=fn:HP_XFER_CONNECT,ft:05/28/2008
14:26:31.106,frs:0,fid:42,xconsID:,fcid:E802FCF32C3B11DD8021A71BF42E2491,legID:14,xrsn:0,
xsts:5,Xor:1001,Xee:C803,Xto:5003
```

Transfer Recall

```
May 28 22:26:38.706: RADIUS:   Cisco AVpair      [1]   167
"feature-vsa=fn:HP_XFER_RECALL_ALERT,ft:05/28/2008
14:26:31.106,frs:0,fid:42,xconsID:,fcid:E802FCF32C3B11DD8021A71BF42E2491,legID:14,xrsn:0,
xsts:5,Xor:1001,Xee:C803,Xto:5003
```

Feature VSA Attributes

Table 4-3 lists (in alphabetical order) the attributes that can be included in the feature VSA. The particular attributes that are included in each instance of the VSA are feature-specific.

Note
- Conferencing call-legs are not supported by the feature VSA.

- For file-based accounting, the ip-phone-info and ip-pbx-mode attributes are appended to the feature-vsa record and are repeated for every feature-vsa instance.

- You can also send Feature-VSA information to a syslog server by using the **gw-accounting syslog** command. Limitations on the length of syslog messages, however, can restrict the amount of feature-vsa information included in the output. If the feature-vsa information exceeds the size limit for a syslog message, some of the information is not collected.

Table 4-3   Attributes in Feature VSA

Attribute	Format	Example	Description
cdn:	E.164 (decimal digits with no spacing characters)	1015550107	Called number of the basic two-way call. Present in the TWC feature VSA.
cgn:	E.164	1015550106	Calling number of the basic two-way call. Present in the TWC feature VSA.
fcid:	16-byte number in hexadecimal notation	411CC18B468911DA8 01DE37EC374A8C6	Feature correlation ID.
fid:	Integer	36	Feature ID of the invocation. Identifies a unique instance of a feature VSA within a gateway. This number is incremented for each new feature VSA that is added.

Table 4-3   Attributes in Feature VSA (continued)

Attribute	Format	Example	Description
fn:	String: `CFA` = Call forward all `CFBY` = Call forward busy `CFNA` = Call forward no answer `BXFER` = Blind transfer `CXFER` = Consultative transfer `HOLD` = Call hold `RESUME` = Call resume `TWC` = Two-way call	`TWC`	Feature name. String representing the type of feature.
frm:	E.164	`1015550109`	Forwarding from number. Phone number that identifies who invoked the forwarding. Useful for call forwarding scenarios where there are multiple forwards. This number is the same as the forwarded from (fwder) number in a single forwarding; it is a different number when there are multiple forwards.
frs:	`0` = Successful `1` = Failed	`0`	Feature status. Success (0) or failure (1). Always set to 0 for Hold and Resume.
ft:	`MM/DD/YYYY` `hh:mm:ss:mmm`	`10/28/2005` `01:30:27.775`	Feature operation time. Time stamp of the operation start and stop time, if applicable for a specific feature.
fdcnt:	Integer	`3`	Forwarding count. Maximum forwarding count after which no further forwarding occurs. The default limit is 5.
frson:	Integer `0` = Unknown `1` = Call forward unconditional `2` = Call forward on busy `3` = Call forward on no reply `4` = Call deflection	`2`	Forwarding reason. The type of call forwarding such as call forward all, call forward busy, or call forward no answer.
fwdee:	E.164	`1015550106`	Forwarded number. Phone number that is forwarded.
fwder:	E.164	`1015550109`	Forwarded from number. Phone number that invoked the forwarding.
fwdto:	E.164	`1015550108`	Forwarded to number. Phone number to which the call is forwarded.
held:	Integer	`3000`	Directory number of the caller on hold.
holding:	Integer	`5000`	Directory number of the user who placed the call on hold.

Table 4-3   Attributes in Feature VSA (continued)

| Attribute	Format	Example	Description
hrson:	Integer: 0= Unknown 1= Hold 2= Call Transfer 3= Conference 4= Call Park 5= Call Pickup 6= Barge	2	Hold reason. The type of call hold such as normal hold, call transfer, conference, call park, barge, or call pickup. For resume it is always set to 0.
legID:	Integer	9	Call leg ID. Each feature VSA is added to a call leg and it captures the call leg ID.
sl:	0= Unique 1= Shared line	shared	Whether the line is shared or not shared.
tag:	Integer	7	Ephone tag of the SCCP phone if the usr field is blank.
usr:	String	7000-abcd	Username associated with the phone that initiated the hold or resume. It could be blank.
XconsID:	Integer	1	Consultation ID. For consultative transfer; not used for blind transfer.
Xee:	Integer	1015550106	Transferred number. Phone number that is transferred. Included in secondary call's accounting record, might be included in primary call's record.
Xor:	Integer	1015550107	Transferred from party (transferor). Party that invoked the transfer. Can be a phone number or an account number. Included in secondary call's accounting record, might be included in primary call's record.
Xto:	Integer	1015550108	Transferred to party. Phone number to which the call is transferred. Included in primary call's accounting record.
xsts:	0 = Consult start 1 = Consult restart 2 = Consult success 3 = Consult failed 4 = Transfer initiated 5 = Transfer success 6 = Transfer failed	5	Transfer status.

Feature Correlation ID

The feature correlation ID (fcid) identifies a given feature across all call legs in a call. It is similar to the GUID defined by the h323-conf-id attribute and it allows the call legs to be correlated based on the specific features invoked for the call. For any given feature, the feature VSA carries a unique feature correlation ID, which a postprocessing system can use to correlate the records.

For example, a simple two-way call generates two start records and two stop records. Each record carries a feature VSA of type TWC and all call legs for the two-way call carry the same feature correlation ID. When another feature is invoked during the two-way call, that feature gets a new feature correlation ID, which is common across the participating legs.

Figure 4-1 shows an example of how the feature correlation ID is used in a Call Forward No Answer scenario. In this figure, A and B are in a two-way call, and B invokes Call Forward No Answer to C. The CFNA VSA is captured on legs A and C stop records. A, B and C would have the same feature correlation ID (fcid:1) for their TWC VSA. The CFNA VSA would have a different feature correlation ID (fcid:2). This is present in A and C stop records.

When the records for A are processed by the accounting system, it would detect that there is a basic two-way call between A and B. It would also detect that there is a CFNA to C in A's stop record. The new forwarded-to leg has the same feature correlation ID for CFNA (fcid:2). It is also carries the same feature correlation ID (fcid:1) for the TWC VSA on the forwarded-to leg.

*Figure 4-1   Feature Correlation ID in Call Forward No Answer Scenario*
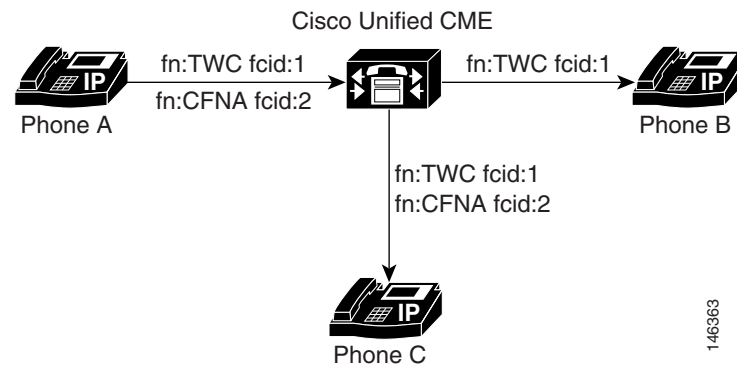
Cisco Unified CME B-ACD and Hunt Groups

Cisco IOS Release 12.4(20)T and later releases allow the correlation of multiple call records for calls routed to Cisco Unified CME Basic Automatic Call Distribution (B-ACD) and hunt groups. The feature correlation ID is the same across all call legs for a given feature.

Figure 4-2 shows an example of a hunt group used with the B-ACD service.

Figure 4-2   B-ACD Hunt Group Example


```
ephone-hunt 1 sequential
 pilot 551
 list 102, 302
 timeout 10, 10
```
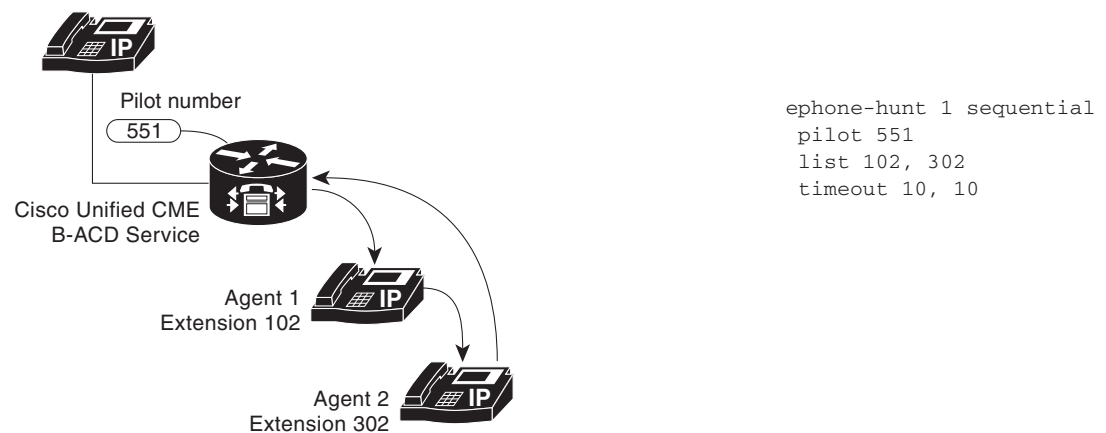
In this example, a call comes into the B-ACD service and proceeds as follows, generating the call records shown:

1. Call goes to the hunt group (CFA from pilot number 551 to agent 1 at extension 102). The call records capture the TWC on incoming leg ID:1, the TWC on legID:2, which is the setup leg, and the CFA to extension 102 on legID:2.

```
000210: May 31 01:24:01.831: RADIUS: Cisco AVpair [1] 121
"feature-vsa=fn:TWC,ft:05/30/2008
18:24:01.743,cgn:771,cdn:551,frs:0,fid:1,fcid:15CD126F2DE711DD8002931556F18823,legID:1"

000311: May 31 01:24:11.855: RADIUS: Cisco AVpair [1] 156
"feature-vsa=fn:CFA,ft:05/30/2008
18:24:01.843,frs:0,fid:2,fcid:15CD126F2DE711DD8002931556F18823,legID:2,frson:1,fdcnt:1,fwd
er:,
fwdee:771,fwdto:102,frm:551"

000313: May 31 01:24:11.855: RADIUS: Cisco AVpair [1] 127
"feature-vsa=fn:TWC,ft:05/30/2008
18:24:01.843,cgn:771,cdn:551,frs:0,fid:4,fcid:15CD126F2DE711DD8002931556F18823,legID:2"
```

2. Agent 1 (102) does not answer so the call is forwarded (CFNA) to agent 2 at extension 302. The call records capture the TWC setup on legID:3, and the CFNA on legID:3 and legID:2.

```
000334: May 31 01:24:11.855: RADIUS: Cisco AVpair [1] 157
"feature-vsa=fn:CFNA,ft:05/30/2008
18:24:11.851,frs:0,fid:6,fcid:15CD126F2DE711DD8002931556F18823,legID:2,frson:3,fdcnt:2,fwd
er:,
fwdee:771,fwdto:302,frm:551"

000441: May 31 01:24:21.867: RADIUS: Cisco AVpair [1] 157
"feature-vsa=fn:CFNA,ft:05/30/2008
18:24:11.851,frs:0,fid:6,fcid:15CD126F2DE711DD8002931556F18823,legID:3,frson:3,fdcnt:2,fwd
er:,
fwdee:771,fwdto:302,frm:551"

000443: May 31 01:24:21.867: RADIUS: Cisco AVpair [1] 127
"feature-vsa=fn:TWC,ft:05/30/2008
18:24:11.855,cgn:771,cdn:102,frs:0,fid:9,fcid:15CD126F2DE711DD8002931556F18823,legID:3"
```

3. Agent 2 (302) also does not answer so the call is returned to the call queue and directed back to pilot number 551. The call records capture the new TWC for legID:7 and the CFA to agent 1 (102) on legID:8 from the BACD application. This is the second instance of CFA captured on legID:1.

```
000606: May 31 01:24:50.899: RADIUS: Cisco AVpair [1] 154
"feature-vsa=fn:CFA,ft:05/30/2008
18:24:42.087,frs:0,fid:14,fcid:15CD126F2DE711DD8002931556F18823,legID:7,frson:1,fdcnt:1,
fwder:,fwdee:771,fwdto:102,frm:"

000608: May 31 01:24:50.899: RADIUS: Cisco AVpair [1] 128
"feature-vsa=fn:TWC,ft:05/30/2008
18:24:42.087,cgn:771,cdn:551,frs:0,fid:13,fcid:2DD915072DE711DD800E931556F18823,legID:7"
```

4. Agent 1 (102) answers the call. The call is connected to LegID:8. Agent 1 (102) does a consult transfer to extension 202 resulting in legID:9. The CXFER instance is captured on the original incoming legID:1, legID:7, and legID:9.

```
000657: May 31 01:24:57.611: RADIUS: Cisco AVpair [1] 119
"feature-vsa=fn:TWC,ft:05/30/2008
18:24:57.611,cgn:102,cdn:,frs:0,fid:16,fcid:37193E252DE711DD8011931556F18823,legID:8"

000693: May 31 01:24:58.023: RADIUS: Cisco AVpair [1] 122
"feature-vsa=fn:TWC,ft:05/30/2008
18:24:58.015,cgn:102,cdn:202,frs:0,fid:17,fcid:37193E252DE711DD8011931556F18823,legID:9"

000753: May 31 01:24:59.127: RADIUS: Cisco AVpair [1] 128
"feature-vsa=fn:CXFER,ft:05/30/2008
18:24:59.119,frs:0,fid:18,xconsID:1,fcid:0000,legID:7,xrsn:0,xsts:5,Xor:102,Xee:771,Xto:20
2"

000791: May 31 01:24:59.143: RADIUS: Cisco AVpair [1] 119
"feature-vsa=fn:TWC,ft:05/30/2008
18:24:57.611,cgn:102,cdn:,frs:0,fid:16,fcid:37193E252DE711DD8011931556F18823,legID:8"

000916: May 31 01:25:02.595: RADIUS: Cisco AVpair [1] 156
"feature-vsa=fn:CXFER,ft:05/30/2008
18:24:59.127,frs:0,fid:23,xconsID:1,fcid:15CD126F2DE711DD8002931556F18823,legID:9,xrsn:0,
xsts:2,Xor:102,Xee:771,Xto:202"

000978: May 31 01:25:02.599: RADIUS: Cisco AVpair [1] 156
"feature-vsa=fn:CXFER,ft:05/30/2008
18:24:59.119,frs:0,fid:21,xconsID:1,fcid:15CD126F2DE711DD8002931556F18823,legID:1,xrsn:0,
xsts:5,Xor:102,Xee:771,Xto:202"

000980: May 31 01:25:02.599: RADIUS: Cisco AVpair [1] 154
"feature-vsa=fn:CFA,ft:05/30/2008
18:24:42.087,frs:0,fid:14,fcid:15CD126F2DE711DD8002931556F18823,legID:1,frson:1,fdcnt:1,
fwder:,fwdee:771,fwdto:102,frm:"
```

Store-and-Forward Fax VSAs

Table 4-4 lists (in alphabetical order) the fax VSAs used by Cisco voice products.

Table 4-4   Store-and-Forward Fax VSA Descriptions

Attribute	VSA No. (Decimal)	Description
abort-Cause	21	If the fax session aborts, indicates the system component that signaled the abort. Examples of system components that could trigger an abort are FAP (Fax Application Process), TIFF (the TIFF reader or the TIFF writer), fax-mail client, fax-mail server, ESMTP client, or ESMTP server.
call-type	19	Type of fax activity: fax receive or fax send.
email-server-address	16	IP address of the e-mail server handling the on-ramp fax-mail message.
email-server-ack-flag	17	The on-ramp gateway received a positive acknowledgment from the e-mail server accepting the fax-mail message.
fax-account-id-origin	3	Account ID origin as defined by the system administrator for the **mmoip aaa receive-id** or the **mmoip aaa send-id** commands.

Table 4-4   *Store-and-Forward Fax VSA Descriptions (continued)*

Attribute	VSA No. (Decimal)	Description
fax-auth-status	15	Whether or not authentication for this fax session was successful. Possible values for this field are success, failed, bypassed, or unknown.
fax-connect-speed	8	Modem speed at which this fax-mail was initially transmitted or received. Possible values are 1200, 4800, 9600, and 14400.
fax-coverpage-flag	6	Whether or not a cover page was generated by the off-ramp gateway for this fax session. True indicates that a cover page was generated; false means that a cover page was not generated.
fax-dsn-address	11	Address to which DSNs are sent.
fax-dsn-flag	12	Whether or not DSN is enabled. True indicates that DSN has been enabled; false means that DSN has not been enabled.
fax-mdn-address	13	Address to which MDNs are sent.
fax-mdn-flag	14	Whether or not message delivery notification (MDN) is enabled. True indicates that MDN is enabled; false means that MDN is not enabled.
fax-modem-time	7	Amount of time, in seconds, the modem sent fax data (x) and the amount of time, in seconds, of the total fax session (y), which includes both fax-mail and PSTN time, in the form x/y. For example, 10/15 means that the transfer time took 10 seconds, and the total fax session took 15 seconds.
fax-msg-id	4	Unique fax message identification number assigned by Store and Forward Fax.
fax-pages	5	Number of pages transmitted or received during this fax session. This page count includes cover pages.
fax-process-abort-flag	10	Whether the fax session was aborted or successful. True means that the session was aborted; false means that the session was successful.
fax-recipient-count	9	Number of recipients for this fax transmission. Until e-mail servers support Session mode, the number is 1.
fax-tx-duration	1	Duration of fax transmitted from this peer to voice gateway for this call. The fax utilization rate can be obtained by dividing this by tx-duration.
gateway-id	18	Name of the gateway that processed the fax session. The name appears in the following format: hostname.domain-name.
port-used	20	Slot/port number of the Cisco AS5300 used to transmit or receive this fax-mail.

T.38 Fax Statistics VSAs

The T.38 Fax Statistics feature provides the ability to gather detailed statistics about fax success indicator for T.38 fax relay calls for voice gateways with NextPort Digital Signal Processors (DSPs). The fax statistics and success indicator are available to CDRs through VSAs and added to the call log. These changes provide detailed CDRs that are useful for diagnostic purposes and give service providers more flexibility in their billing methods for fax relay calls.

RADIUS accounting functions allow statistics to be sent as VSAs at the start and end of sessions, indicating the amount of resources (such as time, packets, bytes, and so on) used during the session. These accounting records are recorded in CDRs. This feature adds several VSAs specifically for T.38 fax relay calls with SIP and H.323 signaling.

This feature interoperates with third-party gateways and therefore the Cisco gateway is able to report T.38 fax success and failure based on the following:

- Fax status end of document indicator
- Fax status received from TDM
- Fax status transmitted to TDM

The accounting template is expanded to include the new statistics so that the end user can choose the statistics they wish to use.

Table 4-5 lists (in alphabetical order) the T.38 fax-statistics VSAs used by Cisco voice products.

Table 4-5   *VSAs Used by T.38 Fax Statistics*

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description

faxrelay-ecm used=text	1	String
		
		Permissible strings:
		
		`Enabled`
		`Disabled`
			Disabled	Whether error correction mode is enabled.

faxrelay-encap protocol=text	1	String
		
		Permissible strings:
		
		`UDPTL`
		`FRF.11`
		`RTP`
			UDPTL	Encapsulation protocol used for fax transfer.

faxrelay-fax direction=text	1	String
		
		Permissible strings:
		
		`Transmit`
		`Receive`
			Transmit	Whether a fax was originated (transmit) or terminated (receive) by this gateway.

faxrelay-fax-success=text	1	String
		
		Permissible strings:
		
		`Success`
		`Indeterminate`
		`Fail`
			Success	Whether fax transfer was successful, the transfer failed, or indeterminate.

faxrelay-jit buf-overflow=value	1	Integer in decimal	3	Number of jitter buffer overflow events during the call.
faxrelay-max-jit depth=value	1	Integer in decimal	12	Depth of the jitter buffer, in ms.
faxrelay-rx pkts=value	1	Integer in decimal	0	Number of packets received.
faxrelay-tx pkts=value	1	Integer in decimal	412	Number of packets transmitted.
faxrelay-init hs modulation=text	1	String formatted as modulation/baud rate	V.17/14400	Initial high-speed modulation and baud rate negotiated at the time the call is connected.
faxrelay-mr hs modulation=text	1	String formatted as modulation/baud rate	V.17/14400	Most recent high-speed modulation and baud rate.
faxrelay-num of pages=value	1	Integer in decimal	2	Sum of the number of transmitted and received fax pages.

Table 4-5   VSAs Used by T.38 Fax Statistics (continued)

Attribute	VSA No. (Decimal)	Format for Value or Text	Sample Value or Text	Description
faxrelay-nsf country code=text	1	String	Japan	NSF country code of local fax device; country name per T.35, Annex A.
faxrelay-nsf manuf code=text	1	String formatted as a series of 2-digit ASCII-encoded hexadecimal bytes; length varies; 64 characters max.	2412	NSF manufacturer code of local fax device.
faxrelay-pkt loss conceal=value	1	Integer in decimal	2	Packet loss concealment; number of white scan lines inserted (nonzero for outbound gateway only).
faxrelay-start-time	1	hh:mm:ss:mmm ZON DDD MMM ## YYYY	18:27:30:094 PST Fri Aug 25 2000	Fax start time in a call. There can be multiple fax start/stop time stamps in one call. Recorded for both VoIP and telephony call legs.
faxrelay-stop-time	1	hh:mm:ss:mmm ZON DDD MMM ## YYYY	18:27:30:094 PST Fri Aug 25 2000	Fax stop time in a call. There can be multiple fax start/stop time stamps in one call. Recorded for both VoIP and telephony call legs.

Internal Error Codes

Internal error codes (IEC) identify errors that cause a gateway to release or refuse to accept a call. The following example shows a partial RADIUS stop accounting record for an IEC:

```
[Vendor 9/1] cisco-avpair = "internal-error-code=1.1.179.2.37.0"
```

The IEC value takes the form of a dotted string of decimal numbers:

```
version.entity.category.subsystem.errorcode.diagnosticcode
```

Table 4-6 describes the six fields that identify the components of the IEC.

Table 4-6   IEC Field Descriptions

IEC Field	Description
version	IEC version. The value 1 indicates the current version.
entity	Network physical entity (hardware system) that generated the IEC. The value 1 is assigned to the gateway.
category	Error category, defined in terms of ITU-based Q.850 cause codes and VoIP network errors.
subsystem	Specific subsystem within the physical entity where the IEC was generated.
error code	Error code within the subsystem.
diagnostic code	Cisco internal diagnostic value. Report this value to Cisco TAC engineers.

VSA Release History

Table 4-7 lists each voice VSA (in alphabetical order) and the Cisco IOS release in which the VSA was introduced. Use this table when you configure the RADIUS server to understand which VSAs are supported, or if you want to upgrade to a later Cisco IOS release when new VSAs are introduced.

Table 4-7   VSA Release History

VSA Attribute String	First Cisco IOS Release
acom-level	12.2(11)T
authorized-services	12.2(11)T
backward-call-indicators	12.2(11)T
call-id	12.2(2)XB
calling-party-category	12.2(11)T
call-origin-endpt	12.2(11)T
call-origin-endpt-type	12.2(11)T
charged-units	12.2(11)T
charge-number	12.2(11)T
cisco-nas-port	12.0(7)T
codec-bytes	12.2(11)T
coder-type-rate	12.2(11)T
disconnect-text	12.2(11)T
early-packets	12.2(11)T
fax-tx-duration	12.2(11)T
faxrelay-ecm used	12.3(14)T
faxrelay-encap protocol	12.3(14)T
faxrelay-fax direction	12.3(14)T
faxrelay-fax-success	12.3(14)T
faxrelay-init hs modulation	12.3(14)T
faxrelay-jit buf-overflow	12.3(14)T
faxrelay-max-jit depth	12.3(14)T
faxrelay-mr hs modulation	12.3(14)T
faxrelay-nsf country code	12.3(14)T
faxrelay-nsf manuf code	12.3(14)T
faxrelay-num of pages	12.3(14)T
faxrelay-pkt loss conceal	12.3(14)T
faxrelay-rx pkts	12.3(14)T
faxrelay-tx pkts	12.3(14)T
faxrelay-start-time	12.2(11)T
faxrelay-stop-time	12.2(11)T

Table 4-7   VSA Release History (continued)

VSA Attribute String	First Cisco IOS Release
feature-vsa	12.4(4)XC, 12.4(9)T
gapfill-with-interpolation	12.2(11)T
gapfill-with-prediction	12.2(11)T
gapfill-with-redundancy	12.2(11)T
gapfill-with-silence	12.2(11)T
gk-xlated-cdn	12.2(11)T
gk-xlated-cgn	12.2(11)T
gw-collected-cdn	12.2(11)T
gtd-gw-rxd-cnn	12.2(11)T
gw-final-xlated-cdn	12.2(11)T
gw-final-xlated-cgn	12.2(11)T
gw-rxd-cdn	12.2(11)T
gw-rxd-cgn	12.2(11)T
h323-billing-model	12.0(7)T
h323-call-origin	12.0(7)T
h323-call-type	12.0(7)T
h323-conf-id	12.0(7)T
h323-connect-time	12.0(7)T
h323-credit-amount	12.0(7)T
h323-credit-time	12.0(7)T
h323-currency	12.0(7)T
h323-disconnect-cause	12.0(7)T
h323-disconnect-time	12.0(7)T
h323-gw-id	12.1(2)T
h323-incoming-conf-id	12.0(7)T
h323-ivr-in	12.1(2)T
h323-ivr-out	12.1(2)T
h323-preferred-lang	12.0(7)T
h323-prompt-id	12.0(7)T
h323-redirect-ip-address	12.0(7)T
h323-redirect-number	12.0(7)T
h323-remote-address	12.0(7)T
h323-remote-id	12.0(7)T
h323-return-code	12.0(7)T
h323-setup-time	12.0(7)T
h323-time-and-day	12.0(7)T

Table 4-7   VSA Release History (continued)

VSA Attribute String	First Cisco IOS Release
h323-voice-quality	12.0(7)T
hiwater-playout-delay	12.2(11)T
img-pages-count	12.2(11)T
in-carrier-id	12.2(11)T
incoming-area	12.2(11)T
incoming-req-uri	12.2(2)XB
info-type	12.2(11)T
in-intrfc-desc	12.2(11)T
in-portgrp-id	12.2(2)T
internal-error-code	12.3(4)T
in-trunkgroup-label	12.2(11)T
ip-pbx-mode	12.4(22)T
ip-phone-info	12.4(22)T
isup-carrier-id	12.2(11)T
late-packets	12.2(11)T
local-hostname	12.4(2)T
logical-if-index	12.2(11)T
lost-packets	12.2(11)T
lowater-playout-delay	12.2(11)T
method	12.2(2)XB
next-hop-dn	12.2(2)XB
next-hop-ip	12.2(2)XB
noise-level	12.2(11)T
ontime-rv-playout	12.2(11)T
originating-line-info	12.2(11)T
out-carrier-id	12.2(11)T
out-intrfc-desc	12.2(11)T
outgoing-area	12.2(11)T
outgoing-req-uri	12.2(2)XB
out-portgrp-id	12.2(2)T
out-trunkgroup-label	12.2(11)T
peer-address	12.2(11)T
peer-id	12.2(11)T
peer-if-index	12.2(11)T
prev-hop-ip	12.2(2)XB
prev-hop-via	12.2(2)XB

Table 4-7   VSA Release History (continued)

VSA Attribute String	First Cisco IOS Release
receive-delay	12.2(11)T
release-source	12.2(13)T
remote-media-address	12.2(2)XB
remote-media-id	12.2(2)XB
remote-media-udp-port	12.2(11)T
remote-udp-port	12.2(11)T
resource-service	12.2(11)T
round-trip-delay	12.2(11)T
session-protocol	12.2(2)XB
subscriber	12.1(5)T
transmission-medium-req	12.2(11)T
tx-duration	12.2(11)T
vad-enable	12.2(11)T
voice-tx-duration	12.2(11)T

INDEX

A

aaa authentication login h323 group radius command   **10**

aaa new-model command   **10**

access request VSAs   **101**

accounting methods

    comparision   **1**

    file (.csv)   **39**

    RADIUS   **3**

    syslog   **17**

accounting request VSAs   **104**

accounting response VSAs   **105**

accounting template command   **14**

accounting templates

    applying to dial peer   **14**

    configuring   **12**

    description   **8**

acct-session-id   **5**

acct-template command   **12, 50**

B

basic call transfer   **82**

basic Two-Way Call   **82**

blind transfer (BXFER)   **81**

C

call accounting template voice command   **13**

call accounting template voice reload command   **13**

call forward all (CFA)   **81**

call forward busy (CFBY)   **81**

call forward no answer (CFNA)   **81**

CDR example

    basic call forwarding   **82**

    basic call transfer   **82**

    basic two-way call   **82**

    hold   **82**

    resume   **82**

    transfer at alert   **83**

    transfer at connect   **83**

    transfer recall   **83**

cdr-format command   **50**

Cisco-NAS-port VSA   **6**

compact file accounting format   **47**

consultive transfer (CXFER)   **81**

csv format   **39**

customized accounting templates   **47**

D

debit card application

    return codes   **112**

    VSAs   **101**

debug aaa commands   **16**

debug voip dump-file-acct command   **51**

debug voip fileacct command   **51**

detailed file accounting format   **41**

dial-peer voice command   **15**

E

error codes, internal   **91**

example

    basic call forwarding   **82**

    configuring

CDR Accounting for Cisco IOS Voice Gateways