

**Oracle® Communications Session  
Border Controller**

Accounting Guide

Release S-CX6.2.0

*Formerly Net-Net Session Director*

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# About this Guide

## Overview

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The *Net-Net 4000 Accounting Guide* describes:

- The Net-Net™ SBC's accounting-based on Remote Authentication Dial-in User Service (RADIUS)
- How to configure RADIUS accounting support, and the features related to it
- Local CDR storage and FTP file push
- Use and maintenance of the Storage Expansion Module
- Diameter-based Rf Accounting

It includes the Acme Packet accounting Vendor-Specific Attributes (VSAs), and the Cisco Systems, Inc.™ VSAs supported by the Net-Net SBC. This reference guide indicates the Cisco Systems' VSAs supported by Acme Packet's Net-Net products.

This guide also includes RADIUS-related statistics and alarm information and associated Acme Packet Command Line Interface (ACLI) configuration element examples. Appendix A of this guide contains a selection of examples of RADIUS logs for purposes of reference.

## Supported Platforms

Release Version S-C6.2.0 is supported on the Acme Packet 4500 and Acme Packet 3800 series platforms.

## Related Documentation

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The following table lists the members that comprise the documentation set for this release:

Document Name	Document Description
Acme Packet 4500 System Hardware Installation Guide	Contains information about the components and installation of the Acme Packet 4500 system.
Acme Packet 3800 Hardware Installation Guide	Contains information about the components and installation of the Acme Packet 3800 system.
Release Notes	Contains information about the current documentation set release, including new features and management changes.
ACLI Configuration Guide	Contains information about the administration and software configuration SBC.

Document Name	Document Description
ACLI Reference Guide	Contains explanations of how to use the ACLI, as an alphabetical listings and descriptions of all ACLI commands and configuration parameters.
Maintenance and Troubleshooting Guide	Contains information about Net-Net SBC logs, performance announcements, system management, inventory management, upgrades, working with configurations, and managing backups and archives.
MIB Reference Guide	Contains information about Management Information Base (MIBs), Enterprise MIBs, general trap information, including specific details about standard traps and enterprise traps, Simple Network Management Protocol (SNMP) GET query information (including standard and enterprise SNMP GET query names, object identifier names and numbers, and descriptions), examples of scalar and table objects.
Accounting Guide	Contains information about the SBC's accounting support, including details about RADIUS accounting.

## Revision History

This section contains a revision history for this document.

Date	Revision Number	Description
November 30, 2009	Revision 0.00	<ul style="list-style-type: none"> <li>Initial Release</li> </ul>
August 23, 2010	Revision 1.00	<ul style="list-style-type: none"> <li>Adds failed Interim local CSV CDR format to Appendix C</li> <li>Fixed other local CSV CDR errors</li> <li>Adds section on IPv6 CDR data in local CSV files to Appendix C</li> </ul>
May 31, 2012	Revision 1.10	<ul style="list-style-type: none"> <li>Updates VSAs 69 and 70 in description table to correct data type</li> <li>Adds to Chapter 1, Using RADIUS with the Net-Net SBC: SIP: Call Tear Down Due to Media Guard Timer Expiration, which documents CDR output of specific application scenarios</li> </ul>
June 29, 2012	Revision 1.20	<ul style="list-style-type: none"> <li>Adds the codec, G722 to the list for Acme-FlowType_FS1_F, in the Using RADIUS with the Net-Net SBC chapter, Notes on Media Flow Attributes</li> </ul>



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<b>Date</b>	<b>Revision Number</b>	<b>Description</b>
December 17, 2012	Revision 1.30	<ul style="list-style-type: none"><li>• Notes the circumstance for including VSA 59 in Local CDR files</li><li>• Corrects recommendation for local CDR capacity configuration</li><li>• Notes vsa-id-range entry specification caveat</li><li>• Restates local CDR deletion criteria</li><li>• Adds useful accounting termination causes</li><li>• Adds missing values to Acme-Disconnect-Cause 62</li><li>• Instructs user on including recursive local policy lookup events in RADIUS interim records</li><li>• Updates list of RADIUS-generated VSAs</li></ul>
February 19, 2013	Revision 1.40	<ul style="list-style-type: none"><li>• Updates SFTP push receiver configuration procedure with corrections and clarifications</li></ul>
May 1, 2013	Revision 1.50	<ul style="list-style-type: none"><li>• Sets max-files range</li></ul>

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# 1 Using RADIUS with the Net-Net SBC

## Introduction

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RADIUS is an accounting, authentication, and authorization (AAA) system. In general, RADIUS servers are responsible for receiving user connection requests, authenticating users, and returning all configuration information necessary for the client to deliver service to the user.

You can configure your Net-Net SBC to send call accounting information to one or more RADIUS servers. This information can help you to see usage and QoS metrics, monitor traffic, and even troubleshoot your system. For more information about QoS, refer to the *Admission Control and QoS* chapter of the *Net-Net 4000 ACLI Configuration Guide*.

For information about how to configure the Net-Net SBC for RADIUS accounting use, refer to this guide's [Configuring Accounting \(39\)](#) chapter.

## Licensing

In order to use RADIUS with your Net-Net SBC, you must have the accounting license installed and activated on your system. For more information about licensing, see the "Software Licensing" section of the *Net-Net 4000 ACLI Configuration Guide's Getting Started* chapter. This chapter provides details about Acme Packet software licensing, including instructions for how to obtain and install licenses.

## Overview

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For H.323, SIP, and calls being interworked between H.323 and SIP (IWF), you can obtain sets of records that contain information to help you with accounting and that provide a quantitative and qualitative measurement of the call. For H.323 and SIP calls, the Net-Net SBC generates one set of records; for calls requiring IWF, the Net-Net SBC generates two sets of records.

You can use the RADIUS records generated by your Net-Net SBC to assist you with:

- Usage accounting—See the calling and called parties for a call, the protocol used, the realm the call traversed (as well as local and remote IP address and port information), and the codec used
- Traffic monitoring—You can see information about the setup, connect, and disconnect times, as well as the SIP or H.323 disconnect cause
- SLA monitoring—The Net-Net SBC supports RADIUS attributes that provide information about jitter, latency, and loss for H.323, SIP, and calls that require interworking between H.323 and SIP
- Troubleshooting—Obtain information about calls that can help you to identify and address issues with quality and how calls are setup and torn down.

## Standard RADIUS Attributes

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This section describes the standard RADIUS attributes that the Net-Net SBC supports. These attributes appear along with VSAs (Vendor-Specific Attributes) in the CDRs that the Net-Net SBC generates.

The [Standard RADIUS Attributes Dictionary \(12\)](#) is a dictionary of the standard RADIUS attributes included in Accounting Request messages sent by the Net-Net SBC to the RADIUS server. The CDR event information determines which messages are generated and which RADIUS attributes are included in the messages. Standard RADIUS messages and attributes are used whenever possible; however, RADIUS does not have attributes to record all important session information.

Possible messages are:

- Start—Marks the start of service delivery and describes the type of service being delivered and the user to whom it is being delivered
- Interim-Update—Indicates to the accounting server that the session parameters have changed
- Stop—
  - Marks the end of service delivery
  - Describes the type of service that was delivered
  - Sometimes describes statistics such as elapsed time, input and output octets, or input and output packets
- On—Marks the start of accounting
- Off—Marks the end of accounting

VSAs are used to record the necessary session information missing from this list of standard RADIUS attributes.

For more information about RADIUS, see to the following Internet Engineering Task Force Request for Comments (IETF RFCs):

- RFC 2865, “Remote Authentication Dial In User Service (RADIUS),” Rigney, et al., June 2000 (<http://www.ietf.org/rfc/rfc2865.txt>)
- RFC 2866, “RADIUS Accounting,” C. Rigney, June 2000 (<http://www.ietf.org/rfc/rfc2866.txt>)

## Standard RADIUS Attributes Dictionary

The table below lists and describes standard RADIUS attributes.

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
NAS-IP-Address	IP address of the SIP proxy or the H.323 stack’s call signaling address.	4	IP address	<ul style="list-style-type: none"> <li>• Start</li> <li>• Interim-Update</li> <li>• Stop</li> <li>• On</li> <li>• Off</li> </ul>
NAS-Port	SIP proxy port or the H.323 stack’s call signaling RAS port.	5	integer	<ul style="list-style-type: none"> <li>• Start</li> <li>• Interim-Update</li> <li>• Stop</li> <li>• On</li> <li>• Off</li> </ul>

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Called-Station-Id	<p>"To" field value of the SIP INVITE message (a type of message used to initiate a session) or the <code>cal l edPartyNumber</code> of the H.323 message.</p>	30	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Calling-Station-Id	<p>"From" field value of the SIP INVITE message or the <code>cal l i ngPartyNumber</code> of the H.323 message.</p>	31	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
NAS-Identifier	<p>Value, if any, set in the optional <code>NAS-ID</code> field for the accounting server that you configure as part of the accounting configuration. This identifier sets the value that the remote server (the accounting server) uses to identify the Net-Net SBC so that RADIUS messages can be transmitted.</p> <p>The remote server to which the accounting configuration will send messages uses at least one of two pieces of information for identification:</p> <ul style="list-style-type: none"> <li>NAS IP address: always included in the accounting message</li> <li>NAS identifier: configured in the <code>NAS-ID</code> parameter of the accounting server; if configured, the NAS identifier is sent to the remote server</li> </ul> <p>This attribute only appears if a value is configured in the <code>NAS-ID</code> field.</p>	32	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> <li>On</li> <li>Off</li> </ul>
Acct-Status-Type	<p>Whether this Accounting Request marks the beginning of the RADIUS message (Start), the middle (Interim-Update), or the end (Stop), and whether the accounting function is on or off (Accounting-On or Accounting-Off).</p>	40	integer	<ul style="list-style-type: none"> <li>Start (1)</li> <li>Interim-Update</li> <li>Stop (2)</li> <li>On</li> <li>Off</li> </ul>
Acct-Session-Id	<p>Either the "Call-ID" field value of the SIP INVITE message, the <code>cal l l i denti fi er</code> of the H.323 message, or RADIUS client information.</p>	44	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> <li>On</li> <li>Off</li> </ul>
Acct-Session-Time	<p>How much time in seconds the user has received service.</p>	46	integer	<ul style="list-style-type: none"> <li>Interim-Update</li> <li>Stop</li> <li>Off</li> </ul>
Acct-Terminate-Cause	<p>How or why the session ended.</p>	49	integer	<ul style="list-style-type: none"> <li>Stop</li> <li>Off</li> </ul>

## RADIUS Accounting Termination Causes

The table below describes the possible session termination causes for the Acct-Terminate-Cause RADIUS attribute.

RADIUS Termination Cause	Related Integer Value (per RFC 2059)	Termination Event	Message
User Request	1	A SIP BYE message.	• Stop
User Error	17	Input from user is erroneous; for example, SIP signaling failed to establish the session. Used in combination with the Cisco Systems Disconnect Cause. (This termination cause is not used for H.323.)	• Stop
Lost Service	3	Service cannot be sustained for reasons such as a lost connection.	• Stop
idle-timeout	4	Idle timer expired.	• Stop
session-timeout	5	Maximum session length timer expired.	• Stop
Admin Reset	6	Net-Net SBC hard reset occurred: A hard reset occurs when you use the front panel's orange Reset button; it reboots the Net-Net SBC.	• Off
Admin Reboot	7	Net-Net SBC gracefully rebooted.	• Off
NAS Request	10	RADIUS server is disabled; session terminated for non-error reason.	• Off

## VSAs

This section describes the VSAs that the Net-Net SBC supports. These attributes appear along with standard RADIUS attributes in the CDRs that the Net-Net SBC generates.

VSAs are defined by vendors of remote access servers in order to customize how RADIUS works on their servers. This section describes the accounting VSAs for Acme Packet and for Cisco Systems.

### Acme Packet RADIUS VSAs

Acme Packet's vendor identification number is 9148. This number refers to the 4-octet VSA Vendor-ID field. The high-order octet is 0 and the low-order 3 octets are the SMI Network Management Private Enterprise Code of the Vendor in network byte order, defined in the Assigned Numbers RFC (<http://www.faqs.org/rfcs/rfc1700.html>; Reynolds, J. and J. Postel, "Assigned Numbers", STD 2, RFC 1700, October 1994).

The table in this section is a dictionary of Acme Packet's accounting VSAs. You can use this information to translate the Acme Packet VSAs in Net-Net SBC RADIUS messages into human-readable form. Acme Packet maintains VSA dictionary definition files for the most popular RADIUS distributions; ask your Acme Packet account representative for details.

Grouped according to attribute function, this table contains the following sections:

- General Flow Attributes—Overall traits of the media flow, these attributes appear in all CDRs regardless of the session’s protocol; these attribute fields are only populated if there are media flows
- Inbound Flow Attributes—Detailed traits of the inbound media flow (including realm, remote IP address and port, and local IP address and port); these attribute fields are only populated if there are media flows
- Outbound Flow Attributes—Detailed traits of the outbound media flow (including realm, remote IP address and port, and local IP address and port); these attribute field are only populated if there are media flows
- Session Attributes—Information about the protocol type, ingress and egress realms used, and an identifier that links the H.323 and SIP legs of a call requiring IWF
- QoS Attributes—RADIUS call records are instantiated by individual signaling applications on the Net-Net SBC. The Net-Net SBC writes the following additional parameters to the call record for QoS (Quality of Service):
  - RTP Lost packets
  - RTP Jitter
  - RTP Maximum Jitter
  - RTCP Lost packets
  - RTCP Jitter
  - RTCP Latency
  - RTCP Maximum Latency
  - RTP Total Packets
  - RTP Total Octets

Only RADIUS Stop records contain QoS information. For non-QoS calls, the attributes appear in the record, but their values are always be zero (0). When you review the list of QoS VSAs, please note that “calling” in the attribute name means the information is sent by the calling party and “called” in the attribute name means the information is sent by the called party.

Examples of how this information appears in CDRs appears in [Appendix A \(97\)](#) of this guide. Please note that the contents of Interim-Update messages do not depend on what events cause a Start message to be generated.

### **New in Release S-C6.0.0**

The Net-Net SBC reports R-Factor and MOS data for the calling and called segments at the end of a session. This information appears in RADIUS CDRs, and in the Acme Packet VSA dictionary:

- Acme-Calling-R-Factor (151)
- Acme-Calling-MOS (152)
- Acme-Called-R-Factor (153)
- Acme-Called-MOS (154)

**Note:** These values are reported as \* 100 in order to appear as integers.

### **Notes on Media Flow Attributes**

The Net-Net SBC records media flow attributes in RADIUS CDRs, and there can be multiple flows per session. In order to distinguish between the two flows that appear

for a basic session (forward and reverse), the Net-Net SBC supports unique media flow attribute names.

The term “flow-set” represents a pair of media flows, where one is the forward flow and one is the reverse. The flow attributes described in the table below have the designation FS1 or FS2, which identifies it as either the first or the second flow-set. In addition, all non-QoS attributes have a direction indicator: F for forward, and R for reverse.

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
<b>General Attributes</b>				
Acme-CDR-Sequence-Number	Sequence number (that increases by 1) the Net-Net SBC generates; recorded in each CDR.	59	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Intermediate-Time	Time interval at which periodic interim records are generated during a call.	63	string	<ul style="list-style-type: none"> <li>Interim-Update</li> </ul>
Acme-Local-Time-Zone	Local GMT/UTC time zone that is provisioned on the Net-Net SBC.	57	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Firmware-Version	Current software version running on the Net-Net SBC.	56	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
<b>General Flow Attributes</b>				
Acme-FlowID_FS1_F	<p>Unique identifier for every media flow processed by the Net-Net SBC, flow-set 1 forward direction.</p> <p>This VSA always prefaces other flow information.</p>	1	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> <li>On</li> <li>Off</li> </ul>
Acme-FlowID_FS1_R	<p>Unique identifier for every media flow processed by the Net-Net SBC, flow-set 1 reverse direction.</p> <p>This VSA always prefaces other flow information.</p>	78	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> <li>On</li> <li>Off</li> </ul>
Acme-FlowID_FS2_F	<p>Unique identifier for every media flow processed by the Net-Net SBC, flow-set 2 forward direction.</p> <p>This VSA always prefaces other flow information.</p>	90	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> <li>On</li> <li>Off</li> </ul>
Acme-FlowID_FS2_R	<p>Unique identifier for every media flow processed by the Net-Net SBC, flow-set 2 reverse direction.</p> <p>This VSA always prefaces other flow information.</p>	112	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> <li>On</li> <li>Off</li> </ul>



Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Acme-FlowType_FS1_F	Codec that describes the flow, flow-set 1 forward direction: PCMU, PCMA, G722, G726, G723, G728, G729, H261, H263, T38.	2	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> <li>On</li> <li>Off</li> </ul>
Acme-FlowType_FS1_R	Codec that describes the flow, flow-set 1 reverse direction: PCMU, PCMA, G726, G723, G728, G729, H261, H263, T38.	79	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> <li>On</li> <li>Off</li> </ul>
Acme-FlowType_FS2_F	Codec that describes the flow, flow-set 2 forward direction: PCMU, PCMA, G726, G723, G728, G729, H261, H263, T38.	91	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> <li>On</li> <li>Off</li> </ul>
Acme-FlowType_FS2_R	Codec that describes the flow, flow-set 2 reverse direction: PCMU, PCMA, G726, G723, G728, G729, H261, H263, T38.	113	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> <li>On</li> <li>Off</li> </ul>

**Inbound Flow Attributes**

Acme-Flow-In-Realm_FS1_F	Inbound realm identifier for flow-set 1, forward direction.	10	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Realm_FS1_R	Inbound realm identifier for flow-set 1, reverse direction.	80	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Realm_FS2_F	Inbound realm identifier for flow-set 2, forward direction.	92	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Realm_FS2_R	Inbound realm identifier for flow-set 2, reverse direction.	114	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Src-Addr_FS1_F	Inbound source address (remote) information for flow-set 1, forward direction.	11	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Src-Addr_FS1_R	Inbound source address (remote) information for flow-set 1, reverse direction.	81	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Src-Addr_FS2_F	Inbound source address (remote) information for flow-set 2, forward direction.	93	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Src-Addr_FS2_R	Inbound source address (remote) information for flow-set 2, reverse direction.	115	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Src-Port_FS1_F	Inbound source (remote) port information for flow-set 1, forward direction.	12	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Acme-Flow-In-Src-Port_FS1_R	Inbound source (remote) port information for flow-set 1, reverse direction.	82	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Src-Port_FS2_F	Inbound source (remote) port information for flow-set 2, forward direction.	94	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Src-Port_FS2_R	Inbound source (remote) port information for flow-set 2, reverse direction.	116	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Dst-Addr_FS1_F	Inbound destination (local) address information (the IPv4 address field value of the steering pool configuration) for flow-set 1, forward direction.	13	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Dst-Addr_FS1_R	Inbound destination (local) address information (the IPv4 address field value of the steering pool configuration) for flow-set 1, reverse direction.	83	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Dst-Addr_FS2_F	Inbound destination (local) address information (the IPv4 address field value of the steering pool configuration) for flow-set 2, forward direction.	95	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Dst-Addr_FS2_R	Inbound destination (local) address information (the IPv4 address field value of the steering pool configuration) for flow-set 2, reverse direction.	117	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Dst-Port_FS1_F	Inbound destination (local) port information (a port in the range between the start port and end port field values of the steering pool configuration) for flow-set 1, forward direction.	14	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Dst-Port_FS1_R	Inbound destination (local) port information (a port in the range between the start port and end port field values of the steering pool configuration) for flow-set 1, reverse direction.	84	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Dst-Port_FS2_F	Inbound destination (local) port information (a port in the range between the start port and end port field values of the steering pool configuration) for flow-set 2, forward direction.	96	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Dst-Port_FS2_R	Inbound destination (local) port information (a port in the range between the start port and end port field values of the steering pool configuration) for flow-set 2, reverse direction.	118	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
<b>Outbound Flow Attributes</b>				
Acme-Flow-Out-Realm_FS1_F	Outbound realm identifier for flow-set 1, forward direction.	20	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Acme-Flow-Out-Realm_FS1_R	Outbound realm identifier for flow-set 1, reverse direction.	85	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Realm_FS2_F	Outbound realm identifier for flow-set 2, forward direction.	97	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Realm_FS2_R	Outbound realm identifier for flow-set 2, reverse direction.	119	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Src-Addr_FS1_F	Outbound source (local) address information (the IPv4 address field value of the steering port configuration) for flow-set 1, forward direction.	21	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Src-Addr_FS1_R	Outbound source (local) address information (the IPv4 address field value of the steering port configuration) for flow-set 1, reverse direction.	86	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Src-Addr_FS2_F	Outbound source (local) address information (the IPv4 address field value of the steering port configuration) for flow-set 2, forward direction.	98	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Src-Addr_FS2_R	Outbound source (local) address information (the IPv4 address field value of the steering port configuration) for flow-set 2, reverse direction.	120	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Src-Port_FS1_F	Outbound source (local) port information for flow-set 1, forward direction (a port in the range between the start port and end port field values of the steering port configuration).	22	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Src-Port_FS1_R	Outbound source (local) port information for flow-set 1, reverse direction (a port in the range between the start port and end port field values of the steering port configuration).	87	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Src-Port_FS2_F	Outbound source (local) port information for flow-set 2, forward direction (a port in the range between the start port and end port field values of the steering port configuration).	99	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Src-Port_FS2_R	Outbound source (local) port information for flow-set 2, reverse direction (a port in the range between the start port and end port field values of the steering port configuration).	121	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Dst-Addr_FS1_F	Outbound destination (remote) address information for flow-set 1, forward direction.	23	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Acme-Flow-Out-Dst-Addr_FS1_R	Outbound destination (remote) address information for flow-set 1, reverse direction.	88	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Dst-Addr_FS2_F	Outbound destination (remote) address information for flow-set 2, forward direction.	100	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Dst-Addr_FS2_R	Outbound destination (remote) address information for flow-set 2, reverse direction.	122	IP address	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Dst-Port_FS1_F	Outbound destination (remote) port information for flow-set 1, forward direction.	24	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Dst-Port_FS1_R	Outbound destination (remote) port information for flow-set 1, reverse direction.	89	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Dst-Port_FS2_F	Outbound destination (remote) port information for flow-set 2, forward direction.	101	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Dst-Port_FS2_R	Outbound destination (remote) port information for flow-set 2, reverse direction.	123	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
<b>Session Attributes</b>				
Acme-Session-Generic-Id	<p>Common ID shared by H.323 and SIP call legs of a session. This attribute is a combination of a time stamp (measured in seconds) and a monotonically increasing 16-bit integer, followed by an at-sign (@) and the MAC address of the rear interface (wancom). This attribute is only used to correlate the H.323 and SIP legs of an interworking call/session.</p> <p>This VSA is not configurable; all CDRs contain this attribute.</p>	40	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Session-Ingress-CallId	Call ID generated by the originating device.	3	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Session-Egress-CallId	Call ID generated by the Net-Net SBC to represent a two-way transaction.	4	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Session-Ingress-Realm	<p>Explicitly identifies the ingress realm, and contains the name of the ingress realm for the session. All CDRs contain this attribute.</p> <p>This VSA is not configurable; all CDRs contain this attribute.</p>	41	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Acme-Session-Egress-Realm	<p>Explicitly identifies the egress realm, and contains the name of the egress realm for the session. All CDRs contain this attribute.</p> <p>This VSA is not configurable. All CDRs contain this attribute, but it is only populated if an egress realm is found; a call without a route does not have an egress realm.</p>	42	string	<ul style="list-style-type: none"> <li>• Start</li> <li>• Interim-Update</li> <li>• Stop</li> </ul>
Acme-Session-Protocol-Type	<p>Signaling protocol used for a particular leg of a session (in the case of IWF, there may be two legs). This attribute contains the signaling protocol type; for example, SIP or H323.</p> <p>This VSA is not configurable; all CDRs contain this attribute.</p>	43	string	<ul style="list-style-type: none"> <li>• Start</li> <li>• Interim-Update</li> <li>• Stop</li> </ul>
Acme-Session-Charging-Vector	<p>Appears when the Net-Net SBC inserts, passes, or deletes the P-Charging-Vector header (SIP).</p> <p>This attribute is only populated for SIP CDRs, and is not populated if the Net-Net SBC does not have P-Charging-Vector information.</p>	54	string	<ul style="list-style-type: none"> <li>• Start</li> <li>• Interim-Update</li> <li>• Stop</li> </ul>
Acme-Session-Charging-Function_Address	<p>Appears when the Net-Net SBC inserts, passes, or deletes the P-Charging-Function-Address.</p> <p>This attribute is only populated for SIP CDRs, and is not populated if the Net-Net SBC does not have P-Charging-Function-Address information.</p>	55	string	<ul style="list-style-type: none"> <li>• Start</li> <li>• Interim-Update</li> <li>• Stop</li> </ul>
Acme-Session-Disposition	<p>Status of the call attempt as it progresses from being initiated (using a SIP INVITE or H.323 Setup message) to being either answered or failing to be answered.</p>	60	integer	<ul style="list-style-type: none"> <li>• Start</li> <li>• Interim-Update</li> <li>• Stop</li> </ul>
Acme-Post-Dial-Delay	<p>Amount of time between session initiation and an alerting event.</p>	58	integer	<ul style="list-style-type: none"> <li>• Start</li> <li>• Interim-Update</li> <li>• Stop</li> </ul>
Acme-P-Asserted-ID	<p>P-Asserted ID as described in RFC 3325.</p>	69	string	<ul style="list-style-type: none"> <li>• Start</li> <li>• Interim-Update</li> <li>• Stop</li> </ul>
Acme-SIP-Diversion	<p>SIP Diversion header; communicates to the called party from whom and why a call diverted.</p>	70	string	<ul style="list-style-type: none"> <li>• Start</li> <li>• Interim-Update</li> <li>• Stop</li> </ul>
Acme-Primary-Routing-Number	<p>Primary routing number and phone context (or ingress SIP Request-URI).</p>	64	string	<ul style="list-style-type: none"> <li>• Start</li> <li>• Interim-Update</li> <li>• Stop</li> </ul>

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Acme-Egress-Final-Routing-Number	Final routing number and phone context (or egress SIP Request-URI).	134	integer	• Stop
Acme-Disconnect-Initiator	Initiator of a call disconnect.	61	integer	• Stop
Acme-Disconnect-Cause	Q.850 cause code value.	62	integer	• Stop
Acme-SIP-Status	SIP status code for RFC 3326 support.	71	integer	• Stop
Acme-Originating-Trunk-Group	Originating trunk group.	65	string	• Start • Interim-Update • Stop
Acme-Originating-Trunk-Context	Originating trunk group context.	67	string	• Start • Interim-Update • Stop
Acme-Terminating-Trunk-Group	Terminating trunk group.	66	string	• Start • Interim-Update • Stop
Acme-Terminating-Trunk-Context	Terminating trunk group context.	68	string	• Start • Interim-Update • Stop
Acme-Ingress-Local-Addr	Signaling IP address and port of the ingress Net-Net SBC signaling interface.	74	string	• Start • Interim-Update • Stop
Acme-Ingress-Remote-Addr	Signaling IP address and port of the ingress remote signaling element.	75	string	• Start • Interim-Update • Stop
Acme-Egress-Local-Addr	Signaling IP address and port of the egress Net-Net SBC signaling interface.	76	string	• Start • Interim-Update • Stop
Acme-Egress-Remote-Addr	Signaling IP address and port of the destination signaling element.	77	string	• Start • Interim-Update • Stop
Acme-Session-Ingress-RPH	RPH value received in the incoming call (e.g., ets.1).  Only populated for NSEP calls.	135	string	• Start • Interim-Update • Stop
Acme-Session-Egress-RPH	RPH value sent in the outgoing call (e.g., ets.3).  Only populated for NSEP calls.	136	string	• Start • Interim-Update • Stop
Acme-Ingress-Network-Interface-Id	To differentiate overlapping IP address spaces (with the Acme-Ingress-Vlan-Tag-Value), gives the ID of the ingress network interface.	137	string	• Start • Interim-Update • Stop
Acme-Ingress-Vlan-Tag-Value	To differentiate overlapping IP address spaces (with the Acme-Ingress-Network-Interface-Id), gives the VLAN tag.	138	integer	• Start • Interim-Update • Stop

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Acme-Egress-Network-Interface-Id	To differentiate overlapping IP address spaces (with the Acme-Egress-Vlan-Tag-Value), gives the ID of the ingress network interface.	139	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Egress-Vlan-Tag-Value	To differentiate overlapping IP address spaces (with the Acme-Egress-Network-Interface-Id), gives the VLAN tag.	140	integer	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Refer-Call-Transfer-Id	For SIP REFER call method transfer, communicates a call has been transferred from the referer to the referree	141	string	<ul style="list-style-type: none"> <li>Stop</li> </ul>
<b>QoS Attributes</b>				
Acme-Calling-RTCP-Packets-Lost_FS1	Total lost packets reported via Real-time Transport Protocol Control Protocol (RTCP), flow-set 1.  Populated only if QoS is enabled.	32	integer	<ul style="list-style-type: none"> <li>Stop</li> </ul>
Acme-Calling-RTCP-Packets-Lost_FS2	Total lost packets measured on RTP packets in milliseconds, flow-set 2.  Populated only if QoS is enabled.	104	integer	<ul style="list-style-type: none"> <li>Stop</li> </ul>
Acme-Calling-RTCP-Avg-Jitter_FS1	Average jitter reported via RTCP measured in milliseconds, flow-set 1.  Populated only if QoS is enabled.	33	integer	<ul style="list-style-type: none"> <li>Stop</li> </ul>
Acme-Calling-RTCP-Avg-Jitter_FS2	Average jitter reported via RTCP measured in milliseconds, flow-set 2.  Populated only if QoS is enabled.	105	integer	<ul style="list-style-type: none"> <li>Stop</li> </ul>
Acme-Calling-RTCP-Avg-Latency_FS1	Average latency reported by comparing the timestamps in RTCP packets for each direction of a call, flow-set 1.  Populated only if QoS is enabled.	34	integer	<ul style="list-style-type: none"> <li>Stop</li> </ul>
Acme-Calling-RTCP-Avg-Latency_FS2	Average latency reported by comparing the timestamps in RTCP packets for each direction of a call, flow-set 2.  Populated only if QoS is enabled.	106	integer	<ul style="list-style-type: none"> <li>Stop</li> </ul>
Acme-Calling-RTCP-MaxJitter_FS1	Maximum amount of jitter value reported via RTCP measured in milliseconds, flow-set 1.  Populated only if QoS is enabled.	35	integer	<ul style="list-style-type: none"> <li>Stop</li> </ul>
Acme-Calling-RTCP-MaxJitter_FS2	Maximum amount of jitter value reported via RTCP measured in milliseconds, flow-set 3.  Populated only if QoS is enabled.	107	integer	<ul style="list-style-type: none"> <li>Stop</li> </ul>

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Acme-Calling-RTCP-MaxLatency_FS1	Maximum latency value measured in milliseconds as observed through RTCP, flow-set 1.  Populated only if QoS is enabled.	36	integer	• Stop
Acme-Calling-RTCP-MaxLatency_FS2	Maximum latency value measured in milliseconds as observed through RTCP, flow-set 2.  Populated only if QoS is enabled.	108	integer	• Stop
Acme-Calling-Octets_FS1	Bytes of RTP traffic for this call, flow-set 1.  Populated only if QoS is enabled.	28	integer	• Stop
Acme-Calling-Octets_FS2	Bytes of RTP traffic for this call, flow-set 2.  Populated only if QoS is enabled.	102	integer	• Stop
Acme-Calling-Packets_FS1	RTP packets for this call, flow-set 1.  Populated only if QoS is enabled.	29	integer	• Stop
Acme-Calling-Packets_FS2	RTP packets for this call, flow-set 2.  Populated only if QoS is enabled.	103	integer	• Stop
Acme-Calling-RTP-Packets-Lost_FS1	Total lost packets measured on RTP packets in milliseconds, flow-set 1.  Populated only if QoS is enabled.	37	integer	• Stop
Acme-Calling-RTP-Packets-Lost_FS2	Total lost packets measured on RTP packets in milliseconds, flow-set 2.  Populated only if QoS is enabled.	109	integer	• Stop
Acme-Calling-RTP-Avg-Jitter_FS1	Total jitter measured on RTP packets in milliseconds, flow-set 1.  Populated only if QoS is enabled.	38	integer	• Stop
Acme-Calling-RTP-Avg-Jitter_FS2	Total jitter measured on RTP packets in milliseconds, flow-set 2.  Populated only if QoS is enabled.	110	integer	• Stop
Acme-Calling-RTP-MaxJitter_FS1	Maximum jitter measured on RTP packets in milliseconds, flow-set 1.  Populated only if QoS is enabled.	39	integer	• Stop
Acme-Calling-RTP-Avg-MaxJitter_FS2	Maximum jitter measured on RTP packets in milliseconds, flow-set 2.  Populated only if QoS is enabled.	111	integer	• Stop



Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Acme-Called-Octets_FS1	Bytes of RTP traffic for the ingress side of the call, flow-set 1.  Populated only if QoS is enabled.	44	integer	• Stop
Acme-Called-Octets_FS2	Bytes of RTP traffic for the ingress side of the call, flow-set 2.  Populated only if QoS is enabled.	124	integer	• Stop
Acme-Called-Packets_FS1	RTP packets for the ingress side of the call, flow-set 1.  Populated only if QoS is enabled.	45	integer	• Stop
Acme-Called-Packets_FS2	RTP packets for the ingress side of the call, flow-set 2.  Populated only if QoS is enabled.	125	integer	• Stop
Acme-Called-RTCP-Packets-Lost_FS1	Total lost packets measured on RTCP packets in milliseconds for the ingress side of the call, flow-set 1.  Populated only if QoS is enabled.	46	integer	• Stop
Acme-Called-RTCP-Packets-Lost_FS2	Total lost packets measured on RTCP packets in milliseconds for the ingress side of the call, flow-set 2.  Populated only if QoS is enabled.	126	integer	• Stop
Acme-Called-RTCP-Avg-Jitter_FS1	Average jitter reported via RTCP measured in milliseconds for the ingress side of the call, flow-set 1.  Populated only if QoS is enabled.	47	integer	• Stop
Acme-Called-RTCP-Avg-Jitter_FS2	Average jitter reported via RTCP measured in milliseconds for the ingress side of the call, flow-set 2.  Populated only if QoS is enabled.	127	integer	• Stop
Acme-Called-Avg-Latency_FS1	Average latency reported via RTCP measured in milliseconds for the ingress side of the call, flow-set 1.  Populated only if QoS is enabled.	48	integer	• Stop
Acme-Called-Avg-Latency_FS2	Average latency reported via RTCP measured in milliseconds for the ingress side of the call, flow-set 2.  Populated only if QoS is enabled.	128	integer	• Stop
Acme-Called-RTCP-MaxJitter_FS1	Maximum amount of jitter reported via RTCP measured in milliseconds for the ingress side of the call, flow-set 1.  Populated only if QoS is enabled.	49	integer	• Stop

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Acme-Called-RTCP-MaxJitter_FS2	Maximum amount of jitter reported via RTCP measured in milliseconds for the ingress side of the call, flow-set 2.  Populated only if QoS is enabled.	129	integer	• Stop
Acme-Called-RTCP-MaxLatency_FS1	Maximum amount of latency reported via RTCP measured in milliseconds for the ingress side of the call, flow-set 1.  Populated only if QoS is enabled.	50	integer	• Stop
Acme-Called-RTCP-MaxLatency_FS2	Maximum amount of latency reported via RTCP measured in milliseconds for the ingress side of the call, flow-set 2.  Populated only if QoS is enabled.	130	integer	• Stop
Acme-Called-RTP-Packets-Lost_FS1	Total lost packets measured on RTP packets in milliseconds for the ingress side of the call, flow-set 1.  Populated only if QoS is enabled.	51	integer	• Stop
Acme-Called-RTP-Packets-Lost_FS2	Total lost packets measured on RTP packets in milliseconds for the ingress side of the call, flow-set 2.  Populated only if QoS is enabled.	131	integer	• Stop
Acme-Called-RTP-Avg-Jitter_FS1	Average jitter reported via RTP measured in milliseconds for the ingress side of the realm, flow-set 1.  Populated only if QoS is enabled.	52	integer	• Stop
Acme-Called-RTP-Avg-Jitter_FS2	Average jitter reported via RTP measured in milliseconds for the ingress side of the realm, flow-set 2.  Populated only if QoS is enabled.	132	integer	• Stop
Acme-Called-RTP-MaxJitter_FS1	Maximum amount of jitter reported via RTP measured in milliseconds for the ingress side of the call, flow-set1.  Populated only if QoS is enabled.	53	integer	• Stop
Acme-Called-RTP-MaxJitter_FS2	Maximum amount of jitter reported via RTP measured in milliseconds for the ingress side of the call, flow-set 2.  Populated only if QoS is enabled.	133	integer	• Stop
Acme-Calling-R-Factor  New in Release S-C6.1.0	QoS R-Factor calculation for the calling side of a session.  Populated only if QoS is enabled.  This value is reported as * 100 in order to appear as an integer.	151	integer	Stop

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Acme-Calling-MOS New in Release S-C6.1.0	QoS MOS calculation for the calling side of a session.  Populated only if QoS is enabled.  This value is reported as * 100 in order to appear as an integer.	152	integer	Stop
Acme-Called-R-Factor New in Release S-C6.1.0	QoS R-Factor calculation for the called side of a session.  Populated only if QoS is enabled.  This value is reported as * 100 in order to appear as an integer.	153	integer	Stop
Acme-Called-MOS New in Release S-C6.1.0	QoS MOS calculation for the called side of a session.  Populated only if QoS is enabled.  This value is reported as * 100 in order to appear as an integer.	154	integer	Stop
Acme-Session-Forked-Call-Id New in release S-C6.2.0	The VSA is a string value, and appears as the header-value without the header parameters from the P-Multiring-Correlator header for a session identified as part of a forked call.	171	string	Stop

## IPv6 Support

The following table lists the media flow attributes for IPv6 flows.

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Acme-Flow-In-Src-IPv6_Addr_FS1_F	Inbound source IPv6 address (remote) information for flow-set 1, forward direction.	155	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Dst-IPv6_Addr_FS1_F	Inbound destination (local) address information (the IPv6 address field value of the steering pool configuration) for flow-set 1, forward direction.	156	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Src-IPv6_Addr_FS1_F	Outbound source (local) address information (the IPv6 address field value of the steering port configuration) for flow-set 1, forward direction.	157	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Dst-IPv6_Addr_FS1_F	Outbound destination (remote) IPv6 address information for flow-set 1, forward direction.	158	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Src-IPv6_Addr_FS1_R	Inbound source IPv6 address (remote) information for flow-set 1, reverse direction.	159	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Acme-Flow-In-Dst-IPv6_Addr_FS1_R	Inbound destination (local) address information (the IPv6 address field value of the steering pool configuration) for flow-set 1, reverse direction.	160	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Src-IPv6_Addr_FS1_R	Outbound source (local) address information (the IPv6 address field value of the steering port configuration) for flow-set 1, reverse direction.	161	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Dst-IPv6_Addr_FS1_R	Outbound destination (remote) IPv6 address information for flow-set 1, reverse direction.	162	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Src-IPv6_Addr_FS2_F	Inbound source address (remote) IPv6 information for flow-set 2, forward direction.	163	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Dst-IPv6_Addr_FS2_F	Inbound destination (local) address information (the IPv6 address field value of the steering pool configuration) for flow-set 2, forward direction.	164	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Src-IPv6_Addr_FS2_F	Outbound source (local) address information (the IPv6 address field value of the steering port configuration) for flow-set 2, forward direction.	165	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Dst-IPv6_Addr_FS2_F	Outbound destination (remote) IPv6 address information for flow-set 2, forward direction.	166	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Src-IPv6_Addr_FS2_R	Inbound source address (remote) IPv6 address information for flow-set 2, reverse direction.	167	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-In-Dst-IPv6_Addr_FS2_R	Inbound destination (local) address information (the IPv6 address field value of the steering pool configuration) for flow-set 2, reverse direction.	168	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Src-IPv6_Addr_FS2_R	Outbound source (local) address information (the IPv6 address field value of the steering port configuration) for flow-set 2, reverse direction.	169	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>
Acme-Flow-Out-Dst-IPv6_Addr_FS2_R	Outbound destination (remote) IPv6 address information for flow-set 2, reverse direction.	170	ipv6addr	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>

**Acme Packet VSA Values**

The table below defines the possible values for several Acme Packet VSAs.

Acme Packet VSA Name	Attribute Value	Possible Values
Acme-PostDial-Delay	58	Unit value in milliseconds
Acme-Session-Disposition	60	<ul style="list-style-type: none"> <li>• 0=unknown</li> <li>• 1=call_attempt</li> <li>• 2=ringing</li> <li>• 3=answered</li> </ul>
Acme-Disconnect-Initiator	61	<ul style="list-style-type: none"> <li>• 0=UNKNOWN_DISCONNECT_INITIATOR</li> <li>• 1=CALLING_PARTY_DISCONNECT</li> <li>• 2=CALLED_PARTY_DISCONNECT</li> <li>• 3=INTERNAL_DISCONNECT</li> </ul>
Acme-Disconnect-Cause	62	<ul style="list-style-type: none"> <li>• 34=No circuit/channel available</li> <li>• 47=Resource unavailable</li> <li>• 3=No route destination</li> <li>• 31=Normal, unspecified</li> <li>• 88=Incompatible destination</li> <li>• 111=Interworking, unspecified</li> <li>• 38=Network out of order</li> <li>• 42=Switching equip congestion</li> <li>• 28=Invalid number format</li> <li>• 41=Temporary failure</li> <li>• 17=User busy</li> <li>• 16=Normal call clearing</li> <li>• 20=Subscriber absent</li> <li>• 31=Normal call clearing</li> <li>• 18=Request error timeout response</li> <li>• 55=Forbidden error response</li> </ul>

Acme Packet VSA Name	Attribute Value	Possible Values
Acme-SIP-Diversion	70	SIP Diversion header based on this RFC draft: draft-levy-sip-diversion-05.txt
Acme-SIP-Status	71	<p>This is a complete list of support status codes; only a subset would be reported in a Stop record:</p> <ul style="list-style-type: none"> <li>• RESP_STATUS_TRYING 100</li> <li>• RESP_STATUS_RINGING 180</li> <li>• RESP_STATUS_FORWARD 181</li> <li>• RESP_STATUS_QUEUED 182</li> <li>• RESP_STATUS_PROGRESS 183</li> <li>• RESP_STATUS_OK 200</li> <li>• RESP_STATUS_CREATED 201</li> <li>• RESP_STATUS_ACCEPTED 202</li> <li>• RESP_STATUS_PART 206</li> <li>• RESP_STATUS_MAX_OK 299</li> <li>• RESP_STATUS_MULTIPLE 300</li> <li>• RESP_STATUS_MOVED 301</li> <li>• RESP_STATUS_MOVED_TMP 302</li> <li>• RESP_STATUS_USE_PROXY 305</li> <li>• RESP_STATUS_ALTERNATE 380</li> <li>• RESP_STATUS_BAD 400</li> <li>• RESP_STATUS_UNAUTH 401</li> <li>• RESP_STATUS_PAY_REQ 402</li> <li>• RESP_STATUS_FORBIDDEN 403</li> <li>• RESP_STATUS_NOT_FOUND 404</li> <li>• RESP_STATUS_NOT_ALLOW 405</li> <li>• RESP_STATUS_NOT_ACCEPT 406</li> <li>• RESP_STATUS_AUTH_REQ 407</li> <li>• RESP_STATUS_REQ_TMO 408</li> <li>• RESP_STATUS_CONFLICT 409</li> <li>• RESP_STATUS_GONE 410</li> <li>• RESP_STATUS_LEN_REQ 411</li> <li>• RESP_STATUS_TOO_BIG 413</li> <li>• RESP_STATUS_URI_TOO_BIG 414</li> <li>• RESP_STATUS_MEDIA 415</li> <li>• RESP_STATUS_URI_SCHEME 416</li> <li>• RESP_STATUS_BAD_EXT 420</li> <li>• RESP_STATUS_EXT_REQ 421</li> <li>• RESP_STATUS_TOO_SMALL 422</li> <li>• RESP_STATUS_TOO_BRIEF 423</li> <li>• RESP_STATUS_TMP_UNAVAIL 480</li> <li>• RESP_STATUS_NO_EXIST 481</li> <li>• RESP_STATUS_LOOP 482</li> <li>• RESP_STATUS_TOOMNY_HOPS 483</li> <li>• RESP_STATUS_ADDR_INCMPL 484</li> <li>• RESP_STATUS_AMBIGUOUS 485</li> <li>• RESP_STATUS_BUSY_HERE 486</li> <li>• RESP_STATUS_CANCELLED 487</li> <li>• RESP_STATUS_NOT_HERE 488</li> <li>• RESP_STATUS_BAD_EVENT 489</li> <li>• RESP_STATUS_PENDING 491</li> <li>• RESP_STATUS_UNDECIPH 493</li> <li>• RESP_STATUS_INT_ERR 500</li> <li>• RESP_STATUS_NOT_IMPL 501</li> <li>• RESP_STATUS_BAD_GTWY 502</li> <li>• RESP_STATUS_SVC_UNAVAIL 503</li> <li>• RESP_STATUS_GTWY_TMO 504</li> <li>• RESP_STATUS_BAD_VER 505</li> <li>• RESP_STATUS_MSG_TOO_BIG 513</li> <li>• RESP_STATUS_PRE_FAIL 580</li> <li>• RESP_STATUS_BUSY 600</li> <li>• RESP_STATUS_DECLINE 603</li> <li>• RESP_STATUS_DONT_EXIST 604</li> <li>• RESP_STATUS_NOTACCEPT 606</li> </ul>

## Authentication VSAs

The table below defines Acme Packet VSAs used for RADIUS authentication.

Acme Packet VSA Name	Attribute Value	Attribute Values
Acme-User-Privilege	Describes at RADIUS login the privileges granted to the administrator (VSA only available with admin security license installed). Values can be: <ul style="list-style-type: none"> <li>sftpForAudit (SFTP is allowed for audit logs)</li> <li>sftpForAll (SFTP is allowed for logging, and audit logs)</li> </ul>	253
Acme-User-Class	Identifies the type user on the Net-Net SBC; used for RADIUS authentication only and does not apply to accounting. Values can be user, admin, and SystemAdmin (only with admin security license installed).	254

## Cisco Systems RADIUS Decodes

The following table is a dictionary of the Cisco Systems (vendor identification number is 9) accounting VSAs. These attribute names are vendor-specific and subject to change without notice.

You can use the information in this table to translate the Cisco Systems VSAs that sometimes appear in Net-Net SBC RADIUS messages into a more human-readable form.

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Setup Time	Time that a SIP INVITE or H.323 SETUP message was received. The SETUP message is used to request a connection (and therefore corresponds with the SIP INVITE).	25	string	<ul style="list-style-type: none"> <li>Start</li> <li>Stop</li> </ul>
Connect Time	Time that a SIP or H.323 session was accepted. This is the time a 200 OK SIP response to the SIP INVITE message was received or the time that a call ANSWERED/CONNECTED response to the H.323 SETUP message was received.	28	string	<ul style="list-style-type: none"> <li>Start</li> <li>Interim-Update</li> <li>Stop</li> </ul>

Attribute Name	Attribute Description	Attribute Value	Attribute Value Type	Messages
Disconnect Time	Time that a SIP BYE or H.323 Release Complete message was received or the session terminated. This is the time a SIP INVITE or H.323 SETUP transaction terminates for any reason.	29	string	• Stop
Disconnect Cause	SIP Reasons for Disconnection (normal, redirection, client error, network error, global error, time-out, or user abandon) or the H.323 Release Complete Reason code (bad format address, unavailable, destination rejection, adaptive busy, etc.).  For more information, refer to this guide's <a href="#">Mappings and Disconnect Cause Values (32)</a> section.	30	string	• Stop

## Mappings and Disconnect Cause Values

This section provides information about H.323 and SIP disconnect cause values for RADIUS CDRs generated by the Net-Net SBC.

### SIP, H.323, and Q.850 Mappings

This section provides tables that show the mappings between SIP Status and: H.323 Disconnect Reason, H.323 Release Complete Reason, and RAS error. It also shows the mapping for Q.850 cause to H.323 Release Complete Reason.

#### SIP Status to H.323 Disconnect Reason Mapping

SIP Status	H.323 Disconnect Reason
480 Temporarily Unavailable	No Bandwidth
404 Not Found	Gatekeeper Resource
404 Not Found	Unreachable Destination
603 Decline	Destination Rejection
505 Version Not Supported	Invalid Revision
401 Unauthorized	No Permission
503 Service Unavailable	Unreachable Gatekeeper
480 Temporarily Unavailable	Gateway Resource
400 Bad Request	Bad Format Request
486 Busy Here	Adaptive Busy
486 Busy Here	In Conference
500 Internal Server Error	Undefined Reason



**SIP Status to H.323  
RAS Error Mapping**

<b>SIP Status</b>	<b>H.323 Disconnect Reason</b>
486 Busy Here	Facility Call Deflection
401 Unauthorized	Security Denied

<b>SIP Status</b>	<b>H.323 RAS Error</b>
404 Not Found	Gatekeeper Resource
401 Unauthorized	Invalid Permission
503 Service Unavailable	Request Denied
500 Internal Server Error	Undefined
401 Unauthorized	Caller Not Registered
305 User Proxy	Route Call to Gatekeeper
500 Internal Server Error	Invalid Endpoint ID
503 Service Unavailable	Resource Unavailable
401 Unauthorized	Security Denial
501 Not Implemented	QoS Control Not Supported
484 Address Incomplete	Incomplete Address
302 Moved Temporarily	Route Call to SCN
485 Ambiguous	Aliases Inconsistent
401 Unauthorized	Not Currently Registered

**SIP Status to H.323  
Release Complete  
Reason Error Mapping**

<b>SIP Status</b>	<b>H.323 RAS Error</b>
300 Multiple Choices	Undefined Reason
401 Unauthorized	Security Denied
402 Payment Required	Undefined Reason
403 Forbidden	No Permission
404 Not Found	Unreachable Destination
405 Method Not Allowed	Undefined Reason
606 Not Acceptable	Undefined Reason
407 Proxy Authentication Required	Security Denied
408 Request Timeout	Adaptive Busy

<b>SIP Status</b>	<b>H.323 RAS Error</b>
409 Conflict	Undefined Reason
410 Gone	Unreachable Destination
411 Length Required	Undefined Reason
414 Request-URI Too Large	Bad Format Address
415 Unsupported Media Type	Undefined Reason
420 Bad Extension	Bad Format Address
480 Temporarily Unavailable	Adaptive Busy
481 Call/Transaction Does Not Exist	Undefined Reason
482 Loop Detected	Undefined Reason
483 Too Many Hops	Undefined Reason
484 Address Incomplete	Bad Format Address

**Q.850 Cause to H.323 Release Complete Reason Mapping**

The table below describes how the Q.850 Causes and the H.323 release complete reasons are mapped internally on the Net-Net SBC.

<b>Q.850 Cause</b>	<b>Numeric Code</b>	<b>H.323 Release Complete Reason</b>
Not Route To Destination	3	Unreachable Destination
Normal Call Clearing	16	Destination Rejection
User Busy	17	In Conference
Subscriber Absent	20	Called Party Not Registered
Invalid Number Format	28	Bad Format Address
Normal Unspecified	16	Undefined Reason
No Circuit/Channel Available	34	No Bandwidth
Network Out of Order	38	Unreachable Gatekeeper
Temporary Failure	41	Adaptive Busy
Switching Equipment Congestion	42	Gateway Resource
Resource Unavailable	47	Gatekeeper Resource
Incompatible Destination	88	Invalid Revision
Interworking Unspecified	111	No Permission

## SIP-SIP Calls

The Net-Net SBC maps SIP status codes and events to disconnect cause attribute values used by Cisco Systems Proxy Server (CSPS) accounting services.

SIP Status Category/Event	CDR Disconnect Cause	Description
Undetermined reason	0	Undetermined reason
BYE	1	Normal clearing
3xx: Redirection	2	Redirection
4xx: Client Error	3	Client error
5xx: Server Error	4	Server error
6xx: Global Failure	5	Global error

## SIP-H.323 Calls with Interworking

For calls that require SIP-H.323 interworking, the Net-Net SBC generates two sets of RADIUS CDRs: one for the SIP call-leg and one for the H.323 call leg. The values recorded in RADIUS Stop records for the disconnect cause depend on the nature and source of the call disconnect or rejection.

## SIP Events and Errors

For calls rejected or disconnected because of SIP events and errors, the Net-Net SBC records Q.850 cause values mapped from the SIP event/status code in the SIP CDR. For the H.323 CDR, the SIP status categories and events are mapped to Q.850 cause codes.

The entries in this table are determined by the [SIP Status to H.323 Release Complete Reason Error Mapping \(33\)](#).

SIP Status Category/Event	SIP CDR Disconnect Cause	H.323 Disconnect Cause Value (Q.850)
BYE	16—Normal call clearing	16—Normal call clearing
3xx	23—Redirection to new destination	16—Normal call clearing
404 Not Found	21—Call rejected	3—No route to destination
410 Gone	21—Call rejected	3—No route to destination
403 Forbidden	21—Call rejected	111—Interworking unspecified
408 Request Timeout	21—Call rejected	41—Temporary failure
413 Request Entity Too Big	21—Call rejected	28—Invalid number format
414 Request URI Too Large	21—Call rejected	28—Invalid number format
420 Bad Extension	21—Call rejected	28—Invalid number format
484 Address Incomplete	21—Call rejected	28—Invalid number format
408 Request Timeout	21—Call rejected	41—Temporary failure
480 Temporarily unavailable	21—Call rejected	41—Temporary failure

SIP Status Category/Event	SIP CDR Disconnect Cause	H.323 Disconnect Cause Value (Q.850)
486 Busy Here	21—Call rejected	17—User Busy
401 Unauthorized	21—Call rejected	32—Normal unspecified
407 Proxy Authentication Required	21—Call rejected	32—Normal unspecified
All other 4xx	21—Call rejected	16—Normal unspecified
502 Bad Gateway	38—Network out of order	28—Invalid number format
505 Bad Version	38—Network out of order	88—Incompatible destination
All other 5xx	38—Network out of order	16—Normal unspecified
600 Busy Everywhere	31—Normal unspecified	41—Temporary failure
603 Decline	31—Normal unspecified	31—Normal unspecified
604 Does Not Exist Anywhere	31—Normal unspecified	3—No route to destination
All other 6xx	31—Normal unspecified	31—Normal unspecified

**H.323 Events and Errors**

The Q.850 cause code value is recorded for the disconnect cause in the CDR for the H.323 call leg if the Q.850 cause is received. H.323 recommendations state that either Q.850 Cause of RelCompReason is mandatory for the RELEASE COMPLETE; the Cause information element (IE) is optional everywhere. The Cause IE and the ReleaseCompleteReason (part of the release complete message) are mutually exclusive.

If a Q.850 cause code is not received, the Net-Net SBC records a Q.850 cause value mapped from the received ReleaseCompleteReason as defined in the table below.

The entries in this table are determined by the [SIP Status to H.323 Disconnect Reason Mapping \(32\)](#).

H.323 ReleaseCompleteReason	H.323 CDR Disconnect Cause	SIP Status	SIP CDR Disconnect Cause
No Bandwidth	34—No channel/circuit available	480 Temporarily Unavailable	21—Call rejected
Gatekeeper Resource	47—Resource unavailable	404 Not Found	21—Call rejected
Unreachable Destination	3—No route to destination	404 Not Found	21—Call rejected
Destination Rejected	31—Normal unspecified	603 Decline	31—Normal unspecified

<b>H.323 ReleaseCompleteReason</b>	<b>H.323 CDR Disconnect Cause</b>	<b>SIP Status</b>	<b>SIP CDR Disconnect Cause</b>
Invalid Revision	88—Incompatible destination	505 Version Not Supported	38—Network out of order
No Permission	111—Interworking unspecified	401 Unauthorized	21—Call rejected
Unreachable Gatekeeper	38—Network out of order	503 Service Unavailable	38—Network out of order
Gateway Resource	42—Switching equipment congestion	480 Temporarily unavailable	21—Call rejected
Bad Format Request	28—Invalid number format	400 Bad request	21—Call rejected
Adaptive Busy	41—Temporary failure	486 Busy Here	21—Call rejected
In Conference	17—User busy	486 Busy Here	21—Call rejected
Undefined Reason	16—Normal unspecified	500 Internal Server Error	38—Network out of order
Called Party Not Registered	20—Subscriber absent	404 Not Found	21—Call rejected
Caller Not Registered	31—Normal call clearing		
New Connection Needed	47—Resource Unavailable	401 Unauthorized	21—Call rejected

## H.225 RAS Errors

For calls that are rejected because of H.225 RAS, there is no CDR generated for the H.323 call leg as no Setup message is generated. The Net-Net SBC maps RAS errors to SIP Status as specified in the table below. The SIP CDR disconnect cause values are the same as the CSPS disconnect cause values already mentioned and defined.

The entries in this table are determined by the [SIP Status to H.323 RAS Error Mapping \(33\)](#).

<b>H.225 RAS Error</b>	<b>SIP Status</b>	<b>SIP CDR Disconnect Cause</b>
Called Party Not Registered	404 Not Found	21—Call Rejected
Invalid Permission	401 Unauthorized	21—Call Rejected
Request Denied	503 Service Unavailable	38—Network out of order
Undefined	500 Internal Server Error	38—Network out of order
Caller Not Registered	401 Unauthorized	21—Call Rejected
Route Call to Gatekeeper	305 Use Proxy	23—Redirection to new destination
Invalid Endpoint ID	500 Internal Server Error	38—Network out of order
Resource Unavailable	503 Service Unavailable	38—Network out of order
Security Denial	401 Unauthorized	21—Call Rejected

H.225 RAS Error	SIP Status	SIP CDR Disconnect Cause
QoS Control Not Supported	501 Not Implemented	38—Network out of order
Incomplete Address	484 Address Incomplete	21—Call Rejected
Route Call to SCN	302 Moved Temporarily	2—Redirection
Aliases Inconsistent	485 Ambiguous	21—Call Rejected
Not Currently Registered	401 Unauthorized	21—Call Rejected

## SIP: Call Tear Down Due to Media Guard Timer Expiration

When a SIP call is torn down by the Net-Net SBC due to media timers expiring, the following standard and VS attributes and their corresponding values will appear in the CDR stop message:

### CDR Output

The following five CDR AVPs must be observed in the same CDR.

```
Acct-Terminate-Cause = Idle-Timeout
h323-disconnect-cause = "6"
Acme-Disconnect-Initiator = 3
Acme-Disconnect-Cause = 0
Acme-SIP-Status = 0
```

### Explanation

- Acct-Terminate-Cause = Idle-Timeout: This standard RADIUS AVP indicates the call was ended due to a timer expiring.
- h323-disconnect-cause = "6": This VSA AVP indicates the call was ended due to a timeout.
- Acme-Disconnect-Initiator = 3: This VSA AVP indicates the call disconnect was initiated internally from the Net-Net SBC, and not from an endpoint or due to an unknown reason.
- Acme-Disconnect-Cause = 0: This VSA AVP indicates that a media timer expired.
- Acme-SIP-Status = 0: This VSA AVP indicates the call disconnect was initiated internally from the Net-Net SBC, and not from an endpoint or due to an unknown reason for a SIP call.

## Overview

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This chapter provides you with information about configuring RADIUS accounting on your Net-Net SBC.

The Net-Net products support Net-Net SBC RADIUS accounting, including these essential configurations and specialized features:

- Accounting for SIP and H.323
- Local CDR storage on the Net-Net SBC, including CSV file format settings-
- The ability to send CDRs via FTP to a RADIUS sever
- Per-realm accounting control
- Configurable intermediate period
- RADIUS CDR redundancy
- RADIUS CDR content control

## Accounting for SIP and H.323

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This section explains SIP and H.323 accounting using the RADIUS Accounting System (RAS).

For accounting purposes, the Net-Net SBC uses RADIUS to send accounting messages. These messages are transmitted to one of a predefined list of accounting servers using a predefined forwarding strategy. RAS provides a mechanism for temporarily storing session initiation and completion statistics and for delivering these statistics to accounting servers located elsewhere in the network.

## Call Detail Records

The Net-Net SBC supports CDRs through RADIUS reporting with additional VSAs to include information that is not available with the standard RADIUS session information. CDRs provide billing information on sessions traversed through a system, as well as troubleshooting information, fraud detection, fault diagnostics, and service monitoring.

CDRs can contain information about recent system usage such as the identities of sources (points of origin), the identities of destinations (endpoints), the duration of each call, the amount billed for each call, the total usage time in the billing period, the total free time remaining in the billing period, and the running total charged during the billing period. VSAs are defined by vendors of remote access servers in order to customize how RADIUS works on their servers.

## RAS Overview

The RAS acts as a RADIUS client. It provides a mechanism for generating accounting information in CDRs. The CDRs are transmitted to a RADIUS server in UDP datagrams, using RADIUS Accounting Request messages.

The RAS receives RADIUS accounting messages when different events occur. The event and CDR event trigger list information determines which RADIUS messages,

if any, are included, as well as which RADIUS attributes are included. The library adds RADIUS messages to the waiting queue only when the message is ready to be sent. The SIP proxy needs to populate the CDR as session information becomes available so, by the time the session ends, it contains the information necessary to generate all of the messages.

The RADIUS accounting client process manages its queue and a list of servers. The servers each have a UDP connection and manage their own pending message queues. Changes in the state of the server connection might cause interaction with the client process waiting queue.

When RADIUS messages are added to the RAS waiting queue, the RAS sends them to a server based on strategy. If the RAS is configured to transmit all the messages when the session ends, all the messages are sent to the same server. Each session continues logging messages according to the event logging scheme in effect when the session began (for example, when the CDR was created).

The RAS notifies the RADIUS server with Accounting-On/Off messages when the RAS's entry for that server is enabled/disabled. The response to the Accounting-On message is the RAS's first determination of RTT, and serves as notification that the server is reachable. Until the Accounting-On response is received, the server cannot send other messages.

## **RADIUS Accounting Client**

The RADIUS accounting client process has a local socket at which it accepts RADIUS messages. RADIUS messages received on the local socket are added to the waiting queue for transmission to a RADIUS server. The waiting queue is a first-in, first-out (FIFO) queue.

The RADIUS accounting client process sends messages to a server queue based on the configuration (servers configured/enable/connected, as well as the strategy). Messages that return from a server (due to server failure/disabling) are first in the FIFO queue.

The RADIUS accounting client process interfaces with the RADIUS accounting servers using the RADIUS protocol with the VSAs outlined above.

The RADIUS server collects a variety of information that can be used for accounting and for reporting on network activity. The RADIUS client sends information to designated RADIUS servers when the user logs on and logs off. The RADIUS client might send additional usage information on a periodic basis while the session is in progress. The requests sent by the client to the server to record logon/logoff and usage information are generally called accounting requests.

RADIUS accounting permits a RADIUS server to track when users commence and terminate their connections. Typical accounting information includes the following:

- Full user name
- RAS identification name or IP address
- RAS port number
- Time connection started

When a client is configured to use RADIUS accounting, it generates an Accounting Start packet describing the type of service being delivered and the user it is being delivered to at the start of service delivery. It sends that packet to the RADIUS Accounting server, which sends back an acknowledgement that the packet has been received. At the end of service delivery, the client generates an Accounting Stop



packet describing the type of service that was delivered and, optionally, statistics such as elapsed time, input and output octets, or input and output packets. It sends that packet to the RADIUS Accounting server, which sends back an acknowledgement that the packet has been received. The Accounting-Request (whether for Start or Stop) is submitted to the RADIUS accounting server through the network.

Transactions between the client and RADIUS accounting server are authenticated through the use of a shared secret, which is never sent over the network.

## Session Accounting

The RAS client can record SIP, H.323, and IWF session activity based on configuration and a CDR. The CDR determines which messages are generated and determines the RADIUS attributes included in the messages. The RAS client must be capable of sending CDRs to any number of RADIUS accounting servers, using the defined hunt, failover, round robin, fewest pending, or fastest server strategies.

The establishment, failed establishment, change, or removal of a session can trigger RADIUS Accounting Request messages. The RAS might also send notification of its status (enabled/disabled). RADIUS Accounting Request messages include the following:

- Start—Session has started.
- Interim-Update—Session parameters have changed.
- Stop—Session has ended.
- Accounting-On—Creation of a new RADIUS client.
- Accounting-Off—RADIUS client has shut down.

Each session might generate Start, Interim-Update, and Stop messages based on the local configuration when the session is initiated. Each Start message tells the RADIUS server that a session has started. Each Interim-Update message changes the session parameters, and may report the session characteristics for the session to that point. Each Stop message informs the RADIUS server that a session has ended and reports session characteristics.

The RAS has the ability to transmit all RADIUS messages related to a session at the end of the session, regardless of which messages are generated and when they are generated. Some customers might choose this option to reduce the likelihood of the RADIUS messages being logged to different servers, or in different log files on the same server.

The RAS always generates a RADIUS Stop message when the session ends, regardless of the session termination cause. The termination cause and the session characteristics are reported.

## Interim RADIUS Records for Recursive Attempts

When the Net-Net SBC routes calls, it performs local policy look-ups that can return several next hops, ordered by preference. This can also happen as a result of an LRT lookup, an ENUM query response, or SIP redirect. To set up sessions, the Net-Net SBC uses—in ordered preference—and recurses through the list if it encounters failures.

You can configure SIP accounting to send RADIUS Interim records when the Net-Net SBC encounters these failures. The interim message contains: the destination IP address, the disconnect reason, a timestamp for the failure, and the number that was called. This feature is enabled by setting the *generate-interim* parameter to

**unsuccessful-attempt.** Please refer to Appendix C to view the format of an unsuccessful-attempt interim record.

## RADIUS Messages

The following table identifies the relationship between the signaling elements and the RADIUS attributes included in Accounting Request messages to the RADIUS server.

RADIUS Attribute	Data Element	Message
NAS IP-Address	IP address of the SIP proxy or the H.323 stack's call signal address.	Start, Interim-Update, Stop, On, Off
NAS Port	SIP proxy port or the H.323 stack's call signaling RAS port.	Start, Interim-Update, Stop, On, Off
NAS Identifier	Value, if any, set in the optional NAS-ID field for the accounting server that you configure as part of the accounting configuration. This identifier sets the value that the remote server (the accounting server) uses to identify the Net-Net SBC so that RADIUS messages can be transmitted.  The remote server to which the accounting configuration will send messages uses at least one of two pieces of information for identification: <ul style="list-style-type: none"> <li>NAS IP address: always included in the accounting message</li> <li>NAS identifier: configured in the NAS-ID parameter of the accounting server; if configured, the NAS identifier is sent to the remote server</li> </ul> This attribute only appears if a value is configured in the NAS-ID field.	Start, Interim-Update, Stop, On, Off
Acct-Session-ID	Either the "Call-ID" field value of the SIP INVITE message, the callIdentifier of the H.323 message, or RADIUS client information.	Start, Interim-Update, Stop, On, Off
Called Station ID	"To" field value of the SIP INVITE message (a type of message used to initiate a session) or the calledPartyNumber of the H.323 message.	Start, Interim-Update, Stop
Calling Station ID	"From" field value of the SIP INVITE message or the callingPartyNumber of the H.323 message.	Start, Interim-Update, Stop
Acct-Terminate-Cause	Reason for session ending (refer to Session Termination session).	Stop, Off
Acct-Session-Time	Length of session (time in seconds).	Interim-Update, Stop, Off

## Session Termination

Sessions are terminated for reasons that include normal termination, signaling failure, timeout, or network problems. The following table maps RADIUS accounting termination cause codes to network events.

RADIUS Termination Cause	Event	Message
User request	SIP BYE message or H.323	Stop
User error	SIP signaling failed to establish session (accompanied by disconnect cause)	Stop
NAS request	RADIUS server disabled	Off

## ACLI Instructions and Examples

This section tells you how to access and set parameters for RADIUS accounting support. To use the Net-Net SBC with external RADIUS (accounting) servers to generate CDRs and provide billing services requires, you need to configure account configuration and account server list.

### Accessing the Accounting and Accounting Servers Configuration

#### To configure the account configuration and account servers:

- In Superuser mode, type **configure terminal** and press <Enter>.
 

```
ACMEPACKET# configure terminal
```
- Type **session-router** and press <Enter> to access the system-level configuration elements.
 

```
ACMEPACKET(configure)# session-router
```
- Type **account-config** and press <Enter>. The system prompt changes to let you know that you can begin configuring individual parameters.
 

```
ACMEPACKET(session-router)# account-config
ACMEPACKET(account-config)#
```
- To configure account server parameters (a subset of the account configuration parameters, type **account-servers** and press <Enter>. The system prompt changes to let you know that you can begin configuring individual parameters.
 

```
ACMEPACKET(account-config)# account-servers
ACMEPACKET(account-server)#
```

### Setting Up the Account Configuration

You set the account configuration parameters to indicate where you want accounting messages sent, when accounting messages you want them sent, and the strategy you want used to select account servers.

#### To configure the account configuration:

- hostname**—Defaults to and must remain local host.
- port**—Retain the default value of 1813 or enter the number of the UDP port associated with the Net-Net SBC from which RADIUS messages are sent.
  - minimum: 1025
  - maximum: 65535

3. **strategy**—Indicate the strategy you want used to select the accounting servers to which the Net-Net SBC will send its accounting messages. The following table lists the available strategies:

Strategy	Description
hunt	Selects accounting servers in the order in which they are listed. If the first accounting server is online, working, and has not exceeded any of the defined constraints, all traffic is sent to it. Otherwise the second accounting server is selected. If the first and second accounting servers are offline or exceed any defined constraints, the third accounting server is selected. And so on through the entire list of configured servers
failover	Uses the first server in the list of predefined accounting servers until a failure is received from that server. Once a failure is received, it moves to the second accounting server in the list until a failure is received. And so on through the entire list of configured servers.
round robin	Selects each accounting server in order, distributing the selection of each accounting server evenly over time.
fastest round trip time	Selects the accounting server that has the fastest round trip time (RTT) observed during transactions with the servers (sending a record and receiving an ACK).
fewest pending	Selects the accounting server that has the fewest number of unacknowledged accounting messages (that are in transit to the Net-Net SBC).

4. **state**—Retain the default value **enabled** if you want the account configuration active on the system. Enter **disabled** if you do not want the account configuration active on the system.
5. **max-msg-delay**—Retain the default value of **60** seconds or indicate the length of time in seconds that you want the Net-Net SBC to continue trying to send each accounting message. During this delay, the Net-Net SBC can hold a generic queue of 4096 messages.
- Minimum: zero (0)
  - Maximum:  $2^{32}-1$
6. **max-wait-failover**—Retain the default value of **100** messages or indicate the maximum number of accounting messages the Net-Net SBC can store its message waiting queue for a specific accounting server, before it is considered a failover situation.
- Once this value is exceeded, the Net-Net SBC attempts to send its accounting messages, including its pending messages, to the next accounting server in its configured list.
- Minimum: one (1) message
  - Maximum: 4096 messages
7. **trans-at-close**—Retain the default value of **disabled** if you do not want to defer the transmission of message information to the close of a session. Enter **enabled** if you want to defer message transmission.
- **disabled**—The Net-Net SBC transmits accounting information at the start of a session (Start), during the session (Interim), and at the close of a session

(Stop). The transmitted accounting information for a single session might span a period of hours and be spread out among different storage files.

- **enabled**—Limits the number of files on the Net-Net SBC used to store the accounting message information for one session. It is easiest to store the accounting information from a single session in a single storage file.
8. **generate-start**—Retain the default value **ok** if you want the RADIUS Start message to be generated once the Net-Net SBC receives an OK message in response to an INVITE. (A RADIUS Start message informs the accounting server that a SIP session has started.)

Other options include:

- **Start**—RADIUS Start message should not be generated.
  - **Invite**—RADIUS Start message should be generated once the Net-Net SBC receives a SIP session INVITE.
9. **generate-interim**—Retain the default value **reinvite response** to cause the Net-Net SBC to transmit a RADIUS Interim message. (A RADIUS Interim message indicates to the accounting server that the SIP session parameters have changed.)

You can select none, one, or more than one of the following values:

Option	Description
ok	RADIUS Start message is generated when the Net-Net SBC receives an OK message in response to an INVITE.
reinvite	RADIUS Interim message is generated when the Net-Net SBC receives a SIP session reINVITE message.
reinvite response (default)	RADIUS Interim message is generated when the Net-Net SBC receives a SIP session reINVITE and responds to it (for example, session connection or failure).
reinvite cancel	RADIUS Interim message is generated when the Net-Net SBC receives a SIP session reINVITE, and the Reinvite is cancelled before the Net-Net SBC responds to it.
unsuccessful-attempt	RADIUS Interim message is generated when a SIP session set-up attempt from a preference-ordered list of next-hop destinations is unsuccessful. This can happen when a local policy lookup, LRT lookup, ENUM query response, or SIP redirect returns a preference-ordered list of next-hop destinations. The interim message contains: the destination IP address, the disconnect reason, a timestamp for the failure, and the number that was called.

10. **account-server**—Create the account server list to store accounting server information for the account configuration. Each account server can hold 100 accounting messages. See the next section for step-by-step instructions.

Account server entries are specific to the account configuration. They cannot be viewed or accessed for editing outside of the account configuration.

**Note:** RADIUS will not work if you do not enter one or more servers in a list.

## Setting Up Accounting Servers

You must establish the list of servers to which the Net-Net SBC can send accounting messages.

1. **hostname**—Name of the host associated with the account server in hostname format (FQDN) or as an IP address.
2. **port**—Retain the default 1813 or enter the number of the UDP port associated with the account server to which RADIUS messages are sent.
  - minimum: 1025
  - maximum: 65535
3. **state**—Retain the default `enabled` to enable the account servers on the system or enter `disabled` to disable them.
4. **min-round-trip**—Retain the default 250 milliseconds or indicate the minimum round trip time of an accounting message.
  - minimum: 1025 milliseconds
  - maximum: 65535 milliseconds

A round trip consists of the following:

- The Net-Net SBC sends an accounting message to the account server.
- The account server processes this message and responds back to the Net-Net SBC.

If the fastest RTT is the strategy for the account configuration, the value you enter here can be used to determine an order of preference (if all the configured account servers are responding in less than their minimum RTT).

5. **max-inactivity**—Retain the default 60 seconds or indicate the length of time in seconds that you want the Net-Net SBC with pending accounting messages to wait when it has not received a valid response from the target account server.
  - minimum: 1 second
  - maximum: 300 seconds

Once this timer value is exceeded, the Net-Net SBC marks the unresponsive account server as disabled in its failover scheme. When a server connection is marked as inactive, the Net-Net SBC attempts to restart the connection and transfers pending messages to another queue for transmission. RADIUS messages might be moved between different account servers as servers become inactive or disabled.

6. **restart-delay**—Retain the default 30 seconds or indicate the length of time in seconds you want the Net-Net SBC to wait before resending messages to a disabled account server.
  - minimum: 1 second
  - maximum: 300 seconds
7. **bundle-vs-a**—Retain the default `enabled` if you want the account server to bundle the VSAs within RADIUS accounting messages. Enter `disabled` if you do not want the VSAs to be bundled. (Bundling means including multiple VSAs within the vendor value portion of the message.)

In a bundled accounting message, the RADIUS message type is vendor-specific, the length is determined for each individual message, and the vendor portion begins with a 4-byte identifier, and includes multiple vendor type, vendor length, and vendor value attributes.

8. **secret**—Enter the secret passed from the account server to the client in text format. Transactions between the client and the RADIUS server are authenticated by the shared secret; which is determined by the source IPv4 address of the received packet.

9. **NAS-ID**—*Optional*. Enter the NAS ID in text format (FQDN allowed). The account server uses this value to identify the Net-Net SBC for the transmittal of accounting messages.

The remote server to which the account configuration sends messages uses at least one of two potential pieces of information for purposes of identification. The Net-Net SBC accounting messages always includes in the first of these:

- Network Access Server (NAS) IP address (the IP address of the Net-Net SBC's SIP proxy)
- NAS ID (the second piece of information) provided by this value. If you enter a value here, the NAS ID is sent to the remote server.

If you have more than one Net-Net SBC pointing to the same account server, the NAS ID can be used to identify which Net-Net SBC generated the record.

## Per Realm Accounting Control

---

You can enable or disable accounting control for specific realms by setting one parameter. This feature is enabled by default.

The Net-Net SBC's SIP and H.323 tasks check whether this parameter is set to enabled or disabled, and sends record on that basis.

### ACLI Instructions and Examples

#### To configure per realm accounting:

1. In Superuser mode, type **configure terminal** and press <Enter>.
 

```
ACMEPACKET# configure terminal
```
2. Type **session-router** and press <Enter>.
 

```
ACMEPACKET(configure)# medi a-router
```
3. Type **realm-config** and press <Enter>.
 

```
ACMEPACKET(medi a-router)# real m-confi g
```
4. **accounting-enable**—Either leave this parameter set to **enabl ed** (default) to generate CDRs for this realm, or change it to **di sabl ed**.
5. Save and activate your configuration.

## Configurable Intermediate Period

---

You can set how often the Net-Net SBC generates periodic interim records for H.323 and for SIP.

- **H.323**—The periodic timer (set to the value you specify in the accounting configuration) is dynamically created when the Net-Net SBC receives a Connect message and an H.323 call answer method is invoked. The Net-Net SBC deletes the timer when the H.323 session is terminated.
- **SIP**—The periodic timer (set to the value you specify in the accounting configuration) is dynamically created when the Net-Net SBC receives a 200 OK response to an INVITE message. The Net-Net SBC deletes the timer when the session is terminated.

#### To set the timer for periodic interim records:

1. In Superuser mode, type **configure terminal** and press <Enter>.
 

```
ACMEPACKET# configure terminal
```

2. Type **session-router** and press <Enter>.
 

```
ACMEPACKET(configure)# session-router
```
3. Type **account-config** and press <Enter>.
 

```
ACMEPACKET(session-router)# account-config
```
4. **intermediate-period**—Enter amount of time in seconds between generating periodic interim records during a SIP or H.323 call. This parameter defaults to zero, which is not a valid value.
5. Save and activate your configuration.

## RADIUS CDR Content Control

---

The Net-Net SBC's RADIUS support has been enhanced so that you can limit the size of RADIUS CDRs. The Net-Net SBC's RADIUS accounting provides a detailed set of records that can contain, for example, multiple media flow descriptions for forked calls that can contain multiple sets of media and QoS attributes. While the level of detail might be required for some networks, in others the large CDRs generated to reflect that level of granularity can cause issues for the application receiving the records.

You can use the following enhancements to control the size of the RADIUS CDRs your Net-Net SBC produces:

- Duplicate RADIUS attribute prevention—Using this feature, you can configure the Net-Net SBC to send only one set of RADIUS attributes in CDR for a forked call. (When a forked SIP INVITE contains media information, media and QoS attributes can potentially be duplicated.)
- RADIUS attribute selection—You can set a list of the Acme Packet VSAs you want included in a RADIUS CDR, and the Net-Net SBC will exclude the others from the record; standard attributes are always included. You specify attributes using their unique identifier in a comma-delimited list, and you can list them in any order. However, entering an invalid range disables this feature.

The Net-Net SBC excludes attributes from the records in which they are already defined. If an attribute only appears in a Stop record, then it will be deleted from Stop records.

The configuration provides a mechanism to make entries flexible and easy.

## ACLI Instructions and Examples

You enable these enhancements using two parameters in the accounting configuration.

### Accessing the Accounting Configuration

#### To access the accounting configuration:

1. In Superuser mode, type **configure terminal** and press <Enter>.
 

```
ACMEPACKET# configure terminal
```
2. Type **session-router** and press <Enter>.
 

```
ACMEPACKET(configure)# session-router
```
3. Type **account-config** and press <Enter>.
 

```
ACMEPACKET(session-router)# account-config
```

From this point, you can reach the individual parameters for duplicate RADIUS attribute prevention and for RADIUS attribute selection.



## Preventing Duplicate RADIUS Attributes

### To enable duplicate RADIUS attribute prevention:

1. **prevent-duplicate-attrs**—Change this parameter from disabled (default) to enabled.  
`ACMEPACKET(account-config)# prevent-duplicate-attrs enabled`
2. Save and activate your configuration.

## RADIUS Attribute Selection

You enter the list of VSAs that you want included as a comma-delimited list. There are special entry types you can use in the comma-delimited list to set ranges and make entries easier:

- **x-** — Where X is a VSA identifier, the Net-Net SBC will include all attributes with an identifier equal to or greater than x.
- **-x** — Where X is a VSA identifier, the Net-Net SBC will include all attributes with an identifier equal to or less than x.
- **-** — Use the minus sign (-) alone when you want to turn off attribute selection, including all VSAs in the CDR.

### To enter a list of RADIUS attributes to include in a CDR:

1. **vsa-id-range**—Enter a comma-delimited list that represents the VSA you want to appear in the RADIUS CDR. There is no default for this parameter.

Do not use <Spaces> when typing in your comma-delimited list.

```
ACMEPACKET(account-config)# vsa-id-range -5, 7, 10-
```

This entry specifies that CDRs contain VSA with identifiers equal to and less than 5, VSA 7, and VSAs with identifiers equal to and greater than 10.

Limit this list to accounting VSAs. For example, VSA 254 is an authentication VSA, so it should not be included in the range. The system generates validate-config errors if your range includes VSAs that are not accounting VSAs.

2. Save and activate your configuration.

## Custom RADIUS CDR VSAs for SIP

---

This section describes these additions to the Net-Net SBC's RADIUS accounting capabilities for customizing your call detail records (CDRs):

- **Generating CDRs with call detail information from a SIP message**—The Net-Net SBC reserves a set of vendor-specific attributes (VSAs) and then populates them according to your header manipulation (HMR) configuration
- **Generating CDRs with trunk group information**—You can enable your Net-Net SBC to provide terminating trunk-group and trunk-context data even when the Net-Net SBC is not performing trunk-group routing.

Both support using the CSV file for RADIUS records, which you can either save locally or push to a defined FTP server.

## About User-Defined VSAs for SIP Calls

The Net-Net SBC reserves VSAs 200-229 for you to define for use with SIP calls. These VSAs should never be used for other purposes, and their use should never conflict with the need to add new VSAs in the future. Because this leaves a significant number of VSAs unused, there is still ample space for any new VSAs that might be required.

Since RADIUS START records are created on session initiation, their content cannot be updated. However, the content for INTERIM and STOP records can be.

To configure user-defined VSAs for a SIP call, you use HMR. For example, when you set up HMR correctly, the Net-Net SBC reports originating or terminating country codes in CDRs in whatever format they appear in the SIP username field. The HMR rules you configure uses the SIP header name P-Acme-VSA, adding it to the SIP header from any part of the SIP message. Then the Net-Net SBC searches for the P-Acme-VSA header, generates a VSA for it, and then includes that VSA in the CDR for the call.

You can include multiple custom VSAs per CDR by adding the corresponding number of rules; in essence, you add in the header as many times as required.

## HMR Adaptations

The following HMR element rule types support user-defined VSA for SIP calls:

- **uri-user-only**—The **uri-user-only** element rule type represents the URI username without the URI user parameters. You can perform these actions for the **uri-user-only** type: store, replaces, delete, and add. This means, for example, that you can add a username string to SIP or TEL URI without having any impact on other parameters.
- **uri-phone-number-only**—The **uri-phone-number-only** applies when all rules are met. It refers to the user part of the SIP/TEL URI without the user parameters when the user qualifies for the BNF shown here:

```
uri-phone-number-only = [+]1*(phone-digit / dtmf-digit / pause-character)
phone-digit           = DIGIT / visual-separator
DIGIT                 = "0" / "1" / "2" / "3" / "4" / "5" / "6" / "7" / "8" / "9"
visual-separator      = "-" / "." / "(" / ")"
dtmf-digit            = "*" / "#" / "A" / "B" / "C" / "D"
pause-character       = "p" / "w"
```

Once the URI user part qualifies as a **uri-phone-number-only** based on this BNF, the Net-Net SBC ignores the visual separators when comparing it against a match value. Furthermore, the Net-Net SBC performs on or using the **uri-phone-number-only** after the excluding the visual separators.

But anew value being added as a **uri-phone-number-only** or replacing a **uri-phone-number-only** does not have to match the BNF noted above. That is, you can use the **uri-phone-number-only** type knowing that:

- The action only occurs if the URI username matches the BNF defined here.
- Even so, you can also replace the **uri-phone-number-only** with one that does not match—using the same rule.

## HMR String Variable

HMR supports the use of a string variable that you can use to populate headers and elements. You set this value in the **hmr-string** parameter for a realm, SIP session agent, or SIP interface. Then, you reference it as the \$HMR\_STRING variable.

When a message arrives, the Net-Net SBC matches the string you provision to the closest session agent, realm, or SIP interface. The precedence for matching is in this order: session agent, realm, and then SIP interface. For example, the Net-Net SBC populates messages matching a session agent using the \$HMR\_STRING variable, but it leaves the value empty for session agents that do not match.

You can use the string variable, for instance, for values specific to realms and session agents such as country code values when the regular expression pattern used to match a country code fails to do so.

## ACLI Instructions and Examples: User-Defined VSAs

This section shows you how to configure user-defined VSAs for SIP calls. It also contains subsections with configuration examples so you can see how this feature is put to use.

This section also shows you two configuration examples for this feature.

### To create a header manipulation rule that generates user-defined VSAs for SIP calls:

1. In Superuser mode, type **configure terminal** and press <Enter>.
 

```
ACMEPACKET# configure terminal
ACMEPACKET(configure)#
```
2. Type **session-router** and press <Enter>.
 

```
ACMEPACKET(configure)# session-router
ACMEPACKET(session-router)#
```
3. Type **sip-manipulation** and press <Enter>.
 

```
ACMEPACKET(session-router)# sip-manipulation
ACMEPACKET(sip-manipulation)#
```
4. Type **header-rules** and press <Enter>.
 

```
ACMEPACKET(session-router)# header-rules
ACMEPACKET(sip-header-rules)#
```
5. **name**—Enter a meaningful name for the header rule you are creating. For example, if you want to add VSA 200 to your CDRs for SIP calls, you might name your rule **generateVSA200**. There is no default for this parameter, and it is required.
6. **header-name**—Set this parameter to P-Acme-VSA so the Net-Net SBC will add this accounting information to CDRs for the call.
7. **action**—Set this parameter to **add**.
8. **new-value**—Enter the regular expression value for the new value you want to add. For example, to add VSA 200 that contains the value from the SIP From header, you would enter **200:+\$storeFrom.\$0**.
9. Save and activate your configuration.

The first example shows you how to generate custom VSA for the To and From headers in SIP messages.

- VSA 200 contains the header value from the SIP From header.
- VSA 220 contains the header value from the SIP To header.

```

sip-manipulation
  namecustom                               VSA1
  description
  header-rule
    name                                     storeFrom
    header-name                             from
    action                                   store
    comparison-type                         pattern-rule
    match-value                             .*
    msg-type                                request
    new-value
    methods                                  INVITE
  header-rule
    name                                     storeTo

```

```

                                header-name      to
                                action            store
                                comparison-type  pattern-rule
                                match-value     .*
                                msg-type        request
                                new-value
                                methods         INVITE
header-rule
                                name            generateVSA200
                                header-name     P-Acme-VSA
                                action         add
                                comparison-type case-sensitive
                                match-value
msg-type                        any
                                new-value      200: +$storeFrom. $0
                                methods        INVITE
header-rule
                                name            generateVSA220
                                header-name     P-Acme-VSA
                                action         add
                                comparison-type case-sensitive
                                match-value
                                msg-type        any
                                new-value      220: +$storeTo. $0
                                methods        INVITE

```

The second example shows you how to configure HMR to generate VSA 225, which contains the customer P\_From header when it is present. When that header is not present, the rule instructs the Net-Net SBC to include the header value from the SIP From header for VSA 225.

```

sip-manipulation
name                          customVSA1
description
header-rule
                                name            storePfrom
                                header-name     P_From
                                action         store
                                comparison-type pattern-rule
                                match-value     .*
                                msg-type        request
                                new-value
                                methods         INVITE
header-rule
                                name            storeFrom
                                header-name     from
                                action         store
                                comparison-type pattern-rule
                                match-value     .*
                                msg-type        request
                                new-value
methods                        INVITE
header-rule
                                name            generateVSA225_1
                                header-name     P-Acme-VSA

```

```

        action add
        comparison-type case-sensitive
        match-value
        msg-type request
        new-value 225: +$storeFrom. $0
        methods INVITE
    header-rule
        name generateVSA225_2
        header-name P-Acme-VSA
        action manipulate
        comparison-type pattern-rule
        match-value $storePfrom
        msg-type request
        new-value
        methods INVITE
    element-rule
        name one
        parameter-name
        type header-value
        action delete-element
        match-value-type any
        comparison-type pattern-rule
        match-value ^225.*
        new-value
    element-rule
        name two
        parameter-name
        type header-value
        action add
        match-value-type any
        comparison-type case-sensitive
        match-value
        new-value 225: +$storePfrom. $0

```

### ACLI Instructions and Examples: String Variable

To use the HMR string variable, you set the **hmr-string** value in the SIP session agent, realm, or SIP interface where you want the feature applied. The following sample shows you how to configure the **hmr-string** parameter for SIP session agent.

1. In Superuser mode, type **configure terminal** and press <Enter>.

```

ACMEPACKET# configure terminal
ACMEPACKET(configure)#

```

2. Type **session-router** and press <Enter>.

```

ACMEPACKET(configure)# session-router
ACMEPACKET(session-router)#

```

3. Type **session-agent** and press <Enter>.

```

ACMEPACKET(session-router)# session-agent
ACMEPACKET(session-agent)#

```

If you are adding this feature to an existing configuration, you need to select the configuration (using the ACLI **select** command) before making your changes.

4. **manipulation-string**—Enter a value that references the \$HMR\_STRING variable that will be used to populate SIP headers and elements using HMR. There is no default value for this parameter.

5. Save and activate your configuration.

## Trunk-Group VSA Generation

You can force the Net-Net SBC to generate VSAs related to trunk groups even when you are not using the trunk group feature. With the **force-report-trunk-info** parameter turned on in the session router configuration:

- The Net-Net SBC reports terminating trunk group and trunk-context information even though it has not perform trunk-group routing.  
The appropriate VSAs report the terminating trunk-group (VSA 65) and trunk context (VSA 67) with the information of the matching ingress session agent and realm of the originator.
- The Net-Net SBC reports the terminating trunk-group (VSA 66) and trunk context (VSA 68) as the received trunk group and context from the call's SIP REQUEST message. If the SIP message has none, then the Net-Net SBC uses the information from the matching egress session agent (or egress realm, when available) and next-hop realm.

Note that information is reported after HMR processing—meaning that header manipulation has been performed on the message information reported.

## ACLI Instructions and Examples

You enable trunk-group VSA generation on a system-wide basis in the session-router configuration.

### To enable forced trunk-group VSA generation:

1. In Superuser mode, type **configure terminal** and press <Enter>.
 

```
ACMEPACKET# configure terminal
ACMEPACKET(configure)#
```
2. Type **session-router** and press <Enter>.
 

```
ACMEPACKET(configure)# session-router
ACMEPACKET(session-router)#
```
3. Type **session-agent** and press <Enter>.
 

```
ACMEPACKET(session-router)# session-router
ACMEPACKET(session-router)#
```
4. **forced-report-trunk-info**—Change this parameter to enabled if you want to turn on the Net-Net SBC's ability to generate VSAs for trunk group information even when you are not using trunk-group routing. The Net-Net SBC uses VSAs 65-68 to report originating and terminating trunk group information as described in the [Trunk-Group VSA Generation \(54\)](#) section above. By default, this parameter is **disabled**.
5. Save and activate your configuration.

## RADIUS Account Server Prioritization

Especially useful for customers with multiple Net-Net SBCs, the RADIUS account server prioritization feature allows you to assign a priority to each of the account servers you configure. Setting the priority for RADIUS accounting servers allows you to load balance traffic across the servers.

Without this feature, the Net-Net SBC sorts RADIUS accounting servers by their IP addresses and ports. For example, if you have a pre-existing accounting server with the IP address and port combination of 10.1.31.2:1813 and then configure a new server at 10.0.3.12:2145, the new server will take priority over the pre-existing one.

Of course, you always have the option of allowing the system to set the priority or your accounting servers in this way.

The prioritization feature works with all of the strategy types you set in the accounting configuration. However, it is most applicable to the **hunt** or **failover** strategies. You can assign a number to each server to mark its priority, or you can leave the priority parameter set to 0 (default) so the Net-Net SBC prioritizes them by IP address and port.

## How You Might User Server Prioritization

This example shows you how you can might benefit from using the prioritization feature if you have multiple Net-Net SBCs sending RADIUS CDRs to multiple RADIUS servers. Consider the following Net-Net SBCs and accounting servers.

Net-Net SBC	Account Server1 Priority	Account Server2 Priority	Account Server3 Priority
Net-Net SBC1	10	7	4
Net-Net SBC2	7	4	10
Net-Net SBC3	4	10	7
Net-Net SBC4	10	7	4
Net-Net SBC5	7	4	10
Net-Net SBC6	4	10	7

If the strategy for this example is set to **hunt** or **failover** and assuming no timeouts are pending, you can see that Net-Net SBC1 sends its accounting traffic to Account Server3 over the other two. Net-Net SBC2 sends its traffic to Account Server2 over the others, and likewise for the remainder of Net-Net SBCs and servers. The traffic, then, is load balanced across the servers, less likely to overburden any of them.

## ACLI Instructions and Examples

This section shows you how set the priority for an account server.

- In Superuser mode, type **configure terminal** and press <Enter>.
 

```
ACMEPACKET# configure terminal
ACMEPACKET(configure)#
```
- Type **session-router** and press <Enter>.
 

```
ACMEPACKET(configure)# session-router
ACMEPACKET(session-router)#
```
- Type **account-config** and press <Enter>.
 

```
ACMEPACKET(session-router)# account-config
ACMEPACKET(account-config)#
```
- Type **account-server** and press <Enter>.
 

```
ACMEPACKET(session-router)# account-server
ACMEPACKET(account-server)#
```
- priority**—Enter the number corresponding to the priority you want this account server to have in relation to the other account servers to which you send traffic. The default for this parameter is 0, meaning the prioritization feature is turned off—and that the Net-Net SBC will therefore prioritize accounting servers by IP

address and port. Otherwise, you can use any numbering scheme that suits your needs and ease of use.

6. Save and activate your configuration.

## Accounting Configuration Example

---

Using the Net-Net SBC with external RADIUS accounting servers to generate CDRs and provide billing services requires you to configure accounting configuration and any associated accounting servers you might need.

The following example shows how you can set accounting configuration and accounting server parameters to support multiple RADIUS accounting servers.

```

ACMEPACKET(account-config)# show
account-config
    hostname                local host
    port                    1813
    strategy                Hunt
    state                   enabled
    max-msg-delay           60
    max-wait-failover      100
    trans-at-close         disabled
    file-output            enabled
    max-file-size          1000000
    max-files               5
    file-path              /ramdrv
    file-rotate-time       60
    ftp-push               enabled
    ftp-address             154.0.12.4
    ftp-port                21
    ftp-user                Admin
    ftp-password            A213HG
    ftp-remote-path        /sdRADIUS
    cdr-output-redundancy  enabled
    generate-start         OK
    generate-interim

                                Reinvite-Response
    intermediate-period    0
    prevent-duplicate-attrs disabled
    vsa-id-range
    cdr-output-inclusive

account-server
    hostname                10.0.0.189
    port                    1813
    state                   enabled
    min-round-trip         250
    max-inactivity         60
    restart-delay          30
    bundle-vsa             enabled
    secret                  acme
    NAS-ID
    priority                0

account-server
    hostname                192.168.200.70
    port                    5050

```



state	enabl ed
mi n-round-tri p	250
max-i nacti vi ty	60
restart-del ay	30
bundl e-vsa	enabl ed
secret	packet
NAS-ID	
pri ori ty	

## Local CDR Storage and FTP Push

---

The local CDR storage feature allows you to save RADIUS CDR data to a local CSV text file on the Net-Net SBC. Local CDR file creation and storage can be used in addition to or independently of sending CDRs to RADIUS servers for every call. Once the Net-Net SBC creates and saves local CDR files, you can:

- Send the files to an FTP server by configuring a push receiver
- Develop and implement your own script for retrieving them as necessary from the Net-Net SBC

You configure the Net-Net SBC to:

- Set directory path where you want to save local CDR files
- Set a maximum file size for the CSV file
- Set a maximum number of local CDR files
- Set an interval in which to close the existing local CDR file and begin writing a new file.

Once local CDR file creation is enabled, you can configure push receivers to “push” any non-active and closed CDR files to an FTP server using FTP or SFTP protocols. You configure the Net-Net SBC with the push receiver’s:

- server IP address and port information
- login credentials
- path to save the local CDR Files
- The interval at which the Net-Net SBC should send files to a push receiver

For flexibility and security, the Net-Net SBC can log into a push receiver with either FTP or SFTP. If you are creating a secure connection with SFTP, your Net-Net SBC can authenticate to the server with either a public shared key or SSH-encrypted username and password.

Bear in mind that the Net-Net SBC deletes a local CDR file after the local CDR file has been successfully transferred to a push receiver.

### Local CDR File Format

The CDRs are written as comma-delimited ASCII records to files on the Net-Net SBC. The types of records are controlled by the same accounting configuration parameters used for RADIUS. The fields of the comma-delimited entries correspond to RADIUS START, INTERIM, and STOP records. Using the accounting configuration, you can configure the Net-Net SBC to record STOP records only.

Because the record types do not have consistent field positioning, any server parsing them would need to read the first field to determine the type and learn how to parse the remaining fields.

## Local CDR File Format Consistency

Unpopulated or unused fields in the RADIUS CDR are omitted from the locally-stored CSV file. This means that there is no fixed position for a RADIUS attribute across all CSV files. Instead, the missing values are skipped in the CSV file so that the order and appearance for attribute values can differ from record to record.

You can optionally guarantee the placement of attributes in locally-stored CSV files with the **CDR output inclusive** parameter. With this enhancement enabled, RADIUS records sent to a RADIUS client contain even empty attributes with an integer, date and time, or IP address format; the default value is zero. In other words, when there is no value to report:

- An IP address attribute will report as 0. 0. 0. 0
- A date and time attribute will report as 00: 00: 00. 000 UTC JAN 01 1970
- An integer attribute value will report as 0

To maintain RFC 2865 and 2866 compliance, the Net-Net SBC will not send empty attributes that are string values to a RADIUS client. And when you enable this feature, the Net-Net SBC adds all attributes to the locally-stored CSV file.

Refer to [Appendix C \(119\)](#) of this document for details about where in locally-generated CSV file VSAs appear for Start, Interim, and Stop records.

## Requirements

If you want to guarantee the CSV placement for RADIUS attribute values, you must use the entire RADIUS dictionary. You cannot use the RADIUS CDR abbreviation feature. Using an abbreviated form of the RADIUS dictionary results in adverse effects for the CSV file.

In your configuration, then, you must set the **vsa-id-range** parameter to use the entire range of attributes. Leaving this parameter blank disables abbreviation and all attributes are included. Alternatively, you can specify all of the parameters (by attribute number) that are used in the Net-Net OS release loaded on your system.

See the [RADIUS CDR Content Control \(48\)](#) section for more information.

## Local CDR File Naming Convention

Filenames are derived from the date and time that the CDR file is opened for writing. The format is cdrYYYYMMDDHHMM[a-j ], where:

- YYYY=the year
- MM=the month
- DD=the day
- HH=the hour
- MM=the minute
- [a-j ]=a suffix that provides additional discrimination in case of changing system time, setting the rotation time for this feature to one minute, or in case of another occurrence that might compromise the date and time

Your file name will resemble the following sample: cdr200511151200.

## Local CDR File Storage Directories

The Net-Net SBC only allows local storage of ASCII CDRs to the /ramdrv and /ramdrv/1 ogs directories. If you try to save to another directory (such as /code or /boot), you will receive an error message.

If you are using the ACLI and enter an inappropriate directory, the ACLI will issue an error message.

## Local CDR File Size and Rotation

You can configure maximum file size, maximum number of local CSV files to store, and the interval at which the files rotate.

The Net-Net SBC saves up to the file size limit (**max file size**) and maintains only number of files that you configure (**max files**). When the maximum file size is reached, the Net-Net SBC closes that file and begins writing VSA attributes and values to a new local CDR file. When it is time for the Net-Net SBC to write the *max files + 1* file, the oldest file is deleted so that the newest one can be stored.

## More About File Rotation Time

You can use the CDR local storage feature on its own, without enabling the ftp push feature. The Net-Net SBC uses a period of time that you set to periodically rotate the files. The **file rotate time** parameter rotates the local CSV files regardless of whether you use the FTP push feature.

## RADIUS CDR Redundancy

When you are using the RADIUS CDR storage and FTP push feature, the Net-Net SBC can create a redundant copy of the comma-delimited CDR files that it stores on the standby system in the HA node.

This enhancement to the CDR storage feature ensures against data loss if, for example, an active Net-Net SBC fails immediately before an FTP push. The standby has a duplicate set of records that it sends. This feature is enabled with the **CDR output redundancy** parameter found in the **account config** configuration element.

## Caveats for H.323

H.323 calls proceed without interruption over an HA node in the event of a failover from one Net-Net SBC to another, and RADIUS records are generated and duplicated across the active and standby systems in an HA node. However if a switchover occurs during an H.323 call (that has been initiated, but not completed), the newly active (formerly standby) system will not generate RADIUS Stop records when the call completes.

## FTP Push

The FTP push feature is used to copy local CDR files to a remote FTP server on a periodic basis. This feature is configured by defining push receivers which contain standard login and FTP server credentials of the remote machine. At the configured time interval (**file rotate time**), the Net-Net SBC closes the current file, and pushes the files that are complete and have not yet been pushed; including the just-closed-file.

## Deprecated ACLI Configuration

The following parameters in the account-config configuration element are deprecated:

- ftp-address
- ftp-port
- ftp-user
- ftp-password
- ftp-remote-path

These parameters will only be used if no `account-config > push-receiver` configuration elements have been defined. All new push receivers must be defined in the `account-config > push-receiver` configuration element.

## Multiple Push Receivers

Net-Net SBC now supports up to five CDR push receivers for use with the local file storage and FTP push feature. For each receiver you configure, you can set the file transfer protocol you want to use—either FTP or SFTP. The system uses the push receivers according to the priorities you set by giving a 0 through 4 priority number to the server when you configure it; 0 is the highest priority, and 4 is the lowest. By default, push receivers always have their priority at the lowest setting (4).

Based on the priority level you set, the Net-Net SBC uses a strategy (which you also set) to select a CDR push receiver. If the highest priority push receiver selected using the strategy becomes unavailable (i.e., times out), the Net-Net SBC uses the strategy (hunt, round robin, etc.) to select another.

This feature is dynamically configurable. When you change the configuration, the Net-Net SBC updates the list of push receivers if it has changed.

## Push Receivers

A push receiver configuration includes all the credentials that the Net-Net SBC needs to log into an FTP server and upload any recent local CDR files. Push receiver configurations must include:

- the server's IP address and port
- remote path of where to upload the local CDR files
- protocol used to connect to the server
- account login credentials

## Secure FTP Push

The Net-Net SD can securely log into a push receiver using one of two methods that create a secure connection.

You can use password-based SSH authentication for logging into an SFTP server by setting the push receiver's **protocol** parameter to `sftp`, configuring a username and password and leaving the **public-key** parameter blank. Note that you must also import the SFTP server's SSH host key onto the Net-Net SD for this authentication.

You can use public key authentication for logging into an SFTP server by setting the push receiver's **protocol** parameter to `sftp` setting the **public-key** parameter to a configured public key record name (`security > public key > name`), including an account **username** and configuring your SFTP server with the Net-Net SD's public key pair.

It is often difficult to determine whether the SFTP server is using its RSA or DSA key for its server application. For this reason, it is common for administrators to try importing both RSA and DSA keys onto the Net-Net SD before getting the Net-Net SD configuration to operate FTP Push properly.

Note that it is also common for the SFTP server to be a Linux machine. In this case, the command `ssh-keygen -e` creates the public key you need to import to the Net-Net SD. This command sequence requires you to specify file export type, as shown below.

```
[linux-vpn-1 ~]# ssh-keygen -e
Enter file in which the key is (/root/.ssh/id_rsa):
/etc/ssh/ssh_host_rsa_key.pub
```

If you do not have access to the SFTP server but can access it from another Linux host, use the command `ssh-keyscan` to get the key. An example command line is shown below.

```
root@server: ~$ssh-keyscan -t dsa sftp.server.com
```

## ACLI Instructions and Examples

This section shows you how to configure Local CDR storage and FTP push on your Net-Net SBC.

### Accessing the Accounting Configuration

To configure parameter for these features, you must access the accounting configuration.

#### To access the accounting configuration:

1. In Superuser mode, type **configure terminal** and press <Enter>.

```
ACMEPACKET# configure terminal
```

2. Type **session-router** and press <Enter>.

```
ACMEPACKET(configure)# session-router
```

3. Type **account-config** and press <Enter>.

```
ACMEPACKET(session-router)# account-config
```

```
ACMEPACKET(account-config)#
```

From here, you can enable local CDR storage and FTP push.

### Enabling Local CDR Storage

#### To enable local CDR storage:

4. **file-output**—Enable this parameter for the Net-Net SBC to create comma-delimited CDRs (generated from RADIUS records). By default, this parameter is disabled.
5. **file-path**—You must configure this path or the CDR push feature will not work. Set the path to use on the Net-Net SBC for file storage from these two options:
  - /ramdrv
  - /ramdrv/logs

To use FTP push, you must configure a usable path.

6. **max-file-size**—Set the maximum CDR file size in bytes. The default and minimum value is 1000000. Acme Packet recommends you limit local CDR storage on your system to 30M. For example, if you retain the **max-file-size** default, set **max-files** to 30. However, if you are using a Storage Expansion Module the maximum value is 10<sup>8</sup>.
7. **max-files**—Set the maximum number of files to be stored on the Net-Net SBC at one time. You can configure the Net-Net SBC to store as few as one file or as many as 4096. The default is 5.
8. **file-rotate-time**—Set how often in minutes you want to rotate the stored files; the Net-Net SBC will overwrite the oldest file first. The minimum rotation time is 2 minutes; the default is 60 minutes. This parameter defaults to 0, and leaving it set to the default means that the Net-Net SBC will not rotate the files.
9. **cdr-output-redundancy**—Set this parameter to enabled for the Net-Net SBC to store a redundant copy of the local CSV file to the standby HA node.

## Configuring a Push Receiver Fallback Method

You set the push receiver strategy and define the maximum timeout in seconds in the main accounting configuration.

**Note:** You may ignore the following two parameters if only one push receiver is configured.

- ftp-strategy**—Set the strategy you want the Net-Net SBC to use when selecting from multiple push receivers. The default is **hunt**.

Strategy	Description
Hunt	The Net-Net SBC selects the push receiver from the available list according to the priority level. The system uses this strategy as its default.
Failover	The Net-Net SBC selects the push receiver based on priority level and will continue to use that same push receiver until it fails over.
RoundRobin	The Net-Net SBC selects push receivers systematically one after another, balancing the load among all responsive push receivers.
FastestRTT	The Net-Net SBC selects the push receiver based on best average throughput. For this situation, throughput is the number of bytes transferred divided by the response time. The system uses a running average of the five most recent throughput values to accommodate for network load fluctuations.

- ftp-max-wait-failover**—Enter the amount of time in seconds to wait before the Net-Net SBC declares a push receiver to have failed over. This default value for this parameter is **60**.

## Setting the CSV File Format

This section shows you how to guarantee the CSV placement for RADIUS attribute values by using the entire RADIUS dictionary.

### To enable fixed value placement in CSV files for RADIUS CDRs:

- In Superuser mode, type **configure terminal** and press <Enter>.

```
ACMEPACKET# configure terminal
ACMEPACKET(configure)#
```

- Type **session-router** and press <Enter>.

```
ACMEPACKET(configure)# session-router
```

- Type **account-config** and press <Enter>.

```
ACMEPACKET(session-router)# account-config
ACMEPACKET(account-config)#
```

If you are adding support for this feature to a pre-existing accounting configuration, then you must use the ACLI **select** command so that you can edit it.

- vsa-id-range**—Either leave this parameter blank (default), or enter the complete range of VSAs for the Net-Net OS release loaded on your system. The following example shows what you would enter to use all of the VSAs for Net-Net OS Release 4.1.4p4 for a system that is not running QoS.

```
ACMEPACKET(account-config)# vsa-id-range 1-4, 10-14, 20-24, 28, 29, 32-71, 74-136
```

- cdr-output-inclusive**—Set this parameter to enabled to fill in 0s in otherwise empty fields in local CDR files. It is disabled by default.

## Enabling FTP Push

### To enable FTP push:

1. In Superuser mode, type **configure terminal** and press <Enter>.
 

```
ACMEPACKET# configure terminal
ACMEPACKET(configure)#
```
2. Type **session-router** and press <Enter>.
 

```
ACMEPACKET(configure)# session-router
```
3. Type **account-config** and press <Enter>.
 

```
ACMEPACKET(session-router)# account-config
```

If you are adding support for this feature to a pre-existing accounting configuration, then you must use the ACLI **select** command so that you can edit it.
4. **ftp-push**—Set the state of FTP push feature to **enabled**. It is disabled by default.
5. Type **push-receiver** and press <Enter>.
 

```
ACMEPACKET(account-config)# push-receiver
```
6. **server**—Enter the IP address of this push receiver FTP server.
7. **port**—Enter the port number of this push receiver FTP server.
8. **remote-path**—Enter the remote pathname to which you want CDR files to be sent on the push receiver. There is no default for this parameter.
9. **filename-prefix**—Enter the filename prefix (as a string) to prepend to the CDR files the Net-Net SBC sends to the push receiver. The Net-Net SBC does not rename local files. There is no default for this parameter.
10. **protocol**—Enter **SFTP** if you want to change the transport protocol for this push receiver from its default, **FTP**.
11. **username**—Enter the username the Net-Net SBC uses when connecting to this push receiver. There is no default for this parameter. This parameter is always required.
12. **password**—Enter the password corresponding to the username the Net-Net SBC uses when connecting to this push receiver. There is no default for this parameter. You can leave this field blank if you are using public key authentication.
13. **public-key**—Enter the public key profile to use for authentication to this push receiver and decryption of this servers packets. Note the procedure below, which tells you how to create a public key profile. Profile configuration is required for both password and public key authentication.
14. Save and activate your configuration.

## Creating a Public Key Profile

The Secure Shell (SSH) and related Secure Shell File Transfer (SFTP) protocols provide for the secure transfer of audit files and for the secure transfer of management traffic across the *wancom0* interface. When using password or public key authentication with push receiver configurations, use the procedures described below to create your profiles.

Create your profile by configuring:

- SSH Properties
- Import an SSH Host Key
- Create the public key profile

The following two tasks are required for public key authentication mode only.

- Generate an SSH Key Pair
- Copy the Net-Net SD public Key to the SFTP server

After the above, you can use this profile within the context of your FTP push configuration.

## SSH Operations

SSH Version 2.0, the only version supported on the Acme Packet Net-Net SBC, is defined by a series of five RFCs.

- RFC 4250, *The Secure Shell (SSH) Protocol Assigned Numbers*
- RFC 4251, *The Secure Shell (SSH) Protocol Architecture*
- RFC 4252, *The Secure Shell (SSH) Authentication Protocol*
- RFC 4253, *The Secure Shell (SSH) Transport Layer Protocol*
- RFC 4254, *The Secure Shell (SSH) Connection Protocol*

RFCs 4252 and 4253 are most relevant to SBC operations.

The transport layer protocol (RFC 4253) provides algorithm negotiation and key exchange. The key exchange includes server authentication and results in a cryptographically secured connection that provides integrity, confidentiality and optional compression. Forward security is provided through a Diffie-Hellman key agreement. This key agreement results in a shared session key. The rest of the session is encrypted using a symmetric cipher, currently 128-bit AES, Blowfish, 3DES, CAST128, Arcfour, 192-bit AES, or 256-bit AES. The client selects the encryption algorithm to use from those offered by the server. Additionally, session integrity is provided through a crypto-graphic message authentication code (hmac-md5, hmac-sha1, umac-64 or hmac-ripemd160).

The authentication protocol (RFC 4252) uses this secure connection provided and supported by the transport layer. It provides several mechanisms for user authentication. Two modes are supported by the Net-Net SD: traditional password authentication and public-key authentication.

## ACLI Instructions and Examples

This section provides ACLI procedures for SFTP push configurations, including SSH property configuration, certificate import, and public key profile configuration on your Net-Net SD.

### Configure SSH Properties

The single instance **ssh-config** configuration element specifies SSH re-keying thresholds.

1. From admin mode, use the following command path to access the ssh configuration element:

```
ragnarok# configure terminal > security > admin-security >
ssh-config
ragnarok(ssh-config)#
```

ssh configuration element properties are shown below with their default values

rekey-interval	60
rekey-byte-count	31

2. **rekey-interval**—specifies the maximum allowed interval, in minutes, between SSH key negotiations



Allowable values are integers within the range 60 through 600, with a default of 60 (minutes). Shorter lifetimes provide more secure connections.

Works in conjunction with **rekey-byte-count**, which sets a packet-based threshold, to trigger an SSH renegotiation. If either trigger is activated, an SSH renegotiation is begun.

Retain the default value, or specify a new value.

```
ragnarok(ssh-confi g)# rekey-i nterval 20
ragnarok(ssh-confi g)
```

3. **rekey-byte-count**—specifies the maximum allowed send and receive packet count, in powers of 2, between SSH key negotiations

Allowable values are integers within the range 20 (1,048,576 packets) through 31 (2,147,483,648 packets), with a default of 31 ( $2^{31}$ ). Smaller packet counts provide more secure connections.

Works in conjunction with **rekey-interval**, which sets a time-based threshold, to trigger an SSH renegotiation. If either trigger is activated, an SSH renegotiation is begun.

Retain the default value, or specify a new value.

```
ragnarok(ssh-confi g)# rekey-packet-count 24
ragnarok(ssh-confi g)
```

A sample SSH configuration appears below:

```
ragnarok(ssh-confi g)# rekey-i nterval 20
ragnarok(ssh-confi g)# done
ragnarok(ssh-confi g)# exi t
ragnarok(admi n-securi ty)#
```

Specifies a key renegotiation every 20 minutes, or at the reception/transmission of 2,147,483,648 packets, whichever comes first.

## Import an SSH host Key

Importing a host key requires access to the SFTP server or servers which receive audit log transfers. Access is generally most easily accomplished with a terminal emulation program such as PuTTY, SecureCRT, or TeraTerm.

1. Use a terminal emulation program to access the SSH file system on a configured SFTP server.
2. Copy the server's base64 encoded public file making sure to include the Begin and End markers as specified by RFC 4716, *The Secure Shell (SSH) Public Key File Format*.

For OpenSSH implementations host files are generally found at */etc/ssh/ssh\_host\_dsa\_key.pub*, or *etc/ssh/ssh\_host\_rsa.pub*. Other SSH implementations can differ.

3. From admin mode use the **ssh-pub-key** command to import the host key to the SBC.

For importing a host key, this command takes the format:

```
ssh-pub-key i mport known-host <name>
```

where *name* is an alias or handle assigned to the imported host key, generally the server name or a description of the server function.

```
ragnarok# ssh-pub-key import known-host fedallah
```

```
IMPORTANT:
```

```
Please paste ssh public key in the format defined in rfc4716.
Terminate the key with ";" to exit.....
```

4. Paste the public key with the bracketing Begin and End markers at the cursor point.
5. Enter a semi-colon (;) to signal the end of the imported host key.
6. Follow directions to save and activate the configuration.

The entire import sequence is shown below.

```
ragnarok# ssh-pub-key import known-host fedallah
```

```
IMPORTANT:
```

```
Please paste ssh public key in the format defined in rfc4716.
Terminate the key with ";" to exit.....
```

```
---- BEGIN SSH2 PUBLIC KEY ----
```

```
Comment: "2048-bit RSA, converted from OpenSSH by klee@acme54"
AAAAB3NzaC1yc2EAAAABI wAAQEA70Bf08j Je7MSMgerj DTgZpbPbl rX4n17LQJgPC7cl L
cdGEtKSi Vt5Mj cSav3v6AEN2pYZi h0xd2Zzi smpoo019kkJ56s/I j GstEzqXMKHKUr9mBV
qvqI E0TqbowEi 5sz2AP31GUj QTCKZRF1X0Qx8A44vHZCum93/j fNRsnWQ1mhHmaZMmT2LS
h0r4J/NI p+vpsvpdroI V6Ftz5ei VfgocxrDrj NcVtsAMyLBpDdL6e9XebQzGSS92TPuKP/
yqzLJ2G5NVFhxdw5i +FvdHz1vBdvB505y2QPj /i z1u3TA/307tyntB0b7beDyI rg64Azc8
G7E3AGi H49LnBtI Qf/aw==
```

```
---- END SSH2 PUBLIC KEY ----
```

```
;
```

```
SSH public key imported successfully...
```

```
WARNING: Configuration changed, run "save-config" command to save it
and run "activate-config" to activate the changes
```

```
ragnarok# save-config
checking configuration
```

```
-----
...
...
...
-----
```

```
Save-Config received, processing.
```

```
waiting for request to finish
```

```
Request to 'SAVE-CONFIG' has Finished,
```

```
Save complete
```

```
Currently active and saved configurations do not match!
```

```
To sync & activate, run 'activate-config' or 'reboot activate'.
```

```
ragnarok# activate-config
```

```
Activate-Config received, processing.
```

```
waiting for request to finish
```

```
SD is not QOS-capable
```

```
Request to 'ACTIVATE-CONFIG' has Finished,
```

```
Activate Complete
```

```
ragnarok#
```

It is important to note that it is often difficult to determine whether the server is using RSA or DSA keys for your application. Unless you can definitively determine this, bear in mind that you need to try importing both.

## Create the Public Key Record

The initial step in generating an SSH key pair is to configure a public key record which will serve as a container for the generated key pair.

1. Navigate to the **public-key** configuration element.

```
ragnarok# configure terminal
ragnarok(configure)# security
ragnarok(security)# public-key
ragnarok(public-key)#
```

2. Use the **name** command to provide the object name, and the **show** command to verify object creation.

```
ragnarok(public-key)# name tashtego
ragnarok(public-key)# show
public-key
      name                tashtego
      type                rsa
      size                1024
      last-modified-by
      last-modified-date
ragnarok(public-key)#
```

This command creates a public key record named *tashtego*.

3. Use the **done** command to complete object creation.

```
ragnarok(public-key)# done
public-key
      name                tashtego
      type                rsa
      size                1024
      last-modified-by    admin@console
      last-modified-date  2009-03-06 11:18:00
ragnarok(public-key)#
```

4. Make a note of the **last-modified-date** time value.
5. Move back to admin mode, and save and activate the configuration.

```
ragnarok(public-key)# exit
ragnarok(security)# exit
ragnarok(configure)# exit
ragnarok#
ragnarok# save-config
...
...
...
ragnarok# activate-config
...
...
...
ragnarok#
```

## Generate an SSH key pair

1. Now use the **ssh-pub-key generate** command, in conjunction with the name of the public key record created in Step 3, to generate an SSH key pair.

For importing an SSH key pair, this command takes the format:

```
ssh-pub-key generate <name>
```

where *name* is an alias or handle assigned to the generated key pair, generally the client name or a description of the client function.

```
ragnarok# ssh-pub-key generate tashtego
Please wait...
public-key 'tashtego' (RFC 4716/SECSH format):

----- BEGIN SSH2 PUBLIC KEY -----
Comment: "1024-bit rsa"
AAAAB3NzaC1yc2EAAAABI wAAAIEArZEP1/Wi YsdGd/Pi 8V6pnSwV4cVG4U+j V
Owi SwNJCC9Nk82/FKYI eLZevy9D3I rZ8ytvu+sCYyOfNk4nwvz20c2N+r86kD
ru88JkUqpel JDx1AR718l cpr7ZaAx2L+e7cpyRSXCgbQR7rXu2H3bp9Jc0VhR
2fmkcl mrGAI r7Gnc=
----- END SSH2 PUBLIC KEY -----
```

SSH public-key pair generated successfully...

WARNING: Configuration changed, run "save-config" command to save it and run "activate-config" to activate the changes

```
ragnarok#
```

2. Copy the base64-encoded public key. Copy only the actual public key — do not copy the bracketing Begin and End markers nor any comments. Shortly you will paste the public key to one or more SFTP servers.
3. Save and activate the configuration.

```
ragnarok# save-config
...
...
...
ragnarok# activate-config
...
...
...
```

4. Return to the public-key configuration object, and select the target public key record instance.

```
ragnarok# configure terminal
ragnarok(configure)# security
ragnarok(security)# public-key
ragnarok(public-key)# select
<name>:
1: acme01
2: acme02
3: tashtego

selection: 3
ragnarok(public-key)# show
public-key
          name                tashtego
          type                rsa
          size                1024
```

```

last-modified-by      admn@console
last-modified-date    2009-03-06 11:24:32
ragnarok(public-key)#

```

5. Verify that the record has been updated to reflect key generation by examining the value of the `last-modified-date` field.

### Copy a client public key to an SFTP server.

Copying the client public key to an SFTP server requires server access generally using a terminal emulation program such as PuTTY, SecureCRT, or TeraTerm.

1. Use a terminal emulation program to access the SSH file system on a configured SFTP server.
2. Copy the client key to the SFTP server.

On OpenSSH implementations, public keys are usually stored in the `~/.ssh/authorized_keys` file. Each line in this file (1) is empty, (2) starts with a pound (#) character (indicating a comment), or (3) contains a single public key.

Refer to the `sshd` man pages for additional information regarding file format.

Use a text editor such as *vi* or *emacs* to open the file and paste the public key to the tail of the `authorized_keys` file.

For SSH implementations other than OpenSSH, consult the system administrator for file structure details.

### View a Public key on the Net-Net SD

You can use the `show security ssh-pub-key` command to display information about SSH keys imported to the SBC with the `ssh-pub-key` command; you cannot display information about keys generated by the `ssh-pub-key` command.

```

ragnarok# show security ssh-pub-key brief
login-name:
  acme74
finger-print:
  51: 2f: f1: dd: 79: 9e: 64: 85: 6f: 22: 3d: fe: 99: 1f: c8: 21
finger-print-raw:
  0a: ba: d8: ef: bb: b4: 41: d0: dd: 42: b0: 6f: 6b: 50: 97: 31

login-name:
  fedallah
finger-print:
  c4: a0: eb: 79: 5b: 19: 01: f1: 9c: 50: b3: 6a: 6a: 7c: 63: d5
finger-print-raw:
  ac: 27: 58: 14: a9: 7e: 83: fd: 61: c0: 5c: c8: ef: 78: e0: 9c
ragnarok#

```

This command displays summary information for all SSH imported keys.

*login-name*

contains the name assigned to the RSA or DSA public key when it was first imported

*finger-print*

contains the output of an MD5 hash computed across the base64-encoded public key

*finger-print-raw*

contains the output of an MD5 hash computed across the binary form of the public key

```
ragnarok# show security ssh-pub-key brief fedallah
login-name:
fedallah
finger-print:
  c4: a0: eb: 79: 5b: 19: 01: f1: 9c: 50: b3: 6a: 6a: 7c: 63: d5
finger-print-raw:
  ac: 27: 58: 14: a9: 7e: 83: fd: 61: c0: 5c: c8: ef: 78: e0: 9c
ragnarok#
```

This command displays summary information for a specific SSH public key (in this case *fedallah*).

```
ragnarok# show security ssh-pub-key detail fedallah
host-name:
  fedallah
comment:
  "2048-bit RSA, converted from OpenSSH by klee@acme54"
finger-print:
  c4: a0: eb: 79: 5b: 19: 01: f1: 9c: 50: b3: 6a: 6a: 7c: 63: d5
finger-print-raw:
  ac: 27: 58: 14: a9: 7e: 83: fd: 61: c0: 5c: c8: ef: 78: e0: 9c
pub-key:
```

```
AAAAB3NzaC1yc2EAAAABIwAAAQEA70Bf08jJe7MSMgerjDTgZpbPblrX4n17LQJgP
C7cLcDGEtKSiVt5Mj cSav3v6AEN2pYZi h0xd2Zzi smpoo019kkJ56s/Ij GstEzqX
MKHKUr9mBVqvqI E0TqbowEi 5sz2AP31GUj QTCKZRF1X0Qx8A44vHZCum93/j fNRsn
WQ1mhHmaZMmT2LSh0r4J/NI p+vpsvpdroI V6Ftz5ei VfgocxrDrj NcVtsAMyLBpDd
L6e9XebQzGSS92TPuKP/yqzLJ2G5NVFhxdw5i +FvdHz1vBdvB505y20Pj /i z1u3TA
/307tyntB0b7beDyI rg64Azc8G7E3AGi H49LnBtI Qf/aw==
```

```
modulus: (256)
ECE05FD3C8C97BB3123207AB8C34E06696CF6E5AD7E27D7B2D02603C2EDC94B70
3184B4A4A256DE4C8DC49ABF7BFA004376A5866284EC5DD99CE2B26A68A34D7D9
24279EACFC88C6B2D133A9730A1CA52BF66055AAFA8810E4EA6E8C048B9B33D80
3F7D4652341308A6511755CE431F00E38BC7642BA6F77FE37CD46C9D64359A11E
66993264F62D284EAF827F365A7EBE9B2FA5DAE8955E85B73E5E8957E0A1CC6B0
EB8CD715B6C00CC8B0690DD2FA7BD5DE6DOCC6492F764CFB8A3FFCAACCB2761B9
355161C5DC398BE16F747CF5BC176F079D39CB640F8FF8B3D6EDD303FDCEEEDCA
7B4139BEDB783C88AE0EB803373C1BB137006887E3D2E706D9507FF6B
exponent: (1)
23
```

```
ragnarok#
```

This command displays detailed information for specific SSH public key (in this case *fedallah*, an RSA key).

*host-name*

contains the name assigned to the RSA key when it was first imported

*finger-print*

contains the output of an MD5 hash computed across the base64-encoded RSA public key

*finger-print-raw*

contains the output of an MD5 hash computed across the binary form of the RSA public key

*public key*

contains the base64-encoded RSA key

*modulus*

contains the hexadecimal modulus (256) of the RSA key

*exponent*

(also known as *public exponent* or *encryption exponent*) contains an integer value that is used during the RSA key generation algorithm. Commonly used values are 17 and 65537. A prime exponent greater than 2 is generally used for more efficient key generation.

```
ragnarok# show security ssh-pub-key detail acme74
```

```
host-name:
```

```
acme74
```

```
comment:
```

```
DSA Public Key
```

```
finger-print:
```

```
51: 2F: f1: dd: 79: 9e: 64: 85: 6f: 22: 3d: fe: 99: 1f: c8: 21
```

```
finger-print-raw:
```

```
0a: ba: d8: ef: bb: b4: 41: d0: dd: 42: b0: 6f: 6b: 50: 97: 31
```

```
pub-key:
```

```
AAAAB3NzaC1kc3MAAACBAPY8ZOHY2yFSJA6XYC9HRwNHxaehvx5w0J0rzZdzoSOXx
bETW6ToHv8D1UJ/z+zHo9Fi ko5XybZnDI aBDHtbl Q+Yp7Stxyl tHnXF1YLfKD1G4T
6JYrdHYI 140m1eg9e4NnCRI eaqoZPF3UGfZi a6bXrGTQf3gJq2e7Yi sk/gF+1VAAA
AFQDb8D5cvwHWTZDPfXOD2s9Rd7NBvQAAAI EAI N92+Bb7D4KLYk3I wRbXbl wXdkPg
gA4pfdtW9vGfJO/RHd+Nj B4eo1D+Odi x6tXwYGN7PKS5R/FXPNwxHPapcj 9uL1Jn2
AWQ2dsknf+i /FAAvi oUPkmdMc0zuWoS0EsSNhVDtX3WdvVcGcBq9cetzrtOKWocJ
mJ80qadxTRHtUAAACBAN7CY+KKv1gHpRzFwdQm7HK9bb1LAo2KwaoXnadFgeptNBQ
eSXG1v0+JsvphVMBJc9HSn24VYtYtsMu74qXvi Yj zi VucWKj j KEb11j uqnFOGDI B3
VVmxHLmxnAz643WK42Z7dLM5sY29ouezv4Xz2PuMch5VGPP+CDqzCM4I oWgV
```

```
p: (128)
```

```
F63C64E1D8DB2152240E97602F47470347C5A7A1BF1E70389D2BCD9773A12397C
5B1135BA4E81EFF03D5427FCFECC7A3D162928E57C9B6670C86810C7B5B950F98
A7B4ADC7296D1E75C5D582DF283D46E13E8962B747608D783A6D5E83D7B836709
195E6AAA193C5DD419F6626BA6D7AC64D07F7809AB67BB622B24FE017ED55
```

```
q: (20)
```

```
DBF03E5CBF01D64D90CF7D7D03DACF5177B341BD
```

```
g: (128)
```

```
94DF76F816FB0F828B624DC8C116D76E5C177643E0800E297DDB56F6F19F274FD
11DDF8D8C1E1EA350FED1D8B1EAD5F060637B3CA4B947F1573CDC311CF6A9723F
6E2F5267D80590D9DB249DFFA2FC5000BE2A143E499D31CD33B96A12384B12361
543B57DD676F55C19C06AF5C7ADCEBB4E2963A8709989F34A9A7714D11ED5
```

```
pub_key: (128)
```

```
DEC263E28ABF5807A51CC5C1D426EC72BD6DBD4B028D8AC1AA179DA74581EA6D3
4141E4971B5BCEF89B2FA6154C04973D1D29F6E1562D62DBOCBBBE2A5EF8988F3
895B9C58A8E32846F5D63BAA9C5D060E50775559B11CB9B19COCFAE3758AE3667
B74B339B18DBDA2E7B3BF85F3D8FB8C721E5518F3FE083AB308CE25A16815
```

```
ragnarok#
```

This command displays detailed information for specific SSH public key (in this case *acme74*, a DSA key).

*host name*

contains the name assigned to the DSA public key when it was first imported

*comment*

contains any comments associated with the DSA key

*finger-print*

contains the output of an MD5 hash computed across the base64-encoded DSA public key

*finger-print-raw*

contains the output of an MD5 hash computed across the binary form of the DSA public key

*public key*

contains the base64 encoded DSA key

*p*

contains the first of two prime numbers used for key generation

*q*

contains the second of two prime numbers used for key generation

*g*

contains an integer that together with p and q are the inputs to the DSA key generation algorithm

```
ragnarok# show security ssh-pub-key detail
```

```
...
...
...
```

```
ragnarok#
```

This command displays detailed information for all SSH imported keys



# 3 RADIUS Accounting Management

## Overview

---

This chapter provides information about management and monitoring of RADIUS accounting functions on your Net-Net SBC.

- Net-Net SBC alarm generation and monitoring
- Status and statistics monitoring

## Alarm Generation and Monitoring

---

The Net-Net products generate alarms when certain hardware and software events occur. For more information about Net-Net SBC alarms for RADIUS, refer to the *Net-Net Maintenance and Troubleshooting Guide*.

The RADIUS ACCOUNTING CONNECTION DOWN alarm, detailed in the table below, is directly associated with the Net-Net SBC's RADIUS functionality. When enabled connections to RADIUS servers have timed-out without a response from the RADIUS server, the alarm is activated. The RADIUS ACCOUNTING CONNECTION DOWN alarm triggers a Simple Network Management Protocol (SNMP) trap that is sent via the syslog Management Information Base (MIB) ([ap-syslog.mib](#)). For a list of all SNMP-related alarms and their associated traps, refer to the table of SNMP trap correlation to Net-Net SBC's alarms in Acme Packet's [MIB Reference Guide](#).

This alarm has no impact on a the health score of a Net-Net SBC that is part of an HA Node.

## RADIUS Alarms

The table below describes the Net-Net SBC's alarms for RADIUS.

Alarm	Alarm ID	Alarm Severity	Cause	Log Message	Actions
RADIUS ACCOUNTING CONNECTION DOWN	327681	<p>CRITICAL if all enabled and configured RADIUS accounting server connections have timed-out without a response from the RADIUS server.</p> <p>MAJOR if some, but not all configured RADIUS accounting server connections have timed-out without a response from the RADIUS server.</p>	The enabled connections to RADIUS servers have timed-out without a response from the RADIUS server.	<p>CRITICAL: All enabled accounting connections have been lost. Check accounting status for more details.</p> <p>MAJOR: One or more enabled accounting connections have been lost. Check accounting status for more details.</p>	<ul style="list-style-type: none"><li>• apSyslogMessageGenerate trap generated</li><li>• critical, major dry contact</li><li>• syslog</li></ul>

## Status and Statistics Monitoring

The ACLI **show radius** command, used with the three arguments described below, displays the status of any established RADIUS accounting connections and authentications. A working RADIUS connection displays **READY**, and a disabled connection displays **DI SABLED**.

When an accounting server is disabled, the triggering and clearing of RADIUS ACCOUNTING CONNECTION DOWN alarms is not affected.

For more information about Net-Net SBC about monitoring your Net-Net SBC, refer to the *Net-Net Maintenance and Troubleshooting Guide*.

### ACLI Show RADIUS Display

The **show radius** command can take one of the three available arguments:

- **authentication**—Shows authentication statistics for primary and secondary RADIUS servers, including: server IP address and port; round trip time; information about failed and successful requests/authentications; number of rejections; number of challenges; number of time-outs, number of retransmissions
- **accounting**—Shows the information described in this table:

Section	Description
Client Display	<p>General accounting setup (as established in the accounting configuration element), including:</p> <ul style="list-style-type: none"> <li>• Information about the state of the RADIUS client</li> <li>• Accounting strategy used ( Hunt, Failover, RoundRobin, FastestRTT, or FewestPending)</li> <li>• IP address and port on which the Net-Net server is listening</li> <li>• Maximum message delay in seconds</li> <li>• Number of configured accounting servers</li> </ul>
Waiting Queue	Amount of accounting (RADIUS) messages waiting to be sent. Waiting queue capacity is 4,096 messages.
<IP Address:Port>	Information about each configured accounting server (established in the accounting servers configuration). The heading above each accounting server section is the IPv4 address and port combination of the accounting server described. This section also includes information about the accounting server's state (e.g., Connect_Attempt, I N I T).

- **all**—Shows all of the information for both the authentication and accounting displays

The following is an example of the ACLI **show radius authentication** command output.

```
ACMEPACKET# show radius authentication
```

```
Active Primary Authentication Servers:
  server ipAddr: 172.30.0.7
```

```
Active Secondary Authentication Servers:
  server ipAddr: 172.30.0.8
```

```
Authentication Statistics:
  Server: "172.30.0.7:1812"
```

```

RoundTri pTi me      : 0
Mal formedAccessResponse: 0
AccessRequests      : 2
BadAuthenti cators  : 0
AccessRetransmi ssi ons : 5
AccessAccepts      : 0
Timeouts           : 6
AccessRej ects      : 0
UnknownPDUTypes    : 0
AccessChal lenges   : 0

```

Server: "172.30.0.8:1812"

```

RoundTri pTi me      : 0
Mal formedAccessResponse: 0
AccessRequests      : 2
BadAuthenti cators  : 0
AccessRetransmi ssi ons : 9
AccessAccepts      : 0
Timeouts           : 10
AccessRej ects      : 0
UnknownPDUTypes    : 0
AccessChal lenges   : 0

```

The following is an example of the ACLI **show radius accounting** command output.

```

ACMEPACKET# show radius accounting
*****Client Display Start*****
Client State = READY, strategy=Hunt
Listening on 127.0.0.1:1813
max message delay = 60 s, # of servers = 2
===== Waiting Queue =====
Waiting size = 89
=====
----- 10.0.0.189:1813 -----
Remote = 10.0.0.189:1813, Local = 0.0.0.0:1026, sock=45 (BOUND)
conn state=READY, RTT=250 ms
Min Rtt=250 ms, Max inacti vity=60 s, expires at Nov 21 13:50:19.582,
Restart delay=30 s
----- 192.168.200.70:5050 -----
Remote = 192.168.200.70:5050, Local = 0.0.0.0:1027, sock=46 (BOUND)
conn state=DI SABLED, RTT=0 ms
Min Rtt=250 ms, Max inacti vity=60 s, expires at Nov 21 13:50:19.569,
Restart delay=30 s
*****Client Display End*****

```

The following is an example of the ACLI **show radius all** command output.

```

ACMEPACKET# show radius all
*****Client Display Start*****
Client State = READY, strategy=Hunt
Listening on 127.0.0.1:1813
max message delay = 60 s, # of servers = 2
===== Waiting Queue =====
Waiting size = 89
=====

```

```

----- 10.0.0.189:1813 -----
Remote = 10.0.0.189:1813, Local = 0.0.0.0:1026, sock=45 (BOUND)
conn state=READY, RTT=250 ms
Min Rtt=250 ms, Max inactivity=60 s, expires at Nov 21 13:50:19.582,
Restart delay=30 s

----- 192.168.200.70:5050 -----
Remote = 192.168.200.70:5050, Local = 0.0.0.0:1027, sock=46 (BOUND)
conn state=DISABLED, RTT=0 ms
Min Rtt=250 ms, Max inactivity=60 s, expires at Nov 21 13:50:19.569,
Restart delay=30 s

*****Client Display End*****

```

```

Active Primary Authentication Servers:
  server ipAddr: 172.30.0.7

```

```

Active Secondary Authentication Servers:
  server ipAddr: 172.30.0.8

```

```

Authentication Statistics:
  Server: "172.30.0.7:1812"
    RoundTriptime           : 0
    MalformedAccessResponse: 0
    AccessRequests          : 2
    BadAuthenticators       : 0
    AccessRetransmissions   : 5
    AccessAccepts           : 0
    Timeouts                : 6
    AccessRejects           : 0
    UnknownPDUTypes        : 0
    AccessChallenges        : 0

  Server: "172.30.0.8:1812"
    RoundTriptime           : 0
    MalformedAccessResponse: 0
    AccessRequests          : 2
    BadAuthenticators       : 0
    AccessRetransmissions   : 9
    AccessAccepts           : 0
    Timeouts                : 10
    AccessRejects           : 0
    UnknownPDUTypes        : 0
    AccessChallenges        : 0

```

## Monitoring CDR Push Receivers

You can use the ACLI **show radius cdr** command to view information about CDR push receivers. The existing display for this command has been extended to include information that looks like the following:

```

***** CDR Push Receiver Display Start*****
strategy = FastestRTT, maxwaitfailover = 10, number of receivers = 1
----- 172.30.0.70:21 -----
cdrpush-receiver = 172.30.0.70:21, state = READY, priority = 4
remote path = /home/acme, remote prefix = vik, protocol = ftp
username = acme, password = *****, publickey =
FTP rtt = 0, FTP successes = 0, FTP failures = 0

```

FTP timeouts = 0, FTP Delays = 0, FTP Put failures = 0  
 FTP conn failures = 0, FTP terminates = 0, FTP triggered terminates = 0

## SNMP Support

The Net-Net SBC sends traps when a single push receiver or all push receivers become unavailable.

- When one CDR push receiver becomes unavailable, the CDR\_PUSH\_RECEIVER\_FAIL\_TRAP trap is sent and a minor alarm is generated.
- When all of the configured CDR push receivers become unavailable, the CDR\_ALL\_PUSH\_RECEIVERS\_FAIL\_TRAP is sent and a major alarm is generated.

When one or more of the push receivers comes back, the CDR\_ALL\_PUSH\_RECEIVERS\_FAIL\_CLEAR\_TRAP is sent and the alarm is cleared.

## CDR File Transfer Failure Alarm

---

The Net-Net SBC sends out traps and triggers corresponding alarms when it encounters failure when attempting to transfer locally stored CDR files via FTP or SFTP. One set of traps is used for instances when one CDR push receiver fails; another is used when all enabled CDR receivers fail. They are part of the apSysMgmtCDRPushReceiverNotificationsGroup.

All of the traps contain information about the type of push receiver, the address of the push receiver, and the failure reason code.

All of the traps contain information about the type of push receiver, the address of the push receiver, and the failure reason code.

The trap and corresponding clearing trap for single push receiver failure are:

- apSysMgmtCDRPushReceiverFailureTrap
- apSysMgmtCDRPushReceiverFailureClearTrap

The trap and corresponding clearing trap for global push receiver failure are:

- apSysMgmtCDRAllPushReceiversFailureTrap
- apSysMgmtCDRAllPushReceiversFailureClearTrap



## Storage Expansion Module Use With Local CDRs / FTP Push

---

The Net-Net 3800 and 4500 can be configured with an optional Storage Expansion Module that extends the system's internal storage beyond the fixed amount of flash RAM. When configuring local CDR creation, you can configure the Net-Net SBC to use the Storage Expansion Module for local CDR files instead of the limited internal flash RAM.

Disk space on the Storage Expansion Module appears as a local volume on the Net-Net SBC. Wherever you specify a volume name for a configuration parameter value, you can enter a volume located on the Storage Expansion Module, (unless the parameter is otherwise specified).

### Local CDR Storage Directory

To save local CDR files to the Storage Expansion Module, configure the **file path** parameter in the account config with a volume and directory located on the Storage Expansion Module.

### FTP Push Backup

When FTP push is enabled, if all FTP push servers are unreachable, then local CDR files are written to local file system until the FTP push servers return to service. Once an FTP Push server becomes reachable, the Net-Net SBC transfers all local CDR files to the remote server automatically. After all local CDR files have been successfully transferred to the FTP server from the Net-Net SBC, they are deleted from the local volume.

### Local CDR File Compression

You can configure the Net-Net SBC to compress local CDRs in zip format to save disk space. The local CDRs will be compressed and appear with a .zip file extension. This feature is enabled with the **cdr compression** parameter.

### ACLI Configuration and Examples

**The following ACLI configuration procedure describes:**

- identifying volumes on the Storage Expansion Module
- configuring Storage Expansion Module volumes as the destination for local CDR files

These procedures are only a portion of local CDR file generation and FTP Push configuration. Please refer to the Net-Net 4000 S-C6.1.0 ACLI Accounting Guide's Local CDR Storage and FTP Push section for a full explanation and all prerequisites before referencing the following procedure.

**To identify the volumes on the Storage Expansion Module to use with local CDR storage:**

1. Note the volume name on the Storage Expansion Module you wish to use for local CDR output using the **show space hard-drive** command. The following example indicates that there are 4 partitions, which are set in bold:

```

SYSTEM# show space hard-disk

/sys: 19695716352/19695749120 bytes (99%) remaining

/local : 19693335040/19693367808 bytes (99%) remaining

/logs: 19693335040/19693367808 bytes (99%) remaining

/misc: 19693335040/19693367808 bytes (99%) remaining
SYSTEM#

```

**Note:** The `check-space-remaining hard-disk` command is identical to the `show space hard-disk` command.

### To configure a Net-Net 3800 or Net-Net 4500 to write local CDRs to the Storage Expansion Module:

1. In Superuser mode, type `configure terminal` and press <Enter>.
 

```
ACMEPACKET# configure terminal
```
2. Type `session-router` and press <Enter>.
 

```
ACMEPACKET(configure)# session-router
```
3. Type `account-config` and press <Enter>.
 

```
ACMEPACKET(session-router)# account-config
ACMEPACKET(account-config)#
```
4. **file-path**—Set this parameter to the volume you identified to use for local CDR file storage in the previous section. Ensure the path begins with a forward slash, “/”.
5. Save and activate your configuration.

## Storage Expansion Module Management

---

The Net-Net SBC provides you with a set of tools to manage the Storage Expansion Module.

### Identifying Storage Expansion Module Volumes

You can identify volumes that exist on the Storage Expansion Module using the `show space hard-drive` command. In addition, free and used space are reported too. For Example:

```

SYSTEM# show space hard-disk

/sys: 19695716352/19695749120 bytes (99%) remaining

/local : 19693335040/19693367808 bytes (99%) remaining

/logs: 19693335040/19693367808 bytes (99%) remaining

/misc: 19693335040/19693367808 bytes (99%) remaining
SYSTEM#

```

### Viewing Directories and Files

You can view files and directories on the Storage Expansion Module using the `show directory <path>` command. Remember to use absolute paths beginning with the forward slash. For example:



```
SYSTEM# show directory /misc
```

```
Listing Directory /misc:
```

```
-rwxrwxrwx 1 0 0 0 Aug 24 14:26 tmp.dat
-rwxrwxrwx 1 0 0 1048580 Aug 25 11:50 file_0.txt
SYSTEM#
```

To view all volumes on the Net-Net SBC, type **show directory** without any arguments. For Example:

```
SYSTEM# show directory
Top-level directories:
/ramdrv
/code
/boot
/local
/logs
```

Typing **show directory \*** displays all top-level directories and their contents.

## Formatting the Storage Expansion Module

You can use the Storage Expansion Module's default partition configuration, or you can create your own scheme creating a maximum of 4 volumes.

### Default Format Plan

When formatting the Storage Expansion Module, the ACLI's default partitioning scheme is as follows:

#### Storage Expansion Module Default Format Plan:

Volume Number	Volume Name	Volume Size
1	/sys	10%
2	/app	90%

### Custom Format Plan

Before formatting the Storage Expansion Module, plan the number of volumes, volume names, and relative percentage of Storage Expansion Module disk space. For example:

#### Storage Expansion Module Format Plan:

Volume Number	Volume Name	Volume Size
1	/archive	20%
2	/misc	35%
3	/localcdrs	45%

The following are invalid Storage Expansion Module volume names:

- ramdrv
- code
- boot

## Custom Partition Scheme

### To format the Storage Expansion Module using a custom partition scheme:

1. Type **format hard-disk** <Enter>. You will be prompted to confirm this action.

```
SYSTEM# format hard-disk
```

```
WARNING: Please ensure device is not currently in use by any
aplications before proceeding
```

```
Continue [y/n]?:
```

```
Type y <Enter> to continue
```

2. Type **n** <Enter> when prompted to use the factory default partitions.

```
Use factory default partitions [y/n]?:
```

3. Enter the number of volumes you wish to create and press <Enter>.

```
Enter the number of partitions to create: 3
```

4. Enter the name of volume 1 and press <Enter>

```
Total unallocated space = 100 %
```

```
Enter the name of volume 1 (or 'q' to quit): archive
```

5. Enter the size in percent of volume 1 and press <Enter>

```
Enter the size of the volume (in %): 20
```

6. Repeat steps 4 and 5 for all additional volumes.

7. A summary of how the Storage Expansion Module will be formatted is displayed on the screen. Type **y** <Enter> at the prompt that confirms you wish to commit this.

```
The following partitions will be created:
```

```
/archive      16005272371 bytes
```

```
/misc        28009226649 bytes
```

```
/localcds    36011862835 bytes
```

```
Format disk and create the partitions as configured above [y/n]?: y
```

8. You will be prompted again to confirm formatting the Storage Expansion Module. All existing data on the Storage Expansion Module will be lost. Type **y** <Enter> to continue.

```
*****
```

```
WARNING: All data on the drive will be permanently
erased and unrecoverable.
```

```
Are you sure [y/n]?: y
```

9. You will be prompted one last time to confirm formatting the Storage Expansion Module. Type **y** <Enter> to continue.

```
The format process will take a few minutes. Once
the format process begins, it cannot be stopped.
Please do not power down or reboot the SD until
```

the format process is complete.

Continue [y/n]?: **y**

- The formatting process displays progress on the screen and concludes after several minutes.

[progress text removed for brevity]

Format finished successfully

New partitions have been created

SYSTEM#

## Default Partition Scheme

### To format the Storage Expansion Module using the factory default partitions:

- Type **format hard-disk** <Enter>. You will be prompted to confirm this action.

SYSTEM# **format hard-disk**

WARNING: Please ensure device is not currently in use by any applications before proceeding

Continue [y/n]?: **y**

Type **y** <Enter> to continue

- Type **y** <Enter> when prompted to use the factory default partitions. The factory partition scheme will be displayed on the screen. Type **Y** <Enter> at the prompt that confirms you wish to commit this.

Use factory default partitions [y/n]?: **y**

The following partitions will be created:

/sys 8002636185 bytes

/app 72023725670 bytes

Format disk and create the partitions as configured above [y/n]?: **y**

- You will be prompted again to confirm you wish to format the Storage Expansion Module. All existing data will be lost. Type **y** <Enter> to continue.

\*\*\*\*\*

WARNING: All data on the drive will be permanently erased and unrecoverable.

Are you sure [y/n]?: **y**

- You will be prompted one last time to confirm formatting the Storage Expansion Module. Type **y** <Enter> to continue.

The format process will take a few minutes. Once the format process begins, it cannot be stopped.

Please do not power down or reboot the SD until the format process is complete.

Continue [y/n]?: **y**

- The formatting process will display progress on the screen and concludes after several minutes.

\*\*\* Beginning format process \*\*\*

[progress text removed for brevity]

```
Format finished successfully
New partitions have been created
SYSTEM#
```

## Storage Expansion Module Monitoring

---

### Low Disk Space Warning

The Net-Net SBC can initiate an alarm and an SNMP trap when a volume reaches a configured threshold of remaining free disk space, configured as a percentage of volume. You can configure multiple alarms, each with increasing severity that indicate less free disk space.

### Low Disk Space Threshold Alarm

The low disk space threshold alarm is configured in **alarm threshold** configuration element. It is non-health affecting. The threshold alarm appears as follows:

```
SYSTEM# di splay-al arms
1 alarms to show
ID      Task      Severi ty      First Occurred      Last Occurred
131142  547896076    4             2009-08-25 13: 36: 26  2009-08-25 13: 36: 26
Count   Descri ption
1       Volume /mi sc space used 81% i s over maj or threshold of 80%.
```

### Low Disk Space Threshold SNMP Trap

For any threshold reached, an SNMP trap will be sent to all configured trap-receivers. The apSysMgmtStorageSpaceAvailThresholdTrap trap contains the following information:

- VolumeName—name of the volume where a threshold was exceeded
- CurrentValue—current percentage of disk space value that is exceeding one of the thresholds.
- MinorThreshold—configured minor threshold for this volume, if none then this is 0.
- MajorThreshold—configured major threshold for this volume, if none then this is 0.
- CriticalThreshold—configured critical threshold for this volume, if none then this is 0.

## ACLI Configuration and Examples

### To configure alarm thresholds for monitoring free disk space:

1. In Superuser mode, type **configure terminal** and press <Enter>.
 

```
ACMEPACKET# configure terminal
```
2. Type **system** and press <Enter>.
 

```
ACMEPACKET(configure)# system
ACMEPACKET(system)#
```
3. Type **system-config** and press <Enter>.
 

```
ACMEPACKET(system)# system-config
ACMEPACKET(system-config)#
```

4. Type select and press <Enter>.
 

```
ACMEPACKET(system-confi g)# sel ect
ACMEPACKET(system-confi g)#
```
5. Type **alarm-threshold** and press <Enter>.
 

```
ACMEPACKET(system-confi g)# al arm-threshol d
ACMEPACKET(al arm-threshol d)#
```

The system prompt changes to let you know that you can begin configuring individual parameters.
6. **type**—Set this parameter to **space** to create an alarm based on reduced free disk space.
7. **volume**—Set this parameter to the volume name you wish to monitor. Generally this string should be the same as the **file-path** parameter located in the account-config.
8. **severity**—Enter the severity level of this alarm. Valid severity values are MINOR, MAJOR, and CRITICAL.
9. **value**—Enter the percent of resource (*type*) in use that triggers the configured alarm (*severity*).
10. Save your work.
11. Repeat this procedure to configure multiple alarm thresholds.

The following example reflects what a major and critical alarm would look like:

```
al arm-threshol d
    type                space
    vol ume             /mi sc
    severi ty          maj or
    val ue              80
al arm-threshol d
    type                space
    vol ume             /mi sc
    severi ty          cri ti cal
    val ue              90
```

## Local CDR File Delete Warning

You can configure the Net-Net SBC to initiate an alarm and send an SNMP trap when the oldest local CDR file was deleted under fault conditions. This feature is enabled with the **file delete alarm** parameter.

The Net-Net SBC deletes a local CDR file in the following three cases:

1. After the local CDR file has been successfully transferred to a push receiver
2. The number of local CDR files exceed the limit configured in the account-config > **max-files** parameter
3. No free disk space remains on the partition where the local CDR files are written: account-config > **file-path**

If a local CDR file is deleted after it was successfully uploaded to a push receiver, no fault is triggered because this is standard, expected operation. But if a local CDR file is deleted for case 2 or 3 above, it is considered a fault condition initiating an alarm and SNMP trap.

**Local CDR File Delete Alarm**

The CDR file delete alarm is configured in **account config** configuration element by enabling the **file-delete-alarm** parameter. This is a minor severity alarm and is non-health affecting. This alarm has no clearing condition and must be manually cleared.

**Local CDR File Delete SNMP Trap**

Under the same circumstances that cause a CDR file delete alarm, an SNMP trap will be sent to all configured trap-receivers. The `apSysMgmtCdrFileDeleteTrap` trap contains the following information:

- File Name—name of the file that was deleted

**Querying Storage Space**

You can monitor currently used and remaining storage space on the Storage Expansion Module by ACLI, SNMP MIB, and HDR collection group.

**ACLI**

To view the total disk space used percentage remaining with the ACLI, use the **show space hard-drive** command. For example:

```
SYSTEM# show space hard-disk

/sys: 19695716352/19695749120 bytes (99%) remaining

/local: 19693335040/19693367808 bytes (99%) remaining

/logs: 19693335040/19693367808 bytes (99%) remaining

/misc: 19693335040/19693367808 bytes (99%) remaining
SYSTEM#
```

**Note:** The **check-space-remaining hard-disk** command is identical to the **show space hard-disk** command.

**Unmounting The Storage Expansion Module**

This section explains the ACLI **unmount hard-disk** command, which—as its name indicates—unmounts the storage expansion module. This command should only be run when you plan to shut down the system. You issue this command to ensure the integrity of the disk when you power off the Net-Net 4500 System or Net-Net 3800 using the power switch. If you do not run the command and use the power switch to power down the system, the Net-Net 4500 System runs a checkdisk on the module the next time the system boots. The checkdisk lasts one to two minutes.

Note that once you run the **unmount hard-disk** command, any application configuration set to use a module partition will no longer work. The only way to regain access is to reboot or power cycle the system.

**ACLI Instructions and Examples**

To ensure the storage expansion module's integrity when powering down the system (using the power switch), use the **unmount hard-disk** command:

```
ACMEPACKET# unmount hard-disk
```

**SNMP MIB**

The following MIB Objects are available to query the amount of remaining drive space.

Name	OID	MIB	Description
apSysStorageSpaceTable	1.3.6.1.4.1.9148.3.2.1.1.23	APSYSMGMT-MIB	The total percentage space available on the drive/partitions.

```

apSysStorageSpaceTable      OBJECT-TYPE
    SYNTAX                    SEQUENCE OF ApSysStorageSpaceEntry
    MAX-ACCESS                not-accessible
    STATUS                     current
    DESCRIPTION
        "A table to hold the total space and available space
        per volume arranged into rows, and indexed by the
        volume name.
        These are all read only."
    ::= { apSysMgmtMIBGeneralObjects 23 }

apSysStorageSpaceEntry      OBJECT-TYPE
    SYNTAX                    ApSysStorageSpaceEntry
    MAX-ACCESS                not-accessible
    STATUS                     current
    DESCRIPTION
        "A table entry designed to hold storage space data, on a
        single volume"
    INDEX { apSysVolumeName }
    ::= { apSysStorageSpaceTable 1 }

ApSysStorageSpaceEntry ::= SEQUENCE {
    apSysVolumeName           DisplayString,
    apSysVolumeTotalSpace    Unsigned32,
    apSysVolumeAvailSpace    Unsigned32,
}

apSysVolumeName            OBJECT-TYPE
    SYNTAX                    DisplayString (SIZE (0..255))
    MAX-ACCESS                read-only
    STATUS                     obsolete
    DESCRIPTION
        "The name of the volume"
    ::= {apSysStorageSpaceEntry 1}

apSysVolumeTotalSpace      OBJECT-TYPE
    SYNTAX                    Unsigned32
    MAX-ACCESS                read-only
    STATUS                     obsolete
    DESCRIPTION
        "The total size of the volume, in bytes"
    ::= {apSysStorageSpaceEntry 2}

apSysVolumeAvailSpace      OBJECT-TYPE
    SYNTAX                    Unsigned32
    MAX-ACCESS                read-only

```

STATUS	obsolete
DESCRIPTION	"The total space available on the volume, in bytes"
	::= {apSysStorageSpaceEntry 3}

**HDR**

Historical Data Record statistics are available that track the amount of storage space available on each Storage Expansion Module partition. At each collect interval, space consumption statistics are gathered for every partition. The Storage Space collect group, configured as **space**, contains these statistics. The contents of this Storage Space group are:

- TimeStamp
- Partition
- Space used
- Space available



## Diameter Accounting

---

The Net-Net SBC supports the Diameter charging interface, Rf. This interface provides similar functionality to the RADIUS interface, but utilizes Diameter as the underlying application layer protocol. As a result, the Net-Net SBC can integrate more thoroughly with IMS standards as well as provide a more dynamic, secure, and robust accounting interface.

### Diameter Accounting Messages

The Rf interface can send two types of messages based on the signaling application's actions. These messages are Accounting Charging Request (ACR) Start and ACR Stop messages.

- ACR start messages are sent at the start of service delivery and describes the type of service being delivered and the user to whom it is being delivered.
- Additional ACR Start messages are sent when service changes; this roughly maps to a RADIUS Interim-Update message. See [Accounting-Record-Type AVP \(480\) \(90\)](#).
- ACR Stop messages are sent at the end of service delivery.

The Net-Net SBC sends a set of a AVPs in each ACR start and stop message that make up the charging data. The following table lists which AVPs are included in ACR Start and ACR Stop messages. Individual AVP descriptions are located in the following section.

AVP	ACR Start	ACR Stop
Session-Id AVP (263)	X	X
Origin-Host AVP (264)	X	X
Origin-Realm AVP (296)	X	X
Destination-Realm AVP (283)	X	X
Destination-Host AVP (293)	X	X
Accounting-Record-Type AVP (480)	X	X
Accounting-Record-Number AVP (485)	X	X
Acct-Application-Id AVP (259)	X	X
User-Name AVP (1)	X	X
Event-Timestamp AVP (55)	X	X
Event-Type AVP (823)	X	X
• SIP-Method AVP (824)		
• Content-Type AVP (826)		
• Content-Length AVP (827)		
Role-of-Node AVP (829)	X	X

AVP	ACR Start	ACR Stop
User-Session-Id AVP (830)	X	X
Calling-Party-Address AVP (831)	X	
Called-Party-Address AVP (832)	X	
Time-Stamps AVP (833)	X	X
<ul style="list-style-type: none"> <li>• SIP-Request-Timestamp AVP (834)</li> <li>• SIP-Response-Timestamp AVP (835)</li> </ul>		
Inter-Operator-Identifier AVP (838)	X	X
<ul style="list-style-type: none"> <li>• Originating-IOI AVP (839)</li> <li>• Terminated-IOI AVP (840)</li> </ul>		
SDP-Session-Description AVP (842)	X	
Session-Media-Component AVP (845)	X	
<ul style="list-style-type: none"> <li>• SDP-Media-Name AVP (844)</li> <li>• SDP-Media-Description AVP (845)</li> </ul>		
Cause AVP (860)		X
<ul style="list-style-type: none"> <li>• Cause-Code AVP (861)</li> <li>• Node-Functionality AVP (862)</li> </ul>		

## ACR AVP Descriptions

### Session-Id AVP (263)

Uniquely identify this session. It is a string value and is delimited by semi-colons. hostname of the accounting server the communication is to out on.

The second two parts are values that get generated by the signaling application related to the signaling session that is occurring. It is a number that gets increased every time a new signaling session is created. An example of a Session-Id from the SD is as follows, acmesystem;0;1.

### Origin-Host AVP (264)

Contains the account-server configuration element's **hostname** parameter followed by the "@" character, followed by the account-server configuration element's **origin-realm** parameter. For example: acmesystem@wancom.com.

### Origin-Realm AVP (296)

Contains the **account server** configuration element's **origin-realm** and **domain-name-suffix** parameters where the server request is sent.

### Destination-Realm AVP (283)

Contains the value of the Origin-Realm AVP in the CEA received from the accounting server for this connection.

### Destination-Host AVP (293)

Contains the value of the Origin-Host AVP in the CEA received from the accounting server for this connection.

### Accounting-Record-Type AVP (480)

Contains the value indicating the type of accounting message being sent.

- start record = 2
- interim record = 3
- stop record = 4

If this is an interim-type message, it's still included in an ACR Start message but with the value of this AVP set to "3".

**Accounting-Record-Number AVP (485)**

A value that uniquely identifies this message in the session, i.e., a sequence number for this connection. This value is arbitrarily created by the Net-Net SBC with the caveat that it is unique for a session.

**Acct-Application-Id AVP (259)**

Set to value "3"; This value indicates Diameter-based accounting messages.

**User-Name AVP (1)**

Contains the account-server configuration element's hostname parameter followed by the "@" character, followed by the account-server configuration element's origin-realm parameter. For example: acmesystem@wancom.com.

**Event-Timestamp AVP (55)**

Contains the number of seconds since January 1, 1900 when this accounting event took place.

**Event-Type AVP (823)**

A grouped AVP containing information about the signaling event. It contains the following AVPs:

- SIP-Method AVP (824)—Contains the exact string payload from the SIP request line; i.e., the Method that triggered the accounting event.
- Content-Type AVP (826)—Contains the exact string payload from the "Content-Type" SIP header of the message that triggered the accounting event.
- Content-Length AVP (827)—Contains the exact string payload from the Content-Length" SIP header of the message that triggered the accounting event.

**Role-of-Node AVP (829)**

Set to the value "2" which indicates that the Net-Net SBC is operating in a PROXY role.

**User-Session-Id AVP (830)**

Contains VSA 44 as used in the RADIUS interface.

**Calling-Party-Address AVP (831)**

Contains the calling party address in the SIP message. The Net-Net SBC first checks for a P-Asserted-Id header. If present, its value is used for this AVP. If not present, the Net-Net SBC inserts the "To:" field from the SIP message into this AVP. ONLY IN ACR Start.

**Called-Party-Address AVP (832)**

Contains the "From:" field of the SIP message. ONLY IN ACR Start.

**Time-Stamps AVP (833)**

A grouped AVP that contains timestamps for the related SIP signaling. It contains the following AVPs.

- SIP-Request-Timestamp AVP (834)—A UTC formatted timestamp that corresponds to when the SIP INVITE that started the session was received.
- SIP-Response-Timestamp AVP (835)—A UTC formatted timestamp that corresponds to when the SIP 200 OK response to the INVITE that started the session was received.

**Inter-Operator-Identifier AVP (838)**

A grouped AVP that indicates the ingress and egress networks from the Net-Net SBC's perspective. It contains the following AVPs.

- Originating-IOI AVP (839)—The realm where the Net-Net SBC received the SIP signaling messages.
- Terminated-IOI AVP (840)—The realm where the SIP signaling message exit the Net-Net SBC.

**SDP-Session-Description AVP (842)**

This AVP may occur multiple times in an ACR message. It is populated with SDP attribute-lines from the SIP messages to which this ACR Stop message refers. Thus, all "i=", "c=", "b=", "k=", "a=", etc., lines comprise multiple instances of this AVP.

If the Net-Net SBC is configured to generate Start events on the INVITE, the calling SDP will be used; if the Net-Net SBC is configured to generate Start events on the OK, the called SDP will be used. ONLY IN ACR Start.

**Session-Media-Component AVP (845)**

A grouped AVP that contains information about the media session. It contains the following AVPs. ONLY IN ACR Start.

- SDP-Media-Name AVP (844)—populated with the "m=" line from the SDP being used.
- SDP-Media-Description AVP (845)—this AVP may occur multiple times in this grouped AVP. It is populated with SDP attribute-lines from the media component as specified by the media described in the SDP-Media-Name AVP. Thus, all "i=", "c=", "b=", "k=", "a=", etc., lines related to the above specified "m=" line comprise multiple instances of this AVP.

**Cause AVP (860)**

A grouped AVP that contains the reason for the termination event and the role/function of the node where the call was terminated. It contains the following AVPs. ONLY IN ACR Stop.

- Cause-Code AVP (861)—Set to value "0".
- Node-Functionality AVP (862)—Set to value "0".

**Configuring Diameter-based Accounting**

Diameter-based Rf accounting relies on many of the same configuration elements used for RADIUS based accounting. The following two sections explain how to configure both the **account-config** and **account-servers** configuration elements. In addition, you must ensure that accounting is enabled for each realm where you want it to occur. The **accounting-enable** parameter in the realm-config is enabled by default.

## ACLI Instructions and Examples

### To configure the global Diameter-based accounting (Rf) features in the account-config:

- In Superuser mode, type **configure terminal** and press <Enter>.
 

```
ACMEPACKET# configure terminal
```
- Type **session-router** and press <Enter>.
 

```
ACMEPACKET(configure)# session-router
```
- Type **account-config** and press <Enter>.
 

```
ACMEPACKET(session-router)# account-config
ACMEPACKET(account-config)#
```
- hostname**—Enter a hostname for this system.
- port**—Enter 3868 for the RFC-recommended Diameter port number. You may enter a different port number.
  - minimum: 1025
  - maximum: 65535
- strategy**—Set the strategy used to select the accounting server which the Net-Net SBC sends accounting messages. The following table lists the available strategies:

Value	Description
hunt	Selects accounting servers in the order in which they are listed. If the first accounting server is online, working, and has not exceeded any of the defined constraints, all traffic is sent to it. Otherwise the second accounting server is selected. If the first and second accounting servers are offline or exceed any defined constraints, the third accounting server is selected. And so on through the entire list of configured servers
failover	Uses the first server in the list of predefined accounting servers until a failure is received from that server. Once a failure is received, it moves to the second accounting server in the list until a failure is received. And so on through the entire list of configured servers.
round robin	Selects each accounting server in order, distributing the selection of each accounting server evenly over time.
fastest round trip time	Selects the accounting server that has the fastest round trip time (RTT) observed during transactions with the servers (sending a record and receiving an ACK).
fewest pending	Selects the accounting server that has the fewest number of unacknowledged accounting messages (that are in transit to the Net-Net SBC).

- protocol**—Set this parameter to **diameter** to use the Rf accounting interface with a Diameter-based accounting server.
- state**— Enter **enabled** to use accounting on this system.
- max-msg-delay**—Retain the default value of **60** seconds or indicate the length of time in seconds that you want the Net-Net SBC to continue trying to send each accounting message. During this delay, the Net-Net SBC can hold a generic queue of 4096 messages.

- Minimum: zero (0)
  - Maximum:  $2^{32}-1$
10. **max-wait-failover**—Retain the default value of **100** messages or indicate the maximum number of accounting messages the Net-Net SBC can store its message waiting queue for a specific accounting server, before it is considered a failover situation.

Once this value is exceeded, the Net-Net SBC attempts to send its accounting messages, including its pending messages, to the next accounting server in its configured list.

- Minimum: one (1) message
  - Maximum: 4096 messages
11. **trans-at-close**—Retain the default value of **disabled** if you do not want to defer the transmission of message information to the close of a session. Enter **enabled** if you want to defer message transmission.
- **disabled**—The Net-Net SBC transmits accounting information at the start of a session (Start), during the session (Interim), and at the close of a session (Stop). The transmitted accounting information for a single session might span a period of hours and be spread out among different storage files.
  - **enabled**—Limits the number of files on the Net-Net SBC used to store the accounting message information for one session. It is easiest to store the accounting information from a single session in a single storage file.
12. **generate-start**—Retain the default value **ok** if you want the ACR Start message to be generated once the Net-Net SBC receives an OK message in response to an INVITE.

Other options include:

- **none**—Accounting Start message should not be generated.
  - **invite**—Accounting Start message should be generated once the Net-Net SBC receives a SIP INVITE.
13. **generate-interim**—Retain the default value **reinvite-response** to cause the Net-Net SBC to send an Interim charging message to the accounting server.

You can select none, one, or more than one of the following values:

Value	Description
ok	Start message is generated when the Net-Net SBC receives an OK message in response to an INVITE.
reinvite	Interim message is generated when the Net-Net SBC receives a SIP session reINVITE message.
reinvite-response (default)	Interim message is generated when the Net-Net SBC receives a SIP session reINVITE and responds to it (for example, session connection or failure).

Value	Description
reinvite-cancel	Interim message is generated when the Net-Net SBC receives a SIP session reINVITE, and the Reinvite is cancelled before the Net-Net SBC responds to it.
unsuccessful-attempt	Interim message is generated when a SIP session set-up attempt from a preference-ordered list of next-hop destinations is unsuccessful. This can happen when a local policy lookup, LRT lookup, ENUM query response, or SIP redirect returns a preference-ordered list of next-hop destinations. The interim message contains: the destination IP address, the disconnect reason, a timestamp for the failure, and the number that was called.

14. **intermediate-period**—Enter amount of time in seconds between generating periodic interim ACR messages during a SIP call. This parameter defaults to zero, which disables continuous Interim charging messages.
15. **vsa-id-range**—Ensure that this parameter is left blank when communicating with a Diameter-based Rf accounting server.
16. Save your work.

#### To configure individual Diameter-based accounting servers:

### Configuring Accounting Servers

You must create one or more servers to which the Net-Net SBC can send accounting messages.

1. Continuing from the previous account-config configuration, enter the account server sub-element by typing **account-servers** <Enter>.
 

```
AZALEA(account-config)# account-servers
AZALEA(account-server)#
```
2. **hostname**—Set this to the IP address or hostname (FQDN) of the Diameter-based Rf accounting server.
3. **port**—Enter 3868 for the RFC-recommended Diameter port number. You may enter a different port number if desired.
  - minimum: 1025
  - maximum: 65535
4. **state**—Retain the default enabled to enable this account server or enter disabled to disable it.
5. **min-round-trip**—Retain the default 250 milliseconds or indicate the minimum round trip time of an accounting message.
  - minimum: 1025 milliseconds
  - maximum: 65535 milliseconds

A round trip consists of the following:

- The Net-Net SBC sends an accounting message to the account server.
- The account server processes this message and responds back to the Net-Net SBC.

If the fastest RTT is the strategy for the account configuration, the value you enter here can be used to determine an order of preference (if all the configured account servers are responding in less than their minimum RTT).

6. **max-inactivity**—Retain the default 60 seconds or indicate the length of time in seconds that you want the Net-Net SBC with pending accounting messages to wait when it has not received a valid response from the target account server.
  - minimum: 1 second
  - maximum: 300 seconds

Once this timer value is exceeded, the Net-Net SBC marks the unresponsive account server as disabled in its failover scheme. When a server connection is marked as inactive, the Net-Net SBC attempts to restart the connection and transfers pending messages to another queue for transmission. Accounting messages might be moved between different account servers as servers become inactive or disabled.
7. **restart-delay**—Retain the default 30 seconds or indicate the length of time in seconds you want the Net-Net SBC to wait before resending messages to a disabled account server.
  - minimum: 1 second
  - maximum: 300 seconds
8. **priority**—Enter the number corresponding to the priority of this account server, for use with server prioritization. The default for this parameter is 0, meaning the prioritization feature is turned off—and that the Net-Net SBC will therefore prioritize accounting servers by IP address and port.
9. **origin-realm**—Enter the realm in which the Net-Net SBC communicates with the Diameter Rf accounting server.
10. **domain-name-suffix**—Enter the suffix to be appended to any Diameter FQDN or Diameter Identity used when the Net-Net SBC communicates with the Diameter Rf accounting server. Your value can be any string, to which the Net-Net SBC will prepend with a dot.
11. Save your work.



# Appendix A

## Net-Net RADIUS Log Examples

### Overview

---

Several examples of RADIUS logs appear in this appendix. These logs were processed and the output generated by a FreeRADIUS server; the labels for each field come from the installed VSA dictionaries, including the Acme Packet RADIUS dictionary.

As you review these examples, please note:

- The `Client-IP-Address =`, `Acct-Unique-Session-Id =` and `Timestamp =` fields shown in the following examples are generated by the RADIUS server and not by the Net-Net SBC.
- The `Client-IP-Address =` may not appear in your output as later versions of freeRADIUS no longer include this field.
- For non-QoS calls, the attributes appear in the record, but their values are always zero (0).

### RADIUS CDR Samples for SIP

---

This section provides an example CDRs for SIP calls.

#### Basic Successful SIP Call

The following sample CDRs are for a successful SIP call.

Successful SIP Call - Peer

=====

```
Acct-Status-Type = Start
NAS-IP-Address = 192.168.12.100
NAS-Port = 5060
Acct-Session-Id = "6edfa77f-f059e59-711c7dce@192.168.11.101"
Acme-Session-Ingress-CallId = "6edfa77f-f059e59-711c7dce@192.168.11.101"
Acme-Session-Egress-CallId = "6edfa77f-f059e59-711c7dce@192.168.11.101"
Acme-Session-Protocol-Type = "SIP"
Calling-Station-Id = ""7812223001"
<sip:7812223001@192.168.11.101>; tag=40335A3-29FEF610"
Called-Station-Id = "<sip:7812223002@192.168.11.101; user=phone>"
h323-setup-time = "16:43:42.452 EST JUL 02 2008"
h323-connect-time = "16:43:53.517 EST JUL 02 2008"
Acme-Egress-Network-Interface-Id = "M10"
Acme-Egress-Vlan-Tag-Value = 0
Acme-Ingress-Network-Interface-Id = "M00"
Acme-Ingress-Vlan-Tag-Value = 0
Acme-Session-Egress-Realm = "Core"
```

```

Acme-Session-Ingress-Realm = "Peer"
Acme-FlowID_FS1_F = "Local host: 65594"
Acme-FlowType_FS1_F = "PCMU"
Acme-Flow-In-Realm_FS1_F = "Peer"
Acme-Flow-In-Src-Addr_FS1_F = 0.0.0.0
Acme-Flow-In-Src-Port_FS1_F = 0
Acme-Flow-In-Dst-Addr_FS1_F = 192.168.11.100
Acme-Flow-In-Dst-Port_FS1_F = 49188
Acme-Flow-Out-Realm_FS1_F = "Core"
Acme-Flow-Out-Src-Addr_FS1_F = 192.168.12.100
Acme-Flow-Out-Src-Port_FS1_F = 49152
Acme-Flow-Out-Dst-Addr_FS1_F = 192.168.12.200
Acme-Flow-Out-Dst-Port_FS1_F = 2222
Acme-FlowID_FS1_R = "Local host: 65595"
Acme-FlowType_FS1_R = "PCMU"
Acme-Flow-In-Realm_FS1_R = "Core"
Acme-Flow-In-Src-Addr_FS1_R = 0.0.0.0
Acme-Flow-In-Src-Port_FS1_R = 0
Acme-Flow-In-Dst-Addr_FS1_R = 192.168.12.100
Acme-Flow-In-Dst-Port_FS1_R = 49152
Acme-Flow-Out-Realm_FS1_R = "Peer"
Acme-Flow-Out-Src-Addr_FS1_R = 192.168.11.100
Acme-Flow-Out-Src-Port_FS1_R = 49188
Acme-Flow-Out-Dst-Addr_FS1_R = 192.168.11.101
Acme-Flow-Out-Dst-Port_FS1_R = 2224
Acme-FlowID_FS2_F = ""
Acme-FlowType_FS2_F = ""
Acme-Flow-In-Realm_FS2_F = ""
Acme-Flow-In-Src-Addr_FS2_F = 0.0.0.0
Acme-Flow-In-Src-Port_FS2_F = 0
Acme-Flow-In-Dst-Addr_FS2_F = 0.0.0.0
Acme-Flow-In-Dst-Port_FS2_F = 0
Acme-Flow-Out-Realm_FS2_F = ""
Acme-Flow-Out-Src-Addr_FS2_F = 0.0.0.0
Acme-Flow-Out-Src-Port_FS2_F = 0
Acme-Flow-Out-Dst-Addr_FS2_F = 0.0.0.0
Acme-Flow-Out-Dst-Port_FS2_F = 0
Acme-FlowID_FS2_R = ""
Acme-FlowType_FS2_R = ""
Acme-Flow-In-Realm_FS2_R = ""
Acme-Flow-In-Src-Addr_FS2_R = 0.0.0.0
Acme-Flow-In-Src-Port_FS2_R = 0
Acme-Flow-In-Dst-Addr_FS2_R = 0.0.0.0
Acme-Flow-In-Dst-Port_FS2_R = 0
Acme-Flow-Out-Realm_FS2_R = ""
Acme-Flow-Out-Src-Addr_FS2_R = 0.0.0.0

```

```

Acme-Flow-Out-Src-Port_FS2_R = 0
Acme-Flow-Out-Dst-Addr_FS2_R = 0.0.0.0
Acme-Flow-Out-Dst-Port_FS2_R = 0
Acme-Firmware-Version = "C6.0.0 GA (Build 13)"
Acme-Local-Time-Zone = "GMT-05:00"
Acme-Post-Dial-Delay = 223
Acme-Primary-Routing-Number = "sip:7812223002@192.168.11.101;user=phone"
Acme-Ingress-Local-Addr = "192.168.11.100:5060"
Acme-Ingress-Remote-Addr = "192.168.11.101:5060"
Acme-Egress-Local-Addr = "192.168.12.100:5060"
Acme-Egress-Remote-Addr = "192.168.12.200:5060"
Acme-Egress-Final-Routing-Number =
"sip:7812223002@192.168.11.101;user=phone"
Acme-CDR-Sequence-Number = 99
Client-IP-Address = 172.30.21.31
Acct-Unique-Session-Id = "5af95b6a3259b428"
Timestamp = 1215033670

```

```

Wed Jul 2 17:21:21 2008
Acct-Status-Type = Stop
NAS-IP-Address = 192.168.12.100
NAS-Port = 5060
Acct-Session-Id = "6edfa77f-f059e59-711c7dce@192.168.11.101"
Acme-Session-Ingress-Call-Id = "6edfa77f-f059e59-711c7dce@192.168.11.101"
Acme-Session-Egress-Call-Id = "6edfa77f-f059e59-711c7dce@192.168.11.101"
Acme-Session-Protocol-Type = "SIP"
Calling-Station-Id = ""7812223001"
<sip:7812223001@192.168.11.101>;tag=40335A3-29FEF610"
Called-Station-Id = "<sip:7812223002@192.168.11.101;user=phone>"
Acct-Terminate-Cause = User-Request
Acct-Session-Time = 11
h323-setup-time = "16:43:42.452 EST JUL 02 2008"
h323-connect-time = "16:43:53.517 EST JUL 02 2008"
h323-disconnect-time = "16:44:04.356 EST JUL 02 2008"
h323-disconnect-cause = "1"
Acme-Egress-Network-Interface-Id = "M10"
Acme-Egress-Vlan-Tag-Value = 0
Acme-Ingress-Network-Interface-Id = "M00"
Acme-Ingress-Vlan-Tag-Value = 0
Acme-Session-Egress-Realm = "Core"
Acme-Session-Ingress-Realm = "Peer"
Acme-FlowID_FS1_F = "Local host: 65594"
Acme-FlowType_FS1_F = "PCMU"
Acme-Flow-In-Realm_FS1_F = "Peer"
Acme-Flow-In-Src-Addr_FS1_F = 192.168.11.101
Acme-Flow-In-Src-Port_FS1_F = 2224
Acme-Flow-In-Dst-Addr_FS1_F = 192.168.11.100

```

```

Acme-Flow-In-Dst-Port_FS1_F = 49188
Acme-Flow-Out-Realm_FS1_F = "Core"
Acme-Flow-Out-Src-Addr_FS1_F = 192.168.12.100
Acme-Flow-Out-Src-Port_FS1_F = 49152
Acme-Flow-Out-Dst-Addr_FS1_F = 192.168.12.200
Acme-Flow-Out-Dst-Port_FS1_F = 2222
Acme-Calling-RTCP-Packets-Lost_FS1 = 0
Acme-Calling-RTCP-Avg-Jitter_FS1 = 0
Acme-Calling-RTCP-Avg-Latency_FS1 = 0
Acme-Calling-RTCP-MaxJitter_FS1 = 0
Acme-Calling-RTCP-MaxLatency_FS1 = 0
Acme-Calling-RTP-Packets-Lost_FS1 = 0
Acme-Calling-RTP-Avg-Jitter_FS1 = 0
Acme-Calling-RTP-MaxJitter_FS1 = 0
Acme-Calling-Octets_FS1 = 0
Acme-Calling-Packets_FS1 = 0
Acme-FlowID_FS1_R = "Local host: 65595"
Acme-FlowType_FS1_R = "PCMU"
Acme-Flow-In-Realm_FS1_R = "Core"
Acme-Flow-In-Src-Addr_FS1_R = 192.168.12.200
Acme-Flow-In-Src-Port_FS1_R = 2222
Acme-Flow-In-Dst-Addr_FS1_R = 192.168.12.100
Acme-Flow-In-Dst-Port_FS1_R = 49152
Acme-Flow-Out-Realm_FS1_R = "Peer"
Acme-Flow-Out-Src-Addr_FS1_R = 192.168.11.100
Acme-Flow-Out-Src-Port_FS1_R = 49188
Acme-Flow-Out-Dst-Addr_FS1_R = 192.168.11.101
Acme-Flow-Out-Dst-Port_FS1_R = 2224
Acme-Called-RTCP-Packets-Lost_FS1 = 0
Acme-Called-RTCP-Avg-Jitter_FS1 = 0
Acme-Called-RTCP-Avg-Latency_FS1 = 0
Acme-Called-RTCP-MaxJitter_FS1 = 0
Acme-Called-RTCP-MaxLatency_FS1 = 0
Acme-Called-RTP-Packets-Lost_FS1 = 0
Acme-Called-RTP-Avg-Jitter_FS1 = 0
Acme-Called-RTP-MaxJitter_FS1 = 0
Acme-Called-Octets_FS1 = 0
Acme-Called-Packets_FS1 = 0
Acme-FlowID_FS2_F = ""
Acme-FlowType_FS2_F = ""
Acme-Flow-In-Realm_FS2_F = ""
Acme-Flow-In-Src-Addr_FS2_F = 0.0.0.0
Acme-Flow-In-Src-Port_FS2_F = 0
Acme-Flow-In-Dst-Addr_FS2_F = 0.0.0.0
Acme-Flow-In-Dst-Port_FS2_F = 0
Acme-Flow-Out-Realm_FS2_F = ""

```

```

Acme-Flow-Out-Src-Addr_FS2_F = 0.0.0.0
Acme-Flow-Out-Src-Port_FS2_F = 0
Acme-Flow-Out-Dst-Addr_FS2_F = 0.0.0.0
Acme-Flow-Out-Dst-Port_FS2_F = 0
Acme-Calling-RTCP-Packets-Lost_FS2 = 0
Acme-Calling-RTCP-Avg-Jitter_FS2 = 0
Acme-Calling-RTCP-Avg-Latency_FS2 = 0
Acme-Calling-RTCP-MaxJitter_FS2 = 0
Acme-Calling-RTCP-MaxLatency_FS2 = 0
Acme-Calling-RTP-Packets-Lost_FS2 = 0
Acme-Calling-RTP-Avg-Jitter_FS2 = 0
Acme-Calling-RTP-MaxJitter_FS2 = 0
Acme-Calling-Octets_FS2 = 0
Acme-Calling-Packets_FS2 = 0
Acme-FlowID_FS2_R = ""
Acme-FlowType_FS2_R = ""
Acme-Flow-In-Realm_FS2_R = ""
Acme-Flow-In-Src-Addr_FS2_R = 0.0.0.0
Acme-Flow-In-Src-Port_FS2_R = 0
Acme-Flow-In-Dst-Addr_FS2_R = 0.0.0.0
Acme-Flow-In-Dst-Port_FS2_R = 0
Acme-Flow-Out-Realm_FS2_R = ""
Acme-Flow-Out-Src-Addr_FS2_R = 0.0.0.0
Acme-Flow-Out-Src-Port_FS2_R = 0
Acme-Flow-Out-Dst-Addr_FS2_R = 0.0.0.0
Acme-Flow-Out-Dst-Port_FS2_R = 0
Acme-Called-RTCP-Packets-Lost_FS2 = 0
Acme-Called-RTCP-Avg-Jitter_FS2 = 0
Acme-Called-RTCP-Avg-Latency_FS2 = 0
Acme-Called-RTCP-MaxJitter_FS2 = 0
Acme-Called-RTCP-MaxLatency_FS2 = 0
Acme-Called-RTP-Packets-Lost_FS2 = 0
Acme-Called-RTP-Avg-Jitter_FS2 = 0
Acme-Called-RTP-MaxJitter_FS2 = 0
Acme-Called-Octets_FS2 = 0
Acme-Called-Packets_FS2 = 0
Acme-Firmware-Version = "C6.0.0 GA (Build 13)"
Acme-Local-Time-Zone = "GMT-05:00"
Acme-Post-Dial-Delay = 223
Acme-Primary-Routing-Number = "sip:7812223002@192.168.11.101;user=phone"
Acme-Ingress-Local-Addr = "192.168.11.100:5060"
Acme-Ingress-Remote-Addr = "192.168.11.101:5060"
Acme-Egress-Local-Addr = "192.168.12.100:5060"
Acme-Egress-Remote-Addr = "192.168.12.200:5060"
Acme-Session-Disposition = 3
Acme-Disconnect-Initiator = 1

```

Acme-Di sconnect-Cause = 0  
 Acme-SIP-Status = 0  
 Acme-Egress-Final-Routing-Number =  
 "sip: 7812223002@192.168.11.101; user=phone"  
 Acme-CDR-Sequence-Number = 100  
 Client-IP-Address = 172.30.21.31  
 Acct-Unique-Session-Id = "5af95b6a3259b428"  
 Timestamp = 1215033681

## Unsuccessful SIP Call

The following sample CDRs are for an unsuccessful SIP call.

Acct-Status-Type = Stop  
 NAS-IP-Address = 192.168.12.100  
 NAS-Port = 5060  
 Acct-Session-Id = "595e3d3c-e74b9a7e-5924bd1f@192.168.12.200"  
 Acme-Session-Ingress-CallId = "595e3d3c-e74b9a7e-5924bd1f@192.168.12.200"  
 Acme-Session-Egress-CallId = "595e3d3c-e74b9a7e-5924bd1f@192.168.12.200"  
 Acme-Session-Protocol-Type = "SIP"  
 Calling-Station-Id = ""7812223002"  
 <sip: 7812223002@192.168.12.200>; tag=591ADA30-B9864E09"  
 Called-Station-Id = "<sip: 7812223001@192.168.12.200; user=phone>"  
 Acct-Terminate-Cause = User-Error  
 Acct-Session-Time = 0  
 h323-setup-time = "16:46:09.612 EST JUL 02 2008"  
 h323-disconnect-time = "16:46:18.762 EST JUL 02 2008"  
 h323-disconnect-cause = "3"  
 Acme-Egress-Network-Interface-Id = "M10"  
 Acme-Egress-Vlan-Tag-Value = 0  
 Acme-Ingress-Network-Interface-Id = "M10"  
 Acme-Ingress-Vlan-Tag-Value = 0  
 Acme-Session-Egress-Realm = "Core"  
 Acme-Session-Ingress-Realm = "Core"  
 Acme-FlowID\_FS1\_F = "Local host: 65596"  
 Acme-FlowType\_FS1\_F = "PCMU"  
 Acme-Flow-In-Realm\_FS1\_F = "Core"  
 Acme-Flow-In-Src-Addr\_FS1\_F = 0.0.0.0  
 Acme-Flow-In-Src-Port\_FS1\_F = 0  
 Acme-Flow-In-Dst-Addr\_FS1\_F = 192.168.12.100  
 Acme-Flow-In-Dst-Port\_FS1\_F = 49154  
 Acme-Flow-Out-Realm\_FS1\_F = "Core"  
 Acme-Flow-Out-Src-Addr\_FS1\_F = 192.168.12.100  
 Acme-Flow-Out-Src-Port\_FS1\_F = 49156  
 Acme-Flow-Out-Dst-Addr\_FS1\_F = 0.0.0.0  
 Acme-Flow-Out-Dst-Port\_FS1\_F = 0  
 Acme-Calling-RTCP-Packets-Lost\_FS1 = 0  
 Acme-Calling-RTCP-Avg-Jitter\_FS1 = 0

```

Acme-Calling-RTCP-Avg-Latency_FS1 = 0
Acme-Calling-RTCP-MaxJitter_FS1 = 0
Acme-Calling-RTCP-MaxLatency_FS1 = 0
Acme-Calling-RTP-Packets-Lost_FS1 = 0
Acme-Calling-RTP-Avg-Jitter_FS1 = 0
Acme-Calling-RTP-MaxJitter_FS1 = 0
Acme-Calling-Octets_FS1 = 0
Acme-Calling-Packets_FS1 = 0
Acme-FlowID_FS1_R = "local host: 65597"
Acme-FlowType_FS1_R = "PCMU"
Acme-Flow-In-Realm_FS1_R = "Core"
Acme-Flow-In-Src-Addr_FS1_R = 0. 0. 0. 0
Acme-Flow-In-Src-Port_FS1_R = 0
Acme-Flow-In-Dst-Addr_FS1_R = 192. 168. 12. 100
Acme-Flow-In-Dst-Port_FS1_R = 49156
Acme-Flow-Out-Realm_FS1_R = "Core"
Acme-Flow-Out-Src-Addr_FS1_R = 192. 168. 12. 100
Acme-Flow-Out-Src-Port_FS1_R = 49154
Acme-Flow-Out-Dst-Addr_FS1_R = 192. 168. 12. 200
Acme-Flow-Out-Dst-Port_FS1_R = 2226
Acme-Called-RTCP-Packets-Lost_FS1 = 0
Acme-Called-RTCP-Avg-Jitter_FS1 = 0
Acme-Called-RTCP-Avg-Latency_FS1 = 0
Acme-Called-RTCP-MaxJitter_FS1 = 0
Acme-Called-RTCP-MaxLatency_FS1 = 0
Acme-Called-RTP-Packets-Lost_FS1 = 0
Acme-Called-RTP-Avg-Jitter_FS1 = 0
Acme-Called-RTP-MaxJitter_FS1 = 0
Acme-Called-Octets_FS1 = 0
Acme-Called-Packets_FS1 = 0
Acme-FlowID_FS2_F = ""
Acme-FlowType_FS2_F = ""
Acme-Flow-In-Realm_FS2_F = ""
Acme-Flow-In-Src-Addr_FS2_F = 0. 0. 0. 0
Acme-Flow-In-Src-Port_FS2_F = 0
Acme-Flow-In-Dst-Addr_FS2_F = 0. 0. 0. 0
Acme-Flow-In-Dst-Port_FS2_F = 0
Acme-Flow-Out-Realm_FS2_F = ""
Acme-Flow-Out-Src-Addr_FS2_F = 0. 0. 0. 0
Acme-Flow-Out-Src-Port_FS2_F = 0
Acme-Flow-Out-Dst-Addr_FS2_F = 0. 0. 0. 0
Acme-Flow-Out-Dst-Port_FS2_F = 0
Acme-Calling-RTCP-Packets-Lost_FS2 = 0
Acme-Calling-RTCP-Avg-Jitter_FS2 = 0
Acme-Calling-RTCP-Avg-Latency_FS2 = 0
Acme-Calling-RTCP-MaxJitter_FS2 = 0

```

```

Acme-Calling-RTCP-MaxLatency_FS2 = 0
Acme-Calling-RTP-Packets-Lost_FS2 = 0
Acme-Calling-RTP-Avg-Jitter_FS2 = 0
Acme-Calling-RTP-MaxJitter_FS2 = 0
Acme-Calling-Octets_FS2 = 0
Acme-Calling-Packets_FS2 = 0
Acme-FlowID_FS2_R = ""
Acme-FlowType_FS2_R = ""
Acme-Flow-In-Realm_FS2_R = ""
Acme-Flow-In-Src-Addr_FS2_R = 0.0.0.0
Acme-Flow-In-Src-Port_FS2_R = 0
Acme-Flow-In-Dst-Addr_FS2_R = 0.0.0.0
Acme-Flow-In-Dst-Port_FS2_R = 0
Acme-Flow-Out-Realm_FS2_R = ""
Acme-Flow-Out-Src-Addr_FS2_R = 0.0.0.0
Acme-Flow-Out-Src-Port_FS2_R = 0
Acme-Flow-Out-Dst-Addr_FS2_R = 0.0.0.0
Acme-Flow-Out-Dst-Port_FS2_R = 0
Acme-Called-RTCP-Packets-Lost_FS2 = 0
Acme-Called-RTCP-Avg-Jitter_FS2 = 0
Acme-Called-RTCP-Avg-Latency_FS2 = 0
Acme-Called-RTCP-MaxJitter_FS2 = 0
Acme-Called-RTCP-MaxLatency_FS2 = 0
Acme-Called-RTP-Packets-Lost_FS2 = 0
Acme-Called-RTP-Avg-Jitter_FS2 = 0
Acme-Called-RTP-MaxJitter_FS2 = 0
Acme-Called-Octets_FS2 = 0
Acme-Called-Packets_FS2 = 0
Acme-Firmware-Version = "C6.0.0 GA (Build 13)"
Acme-Local-Time-Zone = "GMT-05:00"
Acme-Post-Dial-Delay = 210
Acme-Primary-Routing-Number = "sip:7812223001@192.168.12.200;user=phone"
Acme-Ingress-Local-Addr = "192.168.12.100:5060"
Acme-Ingress-Remote-Addr = "192.168.12.200:5060"
Acme-Egress-Local-Addr = "192.168.12.100:5060"
Acme-Egress-Remote-Addr = "192.168.12.200:5060"
Acme-Session-Disposition = 2
Acme-Disconnect-Initiator = 1
Acme-Disconnect-Cause = 47
Acme-SIP-Status = 487
Acme-Egress-Final-Routing-Number =
"sip:7812223001@192.168.12.200;user=phone"
Acme-CDR-Sequence-Number = 101
Client-IP-Address = 172.30.21.31
Acct-Unique-Session-Id = "f1c5761c4d973242"
Timestamp = 1215033815

```



**SIP Call On Hold**

The following sample CDRs are for SIP call on hold.

```

Acct-Status-Type = Start
NAS-IP-Address = 192.168.12.100
NAS-Port = 5060
Acct-Session-Id = "48447425-eb21e8f-d9cc570c@192.168.11.101"
Acme-Session-Ingress-Call-Id = "48447425-eb21e8f-d9cc570c@192.168.11.101"
Acme-Session-Egress-Call-Id = "48447425-eb21e8f-d9cc570c@192.168.11.101"
Acme-Session-Protocol-Type = "SIP"
Calling-Station-Id = ""7812223001"
<sip:7812223001@192.168.11.101>; tag=29749EE9-79CDC11E"
Called-Station-Id = "<sip:7812223002@192.168.11.101;user=phone>"
h323-setup-time = "16:47:28.630 EST JUL 02 2008"
h323-connect-time = "16:47:34.016 EST JUL 02 2008"
Acme-Egress-Network-Interface-Id = "M10"
Acme-Egress-Vlan-Tag-Value = 0
Acme-Ingress-Network-Interface-Id = "M00"
Acme-Ingress-Vlan-Tag-Value = 0
Acme-Session-Egress-Realm = "Core"
Acme-Session-Ingress-Realm = "Peer"
Acme-FlowID_FS1_F = "Local host: 65598"
Acme-FlowType_FS1_F = "PCMU"
Acme-Flow-In-Realm_FS1_F = "Peer"
Acme-Flow-In-Src-Addr_FS1_F = 0.0.0.0
Acme-Flow-In-Src-Port_FS1_F = 0
Acme-Flow-In-Dst-Addr_FS1_F = 192.168.11.100
Acme-Flow-In-Dst-Port_FS1_F = 49190
Acme-Flow-Out-Realm_FS1_F = "Core"
Acme-Flow-Out-Src-Addr_FS1_F = 192.168.12.100
Acme-Flow-Out-Src-Port_FS1_F = 49158
Acme-Flow-Out-Dst-Addr_FS1_F = 192.168.12.200
Acme-Flow-Out-Dst-Port_FS1_F = 2228
Acme-FlowID_FS1_R = "Local host: 65599"
Acme-FlowType_FS1_R = "PCMU"
Acme-Flow-In-Realm_FS1_R = "Core"
Acme-Flow-In-Src-Addr_FS1_R = 0.0.0.0
Acme-Flow-In-Src-Port_FS1_R = 0
Acme-Flow-In-Dst-Addr_FS1_R = 192.168.12.100
Acme-Flow-In-Dst-Port_FS1_R = 49158
Acme-Flow-Out-Realm_FS1_R = "Peer"
Acme-Flow-Out-Src-Addr_FS1_R = 192.168.11.100
Acme-Flow-Out-Src-Port_FS1_R = 49190
Acme-Flow-Out-Dst-Addr_FS1_R = 192.168.11.101
Acme-Flow-Out-Dst-Port_FS1_R = 2226
Acme-FlowID_FS2_F = ""
Acme-FlowType_FS2_F = ""
Acme-Flow-In-Realm_FS2_F = ""

```

```

Acme-Flow-In-Src-Addr_FS2_F = 0.0.0.0
Acme-Flow-In-Src-Port_FS2_F = 0
Acme-Flow-In-Dst-Addr_FS2_F = 0.0.0.0
Acme-Flow-In-Dst-Port_FS2_F = 0
Acme-Flow-Out-Realm_FS2_F = ""
Acme-Flow-Out-Src-Addr_FS2_F = 0.0.0.0
Acme-Flow-Out-Src-Port_FS2_F = 0
Acme-Flow-Out-Dst-Addr_FS2_F = 0.0.0.0
Acme-Flow-Out-Dst-Port_FS2_F = 0
Acme-FlowID_FS2_R = ""
Acme-FlowType_FS2_R = ""
Acme-Flow-In-Realm_FS2_R = ""
Acme-Flow-In-Src-Addr_FS2_R = 0.0.0.0
Acme-Flow-In-Src-Port_FS2_R = 0
Acme-Flow-In-Dst-Addr_FS2_R = 0.0.0.0
Acme-Flow-In-Dst-Port_FS2_R = 0
Acme-Flow-Out-Realm_FS2_R = ""
Acme-Flow-Out-Src-Addr_FS2_R = 0.0.0.0
Acme-Flow-Out-Src-Port_FS2_R = 0
Acme-Flow-Out-Dst-Addr_FS2_R = 0.0.0.0
Acme-Flow-Out-Dst-Port_FS2_R = 0
Acme-Firmware-Version = "C6.0.0 GA (Build 13)"
Acme-Local-Time-Zone = "GMT-05:00"
Acme-Post-Dial-Delay = 217
Acme-Primary-Routing-Number = "sip:7812223002@192.168.11.101;user=phone"
Acme-Ingress-Local-Addr = "192.168.11.100:5060"
Acme-Ingress-Remote-Addr = "192.168.11.101:5060"
Acme-Egress-Local-Addr = "192.168.12.100:5060"
Acme-Egress-Remote-Addr = "192.168.12.200:5060"
Acme-Egress-Final-Routing-Number =
"sip:7812223002@192.168.11.101;user=phone"
Acme-CDR-Sequence-Number = 102
Client-IP-Address = 172.30.21.31
Acct-Unique-Session-Id = "972a994cb16bcd0"
Timestamp = 1215033890

Wed Jul 2 17:24:59 2008
Acct-Status-Type = Interim-Update
NAS-IP-Address = 192.168.12.100
NAS-Port = 5060
Acct-Session-Id = "48447425-eb21e8f-d9cc570c@192.168.11.101"
Acme-Session-Ingress-CallId = "48447425-eb21e8f-d9cc570c@192.168.11.101"
Acme-Session-Egress-CallId = "48447425-eb21e8f-d9cc570c@192.168.11.101"
Acme-Session-Protocol-Type = "SIP"
Calling-Station-Id = ""7812223001"
<sip:7812223001@192.168.11.101>;tag=29749EE9-79CDC11E"
Called-Station-Id = "<sip:7812223002@192.168.11.101;user=phone>"

```

```

h323-setup-time = "16: 47: 28. 630 EST JUL 02 2008"
h323-connect-time = "16: 47: 34. 016 EST JUL 02 2008"
Acme-Egress-Network-Interface-Id = "M10"
Acme-Egress-Vlan-Tag-Value = 0
Acme-Ingress-Network-Interface-Id = "M00"
Acme-Ingress-Vlan-Tag-Value = 0
Acme-Session-Egress-Realm = "Core"
Acme-Session-Ingress-Realm = "Peer"
Acme-FlowID_FS1_F = "Local host: 65598"
Acme-FlowType_FS1_F = "PCMU"
Acme-Flow-In-Realm_FS1_F = "Peer"
Acme-Flow-In-Src-Addr_FS1_F = 0. 0. 0. 0
Acme-Flow-In-Src-Port_FS1_F = 0
Acme-Flow-In-Dst-Addr_FS1_F = 192. 168. 11. 100
Acme-Flow-In-Dst-Port_FS1_F = 49190
Acme-Flow-Out-Realm_FS1_F = "Core"
Acme-Flow-Out-Src-Addr_FS1_F = 192. 168. 12. 100
Acme-Flow-Out-Src-Port_FS1_F = 49158
Acme-Flow-Out-Dst-Addr_FS1_F = 192. 168. 12. 200
Acme-Flow-Out-Dst-Port_FS1_F = 2228
Acme-Calling-RTCP-Packets-Lost_FS1 = 0
Acme-Calling-RTCP-Avg-Jitter_FS1 = 0
Acme-Calling-RTCP-Avg-Latency_FS1 = 0
Acme-Calling-RTCP-MaxJitter_FS1 = 0
Acme-Calling-RTCP-MaxLatency_FS1 = 0
Acme-Calling-RTP-Packets-Lost_FS1 = 0
Acme-Calling-RTP-Avg-Jitter_FS1 = 0
Acme-Calling-RTP-MaxJitter_FS1 = 0
Acme-Calling-Octets_FS1 = 0
Acme-Calling-Packets_FS1 = 0
Acme-FlowID_FS1_R = "Local host: 65599"
Acme-FlowType_FS1_R = "PCMU"
Acme-Flow-In-Realm_FS1_R = "Core"
Acme-Flow-In-Src-Addr_FS1_R = 0. 0. 0. 0
Acme-Flow-In-Src-Port_FS1_R = 0
Acme-Flow-In-Dst-Addr_FS1_R = 192. 168. 12. 100
Acme-Flow-In-Dst-Port_FS1_R = 49158
Acme-Flow-Out-Realm_FS1_R = "Peer"
Acme-Flow-Out-Src-Addr_FS1_R = 192. 168. 11. 100
Acme-Flow-Out-Src-Port_FS1_R = 49190
Acme-Flow-Out-Dst-Addr_FS1_R = 192. 168. 11. 101
Acme-Flow-Out-Dst-Port_FS1_R = 2226
Acme-Called-RTCP-Packets-Lost_FS1 = 0
Acme-Called-RTCP-Avg-Jitter_FS1 = 0
Acme-Called-RTCP-Avg-Latency_FS1 = 0
Acme-Called-RTCP-MaxJitter_FS1 = 0

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Acme-Called-RTCP-MaxLatency\_FS1 = 0  
Acme-Called-RTP-Packets-Lost\_FS1 = 0  
Acme-Called-RTP-Avg-Jitter\_FS1 = 0  
Acme-Called-RTP-MaxJitter\_FS1 = 0  
Acme-Called-Octets\_FS1 = 0  
Acme-Called-Packets\_FS1 = 0  
Acme-FlowID\_FS2\_F = ""  
Acme-FlowType\_FS2\_F = ""  
Acme-Flow-In-Realm\_FS2\_F = ""  
Acme-Flow-In-Src-Addr\_FS2\_F = 0.0.0.0  
Acme-Flow-In-Src-Port\_FS2\_F = 0  
Acme-Flow-In-Dst-Addr\_FS2\_F = 0.0.0.0  
Acme-Flow-In-Dst-Port\_FS2\_F = 0  
Acme-Flow-Out-Realm\_FS2\_F = ""  
Acme-Flow-Out-Src-Addr\_FS2\_F = 0.0.0.0  
Acme-Flow-Out-Src-Port\_FS2\_F = 0  
Acme-Flow-Out-Dst-Addr\_FS2\_F = 0.0.0.0  
Acme-Flow-Out-Dst-Port\_FS2\_F = 0  
Acme-Calling-RTCP-Packets-Lost\_FS2 = 0  
Acme-Calling-RTCP-Avg-Jitter\_FS2 = 0  
Acme-Calling-RTCP-Avg-Latency\_FS2 = 0  
Acme-Calling-RTCP-MaxJitter\_FS2 = 0  
Acme-Calling-RTCP-MaxLatency\_FS2 = 0  
Acme-Calling-RTP-Packets-Lost\_FS2 = 0  
Acme-Calling-RTP-Avg-Jitter\_FS2 = 0  
Acme-Calling-RTP-MaxJitter\_FS2 = 0  
Acme-Calling-Octets\_FS2 = 0  
Acme-Calling-Packets\_FS2 = 0  
Acme-FlowID\_FS2\_R = ""  
Acme-FlowType\_FS2\_R = ""  
Acme-Flow-In-Realm\_FS2\_R = ""  
Acme-Flow-In-Src-Addr\_FS2\_R = 0.0.0.0  
Acme-Flow-In-Src-Port\_FS2\_R = 0  
Acme-Flow-In-Dst-Addr\_FS2\_R = 0.0.0.0  
Acme-Flow-In-Dst-Port\_FS2\_R = 0  
Acme-Flow-Out-Realm\_FS2\_R = ""  
Acme-Flow-Out-Src-Addr\_FS2\_R = 0.0.0.0  
Acme-Flow-Out-Src-Port\_FS2\_R = 0  
Acme-Flow-Out-Dst-Addr\_FS2\_R = 0.0.0.0  
Acme-Flow-Out-Dst-Port\_FS2\_R = 0  
Acme-Called-RTCP-Packets-Lost\_FS2 = 0  
Acme-Called-RTCP-Avg-Jitter\_FS2 = 0  
Acme-Called-RTCP-Avg-Latency\_FS2 = 0  
Acme-Called-RTCP-MaxJitter\_FS2 = 0  
Acme-Called-RTCP-MaxLatency\_FS2 = 0  
Acme-Called-RTP-Packets-Lost\_FS2 = 0

Acme-Called-RTP-Avg-Jitter\_FS2 = 0  
 Acme-Called-RTP-MaxJitter\_FS2 = 0  
 Acme-Called-Octets\_FS2 = 0  
 Acme-Called-Packets\_FS2 = 0  
 Acme-Firmware-Version = "C6.0.0 GA (Build 13)"  
 Acme-Local-Time-Zone = "GMT-05:00"  
 Acme-Post-Dial-Delay = 217  
 Acme-Primary-Routing-Number = "sip:7812223002@192.168.11.101;user=phone"  
 Acme-Ingress-Local-Addr = "192.168.11.100:5060"  
 Acme-Ingress-Remote-Addr = "192.168.11.101:5060"  
 Acme-Egress-Local-Addr = "192.168.12.100:5060"  
 Acme-Egress-Remote-Addr = "192.168.12.200:5060"  
 Acme-Intermediate\_Time = "16:47:42.877 EST JUL 02 2008"  
 Acme-Egress-Final-Routing-Number =  
 "sip:7812223002@192.168.11.101;user=phone"  
 Acme-CDR-Sequence-Number = 103  
 Client-IP-Address = 172.30.21.31  
 Acct-Unique-Session-Id = "972a994cb16bcd0"  
 Timestamp = 1215033899

Wed Jul 2 17:25:04 2008

Acct-Status-Type = Interim-Update  
 NAS-IP-Address = 192.168.12.100  
 NAS-Port = 5060  
 Acct-Session-Id = "48447425-eb21e8f-d9cc570c@192.168.11.101"  
 Acme-Session-Ingress-Call-Id = "48447425-eb21e8f-d9cc570c@192.168.11.101"  
 Acme-Session-Egress-Call-Id = "48447425-eb21e8f-d9cc570c@192.168.11.101"  
 Acme-Session-Protocol-Type = "SIP"  
 Calling-Station-Id = ""7812223001"  
 <sip:7812223001@192.168.11.101>;tag=29749EE9-79CDC11E"  
 Called-Station-Id = "<sip:7812223002@192.168.11.101;user=phone>"  
 h323-setup-time = "16:47:28.630 EST JUL 02 2008"  
 h323-connect-time = "16:47:34.016 EST JUL 02 2008"  
 Acme-Egress-Network-Interface-Id = "M10"  
 Acme-Egress-Vlan-Tag-Value = 0  
 Acme-Ingress-Network-Interface-Id = "M00"  
 Acme-Ingress-Vlan-Tag-Value = 0  
 Acme-Session-Egress-Realm = "Core"  
 Acme-Session-Ingress-Realm = "Peer"  
 Acme-FlowID\_FS1\_F = "local host: 65598"  
 Acme-FlowType\_FS1\_F = "PCMU"  
 Acme-Flow-In-Realm\_FS1\_F = "Peer"  
 Acme-Flow-In-Src-Addr\_FS1\_F = 0.0.0.0  
 Acme-Flow-In-Src-Port\_FS1\_F = 0  
 Acme-Flow-In-Dst-Addr\_FS1\_F = 192.168.11.100  
 Acme-Flow-In-Dst-Port\_FS1\_F = 49190  
 Acme-Flow-Out-Realm\_FS1\_F = "Core"

Acme-Flow-Out-Src-Addr\_FS1\_F = 192.168.12.100  
 Acme-Flow-Out-Src-Port\_FS1\_F = 49158  
 Acme-Flow-Out-Dst-Addr\_FS1\_F = 192.168.12.200  
 Acme-Flow-Out-Dst-Port\_FS1\_F = 2228  
 Acme-Calling-RTCP-Packets-Lost\_FS1 = 0  
 Acme-Calling-RTCP-Avg-Jitter\_FS1 = 0  
 Acme-Calling-RTCP-Avg-Latency\_FS1 = 0  
 Acme-Calling-RTCP-MaxJitter\_FS1 = 0  
 Acme-Calling-RTCP-MaxLatency\_FS1 = 0  
 Acme-Calling-RTP-Packets-Lost\_FS1 = 0  
 Acme-Calling-RTP-Avg-Jitter\_FS1 = 0  
 Acme-Calling-RTP-MaxJitter\_FS1 = 0  
 Acme-Calling-Octets\_FS1 = 0  
 Acme-Calling-Packets\_FS1 = 0  
 Acme-FlowID\_FS1\_R = "Local host: 65599"  
 Acme-FlowType\_FS1\_R = "PCMU"  
 Acme-Flow-In-Realm\_FS1\_R = "Core"  
 Acme-Flow-In-Src-Addr\_FS1\_R = 0.0.0.0  
 Acme-Flow-In-Src-Port\_FS1\_R = 0  
 Acme-Flow-In-Dst-Addr\_FS1\_R = 192.168.12.100  
 Acme-Flow-In-Dst-Port\_FS1\_R = 49158  
 Acme-Flow-Out-Realm\_FS1\_R = "Peer"  
 Acme-Flow-Out-Src-Addr\_FS1\_R = 192.168.11.100  
 Acme-Flow-Out-Src-Port\_FS1\_R = 49190  
 Acme-Flow-Out-Dst-Addr\_FS1\_R = 192.168.11.101  
 Acme-Flow-Out-Dst-Port\_FS1\_R = 2226  
 Acme-Called-RTCP-Packets-Lost\_FS1 = 0  
 Acme-Called-RTCP-Avg-Jitter\_FS1 = 0  
 Acme-Called-RTCP-Avg-Latency\_FS1 = 0  
 Acme-Called-RTCP-MaxJitter\_FS1 = 0  
 Acme-Called-RTCP-MaxLatency\_FS1 = 0  
 Acme-Called-RTP-Packets-Lost\_FS1 = 0  
 Acme-Called-RTP-Avg-Jitter\_FS1 = 0  
 Acme-Called-RTP-MaxJitter\_FS1 = 0  
 Acme-Called-Octets\_FS1 = 0  
 Acme-Called-Packets\_FS1 = 0  
 Acme-FlowID\_FS2\_F = ""  
 Acme-FlowType\_FS2\_F = ""  
 Acme-Flow-In-Realm\_FS2\_F = ""  
 Acme-Flow-In-Src-Addr\_FS2\_F = 0.0.0.0  
 Acme-Flow-In-Src-Port\_FS2\_F = 0  
 Acme-Flow-In-Dst-Addr\_FS2\_F = 0.0.0.0  
 Acme-Flow-In-Dst-Port\_FS2\_F = 0  
 Acme-Flow-Out-Realm\_FS2\_F = ""  
 Acme-Flow-Out-Src-Addr\_FS2\_F = 0.0.0.0  
 Acme-Flow-Out-Src-Port\_FS2\_F = 0

```

Acme-Flow-Out-Dst-Addr_FS2_F = 0.0.0.0
Acme-Flow-Out-Dst-Port_FS2_F = 0
Acme-Calling-RTCP-Packets-Lost_FS2 = 0
Acme-Calling-RTCP-Avg-Jitter_FS2 = 0
Acme-Calling-RTCP-Avg-Latency_FS2 = 0
Acme-Calling-RTCP-MaxJitter_FS2 = 0
Acme-Calling-RTCP-MaxLatency_FS2 = 0
Acme-Calling-RTP-Packets-Lost_FS2 = 0
Acme-Calling-RTP-Avg-Jitter_FS2 = 0
Acme-Calling-RTP-MaxJitter_FS2 = 0
Acme-Calling-Octets_FS2 = 0
Acme-Calling-Packets_FS2 = 0
Acme-FlowID_FS2_R = ""
Acme-FlowType_FS2_R = ""
Acme-Flow-In-Realm_FS2_R = ""
Acme-Flow-In-Src-Addr_FS2_R = 0.0.0.0
Acme-Flow-In-Src-Port_FS2_R = 0
Acme-Flow-In-Dst-Addr_FS2_R = 0.0.0.0
Acme-Flow-In-Dst-Port_FS2_R = 0
Acme-Flow-Out-Realm_FS2_R = ""
Acme-Flow-Out-Src-Addr_FS2_R = 0.0.0.0
Acme-Flow-Out-Src-Port_FS2_R = 0
Acme-Flow-Out-Dst-Addr_FS2_R = 0.0.0.0
Acme-Flow-Out-Dst-Port_FS2_R = 0
Acme-Called-RTCP-Packets-Lost_FS2 = 0
Acme-Called-RTCP-Avg-Jitter_FS2 = 0
Acme-Called-RTCP-Avg-Latency_FS2 = 0
Acme-Called-RTCP-MaxJitter_FS2 = 0
Acme-Called-RTCP-MaxLatency_FS2 = 0
Acme-Called-RTP-Packets-Lost_FS2 = 0
Acme-Called-RTP-Avg-Jitter_FS2 = 0
Acme-Called-RTP-MaxJitter_FS2 = 0
Acme-Called-Octets_FS2 = 0
Acme-Called-Packets_FS2 = 0
Acme-Firmware-Version = "C6.0.0 GA (Build 13)"
Acme-Local-Time-Zone = "GMT-05:00"
Acme-Post-Dial-Delay = 217
Acme-Primary-Routing-Number = "sip:7812223002@192.168.11.101;user=phone"
Acme-Ingress-Local-Addr = "192.168.11.100:5060"
Acme-Ingress-Remote-Addr = "192.168.11.101:5060"
Acme-Egress-Local-Addr = "192.168.12.100:5060"
Acme-Egress-Remote-Addr = "192.168.12.200:5060"
Acme-Intermediate-Time = "16:47:47.186 EST JUL 02 2008"
Acme-Egress-Final-Routing-Number =
"sip:7812223002@192.168.11.101;user=phone"
Acme-CDR-Sequence-Number = 104
Client-IP-Address = 172.30.21.31

```

```

Acct-Unique-Session-Id = "972a994cb16bcd0"
Timestamp = 1215033904

Wed Jul  2 17:25:09 2008
Acct-Status-Type = Stop
NAS-IP-Address = 192.168.12.100
NAS-Port = 5060
Acct-Session-Id = "48447425-eb21e8f-d9cc570c@192.168.11.101"
Acme-Session-Ingress-CallId = "48447425-eb21e8f-d9cc570c@192.168.11.101"
Acme-Session-Egress-CallId = "48447425-eb21e8f-d9cc570c@192.168.11.101"
Acme-Session-Protocol-Type = "SIP"
Calling-Station-Id = ""7812223001"
<sip:7812223001@192.168.11.101>; tag=29749EE9-79CDC11E"
Called-Station-Id = "<sip:7812223002@192.168.11.101; user=phone>"
Acct-Terminate-Cause = User-Request
Acct-Session-Time = 18
h323-setup-time = "16:47:28.630 EST JUL 02 2008"
h323-connect-time = "16:47:34.016 EST JUL 02 2008"
h323-disconnect-time = "16:47:52.721 EST JUL 02 2008"
h323-disconnect-cause = "1"
Acme-Egress-Network-Interface-Id = "M10"
Acme-Egress-Vlan-Tag-Value = 0
Acme-Ingress-Network-Interface-Id = "M00"
Acme-Ingress-Vlan-Tag-Value = 0
Acme-Session-Egress-Realm = "Core"
Acme-Session-Ingress-Realm = "Peer"
Acme-FlowID_FS1_F = "Local host: 65598"
Acme-FlowType_FS1_F = "PCMU"
Acme-Flow-In-Realm_FS1_F = "Peer"
Acme-Flow-In-Src-Addr_FS1_F = 192.168.11.101
Acme-Flow-In-Src-Port_FS1_F = 2226
Acme-Flow-In-Dst-Addr_FS1_F = 192.168.11.100
Acme-Flow-In-Dst-Port_FS1_F = 49190
Acme-Flow-Out-Realm_FS1_F = "Core"
Acme-Flow-Out-Src-Addr_FS1_F = 192.168.12.100
Acme-Flow-Out-Src-Port_FS1_F = 49158
Acme-Flow-Out-Dst-Addr_FS1_F = 192.168.12.200
Acme-Flow-Out-Dst-Port_FS1_F = 2228
Acme-Calling-RTCP-Packets-Lost_FS1 = 0
Acme-Calling-RTCP-Avg-Jitter_FS1 = 0
Acme-Calling-RTCP-Avg-Latency_FS1 = 0
Acme-Calling-RTCP-MaxJitter_FS1 = 0
Acme-Calling-RTCP-MaxLatency_FS1 = 0
Acme-Calling-RTP-Packets-Lost_FS1 = 0
Acme-Calling-RTP-Avg-Jitter_FS1 = 0
Acme-Calling-RTP-MaxJitter_FS1 = 0
Acme-Calling-Octets_FS1 = 0

```



```

Acme-Calling-Packets_FS1 = 0
Acme-FlowID_FS1_R = "Local host: 65599"
Acme-FlowType_FS1_R = "PCMU"
Acme-Flow-In-Realm_FS1_R = "Core"
Acme-Flow-In-Src-Addr_FS1_R = 192.168.12.200
Acme-Flow-In-Src-Port_FS1_R = 2228
Acme-Flow-In-Dst-Addr_FS1_R = 192.168.12.100
Acme-Flow-In-Dst-Port_FS1_R = 49158
Acme-Flow-Out-Realm_FS1_R = "Peer"
Acme-Flow-Out-Src-Addr_FS1_R = 192.168.11.100
Acme-Flow-Out-Src-Port_FS1_R = 49190
Acme-Flow-Out-Dst-Addr_FS1_R = 192.168.11.101
Acme-Flow-Out-Dst-Port_FS1_R = 2226
Acme-Called-RTCP-Packets-Lost_FS1 = 0
Acme-Called-RTCP-Avg-Jitter_FS1 = 0
Acme-Called-RTCP-Avg-Latency_FS1 = 0
Acme-Called-RTCP-MaxJitter_FS1 = 0
Acme-Called-RTCP-MaxLatency_FS1 = 0
Acme-Called-RTP-Packets-Lost_FS1 = 0
Acme-Called-RTP-Avg-Jitter_FS1 = 0
Acme-Called-RTP-MaxJitter_FS1 = 0
Acme-Called-Octets_FS1 = 0
Acme-Called-Packets_FS1 = 0
Acme-FlowID_FS2_F = ""
Acme-FlowType_FS2_F = ""
Acme-Flow-In-Realm_FS2_F = ""
Acme-Flow-In-Src-Addr_FS2_F = 0.0.0.0
Acme-Flow-In-Src-Port_FS2_F = 0
Acme-Flow-In-Dst-Addr_FS2_F = 0.0.0.0
Acme-Flow-In-Dst-Port_FS2_F = 0
Acme-Flow-Out-Realm_FS2_F = ""
Acme-Flow-Out-Src-Addr_FS2_F = 0.0.0.0
Acme-Flow-Out-Src-Port_FS2_F = 0
Acme-Flow-Out-Dst-Addr_FS2_F = 0.0.0.0
Acme-Flow-Out-Dst-Port_FS2_F = 0
Acme-Calling-RTCP-Packets-Lost_FS2 = 0
Acme-Calling-RTCP-Avg-Jitter_FS2 = 0
Acme-Calling-RTCP-Avg-Latency_FS2 = 0
Acme-Calling-RTCP-MaxJitter_FS2 = 0
Acme-Calling-RTCP-MaxLatency_FS2 = 0
Acme-Calling-RTP-Packets-Lost_FS2 = 0
Acme-Calling-RTP-Avg-Jitter_FS2 = 0
Acme-Calling-RTP-MaxJitter_FS2 = 0
Acme-Calling-Octets_FS2 = 0
Acme-Calling-Packets_FS2 = 0
Acme-FlowID_FS2_R = ""

```

```

Acme-FlowType_FS2_R = ""
Acme-Flow-In-Realm_FS2_R = ""
Acme-Flow-In-Src-Addr_FS2_R = 0.0.0.0
Acme-Flow-In-Src-Port_FS2_R = 0
Acme-Flow-In-Dst-Addr_FS2_R = 0.0.0.0
Acme-Flow-In-Dst-Port_FS2_R = 0
Acme-Flow-Out-Realm_FS2_R = ""
Acme-Flow-Out-Src-Addr_FS2_R = 0.0.0.0
Acme-Flow-Out-Src-Port_FS2_R = 0
Acme-Flow-Out-Dst-Addr_FS2_R = 0.0.0.0
Acme-Flow-Out-Dst-Port_FS2_R = 0
Acme-Called-RTCP-Packets-Lost_FS2 = 0
Acme-Called-RTCP-Avg-Jitter_FS2 = 0
Acme-Called-RTCP-Avg-Latency_FS2 = 0
Acme-Called-RTCP-MaxJitter_FS2 = 0
Acme-Called-RTCP-MaxLatency_FS2 = 0
Acme-Called-RTP-Packets-Lost_FS2 = 0
Acme-Called-RTP-Avg-Jitter_FS2 = 0
Acme-Called-RTP-MaxJitter_FS2 = 0
Acme-Called-Octets_FS2 = 0
Acme-Called-Packets_FS2 = 0
Acme-Firmware-Version = "C6.0.0 GA (Build 13)"
Acme-Local-Time-Zone = "GMT-05:00"
Acme-Post-Dial-Delay = 217
Acme-Primary-Routing-Number = "sip:7812223002@192.168.11.101;user=phone"
Acme-Ingress-Local-Addr = "192.168.11.100:5060"
Acme-Ingress-Remote-Addr = "192.168.11.101:5060"
Acme-Egress-Local-Addr = "192.168.12.100:5060"
Acme-Egress-Remote-Addr = "192.168.12.200:5060"
Acme-Session-Disposition = 3
Acme-Disconnect-Initiator = 1
Acme-Disconnect-Cause = 0
Acme-SIP-Status = 0
Acme-Egress-Final-Routing-Number =
"sip:7812223002@192.168.11.101;user=phone"
Acme-CDR-Sequence-Number = 105
Client-IP-Address = 172.30.21.31
Acct-Unique-Session-Id = "972a994cb16bcd0"
Timestamp = 1215033909

```

# Appendix B

## Net-Net 4000 S-C6.2.0 RADIUS Dictionary

---

```
#
#
# dictionary.acme
#
#
# Version:      dictionary.acme, v 1.0 2001/11/19
#              Updated 2009/01/20
#
# For documentation on Acme Packet RADIUS attributes, see:
#
# Net-Net Accounting Guide
#

VENDOR      Acme      9148

#
# Voice over IP attributes.
#
ATTRIBUTE   Acme-FlowID_FS1_F      1      string      Acme
ATTRIBUTE   Acme-FlowType_FS1_F      2      string      Acme
ATTRIBUTE   Acme-Session-Ingress-CallId 3      string      Acme
ATTRIBUTE   Acme-Session-Egress-CallId 4      string      Acme

ATTRIBUTE   Acme-Flow-In-Realm_FS1_F 10     string      Acme
ATTRIBUTE   Acme-Flow-In-Src-Addr_FS1_F 11     ipaddr      Acme
ATTRIBUTE   Acme-Flow-In-Src-Port_FS1_F 12     integer     Acme
ATTRIBUTE   Acme-Flow-In-Dst-Addr_FS1_F 13     ipaddr      Acme
ATTRIBUTE   Acme-Flow-In-Dst-Port_FS1_F 14     integer     Acme

ATTRIBUTE   Acme-Flow-Out-Realm_FS1_F 20     string      Acme
ATTRIBUTE   Acme-Flow-Out-Src-Addr_FS1_F 21     ipaddr      Acme
ATTRIBUTE   Acme-Flow-Out-Src-Port_FS1_F 22     integer     Acme
ATTRIBUTE   Acme-Flow-Out-Dst-Addr_FS1_F 23     ipaddr      Acme
ATTRIBUTE   Acme-Flow-Out-Dst-Port_FS1_F 24     integer     Acme
ATTRIBUTE   Acme-Calling-Octets_FS1 28     integer     Acme
ATTRIBUTE   Acme-Calling-Packets_FS1 29     integer     Acme
ATTRIBUTE   Acme-Calling-RTCP-Packets-Lost_FS1 32     integer     Acme
ATTRIBUTE   Acme-Calling-RTCP-Avg-Jitter_FS1 33     integer     Acme
ATTRIBUTE   Acme-Calling-RTCP-Avg-Latency_FS1 34     integer     Acme
ATTRIBUTE   Acme-Calling-RTCP-MaxJitter_FS1 35     integer     Acme
ATTRIBUTE   Acme-Calling-RTCP-MaxLatency_FS1 36     integer     Acme
ATTRIBUTE   Acme-Calling-RTP-Packets-Lost_FS1 37     integer     Acme
ATTRIBUTE   Acme-Calling-RTP-Avg-Jitter_FS1 38     integer     Acme
ATTRIBUTE   Acme-Calling-RTP-MaxJitter_FS1 39     integer     Acme

ATTRIBUTE   Acme-Session-Generic-Id 40     string      Acme
ATTRIBUTE   Acme-Session-Ingress-Realm 41     string      Acme
ATTRIBUTE   Acme-Session-Egress-Realm 42     string      Acme
ATTRIBUTE   Acme-Session-Protocol-Type 43     string      Acme

ATTRIBUTE   Acme-Called-Octets_FS1 44     integer     Acme
ATTRIBUTE   Acme-Called-Packets_FS1 45     integer     Acme
```

ATTRIBUTES	Acme-Called-RTCP-Packets-Lost_FS1	46	integer	Acme
ATTRIBUTES	Acme-Called-RTCP-Avg-Jitter_FS1	47	integer	Acme
ATTRIBUTES	Acme-Called-RTCP-Avg-Latency_FS1	48	integer	Acme
ATTRIBUTES	Acme-Called-RTCP-MaxJitter_FS1	49	integer	Acme
ATTRIBUTES	Acme-Called-RTCP-MaxLatency_FS1	50	integer	Acme
ATTRIBUTES	Acme-Called-RTP-Packets-Lost_FS1	51	integer	Acme
ATTRIBUTES	Acme-Called-RTP-Avg-Jitter_FS1	52	integer	Acme
ATTRIBUTES	Acme-Called-RTP-MaxJitter_FS1	53	integer	Acme
ATTRIBUTES	Acme-Session-Charging-Vector	54	string	Acme
ATTRIBUTES	Acme-Session-Charging-Function_Address	55	string	Acme
ATTRIBUTES	Acme-Firmware-Version	56	string	Acme
ATTRIBUTES	Acme-Local-Time-Zone	57	string	Acme
ATTRIBUTES	Acme-Post-Dial-Delay	58	integer	Acme
ATTRIBUTES	Acme-CDR-Sequence-Number	59	integer	Acme
ATTRIBUTES	Acme-Session-Disposition	60	integer	Acme
ATTRIBUTES	Acme-Disconnect-Initiator	61	integer	Acme
ATTRIBUTES	Acme-Disconnect-Cause	62	integer	Acme
ATTRIBUTES	Acme-Intermedate-Time	63	string	Acme
ATTRIBUTES	Acme-Primary-Routing-Number	64	string	Acme
ATTRIBUTES	Acme-Originating-Trunk-Group	65	string	Acme
ATTRIBUTES	Acme-Terminating-Trunk-Group	66	string	Acme
ATTRIBUTES	Acme-Originating-Trunk-Context	67	string	Acme
ATTRIBUTES	Acme-Terminating-Trunk-Context	68	string	Acme
ATTRIBUTES	Acme-P-Asserted-ID	69	string	Acme
ATTRIBUTES	Acme-SIP-Version	70	string	Acme
ATTRIBUTES	Acme-SIP-Status	71	integer	Acme
# 72 unused				
# 73 unused				
ATTRIBUTES	Acme-Ingress-Local-Addr	74	string	Acme
ATTRIBUTES	Acme-Ingress-Remote-Addr	75	string	Acme
ATTRIBUTES	Acme-Egress-Local-Addr	76	string	Acme
ATTRIBUTES	Acme-Egress-Remote-Addr	77	string	Acme
ATTRIBUTES	Acme-FlowID_FS1_R	78	string	Acme
ATTRIBUTES	Acme-FlowType_FS1_R	79	string	Acme
ATTRIBUTES	Acme-Flow-In-Realm_FS1_R	80	string	Acme
ATTRIBUTES	Acme-Flow-In-Src-Addr_FS1_R	81	ipaddr	Acme
ATTRIBUTES	Acme-Flow-In-Src-Port_FS1_R	82	integer	Acme
ATTRIBUTES	Acme-Flow-In-Dst-Addr_FS1_R	83	ipaddr	Acme
ATTRIBUTES	Acme-Flow-In-Dst-Port_FS1_R	84	integer	Acme
ATTRIBUTES	Acme-Flow-Out-Realm_FS1_R	85	string	Acme
ATTRIBUTES	Acme-Flow-Out-Src-Addr_FS1_R	86	ipaddr	Acme
ATTRIBUTES	Acme-Flow-Out-Src-Port_FS1_R	87	integer	Acme
ATTRIBUTES	Acme-Flow-Out-Dst-Addr_FS1_R	88	ipaddr	Acme
ATTRIBUTES	Acme-Flow-Out-Dst-Port_FS1_R	89	integer	Acme
ATTRIBUTES	Acme-FlowID_FS2_F	90	string	Acme
ATTRIBUTES	Acme-FlowType_FS2_F	91	string	Acme
ATTRIBUTES	Acme-Flow-In-Realm_FS2_F	92	string	Acme
ATTRIBUTES	Acme-Flow-In-Src-Addr_FS2_F	93	ipaddr	Acme
ATTRIBUTES	Acme-Flow-In-Src-Port_FS2_F	94	integer	Acme
ATTRIBUTES	Acme-Flow-In-Dst-Addr_FS2_F	95	ipaddr	Acme
ATTRIBUTES	Acme-Flow-In-Dst-Port_FS2_F	96	integer	Acme
ATTRIBUTES	Acme-Flow-Out-Realm_FS2_F	97	string	Acme
ATTRIBUTES	Acme-Flow-Out-Src-Addr_FS2_F	98	ipaddr	Acme
ATTRIBUTES	Acme-Flow-Out-Src-Port_FS2_F	99	integer	Acme
ATTRIBUTES	Acme-Flow-Out-Dst-Addr_FS2_F	100	ipaddr	Acme
ATTRIBUTES	Acme-Flow-Out-Dst-Port_FS2_F	101	integer	Acme
ATTRIBUTES	Acme-Calling-Octets_FS2	102	integer	Acme
ATTRIBUTES	Acme-Calling-Packets_FS2	103	integer	Acme
ATTRIBUTES	Acme-Calling-RTCP-Packets-Lost_FS2	104	integer	Acme
ATTRIBUTES	Acme-Calling-RTCP-Avg-Jitter_FS2	105	integer	Acme
ATTRIBUTES	Acme-Calling-RTCP-Avg-Latency_FS2	106	integer	Acme
ATTRIBUTES	Acme-Calling-RTCP-MaxJitter_FS2	107	integer	Acme
ATTRIBUTES	Acme-Calling-RTCP-MaxLatency_FS2	108	integer	Acme

ATTRIBUTE	Acme-Calling-RTP-Packets-Lost_FS2	109	integer	Acme
ATTRIBUTE	Acme-Calling-RTP-Avg-Jitter_FS2	110	integer	Acme
ATTRIBUTE	Acme-Calling-RTP-MaxJitter_FS2	111	integer	Acme
ATTRIBUTE	Acme-FlowID_FS2_R	112	string	Acme
ATTRIBUTE	Acme-FlowType_FS2_R	113	string	Acme
ATTRIBUTE	Acme-Flow-In-Realm_FS2_R	114	string	Acme
ATTRIBUTE	Acme-Flow-In-Src-Addr_FS2_R	115	ipaddr	Acme
ATTRIBUTE	Acme-Flow-In-Src-Port_FS2_R	116	integer	Acme
ATTRIBUTE	Acme-Flow-In-Dst-Addr_FS2_R	117	ipaddr	Acme
ATTRIBUTE	Acme-Flow-In-Dst-Port_FS2_R	118	integer	Acme
ATTRIBUTE	Acme-Flow-Out-Realm_FS2_R	119	string	Acme
ATTRIBUTE	Acme-Flow-Out-Src-Addr_FS2_R	120	ipaddr	Acme
ATTRIBUTE	Acme-Flow-Out-Src-Port_FS2_R	121	integer	Acme
ATTRIBUTE	Acme-Flow-Out-Dst-Addr_FS2_R	122	ipaddr	Acme
ATTRIBUTE	Acme-Flow-Out-Dst-Port_FS2_R	123	integer	Acme
ATTRIBUTE	Acme-Called-Octets_FS2	124	integer	Acme
ATTRIBUTE	Acme-Called-Packets_FS2	125	integer	Acme
ATTRIBUTE	Acme-Called-RTCP-Packets-Lost_FS2	126	integer	Acme
ATTRIBUTE	Acme-Called-RTCP-Avg-Jitter_FS2	127	integer	Acme
ATTRIBUTE	Acme-Called-RTCP-Avg-Latency_FS2	128	integer	Acme
ATTRIBUTE	Acme-Called-RTCP-MaxJitter_FS2	129	integer	Acme
ATTRIBUTE	Acme-Called-RTCP-MaxLatency_FS2	130	integer	Acme
ATTRIBUTE	Acme-Called-RTP-Packets-Lost_FS2	131	integer	Acme
ATTRIBUTE	Acme-Called-RTP-Avg-Jitter_FS2	132	integer	Acme
ATTRIBUTE	Acme-Called-RTP-MaxJitter_FS2	133	integer	Acme
ATTRIBUTE	Acme-Egress-Final-Routing-Number	134	string	Acme
ATTRIBUTE	Acme-Session-Ingress-RPH	135	string	Acme
ATTRIBUTE	Acme-Session-Egress-RPH	136	string	Acme
ATTRIBUTE	Acme-Ingress-Network-Interface-Id	137	string	Acme
ATTRIBUTE	Acme-Ingress-Vlan-Tag-Value	138	integer	Acme
ATTRIBUTE	Acme-Egress-Network-Interface-Id	139	string	Acme
ATTRIBUTE	Acme-Egress-Vlan-Tag-Value	140	integer	Acme
ATTRIBUTE	Acme-Refer-Call-Transfer-Id	141	string	Acme
# Attributes 142-150 are reserved for future use.				
ATTRIBUTE	Acme-Calling-R-Factor	151	integer	Acme
ATTRIBUTE	Acme-Calling-MOS	152	integer	Acme
ATTRIBUTE	Acme-Called-R-Factor	153	integer	Acme
ATTRIBUTE	Acme-Called-MOS	154	integer	Acme
# IPv6 attributes				
ATTRIBUTE	Acme-Flow-In-Src-IPv6_Addr_FS1_F	155	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-In-Dst-IPv6_Addr_FS1_F	156	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-Out-Src-IPv6_Addr_FS1_F	157	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-Out-Dst-IPv6_Addr_FS1_F	158	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-In-Src-IPv6_Addr_FS1_R	159	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-In-Dst-IPv6_Addr_FS1_R	160	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-Out-Src-IPv6_Addr_FS1_R	161	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-Out-Dst-IPv6_Addr_FS1_R	162	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-In-Src-IPv6_Addr_FS2_F	163	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-In-Dst-IPv6_Addr_FS2_F	164	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-Out-Src-IPv6_Addr_FS2_F	165	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-Out-Dst-IPv6_Addr_FS2_F	166	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-In-Src-IPv6_Addr_FS2_R	167	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-In-Dst-IPv6_Addr_FS2_R	168	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-Out-Src-IPv6_Addr_FS2_R	169	ipv6addr	Acme
ATTRIBUTE	Acme-Flow-Out-Dst-IPv6_Addr_FS2_R	170	ipv6addr	Acme
ATTRIBUTE	Acme-Session-Forked-Call-Id	171	string	Acme
ATTRIBUTE	Acme-Custom-VSA-200	200	string	Acme
ATTRIBUTE	Acme-Custom-VSA-201	201	string	Acme
ATTRIBUTE	Acme-Custom-VSA-202	202	string	Acme
ATTRIBUTE	Acme-Custom-VSA-203	203	string	Acme
ATTRIBUTE	Acme-Custom-VSA-204	204	string	Acme
ATTRIBUTE	Acme-Custom-VSA-205	205	string	Acme

ATTRIBUTES	Acme-Custom-VSA-206	206	string	Acme
ATTRIBUTES	Acme-Custom-VSA-207	207	string	Acme
ATTRIBUTES	Acme-Custom-VSA-208	208	string	Acme
ATTRIBUTES	Acme-Custom-VSA-209	209	string	Acme
ATTRIBUTES	Acme-Custom-VSA-210	210	string	Acme
ATTRIBUTES	Acme-Custom-VSA-211	211	string	Acme
ATTRIBUTES	Acme-Custom-VSA-212	212	string	Acme
ATTRIBUTES	Acme-Custom-VSA-213	213	string	Acme
ATTRIBUTES	Acme-Custom-VSA-214	214	string	Acme
ATTRIBUTES	Acme-Custom-VSA-215	215	string	Acme
ATTRIBUTES	Acme-Custom-VSA-216	216	string	Acme
ATTRIBUTES	Acme-Custom-VSA-217	217	string	Acme
ATTRIBUTES	Acme-Custom-VSA-218	218	string	Acme
ATTRIBUTES	Acme-Custom-VSA-219	219	string	Acme
ATTRIBUTES	Acme-Custom-VSA-220	220	string	Acme
ATTRIBUTES	Acme-Custom-VSA-221	221	string	Acme
ATTRIBUTES	Acme-Custom-VSA-222	222	string	Acme
ATTRIBUTES	Acme-Custom-VSA-223	223	string	Acme
ATTRIBUTES	Acme-Custom-VSA-224	224	string	Acme
ATTRIBUTES	Acme-Custom-VSA-225	225	string	Acme
ATTRIBUTES	Acme-Custom-VSA-226	226	string	Acme
ATTRIBUTES	Acme-Custom-VSA-227	227	string	Acme
ATTRIBUTES	Acme-Custom-VSA-228	228	string	Acme
ATTRIBUTES	Acme-Custom-VSA-229	229	string	Acme
ATTRIBUTES	Acme-Custom-VSA-230	230	string	Acme
ATTRIBUTES	Acme-User-Privilege	253	string	Acme
ATTRIBUTES	Acme-User-Class	254	string	Acme

# Appendix C

## Comma-Delimited Entries for Local Files

### Local File Format

---

Appendix C contains three tables that show where, in locally-generated CSV files, specific VSAs appear. There is one table for each of the following type of record: Start, Stop, Interim.

For more information about this feature and how to enable it, refer to the [Local CDR Storage and FTP Push \(57\)](#) section in this guide's [Configuring Accounting \(39\)](#) chapter.

Note that the Acme-CDR-Sequence-Number, VSA ID 59, appears in local CDR files when both file-output is enabled and an account server is configured.

#### Start Record CSV Placement

CSV Placement	Attribute Name	VSA ID Number
1	Acct-Status-Type	
2	NAS-IP-Address	
3	NAS-Port	
4	Acct-Session-Id	
5	Acme-Session-Ingress-CallId	3
6	Acme-Session-Egress-CallId	4
7	Acme-Session-Protocol-Type	43
8	Acme-Session-Forked-Call-Id	171
9	Acme-Session-Generic-Id	40
10	Calling-Station-Id	
11	Called-Station-Id	
12	h323-setup-time	
13	h323-connect-time	
14	Acme-Egress-Network-Interface-Id	139
15	Acme-Egress-Vlan-Tag-Value	140
16	Acme-Ingress-Network-Interface-Id	137
17	Acme-Ingress-Vlan-Tag-Value	138
18	Acme-Session-Egress-Realm	42
19	Acme-Session-Ingress-Realm	41
20	Acme-FlowId_FS1_F	1
21	Acme-FlowType_FS1_F	2
22	Acme-Flow-In-Realm_FS1_F	10
23	Acme-Flow-In-Src-Addr_FS1_F	11

CSV Placement	Attribute Name	VSA ID Number
24	Acme-Flow-In-Src-Port_FS1_F	12
25	Acme-Flow-In-Dst-Addr_FS1_F	13
26	Acme-Flow-In-Dst-Port_FS1_F	14
27	Acme-Flow-Out-Realm_FS1_F	20
28	Acme-Flow-Out-Src-Addr_FS1_F	21
29	Acme-Flow-Out-Src-Port_FS1_F	22
30	Acme-Flow-Out-Dst-Addr_FS1_F	23
31	Acme-Flow-Out-Dst-Port_FS1_F	24
32	Acme-FlowID_FS1_R	78
33	Acme-FlowType_FS1_R	79
34	Acme-Flow-In-Realm_FS1_R	80
35	Acme-Flow-In-Src-Addr_FS1_R	81
36	Acme-Flow-In-Src-Port_FS1_R	82
37	Acme-Flow-In-Dst-Addr_FS1_R	83
38	Acme-Flow-In-Dst-Port_FS1_R	84
39	Acme-Flow-Out-Realm_FS1_R	85
40	Acme-Flow-Out-Src-Addr_FS1_R	86
41	Acme-Flow-Out-Src-Port_FS1_R	87
42	Acme-Flow-Out-Dst-Addr_FS1_R	88
43	Acme-Flow-Out-Dst-Port_FS1_R	89
44	Acme-FlowID_FS2_F	90
45	Acme-FlowType_FS2_F	91
46	Acme-Flow-In-Realm_FS2_F	92
47	Acme-Flow-In-Src-Addr_FS2_F	93
48	Acme-Flow-In-Src-Port_FS2_F	94
49	Acme-Flow-In-Dst-Addr_FS2_F	95
50	Acme-Flow-In-Dst-Port_FS2_F	96
51	Acme-Flow-Out-Realm_FS2_F	97
52	Acme-Flow-Out-Src-Addr_FS2_F	98
53	Acme-Flow-Out-Src-Port_FS2_F	99
54	Acme-Flow-Out-Dst-Addr_FS2_F	100
55	Acme-Flow-Out-Dst-Port_FS2_F	101
56	Acme-FlowID_FS2_R	112
57	Acme-FlowType_FS2_R	113



CSV Placement	Attribute Name	VSA ID Number
58	Acme-Flow-In-Realm_FS2_R	114
59	Acme-Flow-In-Src-Addr_FS2_R	115
60	Acme-Flow-In-Src-Port_FS2_R	116
61	Acme-Flow-In-Dst-Addr_FS2_R	117
62	Acme-Flow-In-Dst-Port_FS2_R	118
63	Acme-Flow-Out-Realm_FS2_R	119
64	Acme-Flow-Out-Src-Addr_FS2_R	120
65	Acme-Flow-Out-Src-Port_FS2_R	121
66	Acme-Flow-Out-Dst-Addr_FS2_R	122
67	Acme-Flow-Out-Dst-Port_FS2_R	123
68	Acme-Session-Charging-Vector	54
69	Acme-Session-Charging-Function_Address	55
70	Acme-Firmware-Version	56
71	Acme-Local-Time-Zone	57
72	Acme-Post-Dial-Delay	58
73	Acme-Primary-Routing-Number	64
74	Acme-Originating-Trunk-Group	65
75	Acme-Terminating-Trunk-Group	66
76	Acme-Originating-Trunk-Context	67
77	Acme-Terminating-Trunk-Context	68
78	Acme-P-Asserted-ID	69
79	Acme-Ingress-Local-Addr	74
80	Acme-Ingress-Remote-Addr	75
81	Acme-Egress-Local-Addr	76
82	Acme-Egress-Remote-Addr	77
83	Acme-SIP-Diversion	70
84	Acme-Egress-Final-Routing-Number	134
85	Acme-Session-Ingress-RPH	135
86	Acme-Session-Egress-RPH	136
87	Acme-Custom-VSA-200	200
88	Acme-Custom-VSA-201	201
89	Acme-Custom-VSA-202	202
90	Acme-Custom-VSA-203	203
91	Acme-Custom-VSA-204	204

CSV Placement	Attribute Name	VSA ID Number
92	Acme-Custom-VSA-205	205
93	Acme-Custom-VSA-206	206
94	Acme-Custom-VSA-207	207
95	Acme-Custom-VSA-208	208
96	Acme-Custom-VSA-209	209
97	Acme-Custom-VSA-210	210
98	Acme-Custom-VSA-211	211
99	Acme-Custom-VSA-212	212
100	Acme-Custom-VSA-213	213
101	Acme-Custom-VSA-214	214
102	Acme-Custom-VSA-215	215
103	Acme-Custom-VSA-216	216
104	Acme-Custom-VSA-217	217
105	Acme-Custom-VSA-218	218
106	Acme-Custom-VSA-219	219
107	Acme-Custom-VSA-220	220
108	Acme-Custom-VSA-221	221
109	Acme-Custom-VSA-222	222
110	Acme-Custom-VSA-223	223
111	Acme-Custom-VSA-224	224
112	Acme-Custom-VSA-225	225
113	Acme-Custom-VSA-226	226
114	Acme-Custom-VSA-227	227
115	Acme-Custom-VSA-228	228
116	Acme-Custom-VSA-229	229
117	Acme-Custom-VSA-230	230
118	Acme-CDR-Sequence-Number	59

### Interim Record CSV Placement

CSV Placement	Attribute Name	VSA ID Number
1	Acct-Status-Type	
2	NAS-IP-Address	
3	NAS-Port	

CSV Placement	Attribute Name	VSA ID Number
4	Acct-Session-Id	
5	Acme-Session-Ingress-CallId	3
6	Acme-Session-Egress-CallId	4
7	Acme-Session-Protocol-Type	43
8	Acme-Session-Forked-Call-Id	171
9	Acme-Session-Generic-Id	40
10	Calling-Station-Id	
11	Called-Station-Id	
12	h323-setup-time	
13	h323-connect-time	
14	Acme-Egress-Network-Interface-Id	139
15	Acme-Egress-Vlan-Tag-Value	140
16	Acme-Ingress-Network-Interface-Id	137
17	Acme-Ingress-Vlan-Tag-Value	138
18	Acme-Session-Egress-Realm	42
19	Acme-Session-Ingress-Realm	41
20	Acme-FlowId_FS1_F	1
21	Acme-FlowType_FS1_F	2
22	Acme-Flow-In-Realm_FS1_F	10
23	Acme-Flow-In-Src-Addr_FS1_F	11
24	Acme-Flow-In-Src-Port_FS1_F	12
25	Acme-Flow-In-Dst-Addr_FS1_F	13
26	Acme-Flow-In-Dst-Port_FS1_F	14
27	Acme-Flow-Out-Realm_FS1_F	20
28	Acme-Flow-Out-Src-Addr_FS1_F	21
29	Acme-Flow-Out-Src-Port_FS1_F	22
30	Acme-Flow-Out-Dst-Addr_FS1_F	23
31	Acme-Flow-Out-Dst-Port_FS1_F	24
32	Acme-Calling-RTCP-Packets-Lost_FS1	32
33	Acme-Calling-RTCP-Avg-Jitter_FS1	33
34	Acme-Calling-RTCP-Avg-Latency_FS1	34
35	Acme-Calling-RTCP-MaxJitter_FS1	35
36	Acme-Calling-RTCP-MaxLatency_FS1	36
37	Acme-Calling-RTP-Packets-Lost_FS1	37

CSV Placement	Attribute Name	VSA ID Number
38	Acme-Calling-RTP-Avg-Jitter_FS1	38
39	Acme-Calling-RTP-MaxJitter_FS1	39
40	Acme-Calling-Octets_FS1	28
41	Acme-Calling-Packets_FS1	29
42	Acme-Calling-R-Factor	151
43	Acme-Calling-MOS	152
44	Acme-FlowID_FS1_R	78
45	Acme-FlowType_FS1_R	79
46	Acme-Flow-In-Realm_FS1_R	80
47	Acme-Flow-In-Src-Addr_FS1_R	81
48	Acme-Flow-In-Src-Port_FS1_R	82
49	Acme-Flow-In-Dst-Addr_FS1_R	83
50	Acme-Flow-In-Dst-Port_FS1_R	84
51	Acme-Flow-Out-Realm_FS1_R	85
52	Acme-Flow-Out-Src-Addr_FS1_R	86
53	Acme-Flow-Out-Src-Port_FS1_R	87
54	Acme-Flow-Out-Dst-Addr_FS1_R	88
55	Acme-Flow-Out-Dst-Port_FS1_R	89
56	Acme-Called-RTCP-Packets-Lost_FS1	46
57	Acme-Called-RTCP-Avg-Jitter_FS1	47
58	Acme-Called-RTCP-Avg-Latency_FS1	48
59	Acme-Called-RTCP-MaxJitter_FS1	49
60	Acme-Called-RTCP-MaxLatency_FS1	50
61	Acme-Called-RTP-Packets-Lost_FS1	51
62	Acme-Called-RTP-Avg-Jitter_FS1	52
63	Acme-Called-RTP-MaxJitter_FS1	53
64	Acme-Called-Octets_FS1	44
65	Acme-Called-Packets_FS1	45
66	Acme-Called-R-Factor	153
67	Acme-Called-MOS	154
68	Acme-FlowID_FS2_F	90
69	Acme-FlowType_FS2_F	91
70	Acme-Flow-In-Realm_FS2_F	92
71	Acme-Flow-In-Src-Addr_FS2_F	93

CSV Placement	Attribute Name	VSA ID Number
72	Acme-Flow-In-Src-Port_FS2_F	94
73	Acme-Flow-In-Dst-Addr_FS2_F	95
74	Acme-Flow-In-Dst-Port_FS2_F	96
75	Acme-Flow-Out-Realm_FS2_F	97
76	Acme-Flow-Out-Src-Addr_FS2_F	98
77	Acme-Flow-Out-Src-Port_FS2_F	99
78	Acme-Flow-Out-Dst-Addr_FS2_F	100
79	Acme-Flow-Out-Dst-Port_FS2_F	101
80	Acme-Calling-RTCP-Packets-Lost_FS2	104
81	Acme-Calling-RTCP-Avg-Jitter_FS2	105
82	Acme-Calling-RTCP-Avg-Latency_FS2	106
83	Acme-Calling-RTCP-MaxJitter_FS2	107
84	Acme-Calling-RTCP-MaxLatency_FS2	108
85	Acme-Calling-RTP-Packets-Lost_FS2	109
86	Acme-Calling-RTP-Avg-Jitter_FS2	110
87	Acme-Calling-RTP-MaxJitter_FS2	111
88	Acme-Calling-Octets_FS2	102
89	Acme-Calling-Packets_FS2	103
90	Acme-FlowID_FS2_R	112
91	Acme-FlowType_FS2_R	113
92	Acme-Flow-In-Realm_FS2_R	114
93	Acme-Flow-In-Src-Addr_FS2_R	115
94	Acme-Flow-In-Src-Port_FS2_R	116
95	Acme-Flow-In-Dst-Addr_FS2_R	117
96	Acme-Flow-In-Dst-Port_FS2_R	118
97	Acme-Flow-Out-Realm_FS2_R	119
98	Acme-Flow-Out-Src-Addr_FS2_R	120
99	Acme-Flow-Out-Src-Port_FS2_R	121
100	Acme-Flow-Out-Dst-Addr_FS2_R	122
101	Acme-Flow-Out-Dst-Port_FS2_R	123
102	Acme-Called-RTCP-Packets-Lost_FS2	126
103	Acme-Called-RTCP-Avg-Jitter_FS2	127
104	Acme-Called-RTCP-Avg-Latency_FS2	128
105	Acme-Called-RTCP-MaxJitter_FS2	129

CSV Placement	Attribute Name	VSA ID Number
106	Acme-Called-RTCP-MaxLatency_FS2	130
107	Acme-Called-RTP-Packets-Lost_FS2	131
108	Acme-Called-RTP-Avg-Jitter_FS2	132
109	Acme-Called-RTP-MaxJitter_FS2	133
110	Acme-Called-Octets_FS2	124
111	Acme-Called-Packets_FS2	125
112	Acme-Session-Charging-Vector	54
113	Acme-Session-Charging-Function_Address	55
114	Acme-Firmware-Version	56
115	Acme-Local-Time-Zone	57
116	Acme-Post-Dial-Delay	58
117	Acme-Primary-Routing-Number	64
118	Acme-Originating-Trunk-Group	65
119	Acme-Terminating-Trunk-Group	66
120	Acme-Originating-Trunk-Context	67
121	Acme-Terminating-Trunk-Context	68
122	Acme-P-Asserted-ID	69
123	Acme-Ingress-Local-Addr	74
124	Acme-Ingress-Remote-Addr	75
125	Acme-Egress-Local-Addr	76
126	Acme-Egress-Remote-Addr	77
127	Acme-SIP-Diversion	70
128	Acme-Intermediate_Time	63
129	Acct-Session-Time	
130	Acme-Egress-Final-Routing-Number	134
131	Acme-Session-Ingress-RPH	135
132	Acme-Session-Egress-RPH	136
133	Acme-Custom-VSA-200	200
134	Acme-Custom-VSA-201	201
135	Acme-Custom-VSA-202	202
136	Acme-Custom-VSA-203	203
137	Acme-Custom-VSA-204	204
138	Acme-Custom-VSA-205	205
139	Acme-Custom-VSA-206	206

CSV Placement	Attribute Name	VSA ID Number
140	Acme-Custom-VSA-207	207
141	Acme-Custom-VSA-208	208
142	Acme-Custom-VSA-209	209
143	Acme-Custom-VSA-210	210
144	Acme-Custom-VSA-211	211
145	Acme-Custom-VSA-212	212
146	Acme-Custom-VSA-213	213
147	Acme-Custom-VSA-214	214
148	Acme-Custom-VSA-215	215
149	Acme-Custom-VSA-216	216
150	Acme-Custom-VSA-217	217
151	Acme-Custom-VSA-218	218
152	Acme-Custom-VSA-219	219
153	Acme-Custom-VSA-220	220
154	Acme-Custom-VSA-221	221
155	Acme-Custom-VSA-222	222
156	Acme-Custom-VSA-223	223
157	Acme-Custom-VSA-224	224
158	Acme-Custom-VSA-225	225
159	Acme-Custom-VSA-226	226
160	Acme-Custom-VSA-227	227
161	Acme-Custom-VSA-228	228
162	Acme-Custom-VSA-229	229
163	Acme-Custom-VSA-230	230
164	Acme-CDR-Sequence-Number	59

**Interim (unsuccessful attempt) Record CSV Placement**

CSV Placement	AttributeName	VSA ID Number
1	Acct-Status-Type	
2	NAS-IP-Address	
3	NAS-Port	
4	Acct-Session-Id	
5	Acme-Session-Ingress-CallId	3
6	Acme-Session-Egress-CallId	4

CSV Placement	AttributeName	VSA ID Number
7	Acme-Session-Protocol-Type	43
8	Acme-Session-Forked-Call-Id	171
9	Acme-Session-Generic-Id	40
10	Calling-Station-Id	
11	Called-Station-Id	
12	h323-setup-time	
13	h323-connect-time	
14	Acme-Egress-Network-Interface-Id	139
15	Acme-Egress-Vlan-Tag-Value	140
16	Acme-Ingress-Network-Interface-Id	137
17	Acme-Ingress-Vlan-Tag-Value	138
18	Acme-Session-Egress-Realm	42
19	Acme-Session-Ingress-Realm	41
20	Acme-FlowID_FS1_F	1
21	Acme-FlowType_FS1_F	2
22	Acme-Flow-In-Realm_FS1_F	10
23	Acme-Flow-In-Src-Addr_FS1_F	11
24	Acme-Flow-In-Src-Port_FS1_F	12
25	Acme-Flow-In-Dst-Addr_FS1_F	13
26	Acme-Flow-In-Dst-Port_FS1_F	14
27	Acme-Flow-Out-Realm_FS1_F	20
28	Acme-Flow-Out-Src-Addr_FS1_F	21
29	Acme-Flow-Out-Src-Port_FS1_F	22
30	Acme-Flow-Out-Dst-Addr_FS1_F	23
31	Acme-Flow-Out-Dst-Port_FS1_F	24
32	Acme-Calling-RTCP-Packets-Lost_FS1	32
33	Acme-Calling-RTCP-Avg-Jitter_FS1	33
34	Acme-Calling-RTCP-Avg-Latency_FS1	34
35	Acme-Calling-RTCP-MaxJitter_FS1	35
36	Acme-Calling-RTCP-MaxLatency_FS1	36
37	Acme-Calling-RTP-Packets-Lost_FS1	37
38	Acme-Calling-RTP-Avg-Jitter_FS1	38
39	Acme-Calling-RTP-MaxJitter_FS1	39
40	Acme-Calling-Octets_FS1	28



CSV Placement	AttributeName	VSA ID Number
41	Acme-Calling-Packets_FS1	29
42	Acme-Calling-R-Factor	151
43	Acme-Calling-MOS	152
44	Acme-FlowID_FS1_R	78
45	Acme-FlowType_FS1_R	79
46	Acme-Flow-In-REALM_FS1_R	80
47	Acme-Flow-In-Src-Addr_FS1_R	81
48	Acme-Flow-In-Src-Port_FS1_R	82
49	Acme-Flow-In-Dst-Addr_FS1_R	83
50	Acme-Flow-In-Dst-Port_FS1_R	84
51	Acme-Flow-Out-REALM_FS1_R	85
52	Acme-Flow-Out-Src-Addr_FS1_R	86
53	Acme-Flow-Out-Src-Port_FS1_R	87
54	Acme-Flow-Out-Dst-Addr_FS1_R	88
55	Acme-Flow-Out-Dst-Port_FS1_R	89
56	Acme-Called-RTCP-Packets-Lost_FS1	46
57	Acme-Called-RTCP-Avg-Jitter_FS1	47
58	Acme-Called-RTCP-Avg-Latency_FS1	48
59	Acme-Called-RTCP-MaxJitter_FS1	49
60	Acme-Called-RTCP-MaxLatency_FS1	50
61	Acme-Called-RTP-Packets-Lost_FS1	51
62	Acme-Called-RTP-Avg-Jitter_FS1	52
63	Acme-Called-RTP-MaxJitter_FS1	53
64	Acme-Called-Octets_FS1	44
65	Acme-Called-Packets_FS1	45
66	Acme-Called-R-Factor	153
67	Acme-Called-MOS	154
68	Acme-FlowID_FS2_F	90
69	Acme-FlowType_FS2_F	91
70	Acme-Flow-In-REALM_FS2_F	92
71	Acme-Flow-In-Src-Addr_FS2_F	93
72	Acme-Flow-In-Src-Port_FS2_F	94
73	Acme-Flow-In-Dst-Addr_FS2_F	95
74	Acme-Flow-In-Dst-Port_FS2_F	96

CSV Placement	AttributeName	VSA ID Number
75	Acme-Flow-Out-Realm_FS2_F	97
76	Acme-Flow-Out-Src-Addr_FS2_F	98
77	Acme-Flow-Out-Src-Port_FS2_F	99
78	Acme-Flow-Out-Dst-Addr_FS2_F	100
79	Acme-Flow-Out-Dst-Port_FS2_F	101
80	Acme-Calling-RTCP-Packets-Lost_FS2	104
81	Acme-Calling-RTCP-Avg-Jitter_FS2	105
82	Acme-Calling-RTCP-Avg-Latency_FS2	106
83	Acme-Calling-RTCP-MaxJitter_FS2	107
84	Acme-Calling-RTCP-MaxLatency_FS2	108
85	Acme-Calling-RTP-Packets-Lost_FS2	109
86	Acme-Calling-RTP-Avg-Jitter_FS2	110
87	Acme-Calling-RTP-MaxJitter_FS2	111
88	Acme-Calling-Octets_FS2	102
89	Acme-Calling-Packets_FS2	103
90	Acme-FlowID_FS2_R	112
91	Acme-FlowType_FS2_R	113
92	Acme-Flow-In-Realm_FS2_R	114
93	Acme-Flow-In-Src-Addr_FS2_R	115
94	Acme-Flow-In-Src-Port_FS2_R	116
95	Acme-Flow-In-Dst-Addr_FS2_R	117
96	Acme-Flow-In-Dst-Port_FS2_R	118
97	Acme-Flow-Out-Realm_FS2_R	119
98	Acme-Flow-Out-Src-Addr_FS2_R	120
99	Acme-Flow-Out-Src-Port_FS2_R	121
100	Acme-Flow-Out-Dst-Addr_FS2_R	122
101	Acme-Flow-Out-Dst-Port_FS2_R	123
102	Acme-Called-RTCP-Packets-Lost_FS2	126
103	Acme-Called-RTCP-Avg-Jitter_FS2	127
104	Acme-Called-RTCP-Avg-Latency_FS2	128
105	Acme-Called-RTCP-MaxJitter_FS2	129
106	Acme-Called-RTCP-MaxLatency_FS2	130
107	Acme-Called-RTP-Packets-Lost_FS2	131
108	Acme-Called-RTP-Avg-Jitter_FS2	132

CSV Placement	AttributeName	VSA ID Number
109	Acme-Called-RTP-MaxJitter_FS2	133
110	Acme-Called-Octets_FS2	124
111	Acme-Called-Packets_FS2	125
112	Acme-Firmware-Version	56
113	Acme-Local-Time-Zone	57
114	Acme-Post-Dial-Delay	58
115	Acme-Primary-Routing-Number	64
116	Acme-Originating-Trunk-Group	65
117	Acme-Terminating-Trunk-Group	66
118	Acme-Originating-Trunk-Context	67
119	Acme-Terminating-Trunk-Context	68
120	Acme-P-Asserted-ID	69
121	Acme-Ingress-Local-Addr	74
122	Acme-Ingress-Remote-Addr	75
123	Acme-Egress-Local-Addr	76
124	Acme-Egress-Remote-Addr	77
125	Acme-SIP-Diversion	70
126	Acme-Intermediate_Time	63
127	Acct-Session-Time	46
128	Acme-Egress-Final-Routing-Number	134
129	Acme-Session-Disposition	60
130	Acme-Disconnect-Initiator	61
131	Acme-Disconnect-Cause	62
132	Acme-SIP-Status	71
133	Acme-Custom-VSA-200	200
134	Acme-Custom-VSA-201	201
135	Acme-Custom-VSA-202	202
136	Acme-Custom-VSA-203	203
137	Acme-Custom-VSA-204	204
138	Acme-Custom-VSA-205	205
139	Acme-Custom-VSA-206	206
140	Acme-Custom-VSA-207	207
141	Acme-Custom-VSA-208	208
142	Acme-Custom-VSA-209	209

CSV Placement	AttributeName	VSA ID Number
143	Acme-Custom-VSA-210	210
144	Acme-Custom-VSA-211	211
145	Acme-Custom-VSA-212	212
146	Acme-Custom-VSA-213	213
147	Acme-Custom-VSA-214	214
148	Acme-Custom-VSA-215	215
149	Acme-Custom-VSA-216	216
150	Acme-Custom-VSA-217	217
151	Acme-Custom-VSA-218	218
152	Acme-Custom-VSA-219	219
153	Acme-Custom-VSA-220	220
154	Acme-Custom-VSA-221	221
155	Acme-Custom-VSA-222	222
156	Acme-Custom-VSA-223	223
157	Acme-Custom-VSA-224	224
158	Acme-Custom-VSA-225	225
159	Acme-Custom-VSA-226	226
160	Acme-Custom-VSA-227	227
161	Acme-Custom-VSA-228	228
162	Acme-Custom-VSA-229	229
163	Acme-Custom-VSA-230	230
164	Acme-CDR-Sequence-Number	59

### Stop Record CSV Placement

CSV Placement	Attribute Name	VSA ID Number
1	Acct-Status-Type	
2	NAS-IP-Address	
3	NAS-Port	
4	Acct-Session-Id	
5	Acme-Session-Ingress-CallId	3
6	Acme-Session-Egress-CallId	4
7	Acme-Session-Protocol-Type	43
8	Acme-Session-Forked-Call-Id	171

CSV Placement	Attribute Name	VSA ID Number
9	Acme-Session-Generic-Id	40
10	Calling-Station-Id	
11	Called-Station-Id	
12	Acct-Terminate-Cause	
13	Acct-Session-Time	
14	h323-setup-time	
15	h323-connect-time	
16	h323-disconnect-time	
17	h323-disconnect-cause	
18	Acme-Egress-Network-Interface-Id	139
19	Acme-Egress-Vlan-Tag-Value	140
20	Acme-Ingress-Network-Interface-Id	137
21	Acme-Ingress-Vlan-Tag-Value	138
22	Acme-Session-Egress-Realm	42
23	Acme-Session-Ingress-Realm	41
24	Acme-FlowId_FS1_F	1
25	Acme-FlowType_FS1_F	2
26	Acme-Flow-In-Realm_FS1_F	10
27	Acme-Flow-In-Src-Addr_FS1_F	11
28	Acme-Flow-In-Src-Port_FS1_F	12
29	Acme-Flow-In-Dst-Addr_FS1_F	13
30	Acme-Flow-In-Dst-Port_FS1_F	14
31	Acme-Flow-Out-Realm_FS1_F	20
32	Acme-Flow-Out-Src-Addr_FS1_F	21
33	Acme-Flow-Out-Src-Port_FS1_F	22
34	Acme-Flow-Out-Dst-Addr_FS1_F	23
35	Acme-Flow-Out-Dst-Port_FS1_F	24
36	Acme-Calling-RTCP-Packets-Lost_FS1	32
37	Acme-Calling-RTCP-Avg-Jitter_FS1	33
38	Acme-Calling-RTCP-Avg-Latency_FS1	34
39	Acme-Calling-RTCP-MaxJitter_FS1	35
40	Acme-Calling-RTCP-MaxLatency_FS1	36
41	Acme-Calling-RTP-Packets-Lost_FS1	37
42	Acme-Calling-RTP-Avg-Jitter_FS1	38

CSV Placement	Attribute Name	VSA ID Number
43	Acme-Calling-RTP-MaxJitter_FS1	39
44	Acme-Calling-Octets_FS1	28
45	Acme-Calling-Packets_FS1	29
46	Acme-Calling-R-Factor	151
47	Acme-Calling-MOS	152
48	Acme-FlowID_FS1_R	78
49	Acme-FlowType_FS1_R	79
50	Acme-Flow-In-REALM_FS1_R	80
51	Acme-Flow-In-Src-Addr_FS1_R	81
52	Acme-Flow-In-Src-Port_FS1_R	82
53	Acme-Flow-In-Dst-Addr_FS1_R	83
54	Acme-Flow-In-Dst-Port_FS1_R	84
55	Acme-Flow-Out-REALM_FS1_R	85
56	Acme-Flow-Out-Src-Addr_FS1_R	86
57	Acme-Flow-Out-Src-Port_FS1_R	87
58	Acme-Flow-Out-Dst-Addr_FS1_R	88
59	Acme-Flow-Out-Dst-Port_FS1_R	89
60	Acme-Called-RTCP-Packets-Lost_FS1	46
61	Acme-Called-RTCP-Avg-Jitter_FS1	47
62	Acme-Called-RTCP-Avg-Latency_FS1	48
63	Acme-Called-RTCP-MaxJitter_FS1	49
64	Acme-Called-RTCP-MaxLatency_FS1	50
65	Acme-Called-RTP-Packets-Lost_FS1	51
66	Acme-Called-RTP-Avg-Jitter_FS1	52
67	Acme-Called-RTP-MaxJitter_FS1	53
68	Acme-Called-Octets_FS1	44
69	Acme-Called-Packets_FS1	45
70	Acme-Called-R-Factor	153
71	Acme-Called-MOS	154
72	Acme-FlowID_FS2_F	90
73	Acme-FlowType_FS2_F	91
74	Acme-Flow-In-REALM_FS2_F	92
75	Acme-Flow-In-Src-Addr_FS2_F	93
76	Acme-Flow-In-Src-Port_FS2_F	94

CSV Placement	Attribute Name	VSA ID Number
77	Acme-Flow-In-Dst-Addr_FS2_F	95
78	Acme-Flow-In-Dst-Port_FS2_F	96
79	Acme-Flow-Out-Realm_FS2_F	97
80	Acme-Flow-Out-Src-Addr_FS2_F	98
81	Acme-Flow-Out-Src-Port_FS2_F	99
82	Acme-Flow-Out-Dst-Addr_FS2_F	100
83	Acme-Flow-Out-Dst-Port_FS2_F	101
84	Acme-Calling-RTCP-Packets-Lost_FS2	104
85	Acme-Calling-RTCP-Avg-Jitter_FS2	105
86	Acme-Calling-RTCP-Avg-Latency_FS2	106
87	Acme-Calling-RTCP-MaxJitter_FS2	107
88	Acme-Calling-RTCP-MaxLatency_FS2	108
89	Acme-Calling-RTP-Packets-Lost_FS2	109
90	Acme-Calling-RTP-Avg-Jitter_FS2	110
91	Acme-Calling-RTP-MaxJitter_FS2	111
92	Acme-Calling-Octets_FS2	102
93	Acme-Calling-Packets_FS2	103
94	Acme-FlowID_FS2_R	112
95	Acme-FlowType_FS2_R	113
96	Acme-Flow-In-Realm_FS2_R	114
97	Acme-Flow-In-Src-Addr_FS2_R	115
98	Acme-Flow-In-Src-Port_FS2_R	116
99	Acme-Flow-In-Dst-Addr_FS2_R	117
100	Acme-Flow-In-Dst-Port_FS2_R	118
101	Acme-Flow-Out-Realm_FS2_R	119
102	Acme-Flow-Out-Src-Addr_FS2_R	120
103	Acme-Flow-Out-Src-Port_FS2_R	121
104	Acme-Flow-Out-Dst-Addr_FS2_R	122
105	Acme-Flow-Out-Dst-Port_FS2_R	123
106	Acme-Called-RTCP-Packets-Lost_FS2	126
107	Acme-Called-RTCP-Avg-Jitter_FS2	127
108	Acme-Called-RTCP-Avg-Latency_FS2	128
109	Acme-Called-RTCP-MaxJitter_FS2	129
110	Acme-Called-RTCP-MaxLatency_FS2	130

<b>CSV Placement</b>	<b>Attribute Name</b>	<b>VSA ID Number</b>
111	Acme-Called-RTP-Packets-Lost_FS2	131
112	Acme-Called-RTP-Avg-Jitter_FS2	132
113	Acme-Called-RTP-MaxJitter_FS2	133
114	Acme-Called-Octets_FS2	124
115	Acme-Called-Packets_FS2	125
116	Acme-Session-Charging-Vector	54
117	Acme-Session-Charging-Function-Address	55
118	Acme-Firmware-Version	56
119	Acme-Local-Time-Zone	57
120	Acme-Post-Dial-Delay	58
121	Acme-Primary-Routing-Number	64
122	Acme-Originating-Trunk-Group	65
123	Acme-Terminating-Trunk-Group	66
124	Acme-Originating-Trunk-Context	67
125	Acme-Terminating-Trunk-Context	68
126	Acme-P-Asserted-ID	69
127	Acme-Ingress-Local-Addr	74
128	Acme-Ingress-Remote-Addr	75
129	Acme-Egress-Local-Addr	76
130	Acme-Egress-Remote-Addr	77
131	Acme-SIP-Diversion	70
132	Acme-Session-Disposition	60
133	Acme-Disconnect-Initiator	61
134	Acme-Disconnect-Cause	62
135	Acme-SIP-Status	71
136	Acme-Egress-Final-Routing-Number	134
137	Acme-Session-Ingress-RPH	135
138	Acme-Session-Egress-RPH	136
139	Acme-Refer-Call-Transfer-Id	141
140	Acme-Custom-VSA-200	200
141	Acme-Custom-VSA-201	201
142	Acme-Custom-VSA-202	202
143	Acme-Custom-VSA-203	203
144	Acme-Custom-VSA-204	204



CSV Placement	Attribute Name	VSA ID Number
145	Acme-Custom-VSA-205	205
146	Acme-Custom-VSA-206	206
147	Acme-Custom-VSA-207	207
148	Acme-Custom-VSA-208	208
149	Acme-Custom-VSA-209	209
150	Acme-Custom-VSA-210	210
151	Acme-Custom-VSA-211	211
152	Acme-Custom-VSA-212	212
153	Acme-Custom-VSA-213	213
154	Acme-Custom-VSA-214	214
155	Acme-Custom-VSA-215	215
156	Acme-Custom-VSA-216	216
157	Acme-Custom-VSA-217	217
158	Acme-Custom-VSA-218	218
159	Acme-Custom-VSA-219	219
160	Acme-Custom-VSA-220	220
161	Acme-Custom-VSA-221	221
162	Acme-Custom-VSA-222	222
163	Acme-Custom-VSA-223	223
164	Acme-Custom-VSA-224	224
165	Acme-Custom-VSA-225	225
166	Acme-Custom-VSA-226	226
167	Acme-Custom-VSA-227	227
168	Acme-Custom-VSA-228	228
169	Acme-Custom-VSA-229	229
170	Acme-Custom-VSA-230	230
171	Acme-CDR-Sequence-Number	59

## IPv6 Values in CDRs

Net-Net OS Release S-C6.2.0 introduces IPv6 to its body of supported features and provides new RADIUS VSAs for IPv6 media flows. This body of VSAs includes numbers 155-170 in the Acme Packet RADIUS dictionary, and they are IPv6 equivalents to their IPv4 counterparts. In this way, the introduction of IPv6 does not change the local CDR CSV format because—for an IPv6 call or where an IPv6 address applies—the IPv6 VSA replaces its IPv4 equivalent.

For example, the new attribute 155 (ACME\_ATTR\_FLOW\_FS1\_F\_INPUT\_SRC\_IPV6\_ADDR) is the IPv6 version of attribute 11 (ACME\_ATTR\_FLOW\_FS1\_F\_INPUT\_SRC\_ADDR), which expresses IPv4 information. In an IPv6 call, the IPv6 address value for VSA 155 will appear in the position occupied by VSA 11 for an IPv4 call—and VSA 11 would not appear at all.

The following table maps the IPv4 and IPv6 equivalent VSAs.

<b>IPv4 VSA Description</b>	<b>IPv4 VSA Number</b>	<b>Equivalent IPv6 VSA Description</b>	<b>IPv6 VSA Number</b>
Acme-Flow-In-Src-Addr_FS1_F	11	Acme-Flow-In-Src-IPv6_Addr_FS1_F	155
Acme-Flow-In-Dst-Addr_FS1_F	13	Acme-Flow-In-Dst-IPv6_Addr_FS1_F	156
Acme-Flow-Out-Src-Addr_FS1_F	21	Acme-Flow-Out-Src-IPv6_Addr_FS1_F	157
Acme-Flow-Out-Dst-Addr_FS1_F	23	Acme-Flow-Out-Dst-IPv6_Addr_FS1_F	158
Acme-Flow-In-Src-Addr_FS1_R	81	Acme-Flow-In-Src-IPv6_Addr_FS1_R	159
Acme-Flow-In-Dst-Addr_FS1_R	83	Acme-Flow-In-Dst-IPv6_Addr_FS1_R	160
Acme-Flow-Out-Src-Addr_FS1_R	86	Acme-Flow-Out-Src-IPv6_Addr_FS1_R	161
Acme-Flow-Out-Dst-Addr_FS1_R	88	Acme-Flow-Out-Dst-IPv6_Addr_FS1_R	162
Acme-Flow-In-Src-Addr_FS2_F	93	Acme-Flow-In-Src-IPv6_Addr_FS2_F	163
Acme-Flow-In-Dst-Addr_FS2_F	95	Acme-Flow-In-Dst-IPv6_Addr_FS2_F	164
Acme-Flow-Out-Src-Addr_FS2_F	98	Acme-Flow-Out-Src-IPv6_Addr_FS2_F	165
Acme-Flow-Out-Dst-Addr_FS2_F	100	Acme-Flow-Out-Dst-IPv6_Addr_FS2_F	166
Acme-Flow-In-Src-Addr_FS2_R	115	Acme-Flow-In-Src-IPv6_Addr_FS2_R	167
Acme-Flow-In-Dst-Addr_FS2_R	117	Acme-Flow-In-Dst-IPv6_Addr_FS2_R	168
Acme-Flow-Out-Src-Addr_FS2_R	120	Acme-Flow-Out-Src-IPv6_Addr_FS2_R	169
Acme-Flow-Out-Dst-Addr_FS2_R	122	Acme-Flow-Out-Dst-IPv6_Addr_FS2_R	170