



Cisco SRST SNMP MIB Release 3.4 Guide

October 26 2005

Corporate Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San José, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

Text Part Number: OL-7959-01



THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

CCSP, the Cisco Square Bridge logo, Cisco Unity, Follow Me Browsing, FormShare, and StackWise are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn, and iQuick Study are service marks of Cisco Systems, Inc.; and Aironet, ASIST, BPX, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Empowering the Internet Generation, Enterprise/Solver, EtherChannel, EtherFast, EtherSwitch, Fast Step, GigaDrive, GigaStack, HomeLink, Internet Quotient, IOS, IP/TV, iQ Expertise, the iQ logo, iQ Net Readiness Scorecard, LightStream, Linksys, MeetingPlace, MGX, the Networkers logo, Networking Academy, Network Registrar, *Packet*, PIX, Post-Routing, Pre-Routing, ProConnect, RateMUX, Registrar, ScriptShare, SlideCast, SMARTnet, StrataView Plus, SwitchProbe, TeleRouter, The Fastest Way to Increase Your Internet Quotient, TransPath, and VCO are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or Website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0406R)

Cisco SRST SNMP MIB Release 3.4 Guide
Copyright © 2005, Cisco Systems, Inc.
All rights reserved.



| | |
|---|------------|
| Preface | v |
| About this Preface | v |
| Document Objective | v |
| Audience | v |
| Document Organization | vi |
| Document Conventions | vi |
| Syntax Conventions | vi |
| Obtaining Documentation | ix |
| Cisco.com | ix |
| Documentation DVD | ix |
| Ordering Documentation | ix |
| Documentation Feedback | x |
| Cisco Product Security Overview | x |
| Reporting Security Problems in Cisco Products | x |
| Obtaining Technical Assistance | xi |
| Cisco Technical Support Website | xi |
| Submitting a Service Request | xi |
| Definitions of Service Request Severity | xii |
| Obtaining Additional Publications and Information | xii |
| Summary History of Document Changes | xiii |
| | |
| Cisco SRST SNMP MIB Support | 1-1 |
| Overview | 1-1 |
| Design of the CISCO-SRST-MIB | 1-2 |
| Structure | 1-2 |
| CISCO-SRST-MIB Features | 1-4 |
| Common Tables | 1-8 |
| Common Notifications/Traps | 1-8 |
| Common Objects | 1-8 |
| Common Tables | 1-8 |
| Dependencies of the SRST MIB | 1-11 |
| Limitations | 1-12 |
| Performance Impact | 1-12 |
| Prerequisites | 1-12 |

- Supported Platforms for SRST 3.4 1-13
 - Cisco Voice Gateways 1-13
 - Cisco IP Phones 1-13
- Licenses 1-14
- Configuration 1-14
 - Using SNMP and MIBs to Extract CISCO-SRST-MIB Information 1-14
 - How to Configure the CISCO-SRST-MIB 1-14
 - Enabling the SNMP Agent 1-14
 - Verifying the Enabling of the SNMP Agent 1-15
 - Configuration Examples 1-15
 - Complete SRST Configuration Example 1-16
 - Configuring SRST Mode 1-19
 - Enabling Traps in SRST Mode 1-21
 - Monitoring SCCP Phone Statistics 1-22
 - Retrieving SIP Phone Registrations 1-23
 - Receiving Notifications/Traps 1-25
 - Command Reference 1-26
- SNMP Overview 1-27
 - Network Management Overview 1-27
 - MIB Overview 1-28
 - MIB Source 1-28
 - MIB Objects 1-28
 - MIB Archive 1-29
- SNMP 1-29
- Internet MIB Hierarchy 1-30
 - SNMP MIB 1-31
- Compliance 1-32
 - Cisco Compliance 1-32
 - Implementation 1-32
- SNMP MIB Tables 1-32
- CISCO-SRST-MIB Object Groups 1-33
- SRST Traps 1-43
- Cisco-SRST-MIB Object Mappings 1-43
- Glossary 1-47



Preface

About this Preface

This preface describes the objectives, audience, organization, and conventions of this document, and explains how to find additional information on related products and services. It contains the following sections:

- [Document Objective, page v](#)
- [Audience, page v](#)
- [Document Organization, page vi](#)
- [Obtaining Technical Assistance, page xi](#)
- [Document Conventions, page vi](#)
- [Syntax Conventions, page vi](#)
- [Obtaining Documentation, page ix](#)
- [Cisco Product Security Overview, page x](#)
- [Obtaining Technical Assistance, page xi](#)
- [Obtaining Additional Publications and Information, page xii](#)
- [Summary History of Document Changes, page xiii](#)

Document Objective

This document describes the information regarding the Cisco SRST Simple Network Management Protocol (SNMP) Management Information Base (MIB). The document contains tables for you to use when using the SNMP MIB to monitor your system.

Audience

The primary audience for this document is network operators and administrators who have experience in the following areas:

- Telecommunications network operations
- Data network operations
- SNMP operation

- MIB syntax
- Telecommunications hardware
- Data network hardware

In addition, the following audiences may find this document useful:

- Software and hardware installers
- Network designers

Document Organization

This document contains the chapters listed in [Table 1](#).

Table 1 **Document Organization**

| Chapter | Title | Description |
|-----------|---------------------------------------|--|
| Chapter 1 | Provisioning Overview | This chapter includes a description of the Cisco SRST MIB. |

Document Conventions



Caution

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.



Note

Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.



Tip

Means *the following information might help you solve a problem*.



Timesaver

Means the *described action saves time*. You can save time by performing the action described in the paragraph.

Syntax Conventions

Conventions used throughout this guide are shown in [Table 2](#).

Table 2 Conventions

| Convention | Meaning | Description / Comments |
|---|--|--|
| Boldface | Commands and keywords you enter as shown. | offset-list |
| <i>Italics</i> | Variables for which you supply values. | command <i>type interface</i> You replace the variable with the type of interface. In contexts that do not allow italics, such as online help, arguments are enclosed in angle brackets (<>). |
| Square brackets ([]) | Optional elements. | command [abc] abc is optional (not required), but you can choose it. |
| Vertical bars () | Separated alternative elements. | command [abc def] You can choose either abc or def, or neither, but not both. |
| Braces ({ }) | Required choices. | command { abc def } You must choose either abc or def, but not both. |
| Braces and vertical bars within square brackets ([{ }]) | A required choice within an optional element. | command [abc { def ghi }] You have three options: nothing abc def abc ghi |
| Caret character (^) | Control key. | The key combinations ^D and Ctrl-D are equivalent: Both mean “hold down the Control key while you press the D key.” Keys are indicated in capital letters, but are not case sensitive. |
| A nonquoted set of characters | A string. | For example, when setting an SNMP community string to <i>public</i> , do not use quotation marks around the string; otherwise, the string will include the quotation marks. |
| System prompts | Denotes interactive sessions, indicates that the user enters commands at the prompt. | The system prompt indicates the current command mode. For example, the prompt Router (config) # indicates global configuration mode. |
| Screen font | Terminal sessions and information the system displays. | |

Table 2 Conventions (continued)

| Convention | Meaning | Description / Comments |
|--|---|---|
| Angle brackets (< >) | Nonprinting characters such as passwords. | |
| Exclamation point (!) at the beginning of a line | A comment line. | Comments are sometimes displayed by the Cisco IOS software. |

Conventions used in the Cisco SRST system (such as in CLI commands) are shown in [Table 3](#).

Table 3 Data Types

| Data Type | Definition | Example |
|----------------|--|----------------------------------|
| Integer | A series of decimal digits from the set of 0 through 9 that represents a positive integer. An integer may have one or more leading zero digits (0) added to the left side to align the columns. Leading zeros are always valid as long as the number of digits is less than or equal to ten digits. Values of this type have a range of zero through 4294967295. | 123 000123 4200000000 |
| Signed integer | This data type has the same basic format as the integer but can be either positive or negative. When negative, it is preceded by the sign character (-). As with the integer data type, this data type can be as many as ten digits in length, not including the sign character. The value of this type has a range of 0 minus 2147483647 through 2147483647. | 123 -000123 -21000000001 |
| Hexadecimal | A series of 16-based digits from the set of 0 through 9, a through f, or A through F. The hexadecimal number may have one or more leading zeros (0) added to the left side. For all hexadecimal values, the maximum size is 0xffffffff (eight hexadecimal digits). | 1f3 01f3000 |
| Text | A series of alphanumeric characters from the ASCII character set, where defined. Tab, space, and double quote (") characters cannot be used. Text can be as many as 255 characters; however, it is recommended that you limit the text to no more than 32 characters for readability. | EntityID LineSES_Threshold999 |
| String | A series of alphanumeric characters and white-space characters. A string is surrounded by double quotes ("). Strings can be as many as 255 characters; however, it is recommended that you limit the strings to no more than 80 characters for readability. | "This is a descriptive string." |

**Note**

Hexadecimal and integer fields in files may have different widths (number of characters) for column alignment.

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

<http://www.cisco.com/univercd/home/home.htm>

You can access the Cisco website at this URL:

<http://www.cisco.com>

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation DVD

Cisco documentation and additional literature are available in a Documentation DVD package, which may have shipped with your product. The Documentation DVD is updated regularly and may be more current than printed documentation. The Documentation DVD package is available as a single unit.

Registered Cisco.com users (Cisco direct customers) can order a Cisco Documentation DVD (product number DOC-DOCDVD=) from the Ordering tool or Cisco Marketplace.

Cisco Ordering tool:

<http://www.cisco.com/en/US/partner/ordering/>

Cisco Marketplace:

<http://www.cisco.com/go/marketplace/>

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpk/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Ordering tool:
<http://www.cisco.com/en/US/partner/ordering/>
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 1 800 553-NETS (6387).

Documentation Feedback

You can send comments about technical documentation to bug-doc@cisco.com.

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you can perform these tasks:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories and notices for Cisco products is available at this URL:

<http://www.cisco.com/go/psirt>

If you prefer to see advisories and notices as they are updated in real time, you can access a Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed from this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you might have identified a vulnerability in a Cisco product, contact PSIRT:

- Emergencies—security-alert@cisco.com
- Nonemergencies—psirt@cisco.com



Tip

We encourage you to use Pretty Good Privacy (PGP) or a compatible product to encrypt any sensitive information that you send to Cisco. PSIRT can work from encrypted information that is compatible with PGP versions 2.x through 8.x.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one that has the most recent creation date in this public key server list:

<http://pgp.mit.edu:11371/pks/lookup?search=psirt%40cisco.com&op=index&exact=on>

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

Obtaining Technical Assistance

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, Cisco Technical Support provides 24-hour-a-day, award-winning technical assistance. The Cisco Technical Support Website on Cisco.com features extensive online support resources. In addition, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not hold a valid Cisco service contract, contact your reseller.

Cisco Technical Support Website

The Cisco Technical Support Website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, 365 days a year, at this URL:

<http://www.cisco.com/techsupport>

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

<http://tools.cisco.com/RPF/register/register.do>



Note

Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support Website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

<http://www.cisco.com/techsupport/servicerequest>

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

<http://www.cisco.com/techsupport/contacts>

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

<http://www.cisco.com/go/marketplace/>

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

<http://www.ciscopress.com>

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

<http://www.cisco.com/packet>

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

<http://www.cisco.com/go/iqmagazine>

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

<http://www.cisco.com/ipj>

- World-class networking training is available from Cisco. You can view current offerings at this URL:

<http://www.cisco.com/en/US/learning/index.html>

Summary History of Document Changes

Table 4 describes the document changes made after the initial release of the *Cisco SRST SNMP MIB Release 3.4 Guide*.

Table 4 Summary History of Document Changes

| Subject | Document Number and Change Date | Change Summary |
|---------|---------------------------------|-----------------|
| — | OL-7959-01, October 26, 2005 | Initial release |



Cisco SRST SNMP MIB Support

Survivable Remote Site Telephony (SRST) Cisco IOS feature is used for the remote office routers that support from 24 to 720 users in a centralized CallManager processing environment, to back up IP phone calls and provide 911 emergency access by the public switched telephone network (PSTN). Any SRST user can leverage SRST MIBs for better management with Simple Network Management Protocol (SNMP) support.

Feature History of the Cisco SRST MIB Feature

| Release | Modification |
|----------|---|
| 12.4(4)T | This feature was introduced on the 12.4(4)T |

Finding Support Information for Platforms and Cisco IOS Software Images

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

Overview

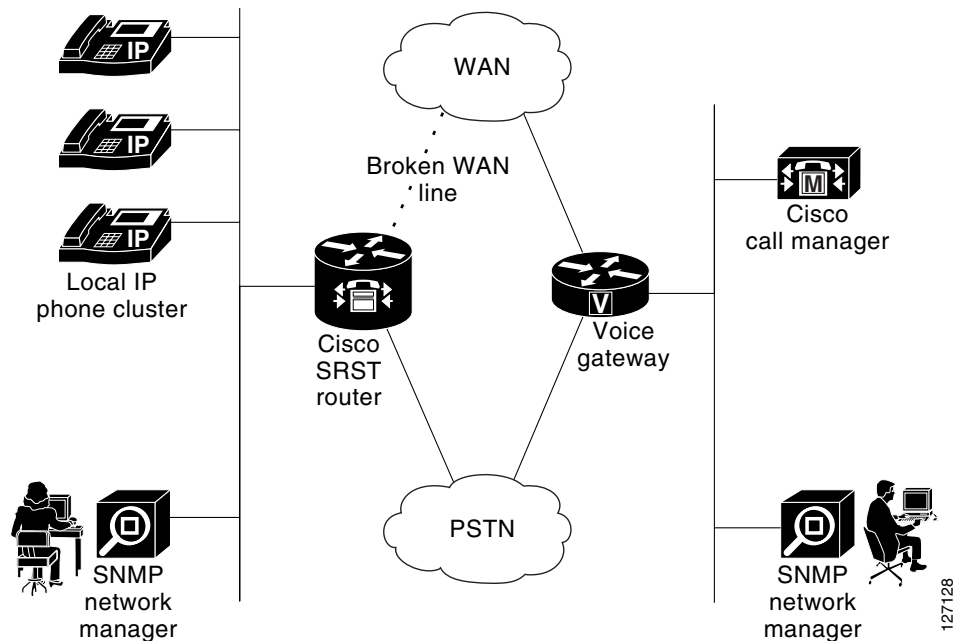
The SRST 3.4 component of Cisco IOS is not capable of participating in network management using SNMP. The SRST 3.4 effort is to make these components SNMP visible and provide necessary network management functions. This Cisco IOS feature can be used in the deployed customer scenarios that use SNMP managers. The Cisco IOS SNMP Agent can provide the following features for the SRST modules:

- Generate notifications/traps for various functionality failures
- Provide objects that help monitor performance/load of some of the key features
- Provide detailed configurations for help in fault isolation.
- Provide the active registrations of IP phones and Session Initiation Protocol (SIP) phones
- Publish statistics on Ephone lines and SIP phone lines
- Provide ability to mask/unmask notification

SRST 3.4 does not have product-specific network management capabilities. The SRST MIB addresses SNMP Management Information Base (MIB) development for generating asynchronous exception notifications/traps, displaying configurations, and monitoring performance for IP telephony management purposes.

The SRST feature provides emergency back up IP phone call capabilities, as shown in [Figure 1-1](#).

Figure 1-1 SRST Router Deployment with Network Management Components



SRST provides backup redundancy for broadband deployment of IP telephony to small branch offices. It can be used if Cisco CallManager is no longer in service due to a loss of WAN connectivity. SRST continues to provide basic call processing and IP telephony service to phones that fall back to SRST.

The CISCO-SRST-MIB defines managed objects that pertain to SRST, SIP Registrar, and SIP phones.

The CISCO-SRST-MIB has dependency on existing Cisco IOS MIBs, especially on the CISCO-CCME-MIB and the CISCO-VOICE-DIAL-CONTROL-MIB.

All of these MIBs are accessible from SNMP management software running on external SNMP managers.

Design of the CISCO-SRST-MIB

The CISCO-SRST-MIB enables you to display configurations and monitor and send traps and asynchronous notifications to the SNMP management applications.

The CISCO-SRST-MIB approach offers the following advantages over the CLI command approach:

- A more efficient use of network bandwidth
- Greater interoperability among vendors because standard SNMP protocols are used

The following paragraphs describe the CISCO-SRST-MIB structure.

Structure

The Structure of Management Information (SMI) is represented conceptually by a tree hierarchy. Branches along the tree have short text strings and integers to identify them. Text strings describe object names, and integers allow computer software to encode compact representations of the names.

The CISCO-SRST-MIB is part of the Cisco management group, which is part of `private.enterprise.cisco.ciscoMgmt`.

The CISCO-SRST-MIB structure is further divided into the following groups:

SRST MIB Groups

ciscoSrstMIBNotifications

ciscoSrstMIBObjects

ciscoSrstMIBConformance

The CISCO-SRST-MIB structure further is divided into the following subgroups:

SRST MIB object groups

csrstConf

csrstNotifInfo

csrstSipConf

csrstActiveStats

csrstMIBNotifs

CISCO-SRST-MIB, which is uniquely identified by the number 441

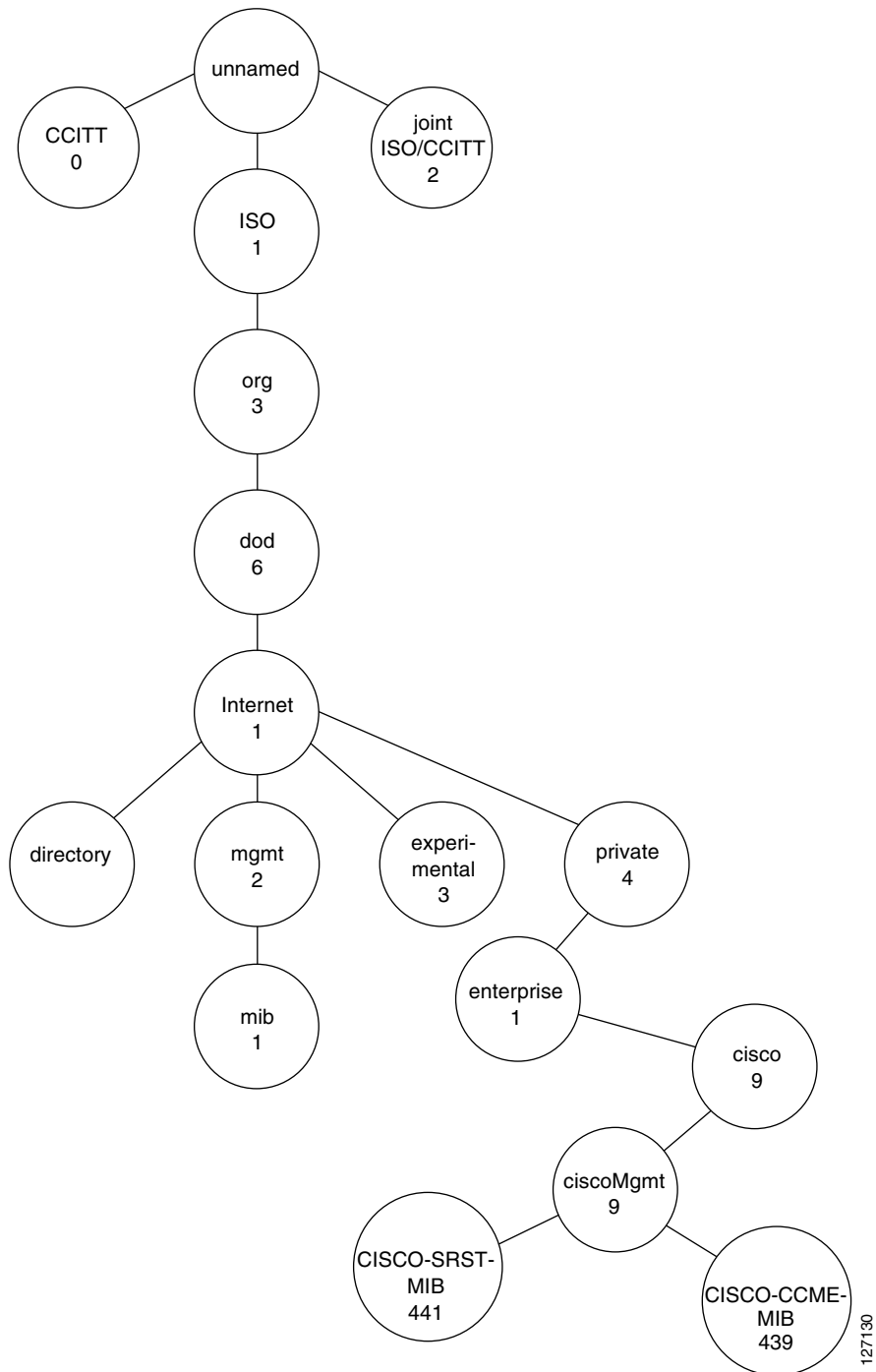
Therefore the ciscoSrstMIB is 1.3.6.1.4.1.9.9.441

Objects in the CISCO-SRST-MIB can be identified by either of the following methods.

- The object identifier is 1.3.6.1.4.1.9.9.441.<SRST MIB-variable>
- The object name is iso(1).org(3).dod(6).internet(1).private(4).enterprise(1).cisco(9).ciscoMgmt(9).ciscoSrstMIB(441).<MIB-variable>

Figure 1-2 shows the position of the CISCO-SRST-MIB in the Internet MIB hierarchy.

Figure 1-2 CISCO-SRST-MIB Tree Structure



CISCO-SRST-MIB Features

The SRST 3.4 features that are supported by the CISCO-SRST-MIB are:

- SRST configuration
- Ephone registrations

- Ephone directory number (DN) (multiple lines per phone, multiple-line appearance per phone)
- Huntstop (alias, SIP number list, between DNs)
- Class of Restriction (COR)
- Translation Rule
- Music on Hold (MoH) (flash, multicast)
- Call-forward
- Phone number alias
- Voicemail number
- Dial-plan pattern
- User-locale information
- Secondary-dial tone
- Ringing timeout
- Date format
- Dual-line mode
- Customized system message
- Consultative call transfer
- Interactive Voice Response (IVR) Application

[Table 1-1](#) lists the objects provided in the CISCO-SRST-MIB. [Table 1-2](#) lists the notifications/traps provided in the CISCO-SRST-MIB.

Table 1-1 Cisco-SRST-MIB Object Groups

| No. | Object Name | Comments |
|------------------|-----------------------------|---|
| csrstConf | | |
| 1. | csrstEnabled | Indicates if SRST support is enabled or disabled |
| 2. | csrstVersion | Cisco SRST version |
| 3. | csrstIPAddressType | IP address type governing the address type format for objects in this MIB |
| 4. | csrstIPAddress | IP address for the router to receive messages from IP phones |
| 5. | csrstPortNumber | Indicates the TCP port number to use for SCCP and is range limited |
| 6. | csrstMaxConferences | Maximum number of simultaneous three-party conference calls configured |
| 7. | csrstMaxEphones | Maximum number of Cisco IP phones configured on the SRST router |
| 8. | csrstMaxDN | Maximum number of IP phone extensions (Ephone-DNs) configured |
| 9. | csrstSipPhoneUnRegThreshold | Indicates a threshold for the number of SIP phones unregistered to SRST |
| 10. | csrstCallFwdNoAnswer | Cisco SRST call forwarding number when a Cisco IP phone is not answered |
| 11. | csrstCallFwdNoAnswerTo | Timeout, in seconds, if a Cisco IP phone is not answered |
| 12. | csrstCallFwdBusy | Cisco SRST call forwarding number when a Cisco IP phone is busy |
| 13. | csrstMohFilename | Music-on-Hold is enabled or disabled |
| 14. | csrstMohMulticastAddrType | Internet address type for the address type format for objects in this MIB |
| 15. | csrstMohMulticastAddr | Indicates the Cisco SRST Music-On-Hold multicast IP address |

Table 1-1 Cisco-SRST-MIB Object Groups (continued)

| No. | Object Name | Comments |
|-----|--------------------------------|--|
| 16. | csrstMohMulticastPort | Indicates Music-on-Hold multicast TCP port which is range limited |
| 17. | csrstVoiceMailNumber | Voice mail number that is speed-dialed when the messages button is pressed |
| 18. | csrstSystemMessagePrimary | System static text message displayed on Cisco IP phone during fallback |
| 19. | csrstSystemMessageSecondary | System message displayed on phones not supporting static text message |
| 20. | csrstScriptName | SRST session-level IVR application script |
| 21. | csrstSecondaryDialTone | SRST secondary dial tone digits |
| 22. | csrstTransferSystem | SRST call transfer method using the ITU-T H.450.2 standard |
| 23. | csrstUserLocaleInfo | SRST language for displays on Cisco IP phone by country |
| 24. | csrstDateFormat | Date display format on Cisco IP phones in the SRST system |
| 25. | csrstTimeFormat | Time display format on Cisco IP phones in the SRST system |
| 26. | csrstInterdigitTo | SRST interdigit timeout duration for Cisco IP phones |
| 27. | csrstBusyTo | Time before disconnect when destination is busy, without call-forwarding |
| 28. | csrstAlertTo | Time before disconnect when call is not answered, without call-forwarding |
| 29. | csrstXlateCalledNumber | Indicates the tag used to translate a called number on the SRST router |
| 30. | csrstXlateCallingNumber | Indicates the tag used to translate a calling number on the SRST router |
| | csrstAliasTable | |
| 31. | csrstAliasIndex | Table index |
| 32. | csrstAliasTag | A number indicating an alias pattern configured on this SRST router |
| 33. | csrstAliasNumPattern | Indicates the pattern to match the incoming telephone number |
| 34. | csrstAliasAltNumber | Alternate number to route incoming calls to match the number pattern |
| 35. | csrstAliasPreference | Indicates the preference value of the associated dial-peer |
| 36. | csrstAliasHuntStopEnabled | Hunt stops after trying the alternate number according to the alias pattern |
| | csrstAccessCodeTable | |
| 37. | csrstAccessCodeType | Type of trunk line to which the access-code is applied |
| 38. | csrstAccessCode | Access-code applied to the corresponding trunk line by creating dial-peers |
| 39. | csrstAccessCodeDIDEnabled | Indicates the direct-inward-dial on a POTS dial-peer is enabled or disabled |
| | csrstLimitDNTable | |
| 40. | csrstLimitDNType | Type of IP phone to which the limit-dn is applied |
| 41. | csrstLimitDN | Maximum number of directory numbers available to each type of IP phone |
| 42. | csrstNotificationEnabled | Indicates if this system produces the SRST notifications |
| | csrstNotifInfoGroup | |
| 43. | csrstSysNotifSeverity | Severity of the alarm condition, for the most recent SNMP notification |
| 44. | csrstSysNotifReason | Failure cause of the alarm condition for the most recent system notification |
| | csrstActiveStats | |
| 45. | csrstState | Current state of Cisco SRST feature on this router |
| 46. | csrstSipPhoneCurrentRegistered | Total number of SIP phones currently registered to the SRST router |

Table 1-1 Cisco-SRST-MIB Object Groups (continued)

| No. | Object Name | Comments |
|-------------------------------------|------------------------------------|---|
| 47. | csrStSipCallLegs | Total number of SIP call legs through the SRST router since activation |
| 48. | csrStTotalUpTime | Total number of minutes that router is active in SRST mode |
| csrStSipConf | | |
| 49. | csrStSipRegSrvExpMax | Max expiration time for the SIP registrar server to time out on a registration |
| 50. | csrStSipRegSrvExpMin | Min. expiration time for the SIP registrar server to time out on a registration |
| 51. | csrStSipIp2IpGlobalEnabled | Indicates if VoIP calls are redirected IP to IP globally |
| 52. | csrStSipSend300MultSupport | Indicates if the redirect contact order is best or longest match |
| csrStSipVoRegPoolTable | | |
| 53. | csrStSipVoRegPoolTag | Identifier tag configured for a voice register pool entry |
| 54. | csrStSipNetId | Network identification information of the SIP voice register pool |
| 55. | csrStSipVoRegPoolIpAddrType | IP address type for the address format of InetAddress objects in this MIB |
| 56. | csrStSipNetMask | IP subnet configured for the SIP voice register pool |
| 57. | csrStSipProxySrvIpAddr | IP address of the proxy server configured for the SIP voice register pool |
| 58. | csrStSipProxySrvPref | Preference order for creating the VoIP dial-peers in the voice register pool |
| 59. | csrStSipProxySrvMonitor | Configured proxy server monitoring protocol for the SIP voice register pool |
| 60. | csrStSipProxySrvAltIpAddr | Alternate IP address monitored other than the proxy configured |
| 61. | csrStSipDefaultPreference | Default preference of the proxy dial-peers created in the voice register pool |
| 62. | csrStSipVoRegPoolAppl | Application for the SIP dial-peers configured under voice register pool |
| csrStSipVoRegNumberListTable | | |
| 63. | csrStSipVoRegNumberListIndex | Table index |
| 64. | csrStSipVoRegNumberListTag | Index of the number list configured for the voice register pool |
| 65. | csrStSipVoRegNumberPattern | Number pattern the registrar permits to handle the register message |
| 66. | csrStSipVoRegNumberPref | Number pattern preference configured for the voice register pool |
| 67. | csrStSipVoRegNumberHuntstopEnabled | Huntstop for the number pattern configured for the voice register pool |
| csrStSipEndpointTable | | |
| 68. | csrStSipEndpointTag | Number that indicates a SIP endpoint configured on this SRST router |
| 69. | csrStSipVoRegPoolEdptTag | Voice register pool tag from which the SIP endpoint (dial-peer) is created |
| 70. | csrStSipEndpointIpAddrType | IP address for the address type for InetAddress objects in this MIB |
| 71. | csrStSipEndpointIpAddress | SIP endpoint IP address configured on this router |
| 72. | csrStSipEndpointDN | SIP phone's DN or line number assigned to the SIP endpoint |

Table 1-2 CISCO-SRST-MIB Summary List of Notifications/Traps

| No. | Object Name | Comments |
|-----|------------------|--|
| 73. | csrStStateChange | An SRST up or down state change notification is generated. |
| 74. | csrStFailNotif | Failure notification generated for a catastrophic failure. |

Table 1-2 CISCO-SRST-MIB Summary List of Notifications/Traps (continued)

| No. | Object Name | Comments |
|-----|-----------------------------------|--|
| 75. | csrStSipPhoneUnRegThresholdExceed | Notification generated when the unregistration threshold is exceeded. |
| 76. | csrStSipPhoneRegFailed | Notification generated when the SIP phone fails to register. |
| 77. | csrStConferenceFailed | Notification generated when maximum number of conferences is exceeded. |

Common Tables

The following tables are common to both the CCME and SRST MIBs:

- ccmeCorConfTable
- ccmeDialplanPatternTable
- ccmeTransferPatternTable
- ccmeEphoneBtnDNAssocConfTable
- ccmeEphoneActTable
- ccmeEphoneDnChStatsHistoryTable
- ccmeEphoneConfTable

Common Notifications/Traps

The following notifications/traps are common to both the CCME and SRST MIBs:

- ccmeEphoneUnRegistrationThresholdExceed
- ccmeEphoneRegFailed
- ccmeEphoneDeceased

Common Objects

The following objects are common to both the CCME and SRST MIBs:

- ccmeEphoneUnRegistrationThreshold
- ccmeEphoneTot
- ccmeEphoneTotalRegistered
- ccmeEphoneCallLegs

Common Tables

The tables listed in [Table 1-3](#) are common to both the CCME and SRST MIBs.

Table 1-3 Common Tables or Elements for the CCME and SRST MIBs

| Common Table or Element | Table or Element | Scope of Objects |
|--|------------------------------|------------------------------------|
| Common COR table | COR table | |
| This SRST COR feature is in the common COR table with scope set for srstSccp | ccmeCorTableIndex | ccme, srst-sccp, and srst-sip mode |
| | ccmeCorTag | ccme, srst-sccp, and srst-sip mode |
| | ccmeCorListName | ccme, srst-sccp, and srst-sip mode |
| | ccmeCorScope | ccme, srst-sccp, and srst-sip mode |
| | ccmeCorDirection | srst-sccp and srst-sip |
| | ccmeCorStartingNumber | srst-sccp and srst-sip |
| | ccmeCorEndingNumber | Srst-sccp and srst-sip |
| | ccmeCorVoiceRegPoolNumber | Applies only to srst-sip mode |
| | ccmeCorListDefaultEnabled | srst-sccp and srst-sip |
| | | |
| Common Dial Plan table | Dial Plan table | |
| This SRST dial plan feature is in the common Dial Plan table | | |
| | ccmeDialplanPatternTag | ccme and srst mode |
| | ccmeDialplanPattern | ccme and srst mode |
| | ccmeDialplanExtLength | ccme and srst mode |
| | ccmeDialplanExtPattern | ccme and srst mode |
| | ccmeDialplanAllowRegiEnabled | ccme and srst mode |
| | | |
| Common Transfer Plan table | Transfer Plan table | |
| This SRST Transfer plan feature is in the common Transfer Plan table | | |
| | ccmeTransferPattern | ccme and srst mode |
| | ccmeTransferPatternType | ccme and srst mode |
| | | |
| Common ccmeEphoneConfTable | ccmeEphoneConfTable | |
| | ccmeEphoneTag | ccme and srst mode |
| | ccmeEphoneIpAddressType | ccme and srst mode |
| | ccmeEphoneIpAddress | ccme and srst mode |
| | ccmeEphoneMacAddress | ccme and srst mode |
| | ccmeEphoneModel | ccme |
| | ccmeEphoneUsername | ccme |
| | ccmeEphoneKeepAlive | ccme |
| | ccmeEphoneAutoLineOut | ccme |

Table 1-3 Common Tables or Elements for the CCME and SRST MIBs (continued)

| Common Table or Element | Table or Element | Scope of Objects |
|--|---------------------------------|---|
| | ccmeEphonePagingDn | ccme |
| | ccmeEphoneAddon | ccme |
| | ccmeEphoneTemplate | ccme |
| | ccmeEphonePagingPolicy | ccme |
| | ccmeEphoneKeyPhone | ccme |
| | ccmeEphoneAutoLineInEnabled | ccme |
| | ccmeEphoneAftHrsBlkExmptEnabled | ccme |
| | ccmeEphoneNightBellSvcEnabled | ccme |
| | ccmeEphoneKeepConfEnabled | ccme |
| | | |
| Common ccmeEphoneButton Association tables | | |
| | ccmeEphoneBtnDNAssocConfTable | |
| | ccmeEphoneButtonNumber | ccme and srst mode |
| | ccmeEphoneOverlayDN | ccme and srst mode |
| | | |
| Common Ephone active table | | |
| Implemented in CCME MIB—this table is for displaying activities of Ephones | ccmeEphoneActTable | Common Ephone active table contents apply to ccme and srst mode |
| | ccmeEphoneDevicename | |
| | ccmeEphoneRegState | |
| | ccmeEphoneActiveDN | |
| | ccmeEphoneActivityStatus | |
| | ccmeEphoneKeepAliveCnt | |
| | ccmeEphonePendingReset | |
| | ccmeEphoneRegTime | |
| | ccmeEphoneCurrentFirmwareRev | |
| | ccmeEphonePreviousFirmwareRev | |
| | ccmeEphoneLastError | |
| | ccmeEphoneObservedType | |
| | ccmeEphoneLoginStatus | |
| | ccmeEphoneDnDStatus | |
| | ccmeEphoneDebugStatus | |
| | ccmeEphoneMediaActive | |
| | ccmeEphoneTAPIClient | |
| | ccmeEphoneMediaCapability | |
| | | |

Table 1-3 Common Tables or Elements for the CCME and SRST MIBs (continued)

| Common Table or Element | Table or Element | Scope of Objects |
|---|-------------------------------------|--|
| Ephone-DN history stats | ccmeEphoneDnChStatsHistoryTable | This table contents apply to ccme and srst |
| | ccmeEphoneDnChNum | |
| | ccmeEphoneDnChIncoming | |
| | ccmeEphoneDnChIncoming | |
| | ccmeEphoneDnChOutbound | |
| | ccmeEphoneDnChOutAnswered | |
| | ccmeEphoneDnChOutBusy | |
| | ccmeEphoneDnChDiscAtConn | |
| | ccmeEphoneDnChDiscAtAlert | |
| | ccmeEphoneDnChDiscAtHold | |
| | ccmeEphoneDnChDiscAtRing | |
| | ccmeEphoneDnChDiscAtCauseNearEnd | |
| | ccmeEphoneDnChDiscCauseFarEnd | |
| | | |
| Common Ephone statistics | ccmeActiveStats | |
| Total number of Ephones present | ccmeEphoneTot | ccme and srst |
| This refers to total number of Skinny phones registered to SRST | EphoneTotalRegistered | ccme and srst |
| This refers to the total number of Ephone call legs routed through SRST | EphoneCallLegs | ccme and srst |
| | ccmeEphoneTotKeyPhConfigured | ccme |
| | ccmeEphoneTotKeyPhRegistered | ccme |
| | | |
| Trap | EphoneUnRegistrationThresholdExceed | ccme and srst mode |
| Trap | EphoneFailRegistration | ccme and srst mode |
| Trap | ccmeEphoneDeceased | ccme and srst mode |
| | | |
| Read/Write object | EphoneUnRegistrationThreshold | ccme and srst mode |
| | | |

Dependencies of the SRST MIB

When using an SRST router, you can get information regarding Ephones, Ephone-dns, and related statistics from the CCME MIB. For example:

- To retrieve the total number of SCCP phones registered (EphoneTotalRegistered) to the SRST router, get the total number of SCCP registered from the CCME MIB.

- To retrieve the total number of SCCP call legs (EphoneCallLegs) accumulated on the SRST router, get the total number of SCCP call legs from the CCME MIB.
- To monitor the SCCP phone activities, retrieve the ccmeEphoneActTable from the CCME MIB.

Limitations

Be aware of the following design limitations when implementing the CISCO-SRST-MIB:

- Configuring objects is not provided through SNMP.
- No password or encrypted objects are provided.
- Objects that are not part of the CISCO-SRST-MIB are out of the scope of this MIB.
- SIP phone details that cannot be seen by underlying Cisco IOS SRST layers, such as the Ethernet address, are not provided.

Performance Impact

The performance characteristics of the SRST SNMP module vary significantly depending on how often bulk data is requested by the SNMP managers.

SNMP bulk data can consume significant CPU and DRAM resources, and even network bandwidth. We recommend that management stations are to minimize the statistical sampling intervals as much as possible. Even though CISCO-SRST-MIB objects are grouped to reduce the unnecessary bulk data that can be fetched at a burst, the Cisco IOS SNMP agent does not enforce the data volume or the frequency at which SNMP managers make requests to the SNMP agent.

To reduce performance impact, the SRST gateway managers can use the traps provided by these MIBs by using asynchronous fault notification and traps to help isolate a fault.

There are few leaf objects, and they are light weighted and important (specified in active Group of the MIBs). They can be sampled at relatively short intervals, which would help gather the load on the CISCO-SRST-MIB components.

The Cisco IOS software supports SNMP versions 1, 2c, and 3 (SNMPv1, SNMPv2c, and SNMPv3). The SRST MIB is compliant with SNMPv2c and SNMPv3.

External SNMP managers are required; they issue SNMP queries and also accept SNMP notifications and traps. The SNMP managers include tools, such as basic Scotty command line tools, HP-OpenView, SunNet managers, IBM Netview, Tivoli, NetIQ, and so on.

To provide complete monitoring solutions, the SNMP managers can interface with existing Cisco IOS MIBs that address individual components and build a “schema” (or view) that helps monitor objects that suit their configuration or needs. For SRST related scenarios, the CISCO-VOICE-DIAL-CONTROL-MIB, various hardware interface MIBs, and the CISCO-CCM-MIB are available.

Prerequisites

The following must be configured for the CISCO-SRST-MIB to function:

- Cisco CallManager Fallback must be configured on your system.

- An SNMP manager must be available on the network. For more information on configuring an SNMP server for use with a MIB, refer to the “Configuring SNMP Support” chapter of the *Cisco IOS Configuration Fundamentals and Network Management Configuration Guide*, Release 12.3. at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/ffun_c/fcfprt3/fcf014.htm

- An SNMP Agent must be configured for the router on which the CISCO-SRST-MIB feature is to be used. Refer to the “Enabling the SNMP Agent” section in this document for more information.
- Ensure the traps are defined in the NMS software.
- Ensure the alarm events are not put into “log only” mode and come up as an Alarm.

Supported Platforms for SRST 3.4

The SRST 3.4 feature is supported on the platforms listed in the following sections.

Cisco Voice Gateways

The SRST 3.4 feature is supported on the following voice gateways:

- Cisco IAD24xx
- Cisco 17xx: 1751V and 1760
- Cisco 2600XM: 261x XM, 262x XM, 265x XM, and 2691
- Cisco 3600: 3640, 3640A, and 3660
- Cisco 37xx: 3725 and 3745
- Catalyst 4500 with AGM
- Cisco 7200

Cisco IP Phones

The SRST 3.4 feature is supported on the following Cisco IP phones:

- Cisco IP Phone 7905 and 7905G
- Cisco IP Phone 7910G
- Cisco IP Phone 7902G
- Cisco IP Phone 7912G
- Cisco IP Expansion Module 7914
- Cisco IP Conference Station 7935
- Cisco IP Phone 7940 and 7940G
- Cisco IP Phone 7960 and 7960G
- Cisco VG248 Analog Phone Gateway Version 1.2(1) and higher
- Cisco VG224 Analog phone gateway

Licenses

The following licences are required for SRST operation:

- A base SRST feature license
- A phone seat license for each phone

Depending on the platform used, the maximum number of ePhone licenses supported ranges from 24 to 240.

Configuration

To configure the SRST/CCME MIB feature, you should understanding the following concept.

Using SNMP and MIBs to Extract CISCO-SRST-MIB Information

SNMP has historically been used to collect network information. SNMP permits retrieval of critical information from network elements such as routers, switches, and workstations. The CISCO-SRST-MIB feature uses SNMP to gather remote site status information.

The CISCO-SRST-MIB feature allows remote site status data for the managed devices on your system to be retrieved by SNMP. You can specify retrieval of CISCO-SRST-MIB information from a managed device (for example, a router) either by entering commands on that managed device or by entering SNMP commands from the NMS workstation to configure the router by the MIB. If the CISCO-SRST-MIB information is configured from the network management system (NMS) workstation, no access to the router is required and all configuration can be performed by SNMP. The CISCO-SRST-MIB request for information is sent from an NMS workstation by SNMP to the router and is retrieved from the router. This information can then be stored or viewed, thus allowing CISCO-SRST-MIB information to be easily accessed and transported across a multivendor programming environment.

How to Configure the CISCO-SRST-MIB

This section contains the following procedures:

- [Enabling the SNMP Agent, page 1-14](#) (required)
- [Verifying the Enabling of the SNMP Agent, page 1-15](#) (optional)

Enabling the SNMP Agent

The SNMP Agent for the SRST/CCME MIB is disabled by default. To enable the SNMP agent for the CISCO-SRST-MIB, perform the following steps:

| | Command or Action | Purpose |
|--------|---|---|
| Step 1 | Prompt# <code>telnet xxx.xxx.xxx.xxx</code> | Telnet to the router identified by the specified IP address (represented as <code>xxx.xxx.xxx.xxx</code>). |
| Step 2 | Router# <code>enable</code> | Enters the enable mode. |

| | Command or Action | Purpose |
|---------------|--|---|
| Step 3 | Router# show running-config | Displays the running configuration to determine if an SNMP agent is already running. If no SNMP information is displayed, continue with Step 4 . If any SNMP information is displayed, you can modify the information or change it as needed. |
| Step 4 | Router# config terminal | Enters global configuration mode. |
| Step 5 | Router(config)# snmp-server community xxxxxx RO | Enables the read-only (RO) community string, where xxxxxx represents the read-only community string |
| Step 6 | Router(config)# snmp-server community xxxxxx RW | Enables the read-write (RW) community string, where xxxxxx represents the read-write community string. |
| Step 7 | Router(config)# exit | Exits global configuration mode and returns you to privileged EXEC mode. |
| Step 8 | Router# write memory | Writes the modified configuration to nonvolatile memory (NVRAM), permanently saving the settings. |

Verifying the Enabling of the SNMP Agent

To verify that the SNMP agent has been enabled on a given network device, perform the following steps:

-
- Step 1** Telnet to the target device:
- ```
Router# telnet xxx.xxx.xxx.xxx
where xxx.xxx.xxx.xxx represents the IP address of the target device.
```
- Step 2** Establish the enable mode on the device:
- ```
Router# enable
```
- Step 3** Display the running configuration on the device and examine the output for any displayed SNMP information:
- ```
Router# show running-config
...
...
snmp-server community public RO
snmp-server community private RW
```

Any “snmp-server” statement appearing in the output that takes the form shown above verifies that SNMP has been enabled on the specified device.

---

## Configuration Examples

Configuration examples are provided in the following sections:

- [Complete SRST Configuration Example, page 1-16](#)
- [Configuring SRST Mode, page 1-19](#)
- [Enabling Traps in SRST Mode, page 1-21](#)
- [Monitoring SCCP Phone Statistics, page 1-22](#)
- [Retrieving SIP Phone Registrations, page 1-23](#)

## Complete SRST Configuration Example

The following is a complete configuration example for SRST. It is provided to give you an example of the commands used when configuring SRST.

```
SRST-Router#sh run
•
•
•
!
hostname SRST-Router
!
•
•
•
ip subnet-zero
ip cef
!
!
voice service voip
sip
 registrar server expires max 600 min 60
!
!
voice class codec 1
codec preference 1 g711ulaw
codec preference 2 g729br8
!
!
!
!
!
!
!
voice register pool 1
id network 1.4.196.0 mask 255.255.255.0
proxy 1.4.196.1 monitor probe rtr
!
voice register pool 3
id network 1.4.4.1 mask 255.255.255.0
number 2 2020 preference 2
number 4 4040 preference 4
alias 2 2211 to 2222 preference 2
alias 4 4411 to 4444 preference 4
!
voice register pool 4
id network 1.4.199.1 mask 255.255.255.255
proxy 1.4.100.1
!
voice register pool 7
id mac 0002.0002.0002
number 3 3030 preference 3
number 10 10 preference 10
cor incoming eng 1 1000
cor incoming eng 3 3000
cor outgoing eng 4 4000
proxy 1.4.196.7 monitor probe rtr
alias 1 1012 to 1013 preference 2
alias 5 5012 to 5013 preference 4
```

```

!
!
!
!
!
!
!
interface FastEthernet0/0
ip address 1.4.196.1 255.255.0.0
no ip route-cache cef
no ip route-cache
no ip mroute-cache
duplex auto
speed auto
no cdp enable
!
interface FastEthernet0/1
ip address 3.0.0.1 255.255.255.0
no ip mroute-cache
duplex auto
speed auto
no keepalive
no cdp enable
!
interface Serial0/2:1
ip address 12.12.12.1 255.255.255.0
!
ip classless
ip route 0.0.0.0 0.0.0.0 1.4.0.1
ip route 4.0.0.0 255.255.255.0 FastEthernet0/0
ip route 223.255.254.0 255.255.255.0 1.4.0.1
ip route 223.255.254.254 255.255.255.255 FastEthernet0/0
!
no ip http server
!
snmp-server community public RW
snmp-server community test RW
snmp-server contact helloall
snmp-server host 1.4.198.78 SNMP
snmp-server host 1.4.198.78 SNMPv2c
no cdp run
arp 3.3.3.3 0000.0000.001a ARPA
!
!
tftp-server flash:POS30202.bin
tftp-server flash:SIP000F23AD6FBC.cnf
tftp-server flash:SIPDefault.cnf
tftp-server flash:OS79XX.TXT
tftp-server flash:POS3-04-1-00.bin
tftp-server flash:P00305000300.bin
!
control-plane
!
!
!
voice-port 0/3:2
no ignore rx-c-bit
no ignore rx-d-bit
condition tx-a-bit off
condition tx-b-bit invert
condition tx-c-bit on
!
voice-port 0/3:3

```

```

!
voice-port 4/0/0
!
voice-port 4/0/1
!
!
!
!
!
dial-peer cor custom
name test_shanmukh_member
name liz
!
!
dial-peer cor list test
!
dial-peer cor list name
!
dial-peer cor list eng
member liz
!
dial-peer cor list hr
!
!
dial-peer voice 2001 pots
destination-pattern 2001
!
dial-peer voice 9002 voip
corlist incoming eng
destination-pattern
session target ipv4:1.4.196.77
dtmf-relay h245-alphanumeric
ip qos dscp cs5 media
!
dial-peer voice 9003 voip
destination-pattern
session target ipv4:1.4.196.78
dtmf-relay h245-alphanumeric
ip qos dscp cs5 media
!
dial-peer voice 9001 voip
!
gateway
timer receive-rtp 1200
security password 1511021F0725 level endpoint
!
sip-ua
sip-server ipv4:1.4.196.1
!
!
call-manager-fallback
max-conferences 8 gain -6
limit-dn 7960 20
ip source-address 1.4.196.1 port 2000
max-ephones 10
max-dn 10
dialplan-pattern 2 2222 extension-length 2 extension-pattern 20 no-reg
dialplan-pattern 4 4444 extension-length 4 extension-pattern 4040
dialplan-pattern 5 5555 extension-length 2 extension-pattern 50
transfer-pattern 111 blind
transfer-pattern 202
transfer-pattern 301 blind
access-code bri 333 direct-inward-dial
access-code pri 44 direct-inward-dial

```



```

alias 1 1234 to 9988 huntstop
alias 2 2222 to 5552222
alias 4 4444 to 5554444
alias 8 8888 to 5558888
time-format 24
date-format yy-mm-dd
cor incoming eng default
cor incoming eng 1 2000
cor incoming eng 2 2000 - 2010
cor outgoing hr 1 1000
cor outgoing hr 2 2000
!
!
line con 0
exec-timeout 0 0
line aux 0
line vty 0 4
login
!
!
end

```

## Configuring SRST Mode

Perform the following steps to configure SRST mode.

- 
- Step 1** Have Ephones registered to CME or CallManager before enabling SRST.
  - Step 2** Have an Ephone-dn assigned to each Ephone.
  - Step 3** Have a button associated with each Ephone-dn.
  - Step 4** Configure and **show call-manager-fallback**.
  - Step 5** Verify the response to **show call-manager-fallback** is similar to the following:

```

SRST-Router#sh call-manager-fallback
CONFIG (Version=3.3)
=====
Version 3.3
For on-line documentation please see:
www.cisco.com/univercd/cc/td/doc/product/access/ip_ph/ip_ks/index.htm

ip source-address 1.4.196.1 port 2000
max-ephones 10
max-dn 10
max-conferences 8 gain -6
dspfarm units 0
dspfarm transcode sessions 0
huntstop
dialplan-pattern 2 2222 extension-length 2 extension-pattern 20 no-reg
dialplan-pattern 4 4444 extension-length 4 extension-pattern 4040
dialplan-pattern 5 5555 extension-length 2 extension-pattern 50
access-code bri 333 direct-inward-dial
access-code pri 44 direct-inward-dial
time-format 24
date-format yy-mm-dd
timezone 0 Greenwich Standard Time
transfer-pattern 111 blind
transfer-pattern 202
transfer-pattern 301 blind
cor incoming eng default
cor incoming eng 1 2000

```

```

cor outgoing hr 1 1000
cor incoming eng 2 2000-2010
cor outgoing hr 2 2000
alias 1 1234 to 9988 huntstop
alias 2 2222 to 5552222
alias 4 4444 to 5554444
alias 8 8888 to 5558888
keepalive 30
timeout interdigit 10
timeout busy 10
timeout ringing 180
caller-id name-only: enable
Limit number of DNS per phone:
 7910: 34
 7935: 34
 7936: 34
 7940: 34
 7960: 20
 7970: 34
Log (table parameters):
 max-size: 150
 retain-timer: 15
local directory service: enabled.

```

**Step 6** Simulate a link failure for Ephones to fall back to SRST mode.

**Step 7** Issue the following command to check call-manager-fallback configuration:

```
getmany -v2c <ip addr> test csrstConf
```

**Step 8** Verify the response to **getmany** is similar to the following:

```

moki:1929> getmany -v2c 1.4.196.1 test csrstConf
csrstEnabled.0 = true(1)
csrstVersion.0 = 3.3
csrstIPAddressType.0 = ipv4(1)
csrstIPAddress.0 = 1.4.196.1
csrstPortNumber.0 = 2000
csrstMaxConferences.0 = 8
csrstMaxEphones.0 = 10
csrstMaxDN.0 = 10
csrstSipPhoneUnRegThreshold.0 = 480
csrstCallFwdNoAnswer.0 =
csrstCallFwdNoAnswerTo.0 = 180
csrstCallFwdBusy.0 =
csrstMohFilename.0 =
csrstMohMulticastAddrType.0 = ipv4(1)
csrstMohMulticastAddr.0 = 0.0.0.0
csrstMohMulticastPort.0 = 0
csrstVoiceMailNumber.0 =
csrstSystemMessagePrimary.0 =
csrstSystemMessageSecondary.0 =
csrstScriptName.0 =
csrstSecondaryDialTone.0 =
csrstTransferSystem.0 = blind(1)
csrstUserLocaleInfo.0 = us(11)
csrstDateFormat.0 = yymmdd(4)
csrstTimeFormat.0 = twentyFourHour(2)
csrstInterdigitTo.0 = 10
csrstBusyTo.0 = 10
csrstAlertTo.0 = 180
csrstXlateCalledNumber.0 = 0
csrstXlateCallingNumber.0 = 0
csrstAliasTag.0 = 1
csrstAliasTag.1 = 2

```

```
csrstAliasTag.2 = 4
csrstAliasTag.3 = 8
csrstAliasTag.4 = 2
csrstAliasTag.5 = 4
csrstAliasTag.6 = 1
csrstAliasTag.7 = 5
csrstAliasNumPattern.0 = 9988
csrstAliasNumPattern.1 = 5552222
csrstAliasNumPattern.2 = 5554444
csrstAliasNumPattern.3 = 5558888
csrstAliasNumPattern.4 = 2222
csrstAliasNumPattern.5 = 4444
csrstAliasNumPattern.6 = 1013
csrstAliasNumPattern.7 = 5013
csrstAliasAltNumber.0 = 1234
csrstAliasAltNumber.1 = 2222
csrstAliasAltNumber.2 = 4444
csrstAliasAltNumber.3 = 8888
csrstAliasAltNumber.4 = 2211
csrstAliasAltNumber.5 = 4411
csrstAliasAltNumber.6 = 1012
csrstAliasAltNumber.7 = 5012
csrstAliasPreference.0 = 0
csrstAliasPreference.1 = 0
csrstAliasPreference.2 = 0
csrstAliasPreference.3 = 0
csrstAliasPreference.4 = 2
csrstAliasPreference.5 = 4
csrstAliasPreference.6 = 2
csrstAliasPreference.7 = 4
csrstAliasHuntStopEnabled.0 = true(1)
csrstAliasHuntStopEnabled.1 = false(2)
csrstAliasHuntStopEnabled.2 = false(2)
csrstAliasHuntStopEnabled.3 = false(2)
csrstAliasHuntStopEnabled.4 = false(2)
csrstAliasHuntStopEnabled.5 = false(2)
csrstAliasHuntStopEnabled.6 = false(2)
csrstAliasHuntStopEnabled.7 = false(2)
csrstAccessCodeType.3 = bri(3)
csrstAccessCodeType.4 = pri(4)
csrstAccessCode.3 = 333
csrstAccessCode.4 = 44
csrstAccessCodeDIDEnabled.3 = true(1)
csrstAccessCodeDIDEnabled.4 = true(1)
csrstLimitDNType.1 = ipPhone7910(1)
csrstLimitDNType.2 = ipPhone7935(2)
csrstLimitDNType.3 = ipPhone7940(3)
csrstLimitDNType.4 = ipPhone7960(4)
csrstLimitDN.1 = 34
csrstLimitDN.2 = 34
csrstLimitDN.3 = 34
csrstLimitDN.4 = 20
csrstNotificationEnabled.0 = false(2)
```

## Enabling Traps in SRST Mode

To enable traps in SRST mode, perform the following steps:

**Step 1** Issue the following command:

```
Setany -v2c <ip addr> test csrstNotificationEnabled.0 -i 1
```

- Step 2** When the SRST has at least 1 SCCP phone with DN associated with it, an “SRST system state change up” trap is generated.

```
*Mar 10 23:13:15.632: SNMP: V1 Trap, ent ciscoMgmt.441, addr 1.4.196.1, gentrap 6,
spectrap 1
ciscoMgmt.441.2.2.2.1.2.1 = 2
ciscoMgmt.441.1.3.1.2.1 = 1
ciscoMgmt.441.2.2.2.2.1 = SRST system state change up
```

---

## Monitoring SCCP Phone Statistics

To monitor SCCP phone statistics, perform the following steps:

- Step 1** Register the Ephones to the SRST router.
- Step 2** Issue the following CLI command:
- ```
Show ephone summary
```
- Step 3** Verify the response to **show Ephone summary** is similar to the following:

```
SRST-Router#sh ephone summary

ephone-1 Mac:000F.24BA.2C37 TCP socket:[1] activeLine:0 REGISTERED
mediaActive:0 offhook:0 ringing:0 reset:0 reset_sent:0 debug:0
IP:1.4.196.42 7912 keepalive 2 1:1 2:2 CM Fallback

ephone-2 Mac:0011.BBEF.7554 TCP socket:[2] activeLine:0 REGISTERED
mediaActive:0 offhook:0 ringing:0 reset:0 reset_sent:0 debug:0
IP:1.4.196.2 Telecaster 7960 keepalive 2 CM Fallback

ephone-3 Mac:000D.2808.427F TCP socket:[3] activeLine:0 REGISTERED
mediaActive:0 offhook:0 ringing:0 reset:0 reset_sent:0 debug:0
IP:1.4.196.3 Telecaster 7960 keepalive 1 CM Fallback

Max 10, Registered 3, Unregistered 0, Deceased 0, Sockets 3
ephone_send_packet process switched 0

Max Conferences 8 with 0 active (8 allowed)
Skinny Music On Hold Status
Active MOH clients 0 (max 480), Media Clients 0
No MOH file loaded
```

- Step 4** Issue the following SNMP request:
- ```
Getmany -v2c <ip addr> test ccmeActiveStats
```
- Step 5** Verify the response for the **getmany** request is similar to the following:

```
moki:1931> getmany -v2c 1.4.196.1 test ccmeActiveStats
ccmeEphoneCallLegs.0 = 0
ccmeEphoneTot.0 = 3
ccmeEphoneTotRegistered.0 = 3
ccmeEphoneTotKeyPhConfigured.0 = 0
ccmeEphoneTotKeyPhRegistered.0 = 0
ccmeEphoneDeviceName.1 = SEP000F24BA2C37
ccmeEphoneDeviceName.2 = SEP000D2808427F
ccmeEphoneDeviceName.3 = SEP0011BBEF7554
```

```

ccmeEphoneRegState.1 = registered(1)
ccmeEphoneRegState.2 = registered(1)
ccmeEphoneRegState.3 = registered(1)
ccmeEphoneActiveDN.1 = 0
ccmeEphoneActiveDN.2 = 0
ccmeEphoneActiveDN.3 = 0
ccmeEphoneActivityStatus.1 = onhook(1)
ccmeEphoneActivityStatus.2 = onhook(1)
ccmeEphoneActivityStatus.3 = onhook(1)
ccmeEphoneKeepAliveCnt.1 = 3
ccmeEphoneKeepAliveCnt.2 = 4
ccmeEphoneKeepAliveCnt.3 = 3
ccmeEphonePendingReset.1 = false(2)
ccmeEphonePendingReset.2 = false(2)
ccmeEphonePendingReset.3 = false(2)
ccmeEphoneRegTime.1 =
ccmeEphoneRegTime.2 =
ccmeEphoneRegTime.3 =
ccmeEphoneCurrentFirmwareRev.1 = CP7912010200SCCP031023
ccmeEphoneCurrentFirmwareRev.2 = 7.0(2.0)
ccmeEphoneCurrentFirmwareRev.3 = 7.0(2.0)
ccmeEphonePreviousFirmwareRev.1 =
ccmeEphonePreviousFirmwareRev.2 =
ccmeEphonePreviousFirmwareRev.3 =
ccmeEphoneLastError.1 = Initialized
ccmeEphoneLastError.2 = CM-closed-TCP
ccmeEphoneLastError.3 = CM-closed-TCP
ccmeEphoneObservedType.1 = 7912
ccmeEphoneObservedType.2 = Telecaster 7960
ccmeEphoneObservedType.3 = Telecaster 7960
ccmeEphoneLoginStatus.1 = false(2)
ccmeEphoneLoginStatus.2 = false(2)
ccmeEphoneLoginStatus.3 = false(2)
ccmeEphoneDnDStatus.1 = false(2)
ccmeEphoneDnDStatus.2 = false(2)
ccmeEphoneDnDStatus.3 = false(2)
ccmeEphoneDebugStatus.1 = false(2)
ccmeEphoneDebugStatus.2 = false(2)
ccmeEphoneDebugStatus.3 = false(2)
ccmeEphoneMediaActive.1 = false(2)
ccmeEphoneMediaActive.2 = false(2)
ccmeEphoneMediaActive.3 = false(2)
ccmeEphoneTAPIClient.1 = false(2)
ccmeEphoneTAPIClient.2 = false(2)
ccmeEphoneTAPIClient.3 = false(2)
ccmeEphoneMediaCapability.1 = audioOnly(1)
ccmeEphoneMediaCapability.2 = audioOnly(1)
ccmeEphoneMediaCapability.3 = audioOnly(1)
ccmeEphoneRemote.1 = true(1)
ccmeEphoneRemote.2 = true(1)
ccmeEphoneRemote.3 = true(1)
ccmeMohSource.0 = liveFeed(2)
ccmeNightServiceEnabled.0 = false(2)

```

## Retrieving SIP Phone Registrations

To retrieve SIP phone registrations, perform the following steps:

- 
- Step 1** Register the SIP phones to the SRST router.

**Step 2** Issue the following CLI command:

```
Show voice register pool <pool #>
```

**Step 3** Verify the **show voice register** response is similar to the following:

```
SRST-Router#sh voice regi pool 1
Pool Tag 1
Config:
 Network address is 1.4.196.0, Mask is 255.255.255.0
 Proxy Ip address is 1.4.196.1
 DTMF Relay is disabled
```

Dialpeers created:

```
dial-peer voice 40001 voip
destination-pattern 5001
redirect ip2ip
session target ipv4:1.4.196.41:25672
session protocol sipv2
```

```
dial-peer voice 40002 voip
destination-pattern 5001
redirect ip2ip
session target ipv4:1.4.196.1:5060
session protocol sipv2
monitor probe rtr 1.4.196.1
```

```
dial-peer voice 40003 voip
destination-pattern 5002
redirect ip2ip
session target ipv4:1.4.196.41:25672
session protocol sipv2
```

```
dial-peer voice 40004 voip
destination-pattern 5002
redirect ip2ip
session target ipv4:1.4.196.1:5060
session protocol sipv2
monitor probe rtr 1.4.196.1
```

```
Statistics:
 Active registrations : 4
```

```
Total Registration Statistics
 Registration requests : 4
 Registration success : 4
 Registration failed : 0
 unRegister requests : 0
 unRegister success : 0
 unRegister failed : 0
```

**Step 4** Issue the following SNMP request:

```
Getmany -v2c <ip addr> test csrstSipEndpointTable
```

**Step 5** Verify the response for the **getmany** request is similar to the following:

```
moki:1919> getmany -v2c 1.4.196.1 test csrstSipEndpointTable
csrstSipVoRegPoolEdptTag.0 = 1
csrstSipVoRegPoolEdptTag.1 = 1
csrstSipVoRegPoolEdptTag.2 = 1
csrstSipVoRegPoolEdptTag.3 = 1
csrstSipEndpointIpAddrType.0 = ipv4(1)
csrstSipEndpointIpAddrType.1 = ipv4(1)
```

```

csrStSipEndpointIpAddrType.2 = ipv4(1)
csrStSipEndpointIpAddrType.3 = ipv4(1)
csrStSipEndpointIpAddress.0 = ipv4:1.4.196.41:26057
csrStSipEndpointIpAddress.1 = ipv4:1.4.196.1:5060
csrStSipEndpointIpAddress.2 = ipv4:1.4.196.41:26057
csrStSipEndpointIpAddress.3 = ipv4:1.4.196.1:5060
csrStSipEndpointDN.0 = 5001
csrStSipEndpointDN.1 = 5001
csrStSipEndpointDN.2 = 5002
csrStSipEndpointDN.3 = 5002

```

## Receiving Notifications/Traps

Notifications and traps are asynchronously generated by SRST to pass information about certain device status changes. Table 1-4 lists the SRST notifications/traps and additional information regarding each notification or trap.

**Table 1-4** SRST Notifications/Traps

| Notification/Trap | Reason                                                                                  | Severity                       |
|-------------------|-----------------------------------------------------------------------------------------|--------------------------------|
| csrStStateChange  | SRST system state change up                                                             | Minor                          |
| csrStStateChange  | SRST system state change down                                                           | Minor                          |
| csrStStateChange  | SIP SRST system state change up                                                         | Minor                          |
| csrStStateChange  | SIP SRST system state change down                                                       | Minor                          |
| csrStFailNotif    | Skinny listening socket setup error                                                     | Minor (when system is running) |
| csrStFailNotif    | Maximum number of allowed sockets has been exceeded                                     | Minor (when system is running) |
| csrStFailNotif    | Skinny server initialization failed<br>Sockets initialization failed                    | Major (at initialization)      |
| csrStFailNotif    | Skinny server initialization failed<br>Not enough memory                                | Major (at initialization)      |
| csrStFailNotif    | Not enough memory to create Registrar Control Block (rcb) for SIP<br>Voice Register DNS | Minor                          |
| csrStFailNotif    | Not enough memory to create Call Control Block (ccb) from SIP<br>registrar outgoing     | Minor                          |

There is no reason string or severity sent with the following traps:

- csrStSipPhoneUnRegThresholdExceed
- csrStSipPhoneRegFailed
- csrStConferenceFailed

The following list contains all the CISCO-SRST-MIB traps.

- csrStStatusChange - SRST status change trap (Up)

\*Mar 7 20:56:23.207: SNMP: V1 Trap, ent ciscoMgmt.441, addr 1.4.196.10, gentrap

```
6, spectrap 1
ciscoMgmt.441.2.2.2.1.2.1 = 2
ciscoMgmt.441.1.3.1.2.1 = 1
ciscoMgmt.441.2.2.2.2.1 = SRST system state change up
```

- **csrstStateChange - SRST status change trap (Down)**

```
*Mar 7 20:57:23.199: SNMP: V1 Trap, ent ciscoMgmt.441, addr 1.4.196.10, gentrap
6, spectrap 1
ciscoMgmt.441.2.2.2.1.2.1 = 2
ciscoMgmt.441.1.3.1.2.1 = 2
ciscoMgmt.441.2.2.2.2.1 = SRST system state change down
```

- **csrstStateChange - SIP-SRST status change trap (Up)**

```
*Mar 7 20:56:23.459: SNMP: V1 Trap, ent ciscoMgmt.441, addr 1.4.196.10, gentrap
6, spectrap 1
ciscoMgmt.441.2.2.2.1.2.2 = 2
ciscoMgmt.441.1.3.1.2.2 = 1
ciscoMgmt.441.2.2.2.2.2 = SIP SRST system state change up
```

- **csrstStateChange - SIP-SRST status change trap (Down)**

```
*Mar 7 20:57:23.451: SNMP: V1 Trap, ent ciscoMgmt.441, addr 1.4.196.10, gentrap
6, spectrap 1
ciscoMgmt.441.2.2.2.1.2.2 = 2
ciscoMgmt.441.1.3.1.2.2 = 2
ciscoMgmt.441.2.2.2.2.2 = SIP SRST system state change down
```

- **csrstSipPhoneUnRegThresholdExceeded Trap – SIP phone unregistration threshold exceeded**

```
*Mar 8 23:53:01.480: SNMP: V1 Trap, ent ciscoMgmt.441, addr 1.4.196.1, gentrap 6,
spectrap 3
ciscoMgmt.441.1.2.9.1.1 = 1
ciscoMgmt.441.1.3.2.1.1 = 1
```

- **csrstFailNotif – SRST System Failure Notification**

```
*Mar 6 01:53:58.957: SNMP: V1 Trap, ent ciscoMgmt.441, addr 1.4.196.1, gentrap 6,
spectrap 2
ciscoMgmt.441.2.2.2.1.1 = 1
ciscoMgmt.441.2.2.2.2.1 = Skinny listening socket setup error
```

- **csrstMaxConferenceExceeded – SRST maximum number of conferences exceeded**

```
*Mar 10 19:16:56.165: SNMP: V1 Trap, ent ciscoMgmt.441, addr 1.4.196.1, gentrap 6,
spectrap 5
ciscoMgmt.441.1.2.6.0 = 8
```

- **csrstSipPhoneRegFailed – SIP phone failed to register**

```
*Mar 11 19:25:00.663: SNMP: V1 Trap, ent ciscoMgmt.441, addr 1.4.196.1, gentrap 6,
spectrap 4
ciscoMgmt.441.1.4.7.1.4.0 = 1.4.196.41
```

## Command Reference

This section documents new or modified CLI commands applicable to this Cisco IOS release. All other CLI commands used with the CISCO-SRST-MIB feature are documented in the Cisco IOS Release 12.2 command reference publications.



# SNMP Overview

The following sections provide an overview of the SNMP.

## Network Management Overview

Network management takes place between two major types of systems: those in control (called managing systems) and those observed and controlled (called managed systems). The most common managing system is called a network management system (NMS). Managed systems can include hosts, servers, or network components such as routers or intelligent repeaters.

To promote interoperability, the cooperating systems must adhere to a common framework and a common language, called a protocol. In the Internet network management framework, that protocol is the Simple Network Management Protocol (SNMP). SNMP is an application-layer protocol designed to facilitate the exchange of network management information between network devices. The SNMP system consists of three parts:

- SNMP manager
- SNMP agent
- MIB

The Internet network management framework is based on the idea of a managing the system interfacing to a managed system. The managing system (called a manager) runs a network management application (called an agent). The managed system runs an agent that answers status requests from the manager. The manager and the managed system exchange information using SNMP.

The information exchanged between the manager and the managed system is about the Management Information Base (MIB), which defines all the information that can be seen or changed by the manager. The MIB may be either standard or proprietary, and a similar concept of the MIB must be shared by both the manager and the agent.

SNMP and its MIBs are defined in a combination of system-specific language and Abstract Syntax Notation 1 (ASN.1). Although ASN.1 is a rich definition language, SNMP uses only a subset of ASN.1, which is defined in the SNMP Structure of Management Information (SMI). For transmission, SNMP is encoded according to the ASN.1 basic encoding rules (BER).

SNMP may be carried over a wide choice of transport protocols. The most common combination is the User Datagram Protocol over the Internet Protocol, UDP/IP. Other possibilities include AppleTalk, Netware, and Ethernet.

SNMP has facilities for identifying the requester and the operational context in which a request is to be performed by the agent, such as read-only or read-write, a MIB subset for a particular group of users, or a subset that may be elsewhere or obtained through other mechanisms (proxy). These are the facilities concerned with security.

SNMP has a small number of MIB management operations it can perform for observation and control of MIB information, comprising various ways of reading (get operations), and one way of modifying (set operations).

The following topics are included as part of the network management overview:

- [MIB Overview, page 1-28](#)
- [SNMP, page 1-29](#)
- [Internet MIB Hierarchy, page 1-30](#)
- [SNMP MIB, page 1-31](#)

## MIB Overview

In a managed device, specialized low-impact software modules, called agents access information about the device and make it available to the network management system (NMS). Managed devices maintain values for a number of variables and report those, as required, to the NMS. For example, an agent can report data such as the number of bytes and packets in and out of the device, or the number of broadcast messages sent and received. In the Internet network management framework, each variable, which is a managed object, is any information that an agent can access and report back to the NMS.

All managed objects are contained in the MIB database. The managed objects can be set or read to provide information on network devices and interfaces. An NMS can control a managed device by sending a message to an agent of that managed device requiring the device to change the value of one or more of its managed objects.

## MIB Source

MIBs come from various sources:

- **Standard**—On the Internet Engineering Task Force (IETF) standards track at Proposed, Draft, or full standard. A Proposed Standard can change somewhat due to implementation experience. A Draft Standard changes somewhat less, with more attention to backward compatibility. A full Internet Standard doesn't change much. At all levels these are published as Requests for Comment (RFCs).
- **Internet Draft**—IETF work in progress. Sometimes the best way to instrument technology is with an Internet Draft MIB, which is typically being worked on by an IETF working group. Such MIBs are somewhat unstable, so it is necessary to capture the specific Internet Draft and to place the MIB within the Cisco Enterprise MIB space (not in the Experimental branch).
- **Cisco**—Cisco enterprise-specific (also called proprietary or private, even though publicly documented). Such MIBs add instrumentation not covered by standard MIBs. As of Cisco IOS Release 10.2, Cisco has old MIBs and new MIBs. The old MIBs are from older software versions and often have somewhat unconventional features.
- **Other companies**—Non-Cisco enterprise-specific. It is occasionally appropriate to implement a MIB defined by some other company, especially for technology they originated and instrumented. This presents problems like these associated with Internet Drafts in that a version of the MIB definition must be captured, but the MIB itself should remain wherever in the MIB space the originating company put it so as to easily support existing applications.

## MIB Objects

A MIB is conceptually a tree (as shown in [Figure 1-4](#)), where the leaves are the individual data objects. An object can be, for example, a counter or a protocol status. The SNMP framework uses the term “object” in a way different from the way OSI management uses it. An OSI object is a network entity, such as a router or a protocol, which has attributes. These OSI attributes and SNMP objects are essentially the same concept, that is, individual data values. A MIB object consists of the following values:

- **Object type**—Identifies the type of MIB object.
- **Syntax**—Identifies the data type which models the object.
- **Access**—Identifies the maximum level of access and can have one of five values (listed from highest to lowest level of access):
  - **Read-create**—Indicates that instances of the object may be read, written, and created

- Read-write—Indicates that instance of the object may be read or written, but not created
- Read-only—Indicates that instances of the object may be read but not written or created
- Accessible-for-notify—Indicates that instances of the object may only appear in notifications
- Not-accessible—Indicates that instances of the object may not be directly read, written, or created
- Status—The status of a managed object can be:
  - Mandatory—Indicates that the definition is required and should be implemented
  - Current—Indicates that the definition is current
  - Deprecated—Indicates that the definition will soon be made obsolete and need no longer be implemented
  - Obsolete—Indicates that managed nodes should not implement the object
- Description—Provides a textual description of the managed object

The following is an example of a MIB object:

```
tpTDMIfCollectTimeInterval OBJECT-TYPE
 SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
This object shows measurement time interval seconds.
 ::= {tpTDMIfStatTableEntry 1}
```

For descriptions of supported MIBs and how to use MIBs, see the Cisco MIB web site on CCO at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

## MIB Archive

Cisco MIBs are archived in the Cisco FTP server and are accessible by anonymous FTP at the following location: <ftp://ftpeng.cisco.com/pub/mibs>

## SNMP

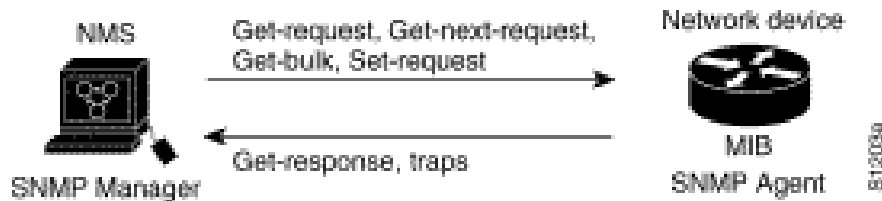
Cisco MIB variables are accessible through SNMP, which is an application-layer protocol designed to facilitate the exchange of management information between network devices.

Instead of defining a large set of commands, SNMP places all operations in a get-request, get-next-request, or set-request format. For example, an SNMP manager can get a value from an SNMP agent or store a value in that SNMP agent. The SNMP manager can be part of an NMS, and the SNMP agent can reside on a networking device such as a router. You can compile the Cisco MIB with your network management software. If SNMP is configured on a Catalyst Switch, the SNMP agent can respond to MIB-related queries being sent by the NMS.

An example of an NMS is the CiscoWorks network management software. CiscoWorks uses the Cisco MIB variables to set device variables and to poll devices on the internetwork for specific information. The results of a poll can be displayed as a graph and analyzed for the troubleshooting of internetwork problems. Results can also be used to increase network performance, verify the configuration of devices, monitor traffic loads, and so on.

As shown in [Figure 1-3](#), the SNMP agent gathers data from the MIB, which is the repository for information about device parameters and network data. The agent can send traps, or notifications of events of interest, to the manager. The Cisco trap file, `mib.traps`, which documents the format of the Cisco traps, is available on the Cisco host `ftp.cisco.com`.

**Figure 1-3** Simple Network Management Protocol Network



The SNMP manager uses information in the MIB to perform the operations described in [Table 1-5](#).

**Table 1-5** SNMP Manager Operations

| Operation        | Description                                                                                                         |
|------------------|---------------------------------------------------------------------------------------------------------------------|
| get-request      | Retrieve a value from a specific variable.                                                                          |
| get-next-request | Retrieve the value following the named variable. Often used to retrieve variables from within a table. <sup>1</sup> |
| get-response     | The reply to a get-request, get-next-request, get-bulk-request, or set-request sent by an NMS.                      |
| get-bulk-request | Similar to a get-next-request, but fill the get-response with up to max-repetition number of get-next interactions. |
| set-request      | Store a value in a specific variable.                                                                               |
| trap             | An unsolicited message sent by an SNMP agent to an SNMP manager indicating that some event has occurred.            |

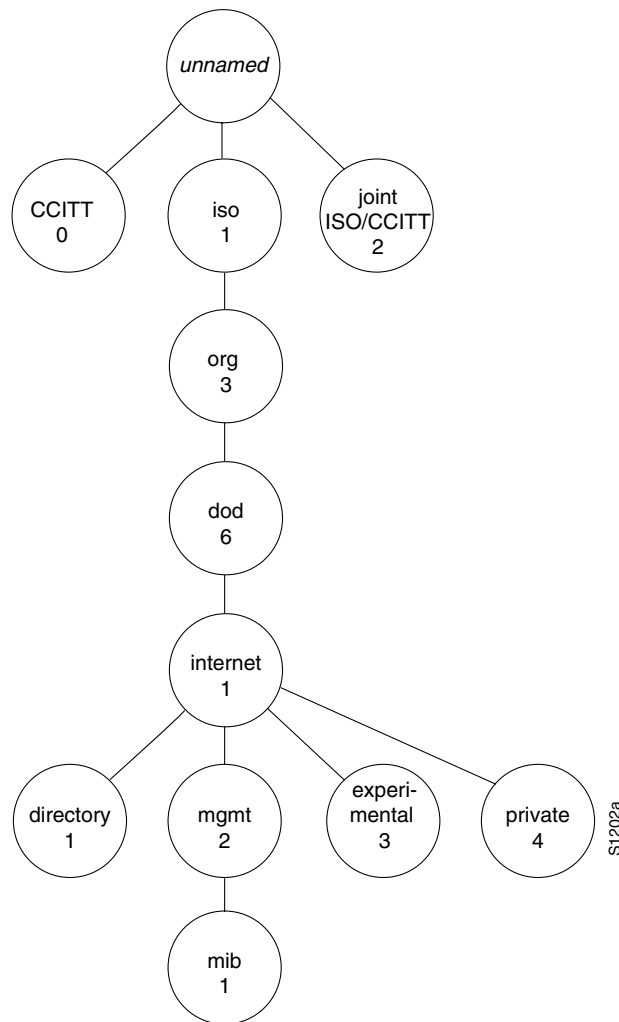
1. With this operation, an SNMP manager does not need to know the exact variable name. A sequential search is performed to find the needed variable from within the MIB.

## Internet MIB Hierarchy

The MIB structure is logically represented by a tree hierarchy (see [Figure 1-4](#)). The structure uses branches and the branches that fall below each category have short text strings and integers to identify them. Text strings describe object names, and integers allow computer software to create compact, encoded representations of the names. For example, the Cisco MIB variable `authAddr` is an object name and is denoted by number 5, which is listed at the end of its object identifier number 1.3.6.1.4.1.9.2.1.5.

The object identifier in the Internet MIB hierarchy is the sequence of numeric labels on the nodes along a path from the root to the object. The Internet standard MIB is represented by the object identifier 1.3.6.1.2.1. It also can be expressed as `iso.org.dod.internet.mgmt.mib`. (See [Figure 1-4](#).)

Figure 1-4 Internet MIB Hierarchy



## SNMP MIB

An SNMP MIB is an abstract database, that is, a conceptual specification for information that a management application may read and modify in a certain form. This does not imply that the information is kept in the managed system in that same form. The SNMP agent translates between the internal data structures and formats of the managed system and the external data structures and formats defined for the MIB.

The SNMP MIB is conceptually a tree structure with conceptual tables, described in more detail in the following sections. Relative to this tree structure, the term “MIB” is used in two ways. In one way, it is actually a MIB branch, usually containing information for a single aspect of technology, such as a transmission medium or a routing protocol. A MIB used in this way is more accurately called a MIB module, and is usually defined in a single document.

In the other way, a MIB is a collection of such branches. Such a collection of MIB branches might comprise, for example, all of the MIB modules implemented by a given agent, or the entire collection of MIB modules defined for SNMP.

MIBs can be standard or enterprise. Internet standard MIBs are defined by working groups of the IETF and published as RFCs. Enterprise MIBs are defined by other organizations, which are usually individual companies. Done properly, enterprise MIBs instrument technology not covered by standard MIBs, either completely or as an extension to a standard MIB.

The prototypical standard MIB is MIB-II, the second revision of the original SNMP MIB. MIB-II contains branches for the basic areas of instrumentation, such as the system, its network interfaces, IP, and TCP. All of these started out in a single MIB module, but as SNMPv2 evolves, they are being split into separate modules.

## Compliance

Cisco MIBs are a set of variables that are private extensions to the Internet standard MIB-II. The MIB-II is documented in RFC 1213 (Management Information Base for Network Management of TCP/IP-based Internets: MIB-II). This RFC includes information on the benefits of the new feature, supported platforms, related documents, troubleshooting tips, configuration examples, and a detailed command reference.

## Cisco Compliance

At present, Cisco implementations of standard MIBs are often read-only or have some objects or object groups missing because of security concerns or time requirements for implementation. Since Cisco IOS Release 10.2, developers must document such specifics with AGENT-CAPABILITIES from RFC 1904.

## Implementation

To find what MIBs Cisco implements, start at [ftp-eng.cisco.com](http://ftp-eng.cisco.com) with [ftp://ftp-eng.cisco.com/pub/mibs/README](http://ftp-eng.cisco.com/pub/mibs/README).

This contains a list of MIBs available for various software versions. The MIB list cannot account for MIBs not included in a particular software subset or because a feature is turned off. Whether or not the MIB is included is the function of AGENT-CAPABILITIES descriptions and the `snmpORTable` (RFC 1907) in later software versions.

## SNMP MIB Tables

Tables are a powerful and often confusing aspect of SNMP MIBs. Architectural purists say SNMP has conceptual tables, not real tables. This is because every object, whether in a table or not, is a leaf of the tree, identified by an object identifier (OID) that includes an instance. So, in an abstract sense, all objects are alike. But practically speaking, SNMP has tables, and using or implementing them gets somewhat more complex than implementing scalars, which are single object instances.

Tables have a rigid structure, defined in the SMI. Tables can contain only simple objects, not other tables, although multiple indexes can represent the concept of tables in tables. An entry, or row, in a table is uniquely identified by one or more table indexes, also called auxiliary objects. The OID of an object from a table is the OID for that object's position in the MIB tree concatenated with a representation of all the table indexes for an entry in the table.

For example, the Interface MIB (RFC 1573) has a key table called the ifTable. Its index object is ifIndex, an integer. Minus the instance, the OID for a counter from that table is:

```
iso.internet.mgmt.mib-2.interfaces.ifTable.ifEntry.ifInOctets
```

Or, numerically:

```
1.3.6.1.2.1.2.2.1.10
```

For the interface with ifIndex 7, the full OID is:

```
iso.internet.mgmt.mib-2.interfaces.ifTable.ifEntry.ifInOctets.7
```

```
1.3.6.1.2.1.2.2.1.10.7
```

Observe that row selection (instance) comes after column selection. This can be particularly confusing when you are applying the principle of lexical order to a table. Using the GetNext protocol operation to walk a table, you can proceed by column, that is, all instances for a column are returned before the next column is started.

Table indexes can be much more complex than tables. Here is an example from the Cisco VINES MIB. The INDEX clause from the ASN.1 definition is:

```
INDEX { cvForwNeighborHost,
 ifIndex,
 cvForwNeighborPhysAddress }
```

The first two indexes are simple integers, with ifIndex being imported from the standard ifTable. The final index is a variable length octet string. Including the integers is simple and obvious. The variable-length index object gets more complex. RFC 1212 includes rules for encoding variable length index objects as instances. The general rule is that the value is preceded by a length, and the length and each part of the value are separate subidentifiers.

So, for example, if we have neighbor host number 9, ifIndex 3, and an Ethernet neighbor physical address 0000.0c03.1ef0, the instance portion of an object for that row is 9.3.6.0.0.12.3.30.240.

In RFC 1902, SNMPv2 extends the instance encoding rules to include an “IMPLIED” keyword that can be used on the final instance object if it is variable length. When “IMPLIED” is present, the string instance cannot have a zero length in front of it.

Because lexical ordering for variable length instance objects effectively sorts them by length, your ASCII text index will not come out naturally in alphabetical order.

## CISCO-SRST-MIB Object Groups

[Table 1-6](#) lists the CISCO-SRST-MIB objects, which are presented according to their group.

The CISCO-SRST-MIB is organized by the following groups listed in [Table 1-6](#)

- csrstConf
- csrstNotifInfo
- csrstActiveStats
- csrstSipConf
- CiscoSrstMIBNotifs

Table 1-6 SRST MIB Object Groups and Descriptions

| MIB Group             | MIB Object          | Max Access | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------|---------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>csrstConfGroup</b> |                     |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                       | csrstEnabled        | read-only  | Cisco SRST support is enabled or disabled. When enabled, the router is in fallback mode to provide call-handling support to IP phones. If disabled, all of the objects in this group have no significance.                                                                                                                                                                                                                                                   |
|                       | csrstVersion        | read-only  | Cisco SRST version.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                       | csrstIPAddressType  | read-only  | Internet address type governing the address type format for one or more InetAddress objects in this MIB. The associated InetAddress objects' description will refer back to this type object as appropriate.                                                                                                                                                                                                                                                 |
|                       | csrstIPAddress      | read-only  | Cisco SRST IP address for the router to receive messages from IP phones, typically one of the addresses of an Ethernet port of the router. The type of IP address used here is indicated by the csrstSysIPAddressType object.                                                                                                                                                                                                                                |
|                       | csrstPortNumber     | read-only  | This object indicates the TCP port number to use for Skinny Client Control Protocol (SCCP) and is range limited. This port also indicates through which IP phones communicate with SRST.                                                                                                                                                                                                                                                                     |
|                       | csrstMaxConferences | read-only  | Maximum number of simultaneous three-party conference calls configured on the router. Range is IOS version and platform dependent. With SRST Version 3.0 onwards, the following are the maximum values for each platform -<br>Cisco 1751, Cisco 1760, Cisco 2600, Cisco 3640<br>- 8 conferences.<br>Cisco 3660, Cisco 3725, Cisco 3745<br>- 16 conferences.<br>Default is half the maximum number of simultaneous three-party conferences for each platform. |
|                       | csrstMaxEphones     | read-only  | Maximum number of Cisco IP phones configured on the SRST router. Range is IOS version and platform dependent.                                                                                                                                                                                                                                                                                                                                                |
|                       | csrstMaxDN          | read-only  | Maximum number of IP phones extensions (Ephone-dns) or directory number configured on this SRST router. Range is IOS version and platform dependent. Default is 0."<br><br>-- This object is changeable by NMS to set a threshold -- for a trap to be reported. This refers to SIP phones -- only.                                                                                                                                                           |



Table 1-6 SRST MIB Object Groups and Descriptions (continued)

| MIB Group | MIB Object                  | Max Access | Description                                                                                                                                                                                                                                                                                                                                                                   |
|-----------|-----------------------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           | csrStSipPhoneUnRegThreshoId | read-write | This object indicates a threshold for the number of SIP phones unregistered to SRST. This threshold is changeable by the NMS user.                                                                                                                                                                                                                                            |
|           | csrStCallFwdNoAnswer        | read-only  | Cisco SRST call forwarding number when a Cisco IP phone is not answered. This directory number is a fully qualified E.164 number.                                                                                                                                                                                                                                             |
|           | csrStCallFwdNoAnswerTo      | read-only  | Timeout in seconds if a Cisco IP phone is not answered, Cisco SRST will call forward to another directory number.                                                                                                                                                                                                                                                             |
|           | csrStCallFwdBusy            | read-only  | Cisco SRST call forwarding number when a Cisco IP phone is busy. This directory number is a fully qualified E.164 number.                                                                                                                                                                                                                                                     |
|           | csrStMohFilename            | read-only  | Cisco SRST Music-On-Hold is enabled with file on flash, or disabled without a file on flash. MOH is enabled by default.                                                                                                                                                                                                                                                       |
|           | csrStMohMulticastAddrType   | read-only  | Internet address type governing the address type format for one or more InetAddress objects in this MIB. The associated InetAddress objects' description will refer back to this type object as appropriate.                                                                                                                                                                  |
|           | csrStMohMulticastAddr       | read-only  | This object indicates Cisco SRST Music-On-Hold Multicast IP address. When configured, this feature enables continuous IP multicast output of MOH from a Flash MOH file. This object has no significance if MOH is not configured. Default is the csrStIPAddress object for Cisco SRST. The type of IP address used here is indicated by the csrStMohMulticastAddrType object. |
|           | csrStMohMulticastPort       | read-only  | This object indicates Cisco SRST Music-On-Hold Multicast TCP port which is range limited. When configured, this feature enables                                                                                                                                                                                                                                               |
|           | csrStVoiceMailNumber        | read-only  | Cisco SRST voice mail number that is speed-dialed when the messages button on a Cisco IP phone is pressed. This voice mail number is a fully qualified E.164 number. If voice-mail number is not configured, this object will have a string length of 2 with the value '**'.                                                                                                  |
|           | csrStSystemMessagePrimary   | read-only  | Cisco SRST system static text message that is displayed on Cisco IP phone during fallback. Length of text string is less than 32 characters. Default message is 'CM Fallback Service Operating'.                                                                                                                                                                              |
|           | csrStSystemMessageSecondary | read-only  | Cisco SRST system message that is displayed on Cisco IP phone that does not support static text message and have a limited display space during fallback. Length of text string is less than 20 characters. Default messages is 'CM Fallback Service'.                                                                                                                        |

Table 1-6 SRST MIB Object Groups and Descriptions (continued)

| MIB Group | MIB Object             | Max Access | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------|------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           | csrstScriptName        | read-only  | Cisco SRST session-level IVR application script. This application can be written in Tool Command Language (TCL) and is applied to all Cisco IP phone lines served by the SRST router. If no application script name is configured, the default built-in IOS application will be applied to all phone lines served by the SRST router and this object will be a zero-length string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|           | csrstSecondaryDialTone | read-only  | Cisco SRST secondary dial tone digits. When a Cisco IP phone user dials a PSTN access prefix, defined by the secondary dial tone digits, the secondary dial tone is enabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|           | csrstTransferSystem    | read-only  | <p>Cisco SRST call transfer method using the ITU-T H.450.2 standard. Default setting is blind.</p> <p>blind (1),<br/> fullBlind (2),<br/> fullConsult (3),<br/> localConsult (4)</p> <p>blind - Calls are transferred without consultation using a single phone line and the Cisco proprietary method.</p> <p>fullBlind - Calls are transferred without consultation using H.450.2 standard methods.</p> <p>fullConsult - Calls are transferred using H.450.2 with consultation using the second phone line if available, or the calls fall back to full-blind if the second line is unavailable.</p> <p>localConsult - Calls are transferred with local consultation using the second phone line if available, or the calls fall back to blind for non- local consultation or transfer target. This mode is intended for use primarily in Voice over Frame Relay (VoFR) networks.</p> |

Table 1-6 SRST MIB Object Groups and Descriptions (continued)

| MIB Group | MIB Object              | Max Access | Description                                                                                                                                                                                                                                        |
|-----------|-------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           | csrstUserLocaleInfo     | read-only  | Cisco SRST language for displays on Cisco IP phone by country.<br>denmark (1),<br>france (2),<br>germany (3),<br>italy (4),<br>netherlands (5),<br>norway (6),<br>portugal (7),<br>russian (8),<br>spain (9),<br>sweden (10),<br>us (11) - default |
|           | csrstDateFormat         | read-only  | Date display format on Cisco IP phones in the Cisco SRST system.<br>mmddyy (1) - default,<br>ddmmyy (2),<br>yyddmm (3)<br>yymmdd (4)                                                                                                               |
|           | csrstTimeFormat         | read-only  | Time display format on Cisco IP phones in the Cisco SRST system.<br>twelveHour (1) - default,<br>twentyFourHour (2)                                                                                                                                |
|           | csrstInterdigitTo       | read-only  | Cisco SRST interdigit timeout duration in seconds for Cisco IP phones.                                                                                                                                                                             |
|           | csrstBusyTo             | read-only  | Cisco SRST time in seconds before disconnect when destination is busy, without call-forwarding.                                                                                                                                                    |
|           | csrstAlertTo            | read-only  | Cisco SRST time in seconds before disconnect when call is not answered, without call-forwarding.                                                                                                                                                   |
|           | csrstXlateCalledNumber  | read-only  | This object indicates the tag of a corresponding translation rule, which utilizes the number-translation mechanism of the IOS to translate a called number on the Cisco SRST router.                                                               |
|           | csrstXlateCallingNumber | read-only  | This object indicates the tag of a corresponding translation rule, which utilizes the number-translation mechanism of the IOS to translate a calling number on the Cisco SRST router.                                                              |

Table 1-6 SRST MIB Object Groups and Descriptions (continued)

| MIB Group | MIB Object                    | Max Access | Description                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------|-------------------------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           | csrstAliasTag                 | read-only  | A unique sequence number that indicates a particular alias pattern configured on this SRST router.                                                                                                                                                                                                                                                                                                                              |
|           | csrstAliasNumPattern          | read-only  | This object indicates the pattern to match the incoming telephone number. It may include wildcards.                                                                                                                                                                                                                                                                                                                             |
|           | csrstAliasAltNumber           | read-only  | This object indicates the alternate telephone phone number to route incoming calls to match the number pattern. This has to be a valid extension for an IP phone actively registered on the SRST router.                                                                                                                                                                                                                        |
|           | csrstAliasPreference          | read-only  | This object indicates the preference value of the associated dial-peer. A value of 0 has the highest preference.                                                                                                                                                                                                                                                                                                                |
|           | csrstAliasHuntStopEnabled     | read-only  | This object specifies that if hunt stop is enabled, after the caller tried the alternate number according to the alias pattern, it will stop call hunting. If hunt stop is disabled, it will rollover to another directory number if available.                                                                                                                                                                                 |
|           | csrstAccessCodeType           | read-only  | <p>This object indicates the type of trunk line to which the access-code is applied to.</p> <p>fxo (1),<br/>em (2),<br/>bri (3),<br/>pri (4)</p> <p>The type of trunk lines can be fxo, e&amp;m, bri, and pri.</p> <p>fxo - Enables a foreign exchange office (FXO) interface.</p> <p>em - Enables an analog ear and mouth (E&amp;M) interface.</p> <p>bri - Enables a BRI interface.</p> <p>pri - Enables a PRI interface.</p> |
|           | csrstAccessCode               | read-only  | This object indicates the access-code to be applied to the corresponding trunk line by creating dial-peers.                                                                                                                                                                                                                                                                                                                     |
|           | csrstAccessCodeDIDEnable<br>d | read-only  | This object indicates the direct-inward- dial on a POTS dial-peer is enabled or disabled.                                                                                                                                                                                                                                                                                                                                       |

Table 1-6 SRST MIB Object Groups and Descriptions (continued)

| MIB Group                    | MIB Object                     | Max Access            | Description                                                                                                                                                                                                                                                                                                                         |
|------------------------------|--------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              | csrstLimitDNType               | read-only             | This object indicates the type of IP phone to which the limit-dn is applied to.<br>ipPhone7910 (1),<br>ipPhone7935 (2),<br>ipPhone7940 (3),<br>ipPhone7960 (4),<br>ipPhone7970 (5),<br>ipPhone7936 (6)                                                                                                                              |
|                              | csrstLimitDN                   | read-only             | This object indicates the maximum number of directory numbers available to each type of IP phone. The current range of maximum lines setting is from 1 to 34. The default is 6.                                                                                                                                                     |
|                              | csrstNotificationEnabled       | read-write            | This variable indicates whether this system produces the SRST notifications. A false value will prevent SRST notifications from being generated by this system.                                                                                                                                                                     |
| <b>csrstNotifInfoGroup</b>   |                                |                       |                                                                                                                                                                                                                                                                                                                                     |
|                              | csrstSysNotifSeverity          | accessible-for-notify | The internally-defined severity of the particular alarm condition, associated with the most recent SNMP notification. A subsequent event in which the alarm condition changes from its failed state back to a 'normal' state has a severity of 'clear'. This severity-level value is supplied with each SRST specific notification. |
|                              | csrstSysNotifReason            | accessible-for-notify | The internally-defined failure cause of the particular alarm condition, associated with the most recent system notification.                                                                                                                                                                                                        |
| <b>csrstActiveStatsGroup</b> |                                |                       |                                                                                                                                                                                                                                                                                                                                     |
|                              | csrstState                     | read-only             | This object indicates the current state of Cisco SRST feature on this router.<br>Active - At least one IP or SIP phone is registered<br>Inactive - Cisco SRST has no IP or SIP phones registered<br>This object has no significance if csrstEnabled object is disabled.                                                             |
|                              | csrstSipPhoneCurrentRegistered | read-only             | Total number of SIP phones currently registered to the SRST router.                                                                                                                                                                                                                                                                 |
|                              | csrstSipCallLegs               | read-only             | Total number of SIP call legs routed through the SRST router since going active. This includes incoming and outgoing calls.                                                                                                                                                                                                         |

Table 1-6 SRST MIB Object Groups and Descriptions (continued)

| MIB Group                | MIB Object                     | Max Access     | Description                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------|--------------------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | csrstTotalUpTime               | read-only      | Accumulated total number of minutes that router is active in SRST mode.                                                                                                                                                                                                                                                                                                                                                |
| <b>csrstSipConfGroup</b> |                                |                |                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                          | csrstSipRegSrvExpMax           | read-only      | This object indicates the maximum expiration time for the SIP Registrar Server to timeout on a registration.                                                                                                                                                                                                                                                                                                           |
|                          | csrstSipRegSrvExpMin           | read-only      | This object indicates the minimum expiration time for the SIP Registrar Server to timeout on a registration.                                                                                                                                                                                                                                                                                                           |
|                          | csrstSipIp2IpGlobalEnabled     | read-only      | This object indicates whether voip calls are re-directed IP to IP globally.                                                                                                                                                                                                                                                                                                                                            |
|                          | csrstSipSend300MultSupport     | read-only      | This object indicates whether the redirect contact order is best or longest match. This applies globally for SIP.<br><br>bestMatch (1),<br>longestMatch (2)<br><br>bestMatch - Uses the current system configuration to set the order of contacts.<br><br>longestMatch - Sets the contact order by using the destination pattern longest match first, and then the second longest match, the third longest match, etc. |
|                          | csrstSipVoRegPoolTag           | not-accessible | A unique identifier tag configured for a voice register pool entry.                                                                                                                                                                                                                                                                                                                                                    |
|                          | csrstSipNetId                  | read-only      | This object indicates the network identification information of the SIP voice register pool configured on this router. This object can be the network Id, IP address, or MAC address.                                                                                                                                                                                                                                  |
|                          | csrstSipVoRegPoolIpAddressType | read-only      | Internet address type governing the address type format for one or more InetAddress objects in this MIB. The associated InetAddress objects' description will refer back to this type object as appropriate.                                                                                                                                                                                                           |
|                          | csrstSipNetMask                | read-only      | This object indicates the IP subnet configured for the SIP voice register pool. The type of IP subnet used here is indicated by the csrstSipVoRegPoolIpAddressType object.                                                                                                                                                                                                                                             |
|                          | csrstSipProxySrvIpAddress      | read-only      | This object indicates the IP address of the proxy server configured for the SIP voice register pool. The type of IP address used here is indicated by the csrstSipVoRegPoolIpAddressType object.                                                                                                                                                                                                                       |
|                          | csrstSipProxySrvPref           | read-only      | This object indicates the preference order for creating the VoIP dial peers in the voice register pool. Setting the preference enables the desired dial peer to be selected when multiple dial peers within a hunt group are matched for a dial string. A value of 0 has the highest preference.                                                                                                                       |

Table 1-6 SRST MIB Object Groups and Descriptions (continued)

| MIB Group | MIB Object                         | Max Access     | Description                                                                                                                                                                                                                                                                                  |
|-----------|------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           | csrStSipProxySrvMonitor            | read-only      | Cisco SIP SRST monitoring protocol of the proxy server configured for the SIP voice register pool. This monitoring protocol can be ICMP ping or RTR probes.<br>icmp (1),<br>rtr (2)                                                                                                          |
|           | csrStSipProxySrvAltIpAddr          | read-only      | Cisco SIP SRST monitoring of an alternate IP address other than the proxy configured for the SIP voice register pool. The type of IP address used here is indicated by the csrStSipVoRegPoolIpAddrType object.                                                                               |
|           | csrStSipDefaultPreference          | read-only      | This object indicates the default preference of the proxy dial-peers created in the voice register pool. If csrStSipProxySrvPref object is not set, the default preference is applied to the dial-peers created. A value of 0 has the highest preference.                                    |
|           | csrStSipVoRegPoolAppl              | read-only      | Application for the SIP dial-peers configured under voice register pool.                                                                                                                                                                                                                     |
|           | csrStSipVoRegNumberListTag         | read-only      | This object indicates the particular index of the number list configured for the corresponding voice register pool.                                                                                                                                                                          |
|           | csrStSipVoRegNumberPattern         | read-only      | This object indicates the number pattern that the registrar permits to handle the register message from the SIP phone. This number pattern is a fully qualified E.164 number.                                                                                                                |
|           | csrStSipVoRegNumberPref            | read-only      | This object indicates the preference of the number pattern configured for the corresponding voice register pool.                                                                                                                                                                             |
|           | csrStSipVoRegNumberHuntstopEnabled | read-only      | This object indicates huntstop is enabled (true) or disabled (false) for the number pattern configured for the corresponding voice register pool. If enabled, the incoming call will stop hunting if the dial-peer is busy. If disabled, the incoming call will hunt further for dial-peers. |
|           | csrStSipEndpointTag                | not-accessible | This object is a number that indicates a SIP endpoint configured on this SRST router                                                                                                                                                                                                         |
|           | csrStSipVoRegPoolEdptTag           | read-only      | This object indicates the voice register pool tag from which the corresponding SIP endpoint (dial-peer) is created.                                                                                                                                                                          |
|           | csrStSipEndpointIpAddrType         | read-only      | Internet address type governing the address type format for one or more InetAddress objects in this MIB. The associated InetAddress objects' description will refer back to this type object as appropriate.                                                                                 |

Table 1-6 SRST MIB Object Groups and Descriptions (continued)

| MIB Group                    | MIB Object                     | Max Access   | Description                                                                                                                                                                                                                    |
|------------------------------|--------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              | csrStSipEndpointIpAddress      | read-only    | This object indicates the SIP endpoint IP address configured on this router. The type of IP address used here is indicated by the csrStSipEndpointIpAddrType object.                                                           |
|                              | csrStSipEndpointDN             | read-only    | This object indicates the SIP phone's DN or line number assigned to the SIP endpoint.                                                                                                                                          |
| <b>csrStActiveStatsGroup</b> |                                |              |                                                                                                                                                                                                                                |
|                              | csrStSipVoRegNumberListTag     | read-only    | This object indicates the particular index of the number list configured for the corresponding voice register pool.                                                                                                            |
|                              | csrStState                     | read-only    | This object indicates the current state of Cisco SRST feature on this router.<br>Active - At least one IP or SIP phone is registered<br>Inactive - Cisco SRST has no IP or SIP phones registered                               |
|                              | csrStSipPhoneCurrentRegistered | read-only    | Total number of SIP phones currently registered to the SRST router.                                                                                                                                                            |
|                              | csrStSipCallLegs               | read-only    | Total number of SIP call legs routed through the SRST router since going active. This includes incoming and outgoing calls.                                                                                                    |
|                              | csrStTotalUpTime               | read-only    | Accumulated total number of minutes that router is active in SRST mode.                                                                                                                                                        |
| <b>csrStMIBNotifsGroup</b>   |                                |              |                                                                                                                                                                                                                                |
|                              | csrStStateChange               | notification | An SRST up or down state change notification is generated. This indicates one or more phones is registered to the SRST router or none is registered.<br><br>csrStSysNotifSeverity<br><br>csrStState<br><br>csrStSysNotifReason |
|                              | csrStFailNotif                 | notification | A failure notification is generated when the SRST router encounters a catastrophic failure.                                                                                                                                    |



Table 1-6 SRST MIB Object Groups and Descriptions (continued)

| MIB Group | MIB Object                        | Max Access   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------|-----------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           | csrStSipPhoneUnRegThresholdExceed | notification | A SIP phone unregistration notification is generated when the number of SIP phone unregistrations have exceeded the threshold. The number of currently registered SIP phones is provided here by <code>csrStSipPhoneCurrentRegistered</code> object as a reference such that if <code>csrStSipPhoneCurrentRegistered</code> falls below <code>csrStSipPhoneUnRegThreshold</code> , a notification will be generated to indicate that the number of unregistered SIP phones has crossed the threshold.<br><code>csrStSipPhoneUnRegThreshold</code><br><code>csrStSipPhoneCurrentRegistered</code> |
|           | csrStSipPhoneRegFailed            | notification | A SIP phone fail registration notification is generated when the SIP phone fails to register.<br><code>csrStSipEndpointIpAddress</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|           | csrStConferenceFailed             | notification | A conference failure notification is generated when the maximum number of conferences are exceeded.<br><code>csrStMaxConferences</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## SRST Traps

SRST traps are SNMP traps, which are unsolicited notifications of an unusual or a catastrophic system event sent to the system administrator.

SRST traps or alerts are sent for the following:

- Notification (alarm/trap): SRST SCCP port is down.
- Threshold (trap and event correlation) on phones registering back and forth between CM and SRST router due to flapping WAN link.
- Threshold (trap and event correlation) on phones registering back and forth between SIP server/proxy and SIP SRST router due to flapping WAN link.



### Note

Send traps by modem or ISDN dial backup links to a secondary NMS when the primary NMS is down. (Do this through the configuration in the SRST router.)

## Cisco-SRST-MIB Object Mappings

Table 1-7 lists the CISCO-SRST-MIB OID mappings.

**Table 1-7 Cisco-SRST-MIB OID Mappings**

| <b>Object Name</b>                | <b>Object ID</b>           |
|-----------------------------------|----------------------------|
| ciscoMgmt                         | 1.3.6.1.4.1.9.9            |
| <b>ciscoSrstMIB</b>               | 1.3.6.1.4.1.9.9.441        |
| ciscoSrstMIBNotifications         | 1.3.6.1.4.1.9.9.441.0      |
| csrStStateChange                  | 1.3.6.1.4.1.9.9.441.0.1    |
| csrStFailNotif                    | 1.3.6.1.4.1.9.9.441.0.2    |
| csrStSipPhoneUnRegThresholdExceed | 1.3.6.1.4.1.9.9.441.0.3    |
| csrStSipPhoneRegFailed            | 1.3.6.1.4.1.9.9.441.0.4    |
| csrStConferenceFailed             | 1.3.6.1.4.1.9.9.441.0.5    |
| ciscoSrstMIBObjects               | 1.3.6.1.4.1.9.9.441.1      |
| csrStGlobal                       | 1.3.6.1.4.1.9.9.441.1.1    |
| csrStConf                         | 1.3.6.1.4.1.9.9.441.1.2    |
| csrStEnabled                      | 1.3.6.1.4.1.9.9.441.1.2.1  |
| csrStVersion                      | 1.3.6.1.4.1.9.9.441.1.2.2  |
| csrStIPAddressType                | 1.3.6.1.4.1.9.9.441.1.2.3  |
| csrStIPAddress                    | 1.3.6.1.4.1.9.9.441.1.2.4  |
| csrStPortNumber                   | 1.3.6.1.4.1.9.9.441.1.2.5  |
| csrStMaxConferences               | 1.3.6.1.4.1.9.9.441.1.2.6  |
| csrStMaxEphones                   | 1.3.6.1.4.1.9.9.441.1.2.7  |
| csrStMaxDN                        | 1.3.6.1.4.1.9.9.441.1.2.8  |
| csrStSipPhoneUnRegThreshold       | 1.3.6.1.4.1.9.9.441.1.2.9  |
| csrStCallFwdNoAnswer              | 1.3.6.1.4.1.9.9.441.1.2.10 |
| csrStCallFwdNoAnswerTo            | 1.3.6.1.4.1.9.9.441.1.2.11 |
| csrStCallFwdBusy                  | 1.3.6.1.4.1.9.9.441.1.2.12 |
| csrStMohFilename                  | 1.3.6.1.4.1.9.9.441.1.2.13 |
| csrStMohMulticastAddrType         | 1.3.6.1.4.1.9.9.441.1.2.14 |
| csrStMohMulticastAddr             | 1.3.6.1.4.1.9.9.441.1.2.15 |
| csrStMohMulticastPort             | 1.3.6.1.4.1.9.9.441.1.2.16 |
| csrStVoiceMailNumber              | 1.3.6.1.4.1.9.9.441.1.2.17 |
| csrStSystemMessagePrimary         | 1.3.6.1.4.1.9.9.441.1.2.18 |
| csrStSystemMessageSecondary       | 1.3.6.1.4.1.9.9.441.1.2.19 |
| csrStScriptName                   | 1.3.6.1.4.1.9.9.441.1.2.20 |
| csrStSecondaryDialTone            | 1.3.6.1.4.1.9.9.441.1.2.21 |
| csrStTransferSystem               | 1.3.6.1.4.1.9.9.441.1.2.22 |
| csrStUserLocaleInfo               | 1.3.6.1.4.1.9.9.441.1.2.23 |
| csrStDateFormat                   | 1.3.6.1.4.1.9.9.441.1.2.24 |
| csrStTimeFormat                   | 1.3.6.1.4.1.9.9.441.1.2.25 |

Table 1-7 Cisco-SRST-MIB OID Mappings (continued)

| Object Name                    | Object ID                      |
|--------------------------------|--------------------------------|
| csrstInterdigitTo              | 1.3.6.1.4.1.9.9.441.1.2.26     |
| csrstBusyTo                    | 1.3.6.1.4.1.9.9.441.1.2.27     |
| csrstAlertTo                   | 1.3.6.1.4.1.9.9.441.1.2.28     |
| csrstXlateCalledNumber         | 1.3.6.1.4.1.9.9.441.1.2.29     |
| csrstXlateCallingNumber        | 1.3.6.1.4.1.9.9.441.1.2.30     |
| <b>csrstAliasTable</b>         | 1.3.6.1.4.1.9.9.441.1.2.31     |
| csrstAliasEntry                | 1.3.6.1.4.1.9.9.441.1.2.31.1   |
| csrstAliasIndex                | 1.3.6.1.4.1.9.9.441.1.2.31.1.1 |
| csrstAliasTag                  | 1.3.6.1.4.1.9.9.441.1.2.31.1.2 |
| csrstAliasNumPattern           | 1.3.6.1.4.1.9.9.441.1.2.31.1.3 |
| csrstAliasAltNumber            | 1.3.6.1.4.1.9.9.441.1.2.31.1.4 |
| csrstAliasPreference           | 1.3.6.1.4.1.9.9.441.1.2.31.1.5 |
| csrstAliasHuntStopEnabled      | 1.3.6.1.4.1.9.9.441.1.2.31.1.6 |
| <b>csrstAccessCodeTable</b>    | 1.3.6.1.4.1.9.9.441.1.2.32     |
| csrstAccessCodeEntry           | 1.3.6.1.4.1.9.9.441.1.2.32.1   |
| csrstAccessCodeType            | 1.3.6.1.4.1.9.9.441.1.2.32.1.1 |
| csrstAccessCode                | 1.3.6.1.4.1.9.9.441.1.2.32.1.2 |
| csrstAccessCodeDIDEnabled      | 1.3.6.1.4.1.9.9.441.1.2.32.1.3 |
| <b>csrstLimitDNTable</b>       | 1.3.6.1.4.1.9.9.441.1.2.33     |
| csrstLimitDNEntry              | 1.3.6.1.4.1.9.9.441.1.2.33.1   |
| csrstLimitDNType               | 1.3.6.1.4.1.9.9.441.1.2.33.1.1 |
| csrstLimitDN                   | 1.3.6.1.4.1.9.9.441.1.2.33.1.2 |
| csrstNotificationEnabled       | 1.3.6.1.4.1.9.9.441.1.2.34     |
| <b>csrstActiveStats</b>        | 1.3.6.1.4.1.9.9.441.1.3        |
| csrstState                     | 1.3.6.1.4.1.9.9.441.1.3.1      |
| csrstSipPhoneCurrentRegistered | 1.3.6.1.4.1.9.9.441.1.3.2      |
| csrstSipCallLegs               | 1.3.6.1.4.1.9.9.441.1.3.3      |
| csrstTotalUpTime               | 1.3.6.1.4.1.9.9.441.1.3.4      |
| <b>csrstSipConf</b>            | 1.3.6.1.4.1.9.9.441.1.4        |
| csrstSipRegSrvExpMax           | 1.3.6.1.4.1.9.9.441.1.4.1      |
| csrstSipRegSrvExpMin           | 1.3.6.1.4.1.9.9.441.1.4.2      |
| csrstSipIp2IpGlobalEnabled     | 1.3.6.1.4.1.9.9.441.1.4.3      |
| csrstSipSend300MultSupport     | 1.3.6.1.4.1.9.9.441.1.4.4      |
| <b>csrstSipVoRegPoolTable</b>  | 1.3.6.1.4.1.9.9.441.1.4.5      |
| csrstSipVoRegPoolEntry         | 1.3.6.1.4.1.9.9.441.1.4.5.1    |
| csrstSipVoRegPoolTag           | 1.3.6.1.4.1.9.9.441.1.4.5.1.1  |

Table 1-7 Cisco-SRST-MIB OID Mappings (continued)

| Object Name                         | Object ID                      |
|-------------------------------------|--------------------------------|
| csrStSipNetId                       | 1.3.6.1.4.1.9.9.441.1.4.5.1.2  |
| csrStSipVoRegPoolIpAddrType         | 1.3.6.1.4.1.9.9.441.1.4.5.1.3  |
| csrStSipNetMask                     | 1.3.6.1.4.1.9.9.441.1.4.5.1.4  |
| csrStSipProxySrvIpAddr              | 1.3.6.1.4.1.9.9.441.1.4.5.1.5  |
| csrStSipProxySrvPref                | 1.3.6.1.4.1.9.9.441.1.4.5.1.6  |
| csrStSipProxySrvMonitor             | 1.3.6.1.4.1.9.9.441.1.4.5.1.7  |
| csrStSipProxySrvAltIpAddr           | 1.3.6.1.4.1.9.9.441.1.4.5.1.8  |
| csrStSipDefaultPreference           | 1.3.6.1.4.1.9.9.441.1.4.5.1.9  |
| csrStSipVoRegPoolAppl               | 1.3.6.1.4.1.9.9.441.1.4.5.1.10 |
| <b>csrStSipVoRegNumberListTable</b> | 1.3.6.1.4.1.9.9.441.1.4.6      |
| csrStSipVoRegNumberListEntry        | 1.3.6.1.4.1.9.9.441.1.4.6.1    |
| csrStSipVoRegNumberListIndex        | 1.3.6.1.4.1.9.9.441.1.4.6.1.1  |
| csrStSipVoRegNumberListTag          | 1.3.6.1.4.1.9.9.441.1.4.6.1.2  |
| csrStSipVoRegNumberPattern          | 1.3.6.1.4.1.9.9.441.1.4.6.1.3  |
| csrStSipVoRegNumberPref             | 1.3.6.1.4.1.9.9.441.1.4.6.1.4  |
| csrStSipVoRegNumberHuntstopEnabled  | 1.3.6.1.4.1.9.9.441.1.4.6.1.5  |
| <b>csrStSipEndpointTable</b>        | 1.3.6.1.4.1.9.9.441.1.4.7      |
| csrStSipEndpointEntry               | 1.3.6.1.4.1.9.9.441.1.4.7.1    |
| csrStSipEndpointTag                 | 1.3.6.1.4.1.9.9.441.1.4.7.1.1  |
| csrStSipVoRegPoolEdptTag            | 1.3.6.1.4.1.9.9.441.1.4.7.1.2  |
| csrStSipEndpointIpAddrType          | 1.3.6.1.4.1.9.9.441.1.4.7.1.3  |
| csrStSipEndpointIpAddress           | 1.3.6.1.4.1.9.9.441.1.4.7.1.4  |
| csrStSipEndpointDN                  | 1.3.6.1.4.1.9.9.441.1.4.7.1.5  |
| ciscoSrStMIBConformance             | 1.3.6.1.4.1.9.9.441.2          |
| ciscoSrStMIBCompliances             | 1.3.6.1.4.1.9.9.441.2.1        |
| ciscoSrStMIBCompliance              | 1.3.6.1.4.1.9.9.441.2.1.1      |
| ciscoSrStMIBGroups                  | 1.3.6.1.4.1.9.9.441.2.2        |
| <b>csrStConfGroup</b>               | 1.3.6.1.4.1.9.9.441.2.2.1      |
| <b>csrStNotifInfoGroup</b>          | 1.3.6.1.4.1.9.9.441.2.2.2      |
| csrStSysNotifSeverity               | 1.3.6.1.4.1.9.9.441.2.2.2.1    |
| csrStSysNotifReason                 | 1.3.6.1.4.1.9.9.441.2.2.2.2    |
| <b>csrStActiveStatsGroup</b>        | 1.3.6.1.4.1.9.9.441.2.2.3      |
| <b>csrStSipConfGroup</b>            | 1.3.6.1.4.1.9.9.441.2.2.4      |
| <b>csrStMIBNotifsGroup</b>          | 1.3.6.1.4.1.9.9.441.2.2.5      |
|                                     |                                |

# Glossary

The following terms are used in this document.

ATA — Analog Telephone Adaptor  
BRI — Basic Rate Interface  
ccb — Call Control Block  
CCME — Cisco CallManager Express  
COR — Class of Restriction  
CTI — Computer Telephony Integration  
CUE — Cisco Unity Express  
DN — directory number  
DnD — do-not-disturb  
E&M — ear and mouth (also recEive and transMit)  
Ephone — Ethernet phone  
FXO — foreign exchange office  
GUI — Graphical User Interface  
IETF — Internet Engineering Task Force  
IVR — Interactive Voice Response  
MIB — Management Information Base  
MoH — Music on hold  
MWI — message-waiting indicator  
OID — Object Identifier  
PLAR — private line, automatic ringdown  
PRI — Primary Rate Interface  
rcb — Registrar Control Block  
RFC — Requests for Comment  
SCCP — Skinny Client Control Protocol  
SIP — Session Initiated Protocol  
SNMP — Simple Network Management Protocol  
SRST — Survivable Remote Site Telephony  
TCL — Tool Command Language  
VoFR — Voice over Frame Relay

