

StorageTek Modular Libraries

SL150/SL500/SL3000/SL8500

SNMP Reference Guide



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November 2012

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Preface

This book is about Oracle StorageTek's SNMP commands for the StorageTek Modular Libraries, including SL150, SL500, SL3000 and SL8500. For specific drive information or for client application software commands, see the appropriate drive or software documentation.

Audience

This guide is intended primarily for administrators and operators of Oracle StorageTek Modular Libraries. It can also be used by Oracle partners and support representatives.

Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit <http://www.oracle.com/support/contact.html> or visit <http://www.oracle.com/accessibility/support.html> if you are hearing impaired.

Obtaining Customer Documentation

To access current product documentation for Tape Storage:

1. **Use Web browser to go to the following Web page:**
<http://www.oracle.com/technetwork/documentation/tape-storage-curr-187744.html>
The Tape Storage Products page opens.
2. **Find the appropriate section and its list of products.**
3. **To view a list of documents for a product, click "View Library."**
A new page opens with a listing of all documents related to the product.
4. **To download the entire suite of documents for the product, click "Download."**
A compressed archive file will download that contains the entire suite of documents for that product.

Summary of Changes

Current Version: E35317-02, November 2012

This edition's updates reflect the recent MIB changes (version 2.12, September 10, 2012 and version 2.11, April 25, 2012).

- Addition of drive tray serial number
- slTrapSvcEvent variable slTrapSvcDeviceEventFscCode changed to TrapSvcDeviceEventResultCode
- Addition of slTrapSvcLocalization to slTrapSvcEvent variables

Revision History

Revision E35317-01, July 2012

This edition of Oracle's *StorageTek Modular Libraries SNMP Reference Guide* has a new Oracle document part number and revision number: E35317-01. Sun part numbers 316194703, 316194501 and 316191602 have been retired.

Updates include:

- Updates to the recent MIB (version 2.10, April 4, 2012)
- Reformatting of information to be task-oriented
- Updating of screen captures for obtaining the MIB through the SL Console
- Addition of type definitions table

Revisions for SL8500 SNMP Manual

316194703 Revision C, April 2010

Updates to this revision include:

- Oracle branding

- Engineering updates
- New command line interface (CLI) layout

316194703 Revision B, September 2009

Updates included adding object identifiers.

316194703 Revision A, April 2008

Initial document release.

Revisions for SL3000 SNMP Manual

316194501 Revision B, September 2009

Updates to this revision included the following additional object identifiers (OIDs):

- slCap
- slDrive
- slLibVersion
- slPowerSupply
- slRobot
- slStorage

316194501 Revision A, April 2008

Initial document release.

Revisions for SL500 SNMP Manual

316191602 Revision B, September 2009

Updates to this revision included the following additional object identifiers (OIDs):

- Oracle branding
- Engineering updates
- New command line interface (CLI) layout

316191602 Revision A, April 2008

Initial document release.

MIB Objects and Variables

The management information base (MIB) is a virtual database that contains objects and their identifiers (or variables) which define characteristics of a managed device. These characteristics are the functional elements for that device which can be monitored using SNMP software.

This chapter lists the MIB objects and variables and their descriptions alphabetically. Basic and additional variables provide a complete set of variables for full functionality of StorageTek modular libraries and support of SNMP.

Accessing SNMP

Libraries can access SNMP through the following methods:

- SL3000 and SL8500: Through CLI
- SL500: Through CLI and the SL Console
- SL150: Through the SL150 GUI with user roles of either administrator or service

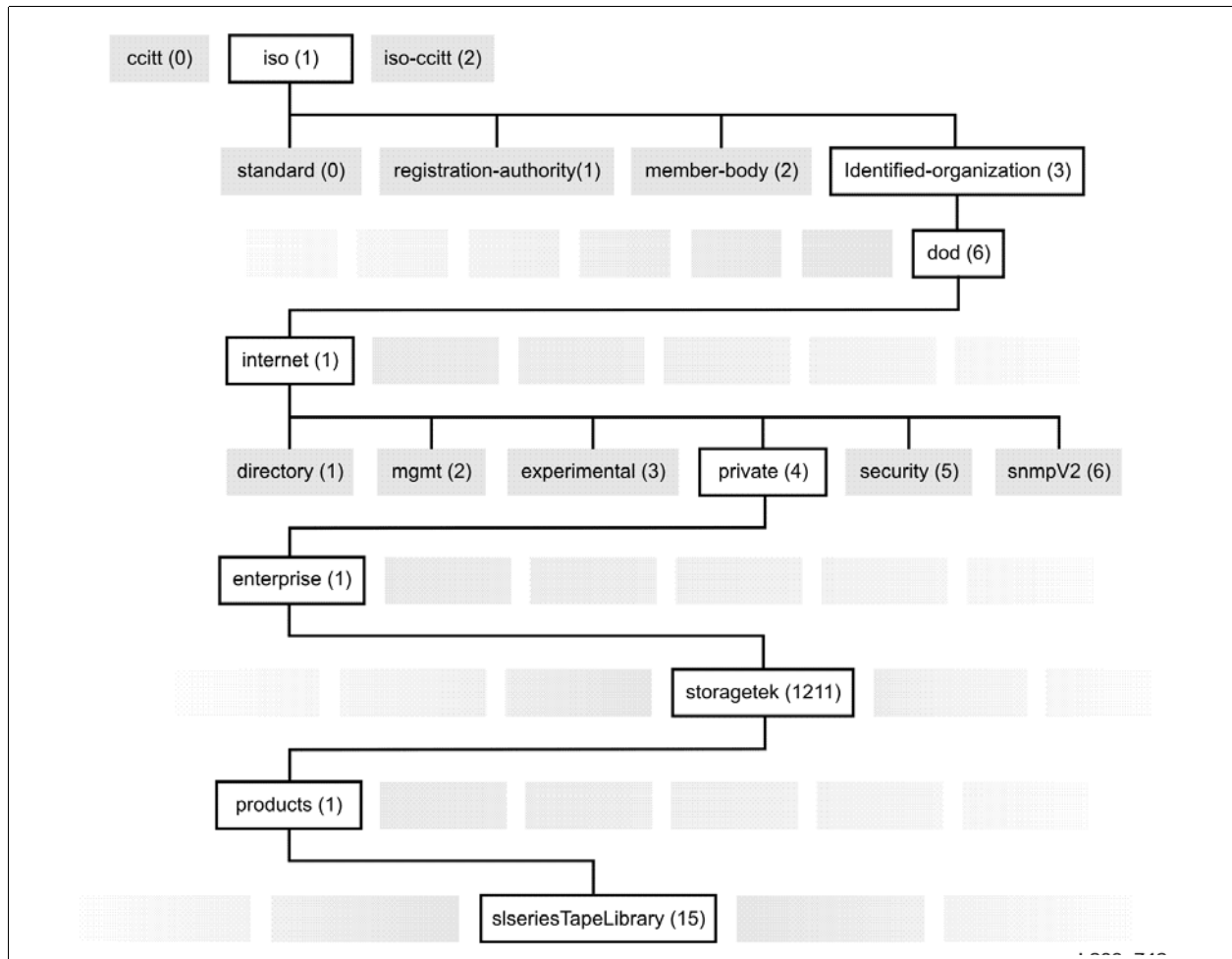
Note – Initially, configuring SNMP through the command line interface (CLI) requires the assistance of a service representative.
See [“Configuring SNMP” on page 33](#).

MIB Structure for StorageTek Modular Libraries

FIGURE 1-1 shows the MIB structure for the StorageTek modular libraries. The object name is:

```
STREAMLINE-TAPE-LIBRARY-MIB:streamlineTapeLibrary ==  
1.3.6.1.4.1.1211.1.15
```

FIGURE 1-1 StreamLine MIB Hierarchy



Type Definitions

Type definitions serve as templates on which other variables can be based.

TABLE 1-1 Type Definitions

Type Definition	Description
SLibraryId	Library identifier (n of Max) within a complex
SLibraryIdMax	Maximum library identifier within a complex
SIComplexId	Library complex identifier
SIsnmpPort	SNMP ports allowed
SIsnmpTrapPort	SNMP trap ports allowed
SIcmdClear	The SNMP trap ports allowed (1=no action, 2=clear)
SIDeviceStatus	Device status (ok=0, error=1, warning=2, info=3, trace=4)
SLibraryCondition	Condition of library (normal=0, degraded=1, not operative=2)
SIMediaEventType	Type of media error (load=1, unload=2, error=3, load retry=4, drive error=5, media end of life=6, drive end of life=7, decryption error=8, unknown=9)
SIHaState	State of RE controller (simplex=0, duplex=1, nonRE=2)
SIHaId	Identifier of RE controller (active=0, standby=1, nonRE=2)
SIHaSlot	Slot of RE controller (side A = 0, side B = 1, nonRE = 3)
SIDriveFibreLoopId	Fibre loop ID of drive
SIDriveFibreSpeed	Fibre speed of drive (unknown=1, one Gbit=2, two Gbit=3, four Gbit=4)
SIDriveFibreAddressing	Drive fibre addressing (hard=1, soft=2)
SIDriveStatus	Status of drive (unknown=0, initializing=1, empty=2, cartridge present=3, loading=4, loaded=5, cleaning=6, rewinding=7, unloading=8, inoperative=9, not loadable=10, not unloadable=11)
SIPartitionType	Type of partition (hli=1, scsi=2, other=3)
SICellHostTypeTC	Cell host type (invalid / unknown cell = 0, storage slot = 1, tape drive = 2, CAP or mailslot = 3, playground / system cell = 4, intransit / reserved cell = 5, PTP = 6, hand / robotic cell = 7)
SISeverityTC	Severity level that a trap can have (ok=0, heartbeat/verification=1, telemetry/metrics=2, configuration=3, trace/debugging=4, information/nominal behavior=5, warning/degraded behavior=6, error/non-operational=7, critical/system fault=8, fatal/system unusable=9, other=10)
SIDiagEntityTC	The entity that diagnosed the fault (fault manager/dedicated on-board fault detection software=1, library app other than fault manager=2, operating system=3, primitive/driver or other low-level firmware=4, other=5)

TABLE 1-1 Type Definitions (Continued)

Type Definition	Description
SlFaultTypeTC	Fault type based on servicing importance (heartbeat/i'm alive or test event=0, automatically recovered=1, suspicious/transient or contributing factor=2, routine/well known=3, escalated/requires more scrutiny=4, critical/overall system behaviour affected=5, alert/iminent customer impact=6, dire/customer impacted=7, emergency/immediate service required=8)
SlCountTC	Amount of items counted
SlFruStatusTC	Status of an FRU (other=1, suspected=2, faulted=3, repaired=4, replaced=5, acquitted=6)

Agent

TABLE 1-2 slAgent Variables

Variable	Description
slAgentBootDate	Date and time when the agent initialized
slAgentCommunity	The agent default community
slAgentLibStatusAtStartup	Condition of the library at agent start (normal,degraded,not-operational)
slAgentPort	UDP port number where the agent is listening
slAgentRevision	Firmware version of the embedded agent
slAgentTrapPort	UDP port number that the agent will send traps to
slAgentURL	URL for Web based management

Redundant Electronics

TABLE 1-3 slAgentHaState Variables

Variable	Description
slAgentHARState	State of RE controller (simplex = 0, duplex/switchable = 1)
slAgentHAIId	Identifier of RE controller (active = 0, standby = 1)
slAgentHaSlot	Slot of RE controller (sideA = 0, sideB = 1)
slAgentHaAlternateIp	IP address of alternate RE controller

Trap Tests

TABLE 1-4 slAgentTrapTest Variables

Variable	Description
slAgentTrapTestLevel	Set to a trap level to generate a trap test for that level. When this is read, the last written value is returned. If a trap level is not implemented, an error will be returned when writing.
slAgentTrapTestCount	Amount of times slAgentTrapTestLevel has been written to.

Cartridge Access Ports

TABLE 1-5 sICAP Variables

Variable	Description
slCapCount	Amount of CAPs in the CAP table
slCapTable	Table of cartridge access ports (CAPs)
slCapEntry	A cartridge access port (CAP)
slCapIndex	Integer index into the CAP table
slCapPhysicalAddressStr	String for CAP's physical address (SL500 returns the logical SCSI element ID instead)
slCapAccessibility	Accessibility of a CAP (for example, open allow/prevent)
slCapAccessStateEnum	Access state of the CAP, presented as an enumeration
slCapState	Physical state of the CAP
slCapStatusEnum	Operational status of the CAP presented as an enumeration
slCapName	Name of CAP
slCapRotations	Rotation count of CAP
slCapRotationRetries	Number of rotation retries performed by the CAP
slCapRotationFails	Number of rotation failures performed by the CAP
slCapIPLs	Number of IPL's performed by the CAP

Cell

TABLE 1-6 slCell Variables

Variable	Description
slCellCount	Amount of storage elements in the cell table
slCellStorageFreeCells	Amount of available (empty) storage cells in the library
slCellStorageRestrictedFreeCells	Amount of available restricted (empty) storage cells in the library
slCellTable	Table of storage elements in the library
slCellEntry	Storage element
slCellIndex	Integer index into the storage cell table
slCellElementID	Element ID or translated logical HLI address of the storage cell
slCellHostAccessible	Indication of host accessible status
slCellContentStatus	Status of the cell (unknown, empty, readable, not_readable, cap_magazine_not_present, drive_not_present, drive_not_available)
slCellContentLabel	Label of the cartridge in the cell (zero length string if empty, '?????' if unreadable)
slCellContentType	Type of the cartridge in the cell (zero length string if empty) which is a text string based on enumerated domain and type values derived from the VOLSER label
slCellGetRetryCount	Amount of get retries performed from this cell
slCellPutRetryCount	Amount of put retries performed to this cell
slCellHostType	The type of cell (0=invalid/unknown cell, 1=storage slot, 2=tape drive, 3=customer access port or mail slot, 4=playground/system cell, 5=intransit/reserved or recovery cell, 6=pass thru port, 7=robotic cell)
slCellPhysicalAddressStr	Physical address string of storage cell
slCellLogicalAddressStr	Logical address string of storage cell
slCellPartition	Partition ID of storage cell
slCellPartitionType	Partition type of storage cell

Cleaning

TABLE 1-7 sLibCleanin Variables

Variable	Description
sLibCleanEnabled	Auto clean feature configuration (not supported on all libraries)
sLibCleanCartTable	Table of cleaning cartridges in the library
sLibCleanCartEntry	Cleaning cartridge
sCleanCartIndex	Integer index into the cleaning cartridge table
sCleanCartLabel	Clean cartridge label
sCleanCartType	Cleaning cartridge type (for example: SDLT, 9840, and LTO)
sCleanCartLocationElementID	Clean cartridge location: Element ID
sCleanCartHostAccessible	Indication of host accessible status
sCleanCartUsageCount	Number of times that the cartridge has been used to clean a tape drive
sLibCleanNumCarts	Count of the clean cartridges in the library
sLibCleanNumCartTypes	Number of unique cartridge types supported
sLibCleanWarnEntry	Table entry for clean count warning threshold
sLibCleanWarnIndex	Index into clean warning threshold table
sLibCleanWarnCartType	Cleaning cartridge type (for example, SDLT, 9840, LTO and T10000)
sLibCleanWarnCount	Configured warning count threshold
sLibCleanWarnTable	Table of clean count warning thresholds

Controller

TABLE 1-8 slController Variables

Variable	Description
slControllerCount	Count of the controllers in the controller table
slControllerTable	Table of controllers
slControllerEntry	Controller entry (HBC, HBCR, RLC, HBT, etc.)
slControllerIndex	Index of controller card
slControllerPhysicalAddressStr	String for physical address of controller
slControllerSerialNum	Serial number of controller card
slControllerTopLevelCondition	Top-level condition of controller (normal, degraded, not operative)
slControllerFaultLED	Fault LED state of controller
slControllerSafeToRemoveLED	Safe to remove LED state of controller
slControllerStatusEnum	Operational of controller status in enumerated form
slControllerCodeVer	Code version of controller
slControllerVersion	Version of controller
slControllerFirmwareVer	Firmware version of controller
slControllerHAState	High Availability Status of controller (active=0 and Standby=1)
slControllerHaId	RE controller identifier (active=0, standby=1)
slControllerHaSlot	RE controller slot (sideA=0, sideB=1)
slControllerHaAlternateIp	IP address of alternate RE controller
slControllerFru	Field Replaceable Unit (FRU)-based serial number of controller

Drive and Media

Drive

TABLE 1-9 slDrive Variables

Variable	Description
slDriveCount	Amount of the drives in the drive table
slDriveFibreLoopId	Fibre loop ID of drive
slDriveFiberSpeed	Fibre speed of drive
slDriveFibreAddressing	Addressing of drive fibre
slDriveTable	Table of drives
slDriveEntry	Tape drive
slDriveIndex	Integer index into the drive table
slDriveHashedPhysAddr	Physical address of the drive (for SL500, logical SCSI Element ID for backward compatibility)
slDriveType	Type of drive (for example, STK10000) derived from manufacturer and make of drive
slDriveVendor	Vendor of drive (for example, STK, HP and IBM)
slDriveSerialNum	Electronic serial number of drive
slDriveInterfaceType	Physical data transport type of drive
slDriveID	SCSI ID or Fibre port assignment of drive
slDriveState	State of drive (for example, empty, loaded, needs cleaning)
slDriveLED	State of drive tray LED (0 = off, 1 = on)
slDriveStatusEnum	Operational status of drive in enumerated form
slDriveCodeVer	Code version (software or firmware) of drive
slDriveVersion	Hardware version of drive
slDriveGetRetries	Amount of mount retries performed to the drive
slDrivePutRetries	Amount of dismount retries performed to the drive
slDriveCommandClean	Signal to start or cancel cleaning of the drive
slDriveCellStatusEnum	Status of drive cell presented as an enumeration
slDriveCellStatusText	Status of drive cell
slDriveCellContentLabel	Label of the cartridge in the drive (a zero length string = empty, ?????? = unreadable)
slDriveCellContentType	Type of cartridge in the drive (a zero length string = empty)
slDriveIdleSeconds	Amount of seconds the drive has been idle (unmounted)
slDriveNumMounts	Amount of mounts to the drive
slDriveFibreNodeName	Fibre node name (node WWN) of drive

TABLE 1-9 slDrive Variables (Continued)

Variable	Description
slDriveFibrePortCount	Amount of active ports in the drive
slDriveFibrePortAwwn	World Wide Name (WWN) of port A
slDriveFibrePortAAdressingMode	Addressing mode of port A
slDriveFibrePortAPortEnabled	Port A enabled (2) or disabled (1)
slDriveFibrePortALoopId	Loop ID of port A
slDriveFibrePortAPortSpeed	Port speed of port A
slDriveFibrePortBwwn	World Wide Name (WWN) of port B
slDriveFibrePortBAdressingMode	Addressing mode of port B
slDriveFibrePortBPortEnabled	Port B enabled (2) or disabled (1)
slDriveFibrePortBLoopId	Loop ID of port B
slDriveFibrePortBPortSpeed	Port speed of port B
slDriveWWNEnabled	World Wide Name (WWN) option for the drive is enabled (can only be set using the command line interface)
slDrivePhysicalAddressStr	Physical address string of drive
slDriveTraySerialNumber	Serial number of drive tray

Media Event

TABLE 1-10 slMediaEvents Variables

Variable	Description
slLibMediaEventCount	Amount of media statistics in the table
slLibMediaEventTable	Table of media statistics
slLibMediaEventEntry	Statistic about media error
slLibMediaEventIndex	Index into the media error statistic table
slLibMediaEventValid	Volume ID of the optical barcode
slLibMediaEventMediaDomain	The domain field of the optical barcode detected from the VOLSER label
slLibMediaEventMediaType	The type of the optical barcode detected from the VOLSER label (1=load, 2=unload, 3=error, 4=loadRetry, 5=driveError, 6=mediaEndOfLife, 7=driveEndOfLife, 8=decryption error, 9=unknown)
slLibMediaEventDriveSerialNum	Electronic serial number of the drive
slLibMediaEventDriveType	Type of tape drive

TABLE 1-10 slMediaEvents Variables (Continued)

Variable	Description
slLibMediaEventDateTime	Log entry date and time in this format: MM:DD:YYYY HH:MM:SS
slLibMediaEventEnum	Type of media error, reported as an enumeration
slLibMediaEventOccurrenceCount	Occurrence count for media statistic

Elevator

TABLE 1-11 slElevator Variables

Variable	Description
slElevatorCount	Amount of elevators in elevator table
slElevatorTable	Table of elevators
slElevatorEntry	Elevator
slElevatorIndex	Elevator index
slElevatorPhysicalAddressStr	Physical address string for elevator
slElevatorPositionOn	Physical position of elevator (not implemented, but defined for backward compatibility for non-SL libraries)
slElevatorHandCartStatus	Elevator hand state (cartridge = 1, no cartridge = 0)
slElevatorSerialNum	Serial number of elevator
slElevatorState	State of elevator (such as idled, moving, inoperative)
slElevatorFaultLED	Fault LED state of elevator
slElevatorStatusEnum	Operational status of elevator in enumerated form
slElevatorCodeVer	Code version of elevator
slElevatorVersion	Version of elevator
slElevatorFirmwareVer	Firmware version of elevator
slElevatorGetRetries	Number of mount retries performed to the elevator
slElevatorPutRetries	Number of dismount retries performed to the elevator

Fan

TABLE 1-12 slFan Variables

Variable	Description
slFanCount	Amount of monitored fans in the library
slFanTable	Table of the library's fans
slFanEntry	Fan
slFanIndex	Integer index into the fan table
slFanName	Name of the fan
slFanOperational	Operational state of the fan

Host Interface

TABLE 1-13 slHostInterface Variables

Variable	Description
slHostInterfaceCount	Count of interface cards.
slHostInterfaceTable	Table of host interfaces
slHostInterfaceEntry	Host interface entry (such as Fiber or SCSI)
slHostInterfaceIndex	Integer index into the table of host interface cards
slHostInterfaceFibreCount	Amount of active fibres in this host interface card
slHostInterfaceAWWN	Fibre A World Wide Name (WWN)
slHostInterfaceA1AddressingMode	Addressing mode for Port A1
slHostInterfaceA1PortEnabled	Port enabled for Port A1
slHostInterfaceA1LoopId	Loop ID for Port A1
slHostInterfaceA1PortSpeed	Port speed for Port A1
slHostInterfaceA2AddressingMode	Addressing mode for Port A2
slHostInterfaceA2PortEnabled	Port enabled for Port A2
slHostInterfaceA2LoopId	Loop ID for Port A2
slHostInterfaceA2PortSpeed	Port speed for Port A2
slHostInterfaceBWWN	Fibre B World Wide Name
slHostInterfaceB1AddressingMode	Addressing mode for Port B1
slHostInterfaceB1PortEnabled	Port enabled for Port B1
slHostInterfaceB1LoopId	Loop ID for Port B1
slHostInterfaceB1PortSpeed	Port speed for Port B1
slHostInterfaceB2AddressingMode	Addressing mode for Port B2
slHostInterfaceB2PortEnabled	Port enabled for Port B2
slHostInterfaceB2LoopId	Loop ID for Port B2
slHostInterfaceB2PortSpeed	Port speed for Port B2
slHostInterfaceElementID	Element ID / address of the controller
slHostInterfaceSerialNum	Serial number for controller card
slHostInterfaceStatus	State of controller (okay, error, warning)
slHostInterfaceFaultLED	Fault LED state for controller
slHostInterfaceSafeToRemoveLED	Safe to remove LED state for controller
slHostInterfaceStatusEnum	Operational status for controller in enumerated form

TABLE 1-13 slHostInterface Variables (Continued)

Variable	Description
slHostInterfaceCodeVer	Code version for controller
slHostInterfaceVersion	Hardware version for controller
slHostInterfaceFirmwareVer	Firmware version for controller

Library

Condition

TABLE 1-14 Library Condition Variables

Variable	Description
SLibraryCondition	Condition of the library (0=normal, 1=degraded, 2=not operative)
sLibraryTopLevelCondition	Overall condition of library (for example, normal, degraded, or not-operational)

Configuration

TABLE 1-15 sLibLSMConfig Variables

Variable	Description
sLibLSMConfigCount	Amount of LSMs installed
sLibLSMConfigTable	A table of LSM configurations
sLibLSMConfigEntry	LSM configuration entry
sLibLSMConfigIndex	LSM configuration index
sLibLSMConfigNumPanels	Amount of physical panels
sLibLSMConfigNumHandCells	Amount of physical hands
sLibLSMConfigMinHandAddr	Minimum Element ID or address of physical hands
sLibLSMConfigMaxHandAddr	Maximum Element ID or address of physical hands
sLibLSMConfigNumSystemCells	Amount of system and reserved cells
sLibLSMConfigNumRestrictedCells	Amount of customer restricted cells
sLibLSMConfigMinSystemAddr	Minimum Element ID or address of system cells
sLibLSMConfigMaxSystemAddr	Maximum Element ID or address of system cells
sLibLSMConfigNumCaps	Amount of cartridge access ports (CAPs)
sLibLSMConfigNumCapColumns	Amount of columns within CAPs
sLibLSMConfigNumCapCells	Amount of CAP cells
sLibLSMConfigMinCapAddr	Minimum Element ID or address of CAP cells
sLibLSMConfigMaxCapAddr	Maximum Element ID or address of CAP cells
sLibLSMConfigNumDriveColumns	Amount of drive columns
sLibLSMConfigNumDrives	Amount of tape drives
sLibLSMConfigMinDriveAddr	Minimum Element ID or address of tape drives
sLibLSMConfigMaxDriveAddr	Maximum Element ID or address of tape drives

TABLE 1-15 sLibLSMConfig Variables (Continued)

Variable	Description
sLibLSMConfigNumStorageCells	Amount of storage cells
sLibLSMConfigMinStorageAddr	Minimum Element ID or address of storage cells
sLibLSMConfigMaxStorageAddr	Maximum Element ID or address of storage cells
sLibLSMConfigNumPtps	Amount of pass-thru ports (PTPs)
sLibLSMConfigNumPtpColumns	Amount of columns within the PTPs
sLibLSMConfigNumPtpCells	Amount of PTP cells
sLibLSMConfigMinPtpAddr	Minimum Element ID or address of PTP cells
sLibLSMConfigMaxPtpAddr	Maximum Element ID or address of PTP cells

Date

TABLE 1-16 sLibDate Variables

Variable	Description
sLibDateString	Date and time in the following format: YYYY:MM:DD HH:MM:SS .xxxx

Identifying Information

TABLE 1-17 sLibIdentification Variables

Variable	Description
sLibStkBaseModel	StorageTek Library model name (see vendor specific model data)
sLibSerialNumber	Serial number of library frame
sLibWWNNumber	Library World Wide Number (WWN) (a 64-digit hexadecimal number)
sLibLibraryTopLevelCondition	Library overall condition (for example: normal, degraded, or not-operational)
SLibLibraryId	Library identifier (n of Max) within a library complex
SLibLibraryIdMax	Maximum library identifier within a library complex
SLibComplexId	Identifier of library complex
sLibMibVer	Version of the MIB supported by the library

Location

TABLE 1-18 sLibLocation Variables

Variable	Description
sLibLocatContact	Primary contact for administration of the library
sLibLocatStreet	Street address of location site
sLibLocatState	State / province of location site
sLibLocatZip	ZIP code or other data of location site
sLibLocatCountry	Country of location site
sLibLocatDescr	Description or other data of location site
sLibLocatCity	City of location site

Network

TABLE 1-19 sLibNetwork Variables

Variable	Description
sLibNetworkCount	Count of all the Ethernet ports
sLibNetworkTable	Table of network interfaces
sLibNetworkEntry	Network interface entry
sLibNetworkIndex	Index into the table
sLibNetworkInterfaceName	Interface name used by the library software
sLibNetworkIpAddr	IP address of library
sLibNetworkGateway	Internet gateway of library network
sLibNetworkEthAddr	Physical 48 bit ethernet address of library
sLibNetworkName	Host name of library network
sLibNetworkNetmask	Internet address netmask of library network
sLibNetworkDhcpEnabled	DHCP IP address / name client lookup service status (SL500 only)
sLibNetworkDomainName	Network domain name of library network
sLibNetworkPrimaryDNS	Primary DNS server of library network
sLibNetworkSecondaryDNS	Secondary DNS server of library network
sLibNetworkRXPKets	Amount of packets received
sLibNetworkTXPKets	Amount of packets transmitted
sLibNetworkErrors	Amount of errors on this interface
sLibNetworkDropped	Amount of dropped packets on this interface

TABLE 1-19 sLibNetwork Variables (Continued)

Variable	Description
sLibNetworkOverruns	Amount of overrun packets on this interface
sLibNetworkFrame	Amount of frame packets on this interface
sLibNetworkCollisions	Amount of collisions on this interface

State

TABLE 1-20 sLibLSMState Variables

Variable	Description
sLibLSMCount	LSM count.
sLibLSMStateTable	A table LSM states.
sLibLSMStateEntry	Entry of an LSM state.
sLibLSMStateIndex	Index of LSM state.
sLibLSMStatus	LSM operational state reported as a string (for example, offline, online, or offline pending). This is a hardware-based state and derived from robot state.
sLibLSMStatusEnum	LSM operational state, reported as an enumeration (online = 0, offline = 1, offlinePending = 2).

Statistics

TABLE 1-21 sLibStatistics Variables

Variable	Description
sLibStatsNumBoots	Amount of library initializations
sLibStatsNumDoorOpens	Amount of occurrences when the service door has been opened
sLibStatsNumGetRetries	Total of get retries
sLibStatsNumGetFails	Total of get failures
sLibStatsNumPutRetries	Total of put retries
sLibStatsNumPutFails	Total of put failures
sLibStatsNumLabelRetries	Total of label read retries
sLibStatsNumLabelFails	Total of label read failures
sLibStatsNumTargetRetries	Total of target read retries
sLibStatsNumTargetFails	Total of target read failures
sLibStatsNumMoves	Total of cartridge moves
sLibStatsNumMounts	Total of mounts
sLibStatsNumTargetReads	Total of target reads

TABLE 1-21 sLibStatistics Variables (Continued)

Variable	Description
sLibStatsNumEmptyReads	Total of empty cell reads
sLibStatsNumLabelReads	Total of label reads
sLibStatsGetTotals	Sum of all Get operations of individual robots
sLibStatsPutTotals	Sum of all Put operations of individual robots
sLibStatsCumMachUptime	Cumulative machine up time in seconds
sLibStatsUpTimeSinceLastBoot	In seconds

Temperature

TABLE 1-22 sTempSensor Variables

Variable	Description
sTempSensorCount	Amount of temperature sensors in the library
sTempSensorTable	Table of the library's temperature sensors
sTempSensorEntry	Temperature sensor
sTempSensorIndex	Integer index into the temperature sensor table
sTempSensorName	Name of the temperature sensor
sTempSensorCurrentTemp	Current / present temperature reading
sTempSensorHighTemp	Storage area peak temp since last machine boot
sTempSensorWarnThreshold	Temperature threshold for automated warning
sTempSensorFailThreshold	Temperature threshold for automated library shutdown

Version

TABLE 1-23 sLibVersion Variables

Variable	Description
sLibVersionFirmRev	Embedded firmware revision of library, per engineering change (EC) field releases
sLibVersionFirmDate	Embedded firmware build date of library
sLibVersionBootRev	Boot software/OS version of library
sLibVersionHardware	Controller hardware version of library

Pass-Thru Ports

TABLE 1-24 slPtp Variables

Variable	Description
slPtpCount	Amount of pass-through ports in the library
slPtpTable	Table of pass-thru ports
slPtpEntry	Pass-thru port
slPtpIndex	Integer index into the PTP table
slPtpPhysicalAddressStr	PTP device address
slPtpSerialNumber	Serial number of PTP
slPtpState	State of the PTP (online, offline)
slPtpFaultLED	Fault LED state of PTP
slPtpStatusEnum	PTP operational state reported as an enumeration
slPtpCodeVer	Code version of PTP
slPtpVersion	Hardware version of PTP
slPtpFirmwareVer	Firmware version of PTP
slPtpMoveRetries	Amount of move retries performed by PTP

Power

Power Supply

TABLE 1-25 slPowerSupply Variables

Variable	Description
slPowerSupplyCount	Amount of power supplies installed in the library
slPowerSupplyTable	Table of the library power supplies
slPowerSupplyEntry	Power supply
slPowerSupplyIndex	Integer index into the power supply table
slPowerSupplyName	Name of the power supply
slPowerSupplyInstalled	Indicates if the supply is installed (2) or not (1)
slPowerSupplyOperational	Indicates if the supply is OK (2) (meaningless if power supply not installed)

Redundant Power

TABLE 1-26 SIHa Variables

Variable	Description
SIHaState	State of RE controller (0=simplex, 1=duplex, 2=nonRE)
SIHaId	Identifier of RE controller (0=active, 1=standby, 2=nonRE)
SIHaSlot	Slot of RE controller (0=sideA, 1=sideB, 2=nonRE)

Robot

TABLE 1-27 slRobot Variables

Variable	Description
slRobotCount	Amount of robot mechanisms
slRobotTable	A table of robots
slRobotEntry	Robot
slRobotIndex	Robot index
slRobotPhysicalAddressStr	Physical address string of robot (logical sequence SCSI element ID for SL500 to allow for backward compatibility)
slRobotPosition	Physical position of the robot (continued to be defined for backward compatibility with robot table)
slRobotHandCartStatus	State of the robot hand regarding a cartridge (cartridge =1, no cartridge = 0)
slRobotSerialNum	Card serial number of robot
slRobotState	Sate of the robot (such as empty, loaded, moving)
slRobotFaultLED	Fault LED stats of robot (off = 0, on = 1)
slRobotStatusEnum	Operational status of robot in enumerated form
slRobotCodeVer	Code version of robot
slRobotVersion	Hardware version of robot
slRobotFirmwareVer	Firmware version of robot
slRobotGetRetries	Number of mount retries performed by robot
slRobotPutRetries	Number of dismount retries performed by robot
slRobotGetFails	Amount of Get fails for robot
slRobotPutFails	Amount of Put fails for robot
slRobotGetTotals	Sum of all Get operations from robots
slRobotPutTotals	Sum of all Put operations from robots

Safety Door

TABLE 1-28 slSafetyDoor Variables

Variable	Description
slSafetyDoorCenterCount	Safety door center completion count
slSafetyDoorRetries	Amount of total safety door retries
slSafetyDoorIPLs	Amount of IPLs performed by the safety door

SNMP

TABLE 1-29 sISNMP Variables

Variable	Description
SiSNMPPort	The SNMP ports allowed
SiSNMPTrapPort	The SNMP trap ports allowed
SiCmdClear	The SNMP trap ports allowed (1=no action, 2=clear)

Tape

TABLE 1-30 slTape Variables

Variable	Description
slTapeCount	Amount of the cartridges in the inventory table
slTapeTable	Table of data cartridges (tapes) in the library
slTapeEntry	Cartridge
slTapeIndex	Integer index into the inventory table
slTapeLabel	Cartridge label
slTapeType	Cartridge type (text string based on the enumerated domain and type values that are derived from the volser label)
slTapeLocationElementID	Element ID or translated logical HLI address of the tape cartridge
slTapeHostAccessible	Indication of host accessible status
slTapePhysicalAddressStr	Physical address string of cartridge
slTapeLogicalAddressStr	Logical address of cartridge
slTapePartition	Partition ID of cartridge
slTapePartitionType	Partition type of cartridge

Traps

TABLE 1-31 slTrap Variables

Variable	Description
slTrapLibrarySerialNumber	Frame serial number of the library
slTrapDeviceId	FRU ID of device (generally component model + serial number)
slTrapDeviceTime	Device's date and time in UTC standard format
slTrapDeviceAddress	Device address of the component associated with the log entry.
slTrapDeviceUserName	User name on the device that identifies the access level that originated the activity
slTrapDeviceInterfaceName	Name representing the interface on the device that was used to request the activity
slTrapDeviceActivity	Short text name representing the device activity being performed
slTrapDeviceRequestId	Device request ID associated with the activity with this trap
slTrapDeviceSeverity	Device log severity
slTrapDeviceResultCode	Device result code
slTrapDeviceFreeFormText	Freeform text area, usually from subsystems that led to log entry

Automatic Service Requests (ASRs)

TABLE 1-32 slTrapAsr Variables

Variable	Description
slTrapAsrSuspectCount	Number of FRU call-outs to follow in this trap (max 5)
slTrapAsrSuspectTable	Table of diagnosed fault suspects
slTrapAsrSuspectEntry	Suspect table entry
slTrapAsrSuspectIndex	Sequence number for suspect FRUs
slTrapAsrSuspectFaultCertainty	Percentage of likelihood that the component is the source of the problem (object has a value of 0 if the system does not support this information)
slTrapAsrSuspectDevice Address	Location of the suspect FRU (either a 5-tuple or 4-tuple physical address)
slTrapAsrSuspectFruName	Name of the suspect FRU
slTrapAsrSuspectFruChassisId	Text string containing serial number of chassis (unambiguous identification of system when combined with slTrapProductName)
slTrapAsrSuspectFruManufacturer	Name of manufacturer of this FRU / CRU
slTrapAsrSuspectFruPn	Replacement part number used to order this FRU / CRU

TABLE 1-32 slTrapAsr Variables (Continued)

slTrapAsrSuspectFruSn	Serial (entitlement) number for this FRU / CRU
slTrapAsrSuspectFruRevision	Revision level of this FRU / CRU
slTrapAsrSuspectFruStatus	Status of FRU / CRU

Configuration

TABLE 1-33 slTrapConfig Variables

Variable	Description
slTrapConfigLibrarySerialNumber	Frame serial number of the library
slTrapConfigDeviceId	Device's FRUI ID, needed for high availability
slTrapConfigDeviceTime	Device's date and time in UTC standard format
slTrapConfigDeviceAddress	Device address of the component associated with the log entry.
slTrapConfigDeviceUserName	User name on the device that identifies the access level that originated the activity
slTrapConfigDeviceInterfaceName	Name representing the interface on the device that was used to request the activity
slTrapConfigDeviceActivity	Short text name representing the device activity being performed
slTrapConfigDeviceRequestId	Device request ID associated with the activity with this trap
slTrapConfigDeviceSeverity	Device log severity
slTrapConfigDeviceResultCode	Device result code
slTrapConfigPropertyName	Device property name that is being configured
slTrapConfigNewPropertyValue	New value that has been changed (only success is reported)
slTrapConfigNewPropertyEffective	Condition when the new property value will be effective

Service Events

TABLE 1-34 slTrapSvcEvent Variables

Variable	Description
slTrapSvcEventTime	Time stamp of when the service event occurred
slTrapSvcLibProductManufacturer	Product manufacturer of library
slTrapSvcLibProductName	Product name of library
slTrapSvcLibProductSn	Product serial (entitlement) number of library
slTrapSvcLibStatus	Condition of the overall system at the time of the event (normal, degraded, not-operational)

TABLE 1-34 slTrapSvcEvent Variables (Continued)

slTrapSvcLibEntity	Software component (diagnostic entity) that generated this fault event
slTrapSvcEventId	Underlying local library event ID that was the catalyst behind this service event
slTrapSvcFaultEventUUID	Universal unique identifier that was assigned to this fault (will have a value of NULL if the system doesn't support this information)
slTrapSvcFaultEventType	Fault event type based on servicing importance
slTrapSvcFaultEventCount	Amount of equivalent fault events since last boot
slTrapSvcFaultEventDescription	Textual description of the fault event
slTrapSvcDeviceEventSeverity	Fault severity of device or system
slTrapSvcDeviceEventActivity	Short text name representing what activity the device was last commanded to perform
slTrapSvcDeviceEventOpCode	Device operational code, indicating state of FRU/CRU
slTrapSvcDeviceEventResultCode	The device result code based upon last command completed
slTrapSvcServiceData	Descriptive text string of this particular service event
slTrapSvcLocalization	Localization string for current service event

TABLE 1-35 slSeverityTC Variables

Variable	Description
slSeverityTC	The severity levels that a trap can have, ordered highest to lowest (0=ok/no fault, 1=heartbeat/verification, 2=telemetry/ metrics, 3=configuration, 4=trace/ debugging, 5=info/nominal behavior, 6=warning/degraded behavior, 7=error/ nonoperational, 8=critical/system fault, 9=fatal/system unusable, 10=other

Tests

TABLE 1-36 slTrapSvc Variables

Variable	Description
slTrapCount	Amount of traps generated since last boot
slTrapLibBootDate	Date & time when the agent initialized
slTrapLibDateString	Date and time of library in format: YYYY:MM:DDTHH:MM:SS.xxxx
slTrapLibSerialNumber	Serial number of library frame
slTrapLibTopLevelCondition	Overall condition of the library (normal,degraded,not-operational)
slTrapHaState	State of RE controller (simplex=0, duplex/switchable=1)

TABLE 1-36 sITrapSvc Variables

sITrapHaId	Identifier of RE controller (active=0, standby=1)
sITrapHaSlot	Slot of RE controller (sideA=0, sideB=1)
sITrapHaAlternateIp	IP address of alternate RE controller

Turntable Elements

TABLE 1-37 sITurntable Variables

Variable	Description
sITurntableCount	Count of the turntables in the turntable table
sITurntableTable	A table of turntables
sITurntableEntry	A turntable
sITurntableIndex	A turntable index
sITurntablePhysicalAddressStr	Physical address string of a turntable
sITurntablePosition	Physical LSM position of the turntable (0=left, 1=right)
sITurntableHandCartStatus	The turntable's hand state (cartridge=1, no cartridge=0)
sITurntableSerialNum	Serial number of the turntable
sITurntableState	State of the turntable (idled, moving, in-op, etc.)
sITurntableFaultLED	Fault LED state
sITurntableStatusEnum	Operational status of the turntable, in enumerated form
sITurntableCodeVer	Code version of the turntable
sITurntableVersion	Hardware version of the turntable
sITurntableFirmwareVer	Firmware version of the turntable
sITurntablesRotation	Rotation count of the turntable
sITurntablesRotationRetries	Number of rotation retries performed by the turntable
sITurntablesRotationFails	Number of rotation failures performed by the turntable
sITurntablesIPLs	Number of IPLs performed by the turntable

Configuring SNMP

This chapter covers:

- [“SNMP” on page 34](#)
- [“SNMP Default Settings” on page 35](#)
- [“SNMP Configuration Process” on page 36](#)
- [“MIB and Trap Information Tasks” on page 37](#)
- [“Managing SNMP Users Tasks” on page 40](#)
- [“Configuring Trap Recipients Tasks” on page 48](#)
- [“Managing Agent Tasks” on page 57](#)
- [“Configuring SNMP Service Information” on page 60](#)

Accessing SNMP

Libraries can access SNMP through the following methods:

- SL3000 and SL8500: Through CLI
- SL500: Through CLI and the SL Console
- SL150: Through the SL150 GUI with the appropriate role (for more information, see the SL150 User’s Guide)

Note – Initially, configuring SNMP through the command line interface (CLI) requires the assistance of a service representative. See [“Configuring SNMP” on page 33](#).

SNMP

Simple Network Management Protocol (SNMP) is an application layer protocol that performs network management operations over an Ethernet connection using User Datagram Protocol/Internet Protocol (UDP/IP).

The Simple Network Management Protocol enables:

- The library to inform the systems administrator of potential problems.
- System administrators to query the library for configuration, operation, and statistical information.
- The library to gather information to be sent to the StorageTek Tape Analytics (STA) server, if applicable. For more information, see the *STA Installation and Administration Guide*.

Supported Versions of SNMP

The StorageTek Modular Libraries support:

- SNMPv2c: Read-only support primarily for machine status queries. With this version, any information transmitted is not secure.
- SNMPv3: Both read and write support. Transmitted information is secure.

Configuration Requirements

The following are configuration requirements:

- StorageTek Modular Libraries firmware must be:
 - SL8500: version FRS_3.12 or higher
 - SL3000: version FRS_1.7 or higher
 - SL500: version FRS_1067 or higher
 - SL150: version FRS_1.0 or higher
- The SL Console must be version FRS_4.0 or higher.
- By default, the SNMP agent is disabled and must be enabled.

Port Control and Managing Agents

Typically, SNMP uses the following user datagram protocol (UDP) ports:

- 161 for the agent (the library)
- 162 for the manager (the host)

The basic protocol for communications between manager and agent is as follows:

- The manager can send requests from any available port to the agent at port 161. The agent then responds to that source port, to the requesting manager.
- The agent generates traps or notifications and sends them from any available port to the manager at port 162.

See [“Managing Agent Tasks” on page 57](#) for more information.

Access Control

SNMPV2c community strings are capable of providing a form of access control in SNMP. Because of this, the Oracle StorageTek embedded agent will not allow community strings to make changes to the library’s configuration.

Either SNMPv2c or SNMPv3 can retrieve the MIB file. However, because SNMPv3 provides encryption capabilities and a stronger user identification, library properties can be changed only with the SNMPv3 set command.

Using an administrative password also provides access control and authorization for set command operations.

Traps, however, can be sent to recipients using either SNMPv2c or SNMPv3 by adding entries to the trap recipient list.

SNMP Default Settings

TABLE 2-38 lists the default SNMP settings for a StorageTek Library.

TABLE 2-38 Default SNMP Settings

Setting	Default	Description
Port ID	Disabled	Agent trap requests are sent and received over the HBC card port. 2B=standard, public port. 2A=optional, redundant port.
Socket number	161	Agent requests are sent and received on the enabled port. Socket numbers (ports) must be enabled to pass through a firewall.
	162	Traps are sent to this socket on the host port. Socket numbers (ports) must be enabled to pass through a firewall.
SNMP (agent)	Disabled	Enabled or disabled through CLI command only.
SNMPv2c users string	Public	Community String Public Agent Community. Use this field (setting) to read-only MIB data. There can be a maximum of 20 SNMP users. This field can be changed or deleted.
SNMPv3 users string	Empty	Community String Public Agent Community. Use this field (setting) to both read and write MIB data. There can be a maximum of 20 SNMP users. This field can be changed or deleted.
Trap recipients	Empty	This list supports up to 20 recipients with no duplicate entries. Users must add themselves to the recipients list for traps to be sent to them. See “Configuring Trap Recipients Tasks” on page 48 for more information.

SNMP Configuration Process

The process of initially configuring SNMP is:

1. **Obtain MIB and trap destination information from the library.**

(See [“Obtain the Management Information Base”](#) on page 38 and [“Obtain Trap Destination Information”](#) on page 39.)

2. **Manage SNMP users.**

(See [“Managing SNMP Users Tasks”](#) on page 40.)

3. **Configure trap recipients.**

(See [“Configuring Trap Recipients Tasks”](#) on page 48.)

4. **Enable the agent, which is within the library controller card.**

(See [“Enable a portID”](#) on page 58.)

SNMP traps should now be enabled and the agent should respond to **gets** from the clients.

5. **Configure SNMP service information.**

(See [“Configuring SNMP Service Information”](#) on page 60.)

Accessing SNMP

Libraries can access SNMP through the following methods:

- SL3000 and SL8500: Through CLI
- SL500: Through CLI and the SL Console
- SL150: Through the SL150 GUI with user roles of either administrator or service

MIB and Trap Information Tasks

Task	Page
Obtain the Management Information Base	38
Obtain Trap Destination Information	39

▼ Obtain the Management Information Base

Note – You can download the MIB through the SL Console, but you cannot view it directly from the SL Console. However, because the MIB is a plain ASCII text file, you can view it from any text editor.

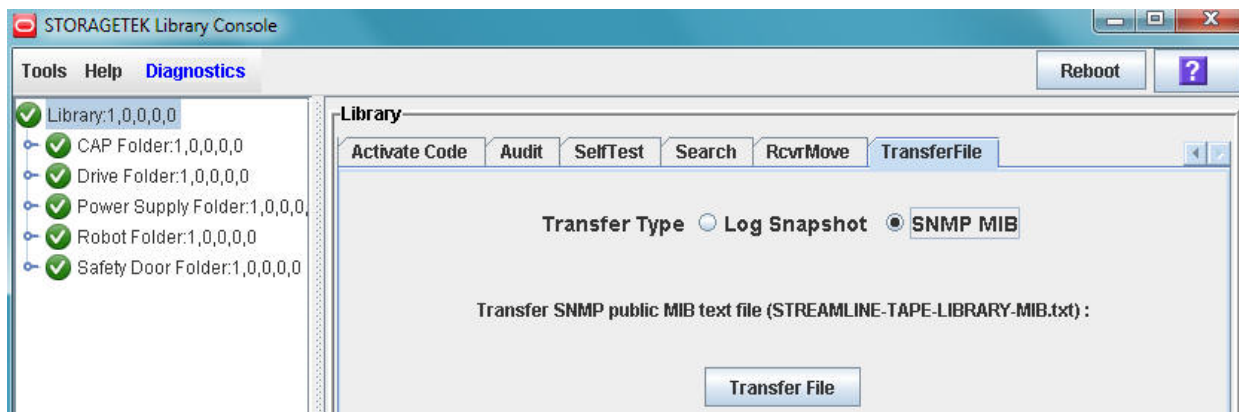
1. At the StorageTek Library Console, select Tools > Diagnostics.
2. Click the Library folder on the navigation tree.

The Library page appears.



3. Click the TransferFile tab.

The Library TransferFile page appears. Select SNMP MIB.



4. Click Transfer File.

The Save dialog box appears.

5. Browse to the directory where you want to save the file, and enter the file name in the File Name field. Be sure to give it a .txt suffix.
6. Click Save.

The data is saved to the specified file, and the **Transferred Successful** message appears.

▼ Obtain Trap Destination Information

1. Obtain the following information trap from the administrator.

For SNMP v2, obtain: IP address of the hosts receiving the traps

For SNMP v3, obtain:

- IP address of the hosts receiving the traps
- Engine ID of the hosts receiving the traps
- Authentication protocol (authPassPhrase) for users and hosts receiving traps (MD5 or SHA)
- Authentication privacy protocol (privacy passPhrase) for users and hosts receiving traps (DES or AES)
- User names and hosts receiving traps

Managing SNMP Users Tasks

Task	Page
Add an SNMP User	41
Delete an SNMP User	44
Configuring Trap Recipients Tasks	48

Libraries can access SNMP through the following methods:

- SL3000 and SL8500: Through CLI
- SL500: Through CLI and the SL Console
- SL150: Through the SL150 GUI with user roles of either administrator or service

▼ Add an SNMP User

v3 User

1. To create a v3 user, enter the following:

```
snmp addUser version v3 name name auth auth_protocol
authPass auth_password priv privacy_protocol privPass priv_password
```

See [TABLE 2-39](#) for possible values of these variables.

CLI Example

SNMPv3 user with a security name of “stkAgentV3,” a mixed level of security, MD5 authentication, and DES encryption:

SL8500

```
SL8500> snmp addUser version v3 name 'stkAgentV3' auth MD5
authPass 'snmpsnmp' priv DES privPass 'DESPassPhrase'
requestId
requestId      10
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 1
```

SL3000

```
SL3000> snmp addUser version v3 name 'stkAgentV3' auth MD5
authPass 'snmpsnmp' priv DES privPass 'DESPassPhrase'
requestId
requestId      10
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 1
```

SL500

```
ADVSRV> snmp addUser version v3 name stkAgentV3 auth MD5
authPass snmpsnmp priv DES privPass DESPassPhrase
requestId
requestId      10
Device         1,0,0,0
Success        true
Done
```

```
Failure Count 0
```

```
Success Count 1
```

v2 User

1. To create a V2 user, enter the following:

```
snmp addUser version v2c community communityString
```

See [TABLE 2-39](#) for possible values of these variables.

CLI Example

SNMPv2 user with community string of “public”:

SL8500

```
SL8500> snmp addUser version v2c community public
requestId
requestId      6
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 1
```

SL3000

```
SL3000> snmp addUser version v2c community public
requestId
requestId      6
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 1
```

SL500

```
ADVSRV> snmp addUser version v2c community public
requestId
requestId      6
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 1
```

TABLE 2-39 SNMP User: Variables

Variable	Value Name	Options / Description
<i>version</i>	v2 or v3	Version of SNMP.
<i>name</i>	name	Name you want to assign to the SNMP user. All libraries monitored by a single StorageTek Modular Libraries server must have the same v3 user name. It is recommended that you create a new, unique user for this purpose.
<i>auth</i>	auth_protocol	Authentication protocol for users and hosts receiving traps. Either MD5 or SHA.
<i>authPass</i>	auth_password	Authorization password of the user
<i>priv</i>	privacy_protocol	Privacy protocol type, either DES or AES.
<i>privPass</i>	priv_password	Encryption password that is the private key for encryption.
<i>community</i>	communitystring	Agent community string. When set to “public,” requests coming from any community string will be accepted.

▼ Delete an SNMP User

v3 User

1. To delete a v3 user, enter the following:

```
snmp deleteUser version v3 name userName
```

See [TABLE 2-39](#) for possible values of these variables.

CLI Example

Deleting user with a user ID of “stkUserV3”:

SL8500

```
SL8500> snmp deleteUser version v3 name 'stkUserV3'
requestId
requestId      6
Device         1,0,0,0
Success        true
Done

Failure Count  0

Success Count  1
```

SL3000

```
SL3000> snmp deleteUser version v3 name 'stkUserV3'
requestId
requestId      6
Device         1,0,0,0
Success        true
Done
v2c User
```

SL500

```
ADVSRV> snmp deleteUser version v3 name stkUserV3
requestId
requestId      36
Device         1,0,0,0
Success        true
Done
v2c User
```

v2c User

1. To delete a v2 user, enter the following:

```
snmp deleteUser id
```

See [TABLE 2-39](#) for possible values of these variables.

CLI Example

Deleting user with a user ID of “stkUserV3”:

SL8500

```
SL8500> snmp deleteUser id 1
requestId
requestId      6
Device         1,0,0,0
Success        true
Done

Failure Count  0

Success Count  1
```

SL3000

```
SL3000> snmp deleteUser id 1
requestId
requestId      4
Device         1,0,0,0
Success        true
Done

Failure Count  0

Success Count  1
```

SL500

```
ADVSRV> snmp deleteUser id 1
requestId
requestId      4
Device         1,0,0,0
Success        true
Done

Failure Count  0

Success Count  1
```

▼ List SNMP Users

v3 or v2 User

1. To list SNMP users, enter the following:

```
snmp listUsers
```

See [TABLE 2-39](#) for possible values of these variables.

v3 Examples

SL8500

```
SL8500> snmp listUsers
requestId
requestId      21

Auth           MD5
AuthPass       *****
Index          2
Name           snmp
Priv           DES
Priv Pass      *****
Version        v3
Object         Snmp
Done           snmp
```

SL3000

```
SL3000> snmp listUsers
requestId
requestId      21

Auth           MD5
AuthPass       *****
Index          2
Name           snmp
Priv           DES
Priv Pass      *****
Version        v3
Object         Snmp
Done           snmp
```

v2 Examples

SL8500

```
SL8500> snmp listUsers
requestId
requestId      21

Attributes     Community public
Index          1
Version        v2c
Object         Snmp
Done           snmp
```

SL3000

```
SL3000> snmp listUsers
requestId
requestId      21

Attributes Community public
              Index      1
              Version     v2c
Object        Snmp       snmp
```

Configuring Trap Recipients Tasks

Task	Page
Add a Trap Recipient	49
Delete a Trap Recipient	52
List Trap Recipients	55

Libraries can access SNMP through the following methods:

- SL3000 and SL8500: Through CLI
- SL500: Through CLI and the SL Console
- SL150: Through the SL150 GUI with user roles of either administrator or service

▼ Add a Trap Recipient

v3 User

1. To add a v3 user, enter the following:

```
snmp addUser version v3 traplevel trapLevelString host name auth
authPass authPassPhrase priv privPass privPassPhrase engineID
engineIDstring
```

See [TABLE 2-40](#) for possible values of these variables.

CLI Example

SNMPv3c to monitor four trap levels (error, warning, informational, and agent start), with:

- An IP address of 128.45.1.162
- MD5 authentication
- DES encryption
- An SNMP engine ID of 0x12345678910

SL8500

```
SL8500> snmp addTrapRecipient trapLevel 1,2,3,11 host 128.45.1.162
version v3 name 'snmp' auth MD5 authPass 'snmpsnp' priv DES
'privPass'
'snmp' engineId 0x12345678910
  requestId
  requestId      2
  Device          1,0,0,0
  Success         true
  Done

  Failure Count 0

  Success Count 1
```

SL3000

```
SL3000> snmp addTrapRecipient trapLevel 1,2,3,11 host
'128.45.1.162' version v3 name 'snmp' auth MD5 authPass 'snmpsnp'
priv DES 'privPass'
'snmp' engineId 0x12345678910
  requestId
  requestId      2
  Device          1,0,0,0
  Success         true
  Done

  Failure Count 0

  Success Count 1
```

SL500

```
ADVSRV> snmp addTrapRecipient trapLevel 1,2,3,11 host 128.45.1.162
version v3 name snmp auth MD5 authPass snmpsnmp priv DES privPass
snmp engineId 0x12345678910
requestId
requestId      2
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 1
```

v2 User

1. To add a v2 user, enter the following:

```
snmp addTrapRecipient trapLevel trapLevelString host 128.45.1.162
version v2c community communityString
```

See [TABLE 2-40](#) for possible values of these variables.

CLI Example

A CLI entry for SNMPv2c to monitor four trap levels: error, warning, informational, and agent start.

SL8500

```
SL8500> snmp addTrapRecipient trapLevel 1,2,3,11 host 128.45.1.162
version v2c community public
requestId
requestId      2
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 0
```

SL3000

```
SL3000> snmp addTrapRecipient trapLevel 1,2,3,11 host 128.45.1.162
version v2c community public
requestId
requestId      2
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 0
```

SL500

```

ADVSRV> snmp addTrapRecipient trapLevel 1,2,3,11 host 128.45.1.162
version v2c community public
requestId
requestId      2
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 1

```

TABLE 2-40 Trap Recipient: Variables

Variable	Value Name	Options / Description
<i>version</i>	v2 or v3	SNMP version
<i>traplevel</i>	trapLevelString	Trap level. Can be single digit or several digits separated by commas.
<i>host</i>		IP address of host (hostName is disabled)
<i>name</i>		Name you want to assign to the SNMP user. All libraries monitored by a single StorageTek Modular Libraries server must have the same v3 user name. It is recommended that you create a new, unique user for this purpose.
<i>auth</i>	MD5 or SHA	Authentication protocol for users and hosts receiving traps.
<i>authPass</i>	authPassPhrase	Authorization password of the user
<i>priv</i>	DES or AES	Privacy protocol type
<i>privPass</i>	authPassPhrase	Encryption password that is the private key for encryption
<i>engineID</i>	engineIDstring	A string of hexadecimal characters (31 max), preceded with 0x. The authoritative engineId is from the SNMP agent that sends the traps (such as the library). Required on SNMPv3 traps.
<i>community</i>	communityString	

As an example, a CLI entry for SNMPv2c to monitor four trap levels (error, warning, informational, and agent start) for an SL8500 library would be:

In general, the authoritative engineId is from the SNMP agent that sends the traps (such as the library). To acquire the engineID, use the following command with its result:

```

snmp engineID print
engineId:      0x80001f8804353136303030303030343434

```

Note – For the SL150, the engineId is preloaded as the default value in the engineId text field within the browser user interface.

▼ Delete a Trap Recipient

v3 User

1. To delete a v3 trap recipient, enter the following:

```
snmp deleteTrapRecipient host version v3 name
```

See [TABLE 2-40](#) for possible values of these variables.

CLI Example

Delete an **SNMPv3** trap recipient, using a trap user name (stkAgentV3).

SL8500

```
SL8500> snmp deleteTrapRecipient host 128.45.1.162
version v3 name 'stkAgentV3'
requestId
requestId      51
Device         1,0,0,0
Success        true
Done

Failure Count  0

Success Count  1

Success Count  1
```

SL3000

```
SL3000> snmp deleteTrapRecipient host 128.45.1.162
version v2 community public
requestId
requestId      46
Device         1,0,0,0
Success        true
Done

Failure Count  0

Success Count  1

Success Count  1
```

SL500

```
ADVSRV> snmp deleteTrapRecipient host 128.45.1.162
version v2 community public
requestId
requestId      46
Device         1,0,0,0
Success        true
Done
```



```
Failure Count 0
```

```
Success Count 1
```

v2c User

1. To delete a v2 trap recipient, enter the following:

```
snmp deleteTrapRecipient host version v2 community communityString
```

See [TABLE 2-40](#) for possible values of these variables.

CLI Example

Deleting an **SNMPv2c** user (uniquely identified by the recipient's host) from a public community string:

SL8500

```
SL8500> snmp deleteTrapRecipient host 128.45.1.162
version v2c community public
requestId
requestId      46
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 1
```

SL3000

```
SL3000> snmp deleteTrapRecipient host 128.45.1.162
version v2c community public
requestId
requestId      46
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 1
```

SL500

```
ADVSRV> snmp deleteTrapRecipient host 128.45.1.162
version v2c community public
requestId
requestId      46
Device         1,0,0,0
Success        true
Done
```

2 Configuring Trap Recipients Tasks

Failure Count 0

Success Count 1

▼ List Trap Recipients

1. To list all trap recipients, enter:

```
snmp listTrapRecipients
```

See [TABLE 2-40](#) for possible values of these variables.

v2 CLI Example

SL8500

```
SL8500> snmp listTrapRecipients
```

```
requestId
requestId      39

Attributes Community public
              Host      128.45.1.162
              Index      1
              Port       162
              Trap Level  1,2,3,11
              Version     v2c
Object        Snmp       snmp
```

SL3000

```
SL3000> snmp listTrapRecipients
```

```
requestId
requestId      39

Attributes Community public
              Host      128.45.1.162
              Index      1
              Port       162
              Trap Level  1,2,3,11
              Version     v2c
Object        Snmp       snmp
```

v3 CLI Example

SL8500

```
SL8500> snmp listTrapRecipients
```

```
requestId
requestId      39
Attributes Auth      MD5
              AuthPass *****
              Engine Id 0x12345678910
              Host      128.45.1.162
              Index      2
              Name       snmp
              Port       162
              Priv       DES
              Priv Pass  *****
```

	Trap Level	1,2,3,11
	Version	v3
Object	Snmp	snmp

SL3000

SL3000> snmp **listTrapRecipients**

requestId		
requestId	39	
Attributes	Auth	MD5
	AuthPass	*****
	Engine Id	0x12345678910
	Host	128.45.1.162
	Index	2
	Name	snmp
	Port	162
	Priv	DES
	Priv Pass	*****
	Trap Level	1,2,3,11
	Version	v3
Object	Snmp	snmp

Managing Agent Tasks

Task	Page
Enable a portID	58
Disable a portID	59

Libraries can access SNMP through the following methods:

- SL3000 and SL8500: Through CLI
- SL500: Through CLI and the SL Console
- SL150: Through the SL150 GUI with user roles of either administrator or service

▼ Enable a portID

1. To enable a port ID, enter:

```
snmp enable port portID
```

CLI Example

SL8500

```
SL8500> snmp enable port2B
requestId
requestId      53
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 1
```

SL3000

```
SL3000> snmp enable port2B
requestId
requestId      53
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 1
```

SL500

```
ADVSRV> snmp enable port1B
requestId
requestId      53
Device         1,0,0,0
Success        true
Done

Failure Count 0

Success Count 1
```

▼ Disable a portID

1. To disable a port ID, enter:

```
snmp disable port portID
```

CLI Example

SL8500

```
SL8500> snmp disable port2B
requestId
requestId      53
Device         1,0,0,0
Success        true
Done
```

Failure Count 0

Success Count 1

SL30004

```
SL3000> snmp disable port2B
requestId
requestId      53
Device         1,0,0,0
Success        true
Done
```

Failure Count 0

Success Count 1

SL500

```
ADVSRV> snmp disable port1B
requestId
requestId      53
Device         1,0,0,0
Success        true
Done
```

Failure Count 0

Success Count 1

Configuring SNMP Service Information

Like configuring for users and traps/notifications, you must also configure the MIB variables that relate to service information.

Service information is also entered through the CLI port.

Libraries can access SNMP through the following methods:

- SL3000 and SL8500: Through CLI
- SL500: Through CLI and the SL Console
- SL150: Through the SL150 GUI with user roles of either administrator or service

▼ Configure SNMP Service Information

1. To configure the SNMP service information, enter values for any or all of the following variables:

```
snmp config serviceInfo set city cityString contact contactString
country countryString zip zipString description descriptionString phone
phoneString
```

See [TABLE 2-41](#) for possible values of these variables.

CLI Example

SL8500

```
SL8500> snmp config serviceInfo set city 'Denver' contact 'Joe'
country 'USA' description 'Manager' phone '303-555-1234'
state 'CO' streetAddr '555 Main Street' zip '80028'
```

SL3000

```
SL3000> snmp config serviceInfo set city 'Denver' contact 'Joe'
country 'USA' description 'Manager' phone '303-555-1234'
state 'CO' streetAddr '555 Main Street' zip '80028'
```

SL500

```
ADVSRV> snmp config serviceInfo set city Denver contact Joe
country USA description Manager phone 303-555-1234
state CO streetAddr 555 Main Street zip 80028
```

TABLE 2-41 SNMP Service Information: Variables

Variable	Value Name	Options / Description
<i>contact</i>	contactString	Name of contact for service
<i>streetAddr</i>	streetAddrString	Street address
<i>city</i>	cityString	City
<i>state</i>	stateString	State
<i>country</i>	countryString	Country
<i>zip</i>	zipString	ZIP
<i>description</i>	descriptionString	Any description you wish to enter
<i>phone</i>	phoneString	Phone number for service

Note – Each string will be truncated at 80 characters and must be delimited by single quotation marks.

SNMP Traps

This chapter lists the supported SNMP traps (also known as events or notifications) and the supporting data for the StorageTek Modular Libraries.

To obtain the information provided by a trap, users must be added to the recipients list.

Trap Numbering

An SNMP trap is assigned a number that correspond to its type. An embedded SNMP agent can distinguish and filter trap recipients based on the trap numbers for which they are registered.

Generic traps are numbered 1-10. Trap numbers 11 and higher are specific, and contain distinct Object IDs (OIDs) within their messages. They are generated from events within the library rather than the log entries.

Generic Traps from Log Entries

Generic traps are generated from log entries and contain:

- Severity codes, for indications such as an error or a warning
- Result codes, such as “0000 = success,” or “5010 = robotic position error”
- Activity string, such as “HLI move” or “CLI version print”
- A descriptive text string
- Date and time
- Other information, such as:
 - Device address associated with the event
 - User name associated with the activity
 - Interface-specific request identifier

TABLE 3-42 lists the generic traps available for the library.

TABLE 3-42 Generic Traps

Trap	#	Sent When:	SL150	SL500	SL3000	SL8500
slTrapError	1	Errors are posted in the log	x	x	x	x
slTrapWarning	2	Warnings are posted in the log	x	x	x	x
slTrapInformation	3	Information is posted in the log	x	x	x	x
slTrapConfiguration	4	Changes are made in a system property, such as network IP or Fibre mode	x	x		

slTrapError

Description

Reports a device condition critical to library operation. Errors are posted in the log.

Trap Number

1

MIB Objects

- slTrapLibrarySerialNumber
- slTrapDeviceId
- slTrapDeviceTime
- slTrapDeviceAddress
- slTrapDeviceUserName
- slTrapDeviceInterfaceName
- slTrapDeviceActivity
- slTrapDeviceRequestId
- slTrapDeviceSeverity
- slTrapDeviceResultCode
- slTrapDeviceFreeFormText

Example

“Device inoperable”

Refers to the entire system. Failure of a sub-unit or redundant component is not a Category 1.

slTrapWarning

Description

Reports a device condition which may need attention. Warnings are posted in the log.

Trap Number

2

MIB Objects

- slTrapLibrarySerialNumber
- slTrapDeviceId
- slTrapDeviceTime
- slTrapDeviceAddress
- slTrapDeviceUserName
- slTrapDeviceInterfaceName
- slTrapDeviceActivity
- slTrapDeviceRequestId
- slTrapDeviceSeverity
- slTrapDeviceResultCode
- slTrapDeviceFreeFormText

Example

“Device degraded”

Refers to recoverable failures that may allow the system to remain in use, but only in a degraded mode.

slTrapInformation

Description

Reports information for activity monitoring. Information is posted in the logs.

Trap Number

3

MIB Objects

- slTrapLibrarySerialNumber
- slTrapDeviceId
- slTrapDeviceTime
- slTrapDeviceAddress
- slTrapDeviceUserName
- slTrapDeviceInterfaceName
- slTrapDeviceActivity
- slTrapDeviceRequestId
- slTrapDeviceSeverity
- slTrapDeviceResultCode
- slTrapDeviceFreeFormText

Example

“Device activity”

A device has reported activity. This information is used to monitor normal activity and messages.

slTrapConfiguration

Description

Reports changes made in a system property or configuration, such as an IP address.

Trap Number

4

MIB Object Types

- slTrapLibrarySerialNumber
- slTrapDeviceId
- slTrapDeviceTime
- slTrapDeviceAddress
- slTrapDeviceUserName
- slTrapDeviceInterfaceName
- slTrapDeviceActivity
- slTrapDeviceRequestId
- slTrapDeviceSeverity
- slTrapDeviceResultCode
- slTrapConfigPropertyName,
- slTrapConfigNewPropertyValue
- slTrapConfigNewPropertyEffective

Example

“Device configuration”

A device has reported configuration activity.

Agent-Specific, Event-Based Traps

Specific traps 11 – 85 are event-based and have distinct information within their trap messages, depending on the trap level. Consult each trap within the library's MIB for the specific data objects returned.

Specific trap number groups are:

- Agent-specific traps: 11-20
- Device-specific traps: 21-100
 - Library status: 21-27
 - Drive status: 41-45
 - Cartridge access port (CAP) status: 61-65
 - Pass-thru port (PTP) status: 81-85
- Media-specific traps: 101 and above

TABLE 3-43 lists the agent-specific traps available within the library.

TABLE 3-43 Event-Based Traps

Trap	#	Sent When:	SL150	SL500	SL3000	SL8500
slTrapAgentStart	11	slAgentTrapTestLevel OID is written with a 13	x	x	x	x
slAgentTest	13	An SNMP agent has started.	x	x	x	x
slAgentTestHeartbeatA	14	Heartbeat is at frequency A (quick rate).	x	x	x	x
slAgentTestHeartbeatB	15	Heartbeat is at frequency B (slow rate).	x	x	x	x
slTrapLibStatusGood	21	Library has changed to normal mode.	x	x	x	x
slTrapLibStatusCheck	25	Library has changed from normal mode.	x	x	x	x
slTrapEnvHdwCheck	27	A device in the library has had an environmental check.	x	x	x	x
slTrapDrvStatusGood	41	Drive has changed to a normal mode.	x	x	x	x
slTrapDrvStatusCheck	45	Drive has changed from normal mode.	x	x	x	x
slTrapCapStatusGood	61	CAP has changed to a normal mode.	x	x	x	x
slTrapCapStatusOpen	63	CAP state has changed to open.	x	x	x	x
slTrapCapStatusCheck	65	CAP status has changed from normal mode.	x	x	x	x
slTrapPtpStatusGood	81	PTP status has changed to good (normal mode)				x

TABLE 3-43 Event-Based Traps (Continued)

Trap	#	Sent When:	SL150	SL500	SL3000	SL8500
slTrapPtpStatusCheck	85	PTP status has changed from a normal mode.				x
slTrapTbiEvent	100	Proprietary				
slTrapSvcEvent	101	Proprietary				
slTrapAsrEvent	102	Proprietary				

slTrapAgentStart

Description

Sent when the agent starts.

Trap Number

11

MIB Objects

- slAgentBootDate
- slAgentLibStatusAtStartup
- slAgentHaState
- slAgentHaId
- slAgentHASlot
- slAgentHaAlternateIp
- slControllerFru
- slLibSerialNumber

slAgentTest

Description

Sent when slAgentTrapTestLevel OID is written with a 13.

Trap Number

13

MIB Objects

- slTrapCount
- slTrapLibBootDate
- slTrapLibDateString
- slTrapLibSerialNumber
- slTrapLibTopLevelCondition
- slTrapHaState
- slTrapHaId
- slTrapHaSlot
- slTrapHaAlternateIp

slAgentTestHeartbeatA

Description

Sent when at a heartbeat frequency A (quick rate).

Trap Number

14

MIB Objects

- slTrapCount
- slTrapLibBootDate
- slTrapLibDateString
- slTrapLibSerialNumber
- slTrapLibTopLevelCondition
- slTrapHaState
- slTrapHaId
- slTrapHaSlot
- slTrapHaAlternateIp

slAgentTestHeartbeatB

Description

Sent when at a heartbeat frequency B (slow rate).

Trap Number

15

MIB Objects

- slTrapCount
- slTrapLibBootDate
- slTrapLibDateString
- slTrapLibSerialNumber
- slTrapLibTopLevelCondition
- slTrapHaState
- slTrapHaId
- slTrapHaSlot
- slTrapHaAlternateIp

slTrapLibStatusGood

Description

Sent when the library status changes to good (normal mode).

Trap Number

21

MIB Objects

- slLibraryTopLevelCondition
- slLibStkBaseModel
- slLibSerialNumber

slTrapLibStatusCheck

Description

Sent when the library condition changes from a normal mode, such as “degraded” or “not-operative.”

Trap Number

25

MIB Objects

- slLibraryTopLevelCondition
- slLibStkBaseModel
- slLibSerialNumber

slTrapEnvHdwCheck

Description

Sent when the library environment or hardware condition changes.

Trap Number

27

MIB Objects

- slTrapLibrarySerialNumber
- slTrapDeviceId
- slTrapDeviceTime
- slTrapDeviceAddress
- slTrapDeviceUserName
- slTrapDeviceInterfaceName
- slTrapDeviceActivity
- slTrapDeviceRequestId
- slTrapDeviceSeverity
- slTrapDeviceResultCode
- slTrapDeviceFreeFormText

slTrapDrvStatusGood

Description

Sent when a drive status changes to good (normal mode).

Trap Number

41

MIB Objects

- slLibSerialNumber
- slDriveState
- slDrivePhysicalAddressStr
- slDriveType
- slDriveVendor
- slDriveSerialNum

slTrapDrvStatusCheck

Description

Sent when a drive status change from a normal mode to a check conditions, such as "error," "warning" or "unknown."

Trap Number

45

MIB Objects

- slLibSerialNumber
- slDriveState
- slDrivePhysicalAddressStr
- slDriveType
- slDriveVendor
- slDriveSerialNum

slTrapCapStatusGood

Description

Sent when a cartridge access port (CAP) status changes to a normal mode.

Trap Number

61

MIB Objects

- slLibSerialNumber
- slCapState
- slCapPhysicalAddressStr

slTrapCapStatusOpen

Sent when a cartridge access port (CAP) status changes to “Open.”

Trap Number

63

MIB Objects

- slLibSerialNumber
- slCapState
- slCapAddress

slTrapCapStatusCheck

Sent when a cartridge access port (CAP) status changes from a normal mode, such as “error,” “warning” or “unknown.”

Trap Number

65

MIB Objects

- slLibSerialNumber
- slCapState
- slCapPhysicalAddressStr

slTrapPtpStatusGood

Sent when a PTP status changes to good (normal mode).

Trap Number

81

MIB Objects

- slLibSerialNumber
- slPtpState
- slPtpPhysicalAddressStr

slTrapPtpStatusCheck

Description

Sent when a PTP status changes from a normal mode, such as an error, warning, or unknown.

Trap Number

85

MIB Objects

- slLibSerialNumber
- slPtpState
- slPtpPhysicalAddressStr

Glossary

This glossary defines terms and abbreviations used in this publication.

A

AES

See [Advanced Encryption Standard \(AES\)](#).

Advanced Encryption Standard (AES)

An NIST-standard cryptographic cipher that uses a block length of 128 bits and multiple key lengths of 128, 192, or 256 bits to encrypt data.

agent

An SNMP-capable software module that resides in a managed device. The agent provides monitored information, responding to requests from the manager and sending SNMP traps to a recipient.

C

community string

Applications use community strings for access control. The manager includes the community string in its SNMP messages to an agent. This can be a maximum of 31 alpha-numeric characters.

D

DES

See [Data Encryption Standard \(DES\)](#).

DHCP

See [Dynamic Host Configuration Protocol \(DHCP\)](#).

DNS

See [Domain Name System \(DNS\)](#).

Data Encryption Standard (DES)

An NIST cryptographic cipher that uses a 56-bit key.

Dynamic Host Configuration Protocol (DHCP)

A set of rules to allow a network attached device to request and obtain an IP address from a server which has a list of addresses available for assignment.

Domain Name System (DNS)

A system that translates IP addresses into human readable computer names.

E**engine ID**

An administratively unique identifier of an SNMPv3 engine used for identification, but not for addressing. In general, the authoritative engineId is from the SNMP agent that sends the traps (such as the library).

F**FTP**

See [File Transfer Protocol \(FTP\)](#).

File Transfer Protocol (FTP)

An internet protocol for transferring files between two hosts over a TCP/IP network.

G**gateway**

A device on a network that serves as an entrance to another network.

H**HTTP**

See [HyperText Transfer Protocol \(HTTP\)](#).

host keyword

Currently, the host keyword is limited to the machine's IP address. The maximum keyword length is 31 alphanumeric characters.

HyperText Transfer Protocol (HTTP)

The protocol most often used to transfer information from World Wide Web servers to browsers.

I**IP**

See [Internet Protocol \(IP\)](#).

Internet Protocol (IP)

A data-oriented, network layer protocol in the internet protocol suite. It is encapsulated in a data link layer protocol such as Ethernet.

M

MD5

See [Message Digest 5 \(MD5\)](#).

MIB

See [management information base \(MIB\)](#).

managed device

A device that provides monitored information and controlled operations using SNMP. StorageTek libraries are managed devices.

management information base (MIB)

An ASCII text file organized hierarchically that describes the elements (configuration and statistical information) of a managed device. When a manager requests information, or a managed device generates a trap, the MIB translates the numerical strings into readable text that identifies each data object within the message.

For StorageTek libraries, a copy of the MIB is loaded with firmware and stored on the library processor card.

management station

A system or server that has an SNMP application installed.

manager

Provides the communication link between the systems administrator and the managed devices on the network. A manager station or server allows the systems administrator to get information about the device through the MIB and to receive traps from an agent. The manager provides the managing, monitoring, and receiving roles of an SNMP-capable network.

Message Digest 5 (MD5)

A popular one-hash function that is used to create a message digest for digital signatures. MD5 is faster than SHA, but is considered less secure.

N

notification

A message that reports a problem, error, or significant event that occurred within a device, also called a trap. See [“trap” on page 88](#).

netmask

A hierarchical partitioning of the network address space.

P

PDU

See [protocol data units](#).

protocol data units

A limited number of commands that follow a simple request and response exchange to communicate between the manager and the agent. For example, “get” is a request for information of a specific variable.

R

recipient

A location on a manager where the SNMP agent sends traps. This location is defined by the combination of either the IP address or DNS name and the port number. The default recipient port number is 162.

S

SHA

See [Secure Hash Algorithm \(SHA-1/SHA\)](#).

Secure Hash Algorithm (SHA-1/SHA)

A popular one-hash algorithm used to create digital signatures. SHA is more secure, but slightly slower than MD5.

T

TCP

See [Transmission Control Protocol \(TCP\)](#).

Transmission Control Protocol (TCP)

One of the core protocols of the Internet protocol suite. With TCP, applications on networked hosts can create connections to one another over which they can exchange data. The protocol guarantees reliable and in-order delivery of sender to receiver data (see also User Datagram Protocol).

trap

A message that reports a problem, error, or significant event that occurred within the device. These messages are sent by the agent to a manager. Also called a notification.

trap level string

The list of trap levels. The maximum length is 31 alpha-numeric characters.

U

UDP

See [User Datagram Protocol \(UDP\)](#).

User Datagram Protocol (UDP)

One of the core protocols of the Internet protocol suite. Using UDP, programs on networked computers can send short messages sometimes known as datagrams to one another.

UDP does not provide the reliability and ordering guarantees that TCP does. Datagrams may arrive out of order or go missing without notice. Without the overhead of checking if every packet actually arrived, UDP is faster and more efficient for many lightweight or time-sensitive purposes.

UDP, like TCP, runs on top of IP networks and is one of the core protocols in the Internet protocol suite. UDP enables network-based devices to send short messages faster and more efficiently for many lightweight and time-sensitive applications.

W

WWN

See [World Wide Name \(WWN\)](#).

World Wide Name (WWN)

A unique identifier in a Fibre Channel or Serial Attached SCSI storage network. Each WWN is an 8-byte number derived from IEEE- and vendor-supplied information.

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