StorageTek

SL150/SL500/SL3000/SL8500 SNMP Reference Guide

E35317-03

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ORACLE

StorageTek SL150/SL500/SL3000/SL8500 SNMP Reference Guide

E35317-03

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Preface

The SNMP Reference Guide can be used for all StorageTek Modular Libraries, including SL150, SL500, SL3000, and SL8500.

Audience

This document is intended for customers who use any of the StorageTek Modular Libraries.

Documentation Accessibility

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Related Documents

For more information, see the following documents:

- *SL150 User Guide*
- *SL500 User Guide*
- *SL3000 User Guide*
- *SL8500 User Guide*

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.

Convention	Meaning
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

Summary of Changes

The following is a summary of changes for this document.

E35317-03, September 2013

The following updates are in this edition and relate to SNMP updates version 2.15 May 20, 2013 and version 2.13 November 27, 2012:

- Added to slCap: slCapSerialNumber, slCapCodeVer, slCapVersion, slCapFirmwarever
- Adde to slElevator: slElevatorGetFails, slElevatorPutFails, slElevatorGetTotals, slElevatorPutTotals
- Added to slPtp: slPtpMoveFails, slPtpMoveTotals
- Added slMVDrive table and its variables
- Increased size of slTrapLibrarySerialNumber, slTrapDeviceId, slTrapConfigLibrarySerialNumber and slTrapConfigDeviceId to 32 to be compatible with SL150 identifier formats

Revision Summary

The following contains a list of previous revisions.

Version	Date	Revisions
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

Version	Date	Revisions
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 ■ 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
316194703 Revision C (SNMP SL8500)	April 2010	Updates to this edition include: ■ Engineering updates ■ New command line interface (CLI) layout ■ Oracle branding
316194703 Revision B (SNMP SL8500)	September 2009	Updates included adding object identifiers.
316194501 Revision B (SNMP SL3000)	September 2009	Updates to this revision included the following additional object identifiers (OIDs: slCap, slDrive, slLibVersion, slPowerSupply, slRobot, slStorage
316191602 Revision B (SNMP SL500)	September 2009	Updates to this revision included the following additional object identifiers (OIDs): ■ Engineering updates ■ New command line interface (CLI) layout ■ Oracle branding
316194703 Revision A (SNMP SL8500)	April 2008	Initial document release.
316194501 Revision A (SNMP SL3000)	April 2008	Initial document release.
316191602 Revision B (SNMP SL500)	April 2008	Initial document release.

1

MIB Objects and Variables

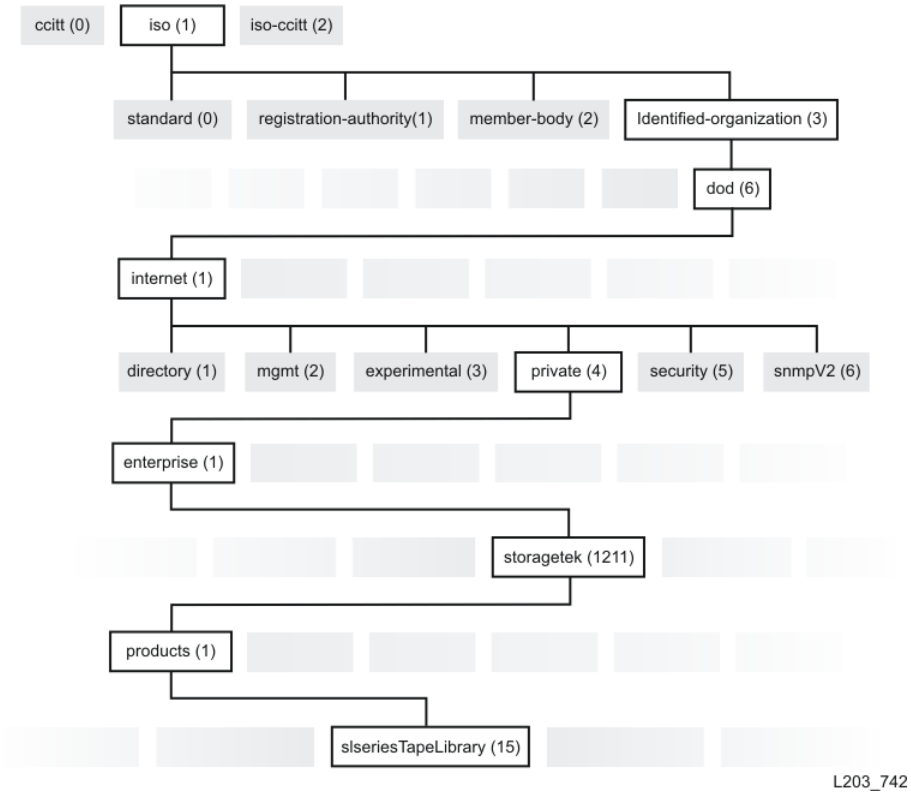
The management information base (MIB) is a virtual database that contains objects and their identifiers (or variables), which define characteristics of a managed device. These characteristics are the functional elements for that device, which can be monitored using SNMP software.

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.

MIB Structure for StorageTek Modular Libraries

The following graphic 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



Type Definitions

The type definitions in Table 1–1 serve as templates on which other variables can be based.

Table 1–1 Type Definitions

Type Definition	Description
SlLibraryId	Library identifier (n of Max) within a complex
SlLibraryIdMax	Maximum library identifier within a complex
SlComplexId	Library complex identifier
SlSnmpPort	SNMP ports allowed
SlSnmpTrapPort	SNMP trap ports allowed
SlCmdClear	The SNMP trap ports allowed (1=no action, 2=clear)
SlDeviceStatus	Device status (ok=0, error=1, warning=2, info=3, trace=4)
SlLibraryCondition	Condition of library (normal=0, degraded=1, not operative=2)
SlMediaEventType	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)
SlHaState	State of RE controller (simplex=0, duplex=1, nonRE=2)
SlHaId	Identifier of RE controller (active=0, standby=1, nonRE=2)
SlHaSlot	Slot of RE controller (side A =0, side B =1, nonRE =3)
SlDriveFibreLoopId	Fibre loop ID of drive
SlDriveFibreSpeed	Fibre speed of drive (unknown=1, one Gbit=2, two Gbit=3, four Gbit=4)
SlDriveFibreAddressing	Drive fibre addressing (hard=1, soft=2)
SlDriveStatus	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)
SlPartitionType	Type of partition (hli=1, scsi=2, other=3)
SlCellHostTypeTC	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)
SlSeverityTC	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)
SlDiagEntityTC	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)
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 behavior affected=5, alert/imminent 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 lists agent variables.

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 where the agent will send traps
slAgentURL	URL for Web based management

Redundant Electronics

Table 1–3 lists variables for Redundant Electronics.

Table 1–3 slAgent HAState Variables

Variable	Description
slAgentHAState	State of RE controller (simplex =0, duplex/switchable =1)
slAgentHAId	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 lists variables for 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 lists variables for Cartridge Access Ports.

Table 1–5 slCap 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

Table 1–5 (Cont.) slCap Variables

Variable	Description
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
slCapSerialNumber	Serial number of the CAP
slCapCodeVer	Code version of the CAP
slCapVersion	Version of the CAP
slCapFirmwareVer	Firmware version of the CAP

Cell

Table 1–6 lists cell variables.

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)

Table 1–6 (Cont.) slCell Variables

Variable	Description
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
slCellCapacityEnabled	Whether the storage cell is enabled (1) or disabled (0)
slCellCapacityAllowed	The number of cells licensed for use.
slCellCapacityUsed	The number of cells being used.

Cleaning

Table 1–7 lists variables for cleaning.

Table 1–7 slLibClean Variables

Variable	Description
slLibCleanEnabled	Auto clean feature configuration (not supported on all libraries)
slLibCleanCartTable	Table of cleaning cartridges in the library
slLibCleanCartEntry	Cleaning cartridge
slCleanCartIndex	Integer index into the cleaning cartridge table
slCleanCartLabel	Clean cartridge label
slCleanCartType	Cleaning cartridge type (for example: SDLT, 9840, and LTO)
slCleanCartLocationElementID	Clean cartridge location: Element ID
slCleanCartHostAccessible	Indication of host accessible status
slCleanCartUsageCount	Number of times that the cartridge has been used to clean a tape drive
slLibCleanNumCarts	Count of the clean cartridges in the library
slLibCleanNumCartTypes	Number of unique cartridge types supported
slLibCleanWarnEntry	Table entry for clean count warning threshold
slLibCleanWarnIndex	Index into clean warning threshold table
slLibCleanWarnCartType	Cleaning cartridge type (for example, SDLT, 9840, LTO and T10000)
slLibCleanWarnCount	Configured warning count threshold
slLibCleanWarnTable	Table of clean count warning thresholds

Controller

Table 1–8 lists controller variables.

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.)

Table 1–8 (Cont.) slController Variables

Variable	Description
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

This section contains information on drive and media variables.

Drive

Table 1–9 lists drive variables.

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

Table 1–9 (Cont.) slDrive Variables

Variable	Description
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
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 Validation

Table 1–10 lists media validation variables for drives.

Table 1–10 slMVDrive Variables

Variable	Description
slMVDrivePhysicalAddressStr	Physical address of drive assigned to media validation pool
slMVDriveType	Make and manufacturer of drive assigned to media validation pool
slMVDriveSerialNum	Electronic serial number of drive assigned to media validation pool
slMVDriveState	State of drive assigned to media validation pool (includes empty, loaded, needs cleaning)
slMVDriveCodeVer	Firmware or software of drive assigned to media validation pool
slMVDriveCellStatusStr	Status of the cell of the drive assigned to media validation pool
slMVDriveCellContentLabel	Label of the cartridge in the drive assigned to media validation pool (0 if empty, ?????? if unreadable)
slMVReservationId	0 indicates the drive assigned to media validation pool is available for use
slMVTapeVolserLabelStr	Physical address of drive assigned to media validation pool
slMVTypeEnum	Type of validation applied to cartridge (0 = no validation, 1 = basic verify, 2 = complete verify from beginning of tape, 3 = complete verify resume, 4 = complete verify divbot, 5 = complete verify divresume, 6 = standard verify, 7 = rebuild MIR, 8 = stop)
slMVOriginatorStr	Test initiator of media validation
slMVStatusStr	Status of media validation test
slMVCompletionStatusStr	Percentage that media validation is completed or that validation has been stopped
slMVErrorCodeStr	Error code for media validation
slMVDriveCount	Amount of drives currently assigned to the media validation pool

Media Event

Table 1–11 lists media event variables.

Table 1–11 slMedia Event 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
slLibMediaEventVolid	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 1–11 (Cont.) slMedia Event Variables

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 1–12 lists elevator variables.

Table 1–12 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
slElevatorGetFails	Number of mount fails for the elevator
slElevatorPutFails	Number of dismount fails for the elevator
slElevatorGetTotals	Sum of all mount operations of the elevator
slElevatorPutTotals	Sum of all dismount operations of the elevator

Fan

Table 1–13 lists fan variables.

Table 1–13 slFan Variables

Variable	Description
slFanCount	Amount of monitored fans in the library
slFanTable	Table of the library's fans

Table 1–13 (Cont.) slFan Variables

slFanEntry	Fan
slFanIndex	Integer index into the fan table
slFanName	Name of the fan
slFanOperational	Operational state of the fan

Host Interface

Table 1–14 lists host interface variables.

Table 1–14 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 1–14 (Cont.) slHostInterface Variables

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

Library

This section contains information regarding library-related variables.

Condition

Table 1–15 lists library condition variables.

Table 1–15 slLibrary Variables

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

Configuration

Table 1–16 lists library configuration variables.

Table 1–16 slLibLSMConfig Variables

Variable	Description
slLibLSMConfigCount	Amount of LSMs installed
slLibLSMConfigTable	A table of LSM configurations
slLibLSMConfigEntry	LSM configuration entry
slLibLSMConfigIndex	LSM configuration index
slLibLSMConfigNumPanels	Amount of physical panels
slLibLSMConfigNumHandCells	Amount of physical hands
slLibLSMConfigMinHandAddr	Minimum Element ID or address of physical hands
slLibLSMConfigMaxHandAddr	Maximum Element ID or address of physical hands
slLibLSMConfigNumSystemCells	Amount of system and reserved cells
slLibLSMConfigNumRestrictedCells	Amount of customer restricted cells
slLibLSMConfigMinSystemAddr	Minimum Element ID or address of system cells
slLibLSMConfigMaxSystemAddr	Maximum Element ID or address of system cells
slLibLSMConfigNumCaps	Amount of cartridge access ports (CAPs)
slLibLSMConfigNumCapColumns	Amount of columns within CAPs
slLibLSMConfigNumCapCells	Amount of CAP cells
slLibLSMConfigMinCapAddr	Minimum Element ID or address of CAP cells
slLibLSMConfigMaxCapAddr	Maximum Element ID or address of CAP cells
slLibLSMConfigNumDriveColumns	Amount of drive columns

Table 1–16 (Cont.) slLibLSMConfig Variables

Variable	Description
slLibLSMConfigNumDrives	Amount of tape drives
slLibLSMConfigMinDriveAddr	Minimum Element ID or address of tape drives
slLibLSMConfigMaxDriveAddr	Maximum Element ID or address of tape drives
slLibLSMConfigNumStorageCells	Amount of storage cells
slLibLSMConfigMinStorageAddr	Minimum Element ID or address of storage cells
slLibLSMConfigMaxStorageAddr	Maximum Element ID or address of storage cells
slLibLSMConfigNumPtps	Amount of pass-thru ports (PTPs)
slLibLSMConfigNumPtpColumns	Amount of columns within the PTPs
slLibLSMConfigNumPtpCells	Amount of PTP cells
slLibLSMConfigMinPtpAddr	Minimum Element ID or address of PTP cells
slLibLSMConfigMaxPtpAddr	Maximum Element ID or address of PTP cells

Date

Table 1–17 lists library date variables.

Table 1–17 slLibDate Variables

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

Identifying Information

Table 1–18 lists variables for library identifying information.

Table 1–18 Identifying Information Variables

Varable	Description
slLibStkBaseModel	StorageTek Library model name (see vendor specific model data)
slLibSerialNumber	Serial number of library frame
slLibWWNNumber	Library World Wide Number (WWN) (a 64-digit hexadecimal number)
slLibraryTopLevelCondition	Library overall condition (for example: normal, degraded, or not-operational)
SlLibLibraryId	Library identifier (n of Max) within a library complex
SlLibLibraryIdMax	Maximum library identifier within a library complex
SlLibComplexId	Identifier of library complex
slLibMibVer	Version of the MIB supported by the library

Location

Table 1–19 lists library location variables.

Table 1–19 slLibLocat Variables

Variable	Description
slLibLocatContact	Primary contact for administration of the library
slLibLocatStreet	Street address of location site
slLibLocatState	State /province of location site
slLibLocatZip	ZIP code or other data of location site
slLibLocatCountry	Country of location site
slLibLocatDescr	Description or other data of location site
slLibLocatCity	City of location site

Network

Table 1–20 lists network variables.

Table 1–20 slLibNetwork Variables

Variable	Description
slNetworkCount	Count of all the Ethernet ports
slNetworkTable	Table of network interfaces
slNetworkEntry	Network interface entry
slNetworkIndex	Index into the table
slLibNetworkInterfaceName	Interface name used by the library software
slLibNetworkIpAddr	IP address of library
slLibNetworkGateway	Internet gateway of library network
slLibNetworkEthAddr	Physical 48 bit ethernet address of library
slLibNetworkName	Host name of library network
slLibNetworkNetmask	Internet address netmask of library network
slLibNetworkDhcpEnabled	DHCP IP address /name client lookup service status (SL500 only)
slLibNetworkDomainName	Network domain name of library network
slLibNetworkPrimaryDNS	Primary DNS server of library network
slLibNetworkSecondaryDNS	Secondary DNS server of library network
slLibNetworkRXPackets	Amount of packets received
slLibNetworkTXPackets	Amount of packets transmitted
slLibNetworkErrors	Amount of errors on this interface
slLibNetworkDropped	Amount of dropped packets on this interface
slLibNetworkOverruns	Amount of overrun packets on this interface
slLibNetworkFrame	Amount of frame packets on this interface
slLibNetworkCollisions	Amount of collisions on this interface

State

Table 1–21 lists library state variables.

Table 1–21 slLibLSMState Variables

Variable	Description
slLibLSMCount	LSM count.
slLibLSMStateTable	A table LSM states.
slLibLSMStateEntry	Entry of an LSM state.
slLibLSMStateIndex	Index of LSM state.
slLibLSMStatus	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.
slLibLSMStatusEnum	LSM operational state, reported as an enumeration (online =0, offline =1, offlinePending =2).

Statistics

Table 1–22 lists library statistic variables.

Table 1–22 slLibStats Variables

Variable	Description
slLibStatsNumBoots	Amount of library initializations
slLibStatsNumDoorOpens	Amount of occurrences when the service door has been opened
slLibStatsNumGetRetries	Total of get retries
slLibStatsNumGetFails	Total of get failures
slLibStatsNumPutRetries	Total of put retries
slLibStatsNumPutFails	Total of put failures
slLibStatsNumLabelRetries	Total of label read retries
slLibStatsNumLabelFails	Total of label read failures
slLibStatsNumTargetRetries	Total of target read retries
slLibStatsNumTargetFails	Total of target read failures
slLibStatsNumMoves	Total of cartridge moves
slLibStatsNumMounts	Total of mounts
slLibStatsNumTargetReads	Total of target reads
slLibStatsNumEmptyReads	Total of empty cell reads
slLibStatsNumLabelReads	Total of label reads
slLibStatsGetTotals	Sum of all Get operations of individual robots
slLibStatsPutTotals	Sum of all Put operations of individual robots
slLibStatsCumMachUptime	Cumulative machine up time in seconds
slLibStatsUpTimeSinceLastBoot	In seconds

Temperature

Table 1–23 lists library temperature variables.

Table 1–23 slTemp Variables

Variable	Description
slTempSensorCount	Amount of temperature sensors in the library
slTempSensorTable	Table of the library's temperature sensors
slTempSensorEntry	Temperature sensor
slTempSensorIndex	Integer index into the temperature sensor table
slTempSensorName	Name of the temperature sensor
slTempSensorCurrentTemp	Current /present temperature reading
slTempSensorHighTemp	Storage area peak temp since last machine boot
slTempSensorWarnThreshold	Temperature threshold for automated warning
slTempSensorFailThreshold	Temperature threshold for automated library shutdown

Version

Table 1–24 lists library version variables.

Table 1–24 slLibVersion Variables

Variable	Description
slLibVersionFirmRev	Embedded firmware revision of library, per engineering change (EC) field releases
slLibVersionFirmDate	Embedded firmware build date of library
slLibVersionBootRev	Boot software/OS version of library
slLibVersionHardware	Controller hardware version of library

Pass-Thru Ports

Table 1–25 lists PTP variables.

Table 1–25 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

Table 1–25 (Cont.) slPtp Variables

Variable	Description
slPtpMoveRetries	Amount of move retries performed by PTP
slPtpMoveFails	Number of move Fails performed by the Pass-thru Port
slPtpMoveTotals	Number total moves performed by the Pass-thru Port

Power

The following section describes variables for library power.

Power Supply

Table 1–26 lists variables for library power supply.

Table 1–26 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 1–27 lists variables for library redundant power.

Table 1–27 Redundant Power Variables

Variable	Description
SlHaState	State of RE controller (0=simplex, 1=duplex, 2=nonRE)
SlHaId	Identifier of RE controller (0=active, 1=standby, 2=nonRE)
SlHaSlot	Slot of RE controller (0=sideA, 1=sideB, 2=nonRE)

Robot

Table 1–28 lists variables for library robot.

Table 1–28 slRobot Variables

Variable	Description
slRobotCount	Amount of robot mechanisms
slRobotTable	A table of robots
slRobotEntry	Robot
slRobotIndex	Robot index

Table 1–28 (Cont.) slRobot Variables

Variable	Description
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 1–29 lists variables for the library safety door.

Table 1–29 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 1–30 lists variables for SNMP.

Table 1–30 slSNMP Variables

Variable	Description
SlSNMPPort	The SNMP ports allowed
SlSNMPTrapPort	The SNMP trap ports allowed
SlCmdClear	The SNMP trap ports allowed (1=no action, 2=clear)

Tape

Table 1–31 lists variables for tapes.

Table 1–31 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 1–32 lists variables for library traps.

Table 1–32 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 1–33 lists variables for automatic service requests.

Table 1–33 slTrapAsr Variables

Variable	Description
slTrapAsrSuspectCount	Number of FRU call-outs to follow in this trap (max 5)
slTrapAsrSuspectTable	Table of diagnosted 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
slTrapAsrSuspectFruSn	Serial (entitlement) number for this FRU /CRU
slTrapAsrSuspectFruRevision	Revision level of this FRU /CRU
slTrapAsrSuspectFruStatus	Status of FRU /CRU

Configuration

Table 1–34 lists variables for library configuration.

Table 1–34 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 1–35 lists variables for service events.

Table 1–35 slTrapSvc 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)
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

Severity Variables

Table 1–36 lists options for severity levels of a trap.

Table 1–36 slSeverityTC

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 1–37 lists variables for tests.

Table 1–37 Variables for Tests

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.**
slTrapLibSerialNumber	Serial number of library frame

Table 1–37 (Cont.) Variables for Tests

slTrapLibTopLevelCondition	Overall condition of the library (normal,degraded,not-operational)
slTrapHaState	State of RE controller (simplex=0, duplex/switchable=1)
slTrapHaId	Identifier of RE controller (active=0, standby=1)
slTrapHaSlot	Slot of RE controller (sideA=0, sideB=1)
slTrapHaAlternateIp	IP address of alternate RE controller

Turntable Elements

Table 1–38 lists variables for turntable elements.

Table 1–38 slTurntable Variables

Variable	Description
slTurntableCount	Count of the turntables in the turntable table
slTurntableTable	A table of turntables
slTurntableEntry	A turntable
slTurntableIndex	A turntable index
slTurntablePhysicalAddressStr	Physical address string of a turntable
slTurntablePosition	Physical LSM position of the turntable (0=left, 1=right)
slTurntableHandCartStatus	The turntable's hand state (cartridge=1, no cartridge=0)
slTurntableSerialNum	Serial number of the turntable
slTurntableState	State of the turntable (idled, moving, in-op, etc.)
slTurntableFaultLED	Fault LED state
slTurntableStatusEnum	Operational status of the turntable, in enumerated form
slTurntableCodeVer	Code version of the turntable
slTurntableVersion	Hardware version of the turntable
slTurntableFirmwareVer	Firmware version of the turntable
slTurntablesRotation	Rotation count of the turntable
slTurntablesRotationRetries	Number of rotation retries performed by the turntable
slTurntablesRotationFails	Number of rotation failures performed by the turntable
slTurntablesIPLs	Number of IPLs performed by the turntable

2

Configuring SNMP

This chapter explains the concepts and commands involved with configuring SNMP. The following topics are discussed:

Configuration Methods

You can configure SNMP through the following methods:

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

> **Note:** Initially, configuring SNMP through the command line interface (CLI) requires the assistance of an Oracle service representative.

SNMP Overview

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 Configuration 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:

- Firmware for StorageTek Modular Libraries 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.
- STA has separate firmware requirements. See the STA documentation for more information.

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 "Enabling and Disabling Ports" on page 2-9 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 2–1 lists the default SNMP settings for a StorageTek library.

Table 2–1 Default SNMP Settings for a StorageTek Library

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 2-7for 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 2-4 and "Obtain Trap Destination Information" on page 2-4.)

2. Manage SNMP users.

   (See "Managing SNMP Users: Tasks" on page 2-4.)

3. Configure trap recipients.

   (See "Configuring Trap Recipients Tasks" on page 2-7.)

4. Enable the agent within the library controller card.

   (See "Enable a Port ID" on page 2-10.)

   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 2-10.)

MIB and Trap Information Tasks

This section contains information on MIB and trap destination.

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 Libary Console, select **Tools > Diagnostics**.
2. Click the Library folder on the navigation tree. The Library page appears.
3. Click the Transfer File tab. The Transfer File 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 SNMPv2c, obtain: IP address of the hosts receiving the traps

   For SNMPv3, 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

Table 2–2 lists the variables used in this section.

Table 2–2 SNMP User Variables

Argument	Variable	Description
version	v2c or v3	Version of SNMP.
name	*name*	Name assigned 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.
auth	*auth_protocol*	Authentication protocol for users and hosts receiving traps. Either MD5 or SHA.
authPass	*auth_password*	Authorization password of the user

Table 2–2 (Cont.) SNMP User Variables

Argument	Variable	Description
priv	*privacy_protocol*	Privacy protocol type, either DES or AES.
privPass	*priv_password*	Encryption password that is the private key for encryption.
community	*communitystring*	Agent community string. When set to *public*, requests coming from any community string will be accepted.

List SNMP Users

To list SNMP users, enter the following.

```
snmp listUsers
```

Example 2–1 List SNMP users — v3 output

```
> snmp listUsers
 requestId
 requestId 21

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

Example 2–2 List SNMP users — v2c output

```
> snmp listUsers
 requestId
 requestId 21

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

Add an SNMP User

The following describe how to add an SNMP user for SNMPv3 and SNMPv2c.

SNMPv3

To create a user for SNMPv3, enter the following. See Table 2–2 for possible values of these variables.

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

Example 2–3 Add SNMP v3 user

```
> 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
```

SNMPv2c

To create an SNMPv2c user, enter the following. See Table 2–2 for possible values of these variables.

snmp addUser version v2c community *communityString*

Example 2–4 Add SNMP v2c user

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

 Failure Count 0
 Success Count 1
```

Delete an SNMP User

The follow describes how to delete an SNMP user.

SNMPv3

To delete an SNMPv3 user, enter the following. See Table 2–2 for possible values of these variables.

snmp deleteUser version v3 name *userName*

Example 2–5 Delete SNMP v3 user

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

 Failure Count 0
 Success Count 1
```

SNMPv2c

To delete an SNMPv2c user, enter the following.

snmp deleteUser id *id*

Example 2–6 Delete SNMP v2c user

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

```
Failure Count 0

Success Count 1
```

Configuring Trap Recipients Tasks

Table 2–3 lists the variables used in this section.

Table 2–3 Trap Recipient Variables

Argument	Variable	Description
trapLevel	*trapLevelString*	Trap level (can be single digit or several digits separated by commas).
host	*name*	IP address of host (hostName is disabled).
version	v2 or v3	Version of SNMP.
name	*name*	Name assigned to the SNMP user. All libraries monitored by a single StorageTek Modular Librariesserver must have the same v3 user name. It is recommended that you create a new, unique user for this purpose.
auth	*auth_protocol*	Authentication protocol for users and hosts receiving traps. Either MD5 or SHA.
authPass	*auth_password*	Authorization password or pass phrase.
priv	*privacy_protocol*	Privacy protocol type, either DES or AES.
privPass	*priv_password*	Encryption password that is the private key for encryption.
engineID	*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.
community	*communitystring*	Agent community string. When set to public, requests coming from any community string will be accepted.

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:

```
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.

List Trap Recipients

To list all trap recipients, enter the following.

```
snmp listTrapRecipients
```

Example 2–7 List trap recipients — v3 output

```
> 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
```

Example 2–8 List trap recipients — v2c output

```
> 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
```

Add a Trap Recipient

The following information describes how to add a trap recipient for SNMPv3 and SNMPv2c.

SNMPv3

To add an SNMPv3 trap recipient, enter the following. See Table 2–3 for possible values of these variables.

snmp addTrapRecipient traplevel *trapLevelString* **host** *name* **version v3 name** *name* **auth** *auth_protocol* **authPass** *authPassPhrase* **priv** *privacy_protocol* **privPass** *privPassPhrase* **engineID** *engineIDstring*

Example 2–9 Add v3 trap recipient

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

 Failure Count 0
 Success Count 1
```

SNMPv2c

To add an SNMPv2c trap recipient, enter the following. See Table 2–3 for possible values of these variables.

snmp addTrapRecipient traplevel *trapLevelString* **host** *name* **version v2c community** *communityString*

Example 2–10 Add v2c trap recipient

```
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
```

Delete a Trap Recipient

This section describes how to delete a trap recipient. See Table 2–2 for possible values of these variables.

SNMPv3

To delete an SNMPv3 trap recipient, enter the following.

snmp deleteTrapRecipient host *name* **version v3**

Example 2–11 Delete v3 trap recipient

```
> 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
```

SNMPv2c

To delete an SNMPv2c trap recipient, enter the following.

snmp deleteTrapRecipient host *name* **version v2 community** *communityString*

Example 2–12 Delete a v2c trap recipient

```
> 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
```

Enabling and Disabling Ports

The following commands are used to either enable or disable port IDs for SNMP.

Enable a Port ID

To enable a port ID, enter:

snmp enable *portID*

Example 2–13 Enable a port ID

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

 Failure Count 0
 Success Count 1
```

Disable a Port ID

To disable a port ID, enter:

snmp disable *portID*

Example 2–14 Disable a port ID

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

 Failure Count 0
 Success Count 1
```

Configuring SNMP Service Information

Service information is entered through the CLI port. To configure the SNMP service information, enter values for any or all of the following variables. See Table 2–4 for possible values of these variables.

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

Table 2–4 SNMP Service Information Variables

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

Note: Each string will be truncated at 80 characters. For the SL8500 and SL3000, strings must be delimited by single quotation marks.

Example 2–15 Configure SNMP service information

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

3

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 corresponds 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 3–1 lists the generic traps available for the library.

Table 3–1 Generic Traps

Trap	#	Sent When:	SL150	SL500	SL3000	SL8500
slTrapError	1	Errors are posted in the log	x	x	x	x

Table 3–1 (Cont.) Generic Traps

Trap	#	Sent When:	SL150	SL500	SL3000	SL8500
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

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

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

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

Trap Number

3

MIB Objects

- slTrapLibrarySerialNumber
- slTrapDeviceId
- slTrapDeviceTime
- slTrapDeviceAddres
- 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

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 3–2 lists the agent-specific traps available within the library.

Table 3–2 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

Table 3–2 (Cont.) Event-Based Traps

Trap	#	Sent When:	SL150	SL500	SL3000	SL8500
slAgentTestHeartbeatB	15	Heartbeat is at frequence 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
Figure slTrapCapStatusCheck	65	CAP status has changed from normal mode.	x	x	x	x
slTrapPtpStatusGood	81	PTP status has changed to good (normal mode)				x
slTrapPtpStatusCheck	85	PTP status has changed from a normal mode.				x
slTrapTbiEvent	100	Proprietary				
slTrapSvcEvent	101	Proprietary				
slTrapAsrEvent	102	Proprietary				

slTrapAgentStart

Sent when the agent starts.

Trap Number

11

MIB Objects

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

slAgentTest

Sent when slAgentTrapTestLevel OID is written with a 13.

Trap Number

13

MIB Objects

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

slAgentTestHeartbeatA

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

Trap Number

14

MIB Objects

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

slAgentTestHeartbeatB

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

Trap Number

15

MIB Objects

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

slTrapLibStatusGood

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

Trap Number

21

MIB Objects

- slLibraryTopLevelCondition
- slLibStkBaseModel
- slLibSerialNumber

slTrapLibStatusCheck

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

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

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

Trap Number

41

MIB Objects

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

slTrapDrvStatusCheck

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

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

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.

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.

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.

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.

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).

FTP

See **File Transfer Protocol (FTP)**.

File Transfer Protocol (FTP)

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

gateway

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

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

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.

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.

notification

A message that reports a problem, error, or significant event that occurred within a device, also called a trap. *See* "trap".

netmask

A hierarchical partitioning of the network address space.

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.

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.

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.

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.

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.

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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