

# StorageTek Automated Cartridge System Library Software

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Administrator's Guide

Version 7.3.1



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# Summary of Changes

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## 7.3.1 EC released document table.

EC	Date	Edition	Revision	Description
EC001630	May 2010	First	AA	<p>This release supports:</p> <ul style="list-style-type: none"><li>• Redundant Electronics.</li><li>• In this release software enforcement of the right-to-use license is no longer employed in ACSLS, and no longer checks for a valid license key</li></ul>

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## Summary of Changes

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# Preface

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StorageTek Automated Cartridge System Library Software (ACSLS) 7.3.1 is Oracle's StorageTek's UNIX server software that controls a StorageTek Automated Cartridge System (ACS). The StorageTek ACS family of products consists of fully automated, tape cartridge-based data storage and retrieval systems. StorageTek ACSLS supports network access to different client systems that can range from workstations to mainframes to supercomputers running on a variety of operating systems.

This guide is for the individual responsible for administering StorageTek ACSLS. It is expected that you already have a working knowledge of the following:

- UNIX file and directory structure
- How to use UNIX commands and utilities for your platform
- UNIX system files
- How to do typical UNIX system administrator tasks, such as logging on as root and setting up user accesses to a UNIX application

## ■ Related Documentation

The following list contains the names and order numbers of publications that provide additional information about *the product*.

The online documentation is available at:

<http://docs.sun.com/app/docs/prod/filename>

Function	Title	Part Number
Administrators	<i>StorageTek ACSLS 7.3.1 Administrator's Guide</i>	316137301
Administrators	<i>StorageTek ACSLS 7.3.1 Messages Guide</i>	316137401
Installation	<i>StorageTek ACSLS 7.3.1 Installation</i>	316137501

Function	Title	Part Number
Marketing	<i>StorageTek ACSLS 7.3.1 Product Information</i>	316137601
Administrators	<i>StorageTek ACSLS 7.3.1 Quick Reference</i>	316137701
Administrators	<i>StorageTek ACSLS 7.3.1 Release Notes</i>	316137801

## ■ Documentation Website

Function	URL
Documentation	
Customer:	<a href="http://docs.sun.com">http://docs.sun.com</a>
Employee:	<a href="http://docs.sfbay.sun.com/">http://docs.sfbay.sun.com/</a>

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# Overview

## ■ About StorageTek ACSLS

StorageTek Automated Cartridge System Library Software (ACSLS) is Oracle's StorageTek server software that controls a StorageTek tape library. An Automated Cartridge System (ACS) is a group of tape libraries connected through pass-thru-ports (PTPs). StorageTek ACSLS accesses and manages information stored in one or more ACSs through command processing across a network. The software includes a system administration component and interfaces to client system applications, and library management facilities.

## ■ About StorageTek ACSLS HA

StorageTek ACSLS High Availability (HA) is a software solution offered by Professional Services. This solution is only available for the Solaris 10 SPARC platform. An StorageTek ACSLS HA system includes two Solaris servers that are both connected to a RAID disk. One server is active and running StorageTek ACSLS. The other server is a standby. Solaris Cluster manages the HA system, failing over from the active to the standby server as necessary in order to keep StorageTek ACSLS available for automated library services.

## Failover when Library Communication is Lost

In environments where there is only one ACS, it is sometimes desirable to failover to the other HA server in the event that communication is lost to the library. The StorageTek ACSLS HA agent contains a variable that causes different behaviors based on these environmental considerations called "FAIL\_OVER". This variable exists within the script located in the /opt/SUNWscacs1s/lib/acs1s\_env file. It can contain one of two values, "0" or "1":

- Setting the variable to "0" prevents failover.
- Setting the variable to "1" causes the StorageTek ACSLS server to automatically failover to the standby server in an attempt to resolve library communication failures.

**CAUTION:** **Setting this variable to "1" is NOT recommended in environments with multiple libraries. If this is set in environments with multiple libraries, failing over impacts ALL libraries.**

**Note:** Please refer to the `/opt/SUNWscacs1s/lib/acs1s_env` file for a complete description of the `FAIL_OVER` variable.

## ■ The acssa and acsss User IDs

To control and interact with StorageTek ACSLS, you use the following user IDs:

**acssa**  
lets you enter StorageTek ACSLS commands from `cmd_proc`.

**acsss**  
lets you run StorageTek ACSLS utilities from the UNIX command line prompt. You can also open a `cmd_proc` from the `acsss` user ID if you prefer to work from a single user ID; see [“Manually Starting a `cmd\_proc`” on page 6](#) for more information.

You can log into multiple windows with both the `acssa` and the `acsss` user IDs. This lets you enter both ACSLS utilities and commands. These windows contains the following:

- **A UNIX terminal window**  
logged in as the `acsss` user.
- **A “tailed” StorageTek ACSLS Event Log**  
that lets you monitor StorageTek ACSLS activity.

To do this, go to the log directory, `cd $ACS_HOME/log`, and enter the UNIX command:

```
tail -f acsss_event.log
```

You can now see the most recent Event Log messages.

- **A `cmd_proc` window**  
that lets you enter StorageTek ACSLS commands.  
For more information, see [“Using a `cmd\_proc`” on page 2](#).
- **A system clock**  
showing the current date and time.

## ■ Using a `cmd_proc`

### **`cmd_proc` Window**

[Figure 1](#) shows the `cmd_proc` window displayed when you log in as `acssa`. The `cmd_proc` window is a split screen where the top section is the message

area and the bottom section is the command area. You enter StorageTek ACSLS commands at the prompt.

StorageTek ACSLS must be running to accept commands. If you see the message **Query: Query failed. Process failure, wait up to a minute and re-issue the query server command.**

**Figure 1. cmd\_proc Window**

```
-----ACSL x.x.x-----
ACSSA> query server
2008-01-23 15:41:42

          Server Status
IdentifierStateFree CellAudit Mount  DismountEnter  Eject
                    Count      C/P      C/P      C/P      C/P
run          234        0/0      0/0      0/0      0/0

>ACSSA
ACSSS>
```

## How to Suspend and Resume a cmd\_proc

If you use “[Manually Starting a cmd\\_proc](#) on page 6”, you can suspend the cmd\_proc to perform UNIX commands, and then resume the cmd\_proc.

**Hint:** Note the following:

1. You must start the cmd\_proc manually.
2. You must use the C, K, or Bourne shell for this procedure.
3. Any in-process requests that you initiated at the cmd\_proc will continue to completion while the cmd\_proc is suspended.

**To suspend and resume a cmd\_proc, do the following:**

1. While running a cmd\_proc, press <CTRL>+Z.
2. The UNIX shell prompt appears.

Perform whatever UNIX operations you want.

3. To resume the cmd\_proc, enter the following UNIX command:

fg

## How to Exit a cmd\_proc

Use this procedure to terminate an interactive cmd\_proc session.

**To terminate an interactive cmd\_proc session, do the following:**

1. While running a cmd\_proc, wait until all in-process activity is complete and the ACSSS> prompt has returned.
2. To exit the cmd\_proc, enter the following command:

```
logoff
```

The cmd\_proc terminates.

**WARNING:** Do not “kill” a cmd\_proc process or exit the session by closing the shell window. Terminating the cmd\_proc without the proper “logoff” may lock up a shared memory segment which is used by other StorageTek ACSLS processes.

## Starting a cmd\_proc

You can start a cmd\_proc from any terminal type with a minimum 24 x 80 display size. The terminal type must be defined in the workstation's /etc/termcap file.

After logging in, you can start additional cmd\_procs by entering the cmd\_proc command from a UNIX terminal window as described in [“Manually Starting a cmd\\_proc” on page 6](#). Typically, you will run only one cmd\_proc, but you can run as many as your system resources will allow.

**Hint:** A cmd\_proc session runs independent of StorageTek ACSLS. If you start a cmd\_proc session without starting StorageTek ACSLS, there will be no response to your commands. You may see a socket communication error in the cmd\_proc if you attempt to run commands while StorageTek ACSLS is not running. You need not re-start this cmd\_proc session. It will respond normally once StorageTek ACSLS is up and running.

## Logging in as acsss from the StorageTek ACSLS Server

**To start a cmd\_proc when logged in as acsss on the StorageTek ACSLS server, do the following:**

1. From the StorageTek ACSLS server, open a UNIX terminal window.
2. To log in as acsss, enter the following command:

```
login acsss
```

3. To start the cmd\_proc, enter the following command:

cmd\_proc

4. Respond to the prompt by entering your terminal type.
5. Press [[RETURN]].

The cmd\_proc window appears.

## Logging in Remotely as acssa

**To start a cmd\_proc by logging in remotely as acssa, do the following:**

1. From a UNIX host on the network, open a UNIX terminal window.
2. To access the StorageTek ACSLS server, enter the following command:

`rlogin hostname -l acssa`

Where *hostname* is the UNIX hostname of the StorageTek ACSLS server.

3. Press [[RETURN]].

The cmd\_proc window appears.

## Logging in as acssa from a Non-UNIX Client

Use this procedure to start an interactive command cmd\_proc from a non-UNIX client on the network.

**Hint:** To use this procedure you must have a TCP/IP link to the StorageTek ACSLS server. Depending on your installation, you may be directly connected to TCP/IP, or you may have to access it manually.

**To start a cmd\_proc from a non-UNIX client:**

1. If necessary, access TCP/IP.

See your system administrator for instructions on how to access TCP/IP at your location.

2. To access the StorageTek ACSLS server, enter the following command:

`telnet hostname`

Where *hostname* is the UNIX hostname of the StorageTek ACSLS server.

3. Log in as acssa.

4. Respond to the prompt by entering your terminal type.

5. Press [[RETURN]].

The cmd\_proc window appears.

## Manually Starting a cmd\_proc

Typically, you will manually start a cmd\_proc from the acsss user ID if you do not want to log in as acssa to bring up a cmd\_proc.

**To manually start a cmd\_proc, do the following:**

1. While logged in as acssa or acsss, open a UNIX terminal window.
2. To start the cmd\_proc, enter the following command:

cmd\_proc

3. Respond to the prompt by entering your terminal type.
4. Press [[RETURN]].

The cmd\_proc window appears.

### cmd\_proc options

When you manually start a cmd\_proc, you can also enter the following options:

-q  
suppresses the automatic query server command.

-1  
brings up cmd\_proc in command line mode (command area only, no split screen, no message area).

## cmd\_proc Keyboard Shortcuts

Table 1 describes the cmd\_proc keyboard shortcuts, which are <CTRL>+keystroke combinations.

**Table 1. cmd\_proc Keyboard Shortcuts**

Key Combination	Action	Notes
<CTRL>+C	Cancels the last cmd_proc command.	<CTRL>+C is the keyboard shortcut for the <a href="#">cancel</a> command. See “cancel” on page 188 for more information about the <a href="#">cancel</a> command.

**Table 1. cmd\_proc Keyboard Shortcuts**

Key Combination	Action	Notes
<CTRL>+D	Returns to the cmd_proc prompt.	<CTRL>+D has no effect if the current command has completed. If the current command is processing, it completes but cmd_proc does not display a response message. If you have not entered the current command at the ACSSS prompt, <CTRL>+D deletes the command.
<CTRL>+H	Deletes the previous character on the command line.	On most keyboards, you can also use the [[DELETE]] or [[BACK SPACE]] key.
<CTRL>+I	Refreshes the cmd_proc display	This function is useful if the current cmd_proc display has been corrupted by noise on the communications lines.
<CTRL>+R	Refreshes the current command line.	This function is useful if the current command line display has been corrupted by noise on the communications lines.
<CTRL>+U	Deletes the current command line.	
<CTRL>+Z	Suspends cmd_proc and escapes to the shell environment.	Enter the C shell fg command to resume cmd_proc.

## Redirecting cmd\_proc Inputs and Outputs

You can use an input file to automatically enter commands when you start a cmd\_proc. For example, the following input file verifies StorageTek ACSLS by mounting and dismounting a cartridge.

```
query drive 0,0,0,0
query volume JB1400
mount JB1400 0,0,0,0
dismount JPB1400 0,0,0,0 force
logoff
```

**To start an additional cmd\_proc and specify an input file, do the following:**

1. To start the cmd\_proc, enter the following command:

```
cmd_proc -q < filename
```

You can also start a cmd\_proc, specify an input file, and redirect the output to another file. Using input and output files lets you run a set of commands at cmd\_proc startup and look at the results. For example, the following file shows the results of the commands run in the previous example that showed cmd\_proc with only an input file.

**Figure 2. cmd\_proc with input file.**

```
ACSSA> query drive 0,0,0,0
1998-06-30 18:23:08
IdentifierStateStatus      Cartridge      Type
0,0,0,0online available                           9840
ACSSA> query volume JPL1400
1998-06-30 18:23:09
IdentifierStatusCurrent location
JB1400home    0,0,3,0,0
ACSSA> mount JPL1400 0,0,0,0
ACSSA> Mount: JB1400 mounted on 0,0,0,0
ACSSA> dismount JPL1400 0,0,0,0 force
ACSSA> Dismount: Forced dismount of JB1400 from 0,0,0,0
ACSSA> logoff
ACSSA>
```

**To start an additional cmd\_proc, specify an input file, and redirect the output, do the following:**

1. While logged in as acssa or acsss, open a UNIX terminal window.
2. To start the cmd\_proc, enter the following command:

```
cmd_proc -q < file1 > file2
```

Where *file1* is the input file and *file2* is the file to which the output is directed.

By default, cmd\_proc display area messages are written to stderr. but you can also redirect these messages. For example:

```
cmd_proc -q < file1 > file2 2>> file2
```

## Idling StorageTek ACSLS

Use this procedure to suspend request processing by putting StorageTek ACSLS in the idle state. Typically, this procedure is used before shutting down StorageTek ACSLS, but you can also use it to temporarily stop StorageTek ACSLS request processing.

**To idle StorageTek ACSLS, do the following:**

1. From a cmd\_proc, enter the following command:

```
idle
```

StorageTek ACSLS processes all current requests, rejects all new requests, and goes into the idle state.

## Restarting StorageTek ACSLS

Use this procedure to resume request processing by putting StorageTek ACSLS in the run state. Typically, you restart StorageTek ACSLS to remove it from the idle state.

**To restart StorageTek ACSLS, do the following:**

1. From a cmd\_proc, enter the following command:

```
start
```

StorageTek ACSLS resumes request processing.

## ■ StorageTek ACSLS Directory Structure

[Table 2](#) shows a listing of the directories, subdirectories, and most common used files and shell scripts in StorageTek ACSLS directory structure.

Two variables are used for StorageTek ACSLS paths. They are:

- `$ACS_HOME`

This is the home directory for the acsss user ID. It is also where the StorageTek ACSLS product is installed.

- For Solaris, `$ACS_HOME` is `/export/home/ACSSS` by default. However, the parent directory of `$ACS_HOME` is the StorageTek ACSLS installation directory (by default `/export/home`), which is customer-defined during StorageTek ACSLS installation on Solaris.

- `$ACSDB_BKUP`

This is the directory where the StorageTek ACSLS backups are saved.

**Table 2. StorageTek ACSLS Directory Structure**

Directory	Contents
\$ACSDB_BKUP  (by default /export/backup/)	Database backups
\$ACS_HOME  (by default /export/home/ACSSS/)	Home directory for the acsss user ID. Also the StorageTek ACSLS home directory. (By default, the ACS_HOME environment variable points to this directory.)
\$ACS_HOME/config/	Contains StorageTek ACSLS configuration files.
\$ACS_HOME/data/ external/	Contains customized files used in access control, mixed media, and cartridge reporting.
\$ACS_HOME/data/ external/ access_control/	Contains access control sample and customized files.
\$ACS_HOME/data/ internal/	StorageTek ACSLS internal configuration files. Please do not modify.
\$ACS_HOME/diag/bin	Contains diagnostic files and shell scripts.
\$ACS_HOME/lib/	Contains StorageTek ACSLS installed shared libraries required at runtime.
\$ACS_HOME/log/	Contains StorageTek ACSLS event log and utility event log files.
\$BASEDIR/ACSSA/  (by default /export/home/ACSSA/)	acssa home directory.
\$BASEDIR/acsdb/acsbd  (by default /export/home/acsdb/)	Database home directory.

# StorageTek ACSLS License Key

2

---

Beginning with StorageTek ACSLS versions 7.3.1 software enforcement of the right-to-use license is no longer employed in StorageTek ACSLS and ACSLS no longer checks for a valid license key. Messages regarding a soon-to-be-expired license key or library capacity license no longer display on the system console or in the `acsss_event.log`.

The following utilities no longer function in their capacity to set and check for a valid license key:

- `licensekey.sh`
- `get_license_info.sh`

To view your library slot usage see “[free\\_cells.sh](#)” on page 147.



# Installing and Configuring Your Library Hardware

3

---

The installation and configuration of your library hardware involve the following tasks:

- [“Installing Connections to Your Library Hardware” on page 14](#)

Installing connections to library hardware involves:

- Adding a the SCSI mchanger device driver
- Optionally enabling Dual TCP/IP support (for the StorageTek SL8500 or StorageTek SL3000)

- [“Using acsss\\_config to Configure Your Library Hardware” on page 15](#)

This lets you:

- Establish library communications
- Configure the number of libraries to be supported and if they are partitioned
- Establish if the connection to a library is SCS/Fibre, TCP/IP, serial or SCSI/Fibre and the format to use
- Reconfigure your library hardware

**Note:** Refer to the *StorageTek ACSLS Product Information* guide for a list of StorageTek ACSLS supported: libraries; tape drives; tape media; and transport/media compatibility.

## ■ **Installing Connections to Your Library Hardware**

### **Adding the SCSI mchanger Device Driver**

The SCSI Media Changer (mchanger) is the SCSI/Fibre attached library device driver that communicates between StorageTek ACSLS and any SCSI/Fibre attached library. An mchanger must be created for each SCSI/Fibre attached library that is connected to StorageTek ACSLS.

Adding an mchanger device is part of the installation process. However, there may be times when you need to add a new SCSI library to an existing StorageTek ACSLS installation. In this case, you must create a new mchanger device driver. To do this:

1. Login to the StorageTek ACSLS server as root user and enter your password.
2. Go to the installation directory:  
`cd/export/home/ACSSS/install`
3. Make sure that the SCSI library is functional and physically attached to the StorageTek ACSLS server.
4. Invoke the driver installation script:  
`./install_scsi_sol.sh` (Solaris)  
`./install_scsi_aix.sh` (AIX)

### **Enabling StorageTek SL8500 or StorageTek SL3000 Dual TCP/IP Support**

If you have installed the StorageTek SL8500 or StorageTek SL3000 library and want to enable dual TCP/IP support, refer to [“Dual TCP/IP Support ” on page 318](#). This section also discuss the customized routing table entries that you need to create.

### **Configuring or Re-configuring Library Hardware**

There are two ways to configure or re-configure library hardware (new or changed libraries and/or tape drives):

- `acsss_config`

This command must be run while StorageTek ACSLS is down. You must use `acsss_config`:

- for your initial (first time) configuration of library hardware.
- to remove ACSs.
- to change or remove port connections to a library.

- to re-configure Fibre or SCSI-attached libraries.
- **Dynamic Configuration (config) utility**  
You run this utility while StorageTek ACSLS remains running. Use config for all changes except those excluded above. The config utility:
  - adds new libraries.
  - updates TCP/IP-attached library configurations.
  - adds port connections, LSMs, CAPs, and drives.

## ■ Using acsss\_config to Configure Your Library Hardware

Using acsss\_config lets you configure or reconfigure your library hardware.

### **WARNING:**

- Each ACS must have at least one CAP. This can be a CAP that is shared with another partition.
- There must be at least one drive configured to the entire StorageTek ACSLS system.

Example: StorageTek ACSLS supports four libraries. Three of the libraries can contain zero (0) drives. However, the fourth library must contain at least one drive.

- Configure your library hardware

You must use the acsss\_config utility to configure your library hardware for the first time. The acsss\_config utility is menu driven and selecting option 8 lets you to perform tasks such as: configuring hardware for the first time; deleting libraries; or changing port connections to libraries.

**Note:** StorageTek ACSLS 7.3.1 lets you to skip ACS numbers when you configure or reconfigure libraries (see # 6). Both acsss\_config and Dynamic Configuration support specifying and skipping ACS numbers.

For example: After migrating from an ACS 0 of 9310s to an ACS 1 of SL8500s, you can remove ACS 0 without renumbering the drive and volume IDs in the remaining StorageTek SL8500 ACS 1.

- Reconfigure your library hardware

Before using acsss\_config to update the configuration information for all your libraries, record your current configuration. Changing the ACS numbers assigned to your current libraries would cause all of your volumes to be marked absent and all of your drive's addresses to change.

Save the output from a `query lmu all` command to record your current ACS numbers and port connections.

After your initial library configuration, you can also use the `config` utility, to dynamically add or reconfigure ACSs, LSMs, or tape drives without stopping StorageTek ACSLS.

For more information and procedures, refer to [“Dynamic Configuration \(config\) utilities” on page 131](#).

**Note:** The StorageTek ACSLS database must be updated using `acsss_config` or `config` whenever the physical configuration of the library changes. StorageTek ACSLS will not run correctly if the configuration defined in its database does not match the configuration defined in the library.

**Examples:**

Examples of configuration changes requiring an update to the database include:

- Adding or removing an ACS, LSM (including a SCSI-attached LSM such as the StorageTek SL500), Pass-Thru Port (PTP), transport, or standby LC/LMU

**CAUTION:** After you install a new ACS or LSM, make sure that each attached library and LSM is fully (hardware) configured, powered on, and ready before you reconfigure StorageTek ACSLS. Otherwise, `acsss_config` or `config` will not configure the library correctly.

- Adding or removing a port connection between the server system and the LMU

To start `acsss_config`:

1. Log in as `acsss`.
2. At the password prompt, press `[[ENTER]]`.
3. Follow this step if you are re-configuring your library hardware:

Display your existing ACS numbers, partition IDs, and port connections with the `query lmu all cmd_proc` command before stopping StorageTek ACSLS and record this information.

4. Shut down StorageTek ACSLS if it is running.
5. Run the configuration utility:

`acsss_config`

The StorageTek ACSLS feature configuration screen appears.

**Note:** The configuration utility, acsss\_config, configures the library correctly unless all libraries, LSMs, and transports are not fully configured, powered on, and ready.

The following menu appears:

```
StorageTek ACSLS feature configuration
Please enter the number followed by Return for your choice from the
following menu to configure product behavior in that area.

Press? followed by the Return key for help.

• 1: Set CSI tuning variables
• 2: Set event logging variables
• 3: Set general product behavior variables
• 4: Set access control variables
• 5: Set automatic backup parameters
• 6: Rebuild access control information
• 7: Event Notification settings
• 8: Define or Change Library Hardware Configuration
• E: Exit

Menu choice:
```

**Note:** For a discussion of options 1-7, refer to “[Setting Variables that Control StorageTek ACSLS Behavior](#)” on page 23.

6. Select option 8.

The following prompts take you through setting up your configuration.

- **Prompt:** *Configure library communications? (y/n):*

Enter **y** to establish communications between the StorageTek ACSLS server and any libraries.

Selecting **n** refreshes the hardware configurations of your current libraries.

Bypassing configuring your library communications and just refreshing your hardware configuration is the easiest and best option if you do not need to: add or remove ACSs or add, change, or remove connections to libraries. You skip re-defining all of your current connections to your libraries and just refresh the library configuration recorded in the StorageTek ACSLS database. This eliminates the risk of omitting a connection to a library or specifying it incorrectly.

- **Prompt:** *Library server database exists and will be overwritten, continue? (y or n): y*

This prompt only displays if library communications have been previously established and there is an existing database.

If you enter **y** to this prompt, changes are made to the configuration information only.

7. Specify the number of ACSs to be supported.

- **Prompt:** *Number of ACSs to be supported:*

Enter the number of ACSs (between 1 and 32) that to be supported at your site. You must answer at least 1 to this prompt. Hardware must be installed to support one or more ACSs.

**Note:** A pair of L700e libraries connected by a pass-thru-port counts as one ACS.

**Note:** Skip ACS numbering.

You can configure or re-configure libraries without assigning the ACS numbers in sequence.

8. Specify each ACS number.

- **Prompt:** *Please enter the first ACS number [default: 0]:*

Enter the number for this ACS.

**CAUTION:** When you reconfigure existing ACSs, specify the same ACS numbers that are currently assigned to them.

You are then prompted (see step 7) to define the device connections for each ACS.

9. Define the device connections (ports) for each ACS.

- **Prompt:** *Is ACS #n in a partitioned library? (y or n)*

Enter **y** to create a partitioned library. The following prompt displays.

- **Prompt:** *Number of connections to ACS #n*

This prompt appears for each ACS configured and establishes the number of communication ports for each ACS. The connections are:

- SCSI connection(s)

**Note:** An L1400 with a pair of L700e SCSI libraries connected by a pass-thru-port has two connections - one for each L700e.

- Serial or TCP/IP connection between the StorageTek ACSLS and the library. At least two connections are recommended

If you are connecting to multiple StorageTek SL8500 libraries, a maximum of fifteen-connections is allowed.

The ACSs must be physically connected. You must enter a decimal number between 1 and 15.

**Note:** An L1400 with a pair of L700e SCSI libraries connected by a pass-thru-port has two connections - one for each L700e.

- **Prompt:** *Device or host - ACS#n, connection #n:*

Enter the device or host for each connection.

**WARNING:** Make sure you specify the correct hostname or IP address. Do not connect to the wrong library.

Ensure that all connections specified for an ACS are actually connected to the same ACS.

To specify the connection to a TCP/IP attached LMU, enter one of the following:

- An IP address
- A hostname
- A fully qualified hostname

**Note:** If a host name is specified, this host name must be mapped to the IP address entered into an StorageTek SL8500 library or an 9330 LMU. This host name-to-IP address mapping is site-specific. Typically, this is done by the /etc/hosts file, your Domain Name Server, NIS, or NIS+.

**Sample TCP/IP device names for 9300 libraries**

```
Device or host - ACS #0, connection #0: hostname1
Device or host - ACS #0, connection #1: hostname2
Device or host - ACS #1, connection #0: fully_qualified_hostname
Device or host - ACS #2, connection #0: 192.168.174.31
```

**Note:** A connection to a 9330 ACS can be either serial or TCP/IP, but not both..

**Sample serial device names for 4400 or 9300 libraries**

```
Device or host - ACS #0, device #0: /dev/ttya
Device or host - ACS #0, device #1: /dev/ttyb
```

Fibre or SCSI-attached libraries are connected through mchanger devices.

**Sample device name for SCSI Library**

```
Device or host - ACS #1, connection #0: /dev/mchanger2
```

An L1400 with a pair of L700e SCSI libraries connected by a pass-thru-port has two connections - one for each L700e.

**Sample device name for pair of L700e libraries**

Device or host - ACS #1, connection #0: /dev/mchanger2  
Device or host - ACS #1, connection #1: /dev/mchanger3

**Note:** If you have more ACSs to define, you will be asked to specify their ACS numbers (see step 6).

10. Create or update the configuration in the StorageTek ACSLS database.

- **Prompt:** *This step builds a database image of your complete library hardware configuration. Before proceeding, make sure that your library is completely configured, that all subsystems are functional and powered on. Build/Verify library configuration? (y or n):*

Enter **y**.

Before proceeding, make sure that your library is completely configured, that all subsystems are functional and powered on.

This step updates the database with all configuration changes except adding or removing port connections.

- **Prompt:** *Library server database exists and will be overwritten, continue? (y or n):*

Enter **y**. As the script builds the library configuration, it displays the following message of each panel in each LSM.

ACS # n, LSM # nn, PANEL # nn, created

The script also generates a library configuration report and appends it to the following file:

/export/home/ACSSS/log/acsss\_config.log

11. Optionally, configure non-TCP/IP clients on Solaris.

- **Prompt:** *Configure client system interfaces? (y or n):*

Respond (y or n) when the system asks whether to configure client system interfaces.

Enter **n** unless you are using an ICL client with OSLAN protocol.

Entering **y** displays the following message:

CSI SELECTION TABLE

- 1) OSLAN CSI Not Selected
- 2) ONC/RPC CSI Always Selected

Do you want to change the CSI selection table (n):

If y, the following message appears:

Select OSLAN CSI (n):

ONC/RPC is always selected.

**Note:** acsss\_config automatically backups the database and then terminates.

12. Run rc.acsss to start the server.

You can look at the event log to verify everything is up and running.

If the automatic startup on reboot option was enabled during StorageTek ACSLS installation, StorageTek ACSLS is initiated automatically when the server system is rebooted.

13. Perform an audit of the Library

An audit updates the StorageTek ACSLS database to match the actual inventory of library cartridges.

StorageTek ACSLS is now ready for library operations. If you want to enter StorageTek ACSLS commands, log in as acssa.



# Setting Variables that Control StorageTek ACSLS Behavior

---

You must use the `acsss_config` menu to set the variables that control StorageTek ACSLS behavior. With options 1-8, you will be:

- “Setting CSI Tuning Variables” on page 25
- “Setting Event Logging Variables” on page 28
- “Setting General Product Behavior Variables” on page 29
- “Setting Access Control Variables” on page 35
- “Setting Automatic Backup Variables” on page 36
- “Rebuilding Access Control Information” on page 37
- “Defining Event Notification Settings” on page 37
- “Configuring or Updating your Library Hardware” on page 38

**Note:** You need to reboot your system if you have set any static variable(s). You do not have to do this for the dynamic variables.

To save or view current variables:

- Display the current settings of the variables by entering:

**`dv_config -d`**

- Save the current settings of the variables to a file:

**`dv_config -d > filename`**

- View the file:

**`vi filename`**

- Print values of dynamic options:

**`dv_print`**

## ■ Accessing the StorageTek ACSLS Feature Configuration Menu

When you install or upgrade StorageTek ACSLS, system defaults have already been set based on most user environments. However, when necessary, you can use options 1-8 to change any of these settings. Options 1 through 7 allow you to change dynamic and static variables.

Use option 8 to add and define your library hardware. Use this option if you have just installed StorageTek ACSLS for the first time, or, for example, when you need to add a new library.

Select ? to get detailed information on each prompt.

To start acsss\_config:

1. Exit out of the CDE until you reach the CDE login.
2. Log in as acsss.
3. At the password prompt, press [[ENTER]].
4. Run the configuration script:

acsss\_config

The StorageTek ACSLS feature configuration screen appears.

**Note:** The configuration script, acsss\_config, will fail unless all LMUs, LSMs, and transports are fully configured, powered on, and ready.

The following menu appears:

<p>StorageTek ACSLS feature configuration</p> <p>Please enter the number followed by Return for your choice from the following menu to configure product behavior in that area.</p> <p>Press? followed by the Return key for help.</p> <ul style="list-style-type: none"><li>• 1: Set CSI tuning variables</li><li>• 2: Set event logging variables</li><li>• 3: Set general product behavior variables</li><li>• 4: Set access control variables</li><li>• 5: Set automatic backup parameters</li><li>• 6: Rebuild access control information</li><li>• 7: Event Notification settings</li><li>• 8: Define or Change Library Hardware Configuration</li><li>• E: Exit</li></ul> <p>Menu choice:</p>
--

## ■ Verifying and Changing Dynamic and Static Variables

Options 1 through 8 allow you to change the following dynamic and static variables.

### Setting CSI Tuning Variables

The Client System Interface (CSI) handles communication between StorageTek ACSLS and clients of other servers. It sets up how communications are handled for each client. If communication with one client is lost, the other clients are not affected and their communication continues without interruption. Multiple CSIs can run under StorageTek ACSLS.

Option 1 allows you to set or change the following:

- **Prompt:** *Maximum age in seconds of pending requests in CSI request queue [172800]*

**Variable:** CSI\_CONNECT\_AGETIME

A dynamic variable, this setting determines how long StorageTek ACSLS holds on to client requests to which it has not responded.

Valid entry is: 600 to 315360000 seconds. Default is 172800 seconds.

- **Prompt:** *Number of seconds between successive retries [4]*

**Variable:** CSI\_RETRY\_TIMEOUT

The default is 4 seconds.

A dynamic variable, this option specifies the minimum amount of time, in seconds, that the CSI should wait between attempts to establish a network connection.

You should modify this value if timing problems occur between the CSC and CSI.

- **Prompt:** *Number of retries for the CSI before a timeout condition occurs [5].*

**Variable:** CSI\_RETRY\_TRIES

A dynamic variable, this option specifies the number of attempts the CSI should make to transmit a message. Pending messages are discarded if a connection cannot be established within the number of retries specified. Default is 5 retries.

- **Prompt:** *Changes to alter use of the TCP protocol will not take effect until the product is restarted. CSI support for RPC using the TCP protocol is enabled [TRUE].*

**Variable:** CSI\_TCP\_RPCSERVICE

A static option, this option specifies if the CSI is to act as a TCP RPC server. Default is true.

- **Prompt:** *Changes to alter the use of the UDP protocol will not take effect until the product is restarted. CSI support for RPC using the UDP protocol is enabled [TRUE].*

**Variable:** CSI\_UDP\_RPCSERVICE

A static option, this option specifies if the CSI is to act as a UDP RPC server. You must accept the default for clients to communication with StorageTek ACSLS over UDP. Default is true.

**Note:** StorageTek ACSLS must be restarted for this option to take effect.

- **Prompt:** *Changes to alter use of the port mapper will not take effect until the product is restarted. Enable port mapper: (ALWAYS / NEVER / IF\_DUAL\_LAN\_NOT\_ENABLED) [IF\_DUAL\_LAN\_NOT\_ENABLED].*

**Variable:** CSI\_USE\_PORTMAPPER

Default is IF\_DUAL\_LAN\_NOT\_ENABLED. A static option, the valid options are:

- ALWAYS - the port mapper should always be interrogated when the CSI is unable to send a message to a client.
- NEVER - the port mapper should never be interrogated when the CSI is unable to send a message to a client. Select this option if clients do not support a port mapper.
- IF\_DUAL\_LAN\_NOT\_ENABLED - the port mapper should be interrogated only if dual LAN support has not been enabled. If dual LAN support has been enabled, then it is assumed that clients do not support a port mapper.

- **Prompt:** *Number of ACSSURR persistent processes that should be started [1]:*

**Variable:** SURROGATE\_PROCESSES

Valid entries: 0 or 1. Enter 0 if the LM Gateway is not installed.

- **Prompt:** *TCP/IP port number that the ACSLS surrogate (ACSSURR) socket will listen on for requests from a gateway system [50300].*

**Variable:** SURROGATE\_PORT

This variable applies only to the Library Management (LM) Gateway. Valid entries: 50300 - 99999.

- **Prompt:** *Number of seconds to wait for data packets to be read on surrogate/gateway sockets:*

**Variable:** SURROGATE\_TIMEOUT

This variable applies only to the Library Management (LM) Gateway. Valid entries: 1 - 600.

- **Prompt:** *Number of minutes to wait before deleting a stale queue entry [5].*

**Variable:** SURROGATE\_QUEUE\_AGE

This variable applies only to the Library Management (LM) Gateway. Valid entries: 5 - 60.

- **Prompt:** *Automatically start CSCI at ACSLS startup (TRUE/FALSE) [FALSE]:*

**Variable:** START\_CSCI\_PROCESS

This variable determines if the CSCI process is automatically started during StorageTek ACSLS startup. The default value, FALSE, means that the CSCI is not started with StorageTek ACSLS. Set this variable to TRUE to start the CSCI process with StorageTek ACSLS.

- **Prompt:** *Enable CSI to be used behind a firewall (user-defined inbound port) (TRUE/FALSE) [FALSE]:*

**Variable:** CSI\_FIREWALL\_SECURE

A dynamic variable, this setting enables or disables the firewall security definition of a single, user-defined port for incoming requests to StorageTek ACSLS. Values are:

**False** - select False if you do not want the ports on the StorageTek ACSLS server to be restricted.

**True** - select True if you want the StorageTek ACSLS server to operate behind a secured firewall.

**Prompt:** *Port number used by the CSI to receive incoming ACSLS requests.*

**Variable:** CSI\_INET\_PORT

This variable specifies the single, user-defined port used by the CSI for incoming TCP requests from one or more clients.

This variable is used only when the firewall secure CSI is enabled by setting CSI\_FIREWALL\_SECURE to True.

**Default:** 30031

**Valid entry:** 1024 - 65535

## Setting Event Logging Variables

Option 2 allows you to set or change the following event logs:

- **Prompt:** *Number of event log files to retain [9]:*

**Variable:** EVENT\_FILE\_NUMBER

9 is the default when ACSLS is installed or upgraded.

A dynamic value, this option allows you to specify the number of additional event log files to retain. If enabled and the current event log file size reaches the threshold size, the log is automatically copied to another file. Once the specified number of files is reached, the data in the oldest file is overlaid.

If you specify 0, ACSLS creates only one event log file with no additional event log files. When this file reaches its threshold size, an “Event log full” message is displayed periodically until the event log is renamed or deleted.

Specify a number between 1 and 9 to enable and specify the number of log files to retain. When the event log reaches the threshold size, the data is moved into the file event0.log. The next time the threshold size is reached, the event0.log data is moved to event1.log and the older event log data is moved to event0.log.

**Prompt:** *Changes to the logging directory will not take effect until the product is restarted. What directory should logging information be in [\$ACS\_HOME/log]:*

**Variable:** LOG\_PATH

This is the directory where the log files are to be placed. By default the ACSLS log files are placed in the \$ACS\_HOME/log directory. An alternative path can be used if there are disk space problems in the file system that contains \$ACS\_HOME.

The path must be an absolute path, that is, it must start with a / or \$ACS\_HOME.

Path length cannot exceed 120 alpha characters.

**Prompt:** *Maximum library server event log size in Kilobytes (1000 bytes) [500].*

**Variable:** LOG\_SIZE

This option specifies the threshold size for the Event Log in Kbytes (1,000 bytes). Default is 500.

Valid entry: 32-2147483

- **Prompt:** Date/time format for all logs [%Y-%m-%d %H:%M:%S]:

**Variable:** TIME\_FORMAT

This option specifies the format to use for printing the date and time information in the event and trace logs. The default format is %Y-%m-%d%H:%M:%S.

**Note:** This format does not apply to the backup dates presented for a point-in-time restore.

## Setting General Product Behavior Variables

Option 3 allows you to set or change the following:

- **Prompt:** Enable Library Volume Statistics Gathering: (ON / OFF) [OFF]: ?

**Variable:** LIB\_VOL\_STATS

This option specifies if the Library Volume Statistics (LVSTATS) information should be collected from the following operations: enter; eject; mount; dismount; and audit. Logging these statistics can take considerable disk space. Default is OFF.

- **Prompt:** Number of acsss\_stats log files to retain [9]: ?

**Variable:** VOL\_STATS\_FILE\_NUM

A dynamic value, this option allows you to specify file size and number of rollover files for the volume statistics log (acsss\_stats.log). Valid entry: 0-9. Default is 9.

9 is the default when ACSLS is installed or upgraded.

A dynamic value, this option allows you to specify the number of additional acsss\_stats log files to retain. If enabled and the current acsss\_stats log file size reaches the threshold size, the log is automatically copied to another file. Once the specified number of files is reached, the data in the oldest file is overlaid.

If you specify 0, ACSLS creates only one event log file with no additional event log files. When this file reaches its threshold size, an “acsss\_stats log full” message is displayed periodically until the acsss\_stats log is renamed or deleted.

Specify a number between 1 and 9 to enable and specify the number of log files to retain. When the acsss\_stats log reaches the threshold size, the data is moved to the file vol\_stats0.log. The next time the threshold size is reached, the vol\_stats0.log data is moved to vol\_stats1.log and the older event log data is moved to vol\_stats0.log.

- **Prompt:** *Maximum library server access\_stats log size in Kbytes (1000 bytes) [500].*

**Variable:** VOL\_STATS\_FILE\_SIZE

This option specifies the threshold size for the `access_stats` log in Kbytes (1000 bytes). Default is 500.

Valid entry: 32-2147483

- **Prompt:** *Select cleaning cartridge ordering method [VOLID\_SORT]*

**Variable:** UNIFORM\_CLEAN\_USE

Valid options are:

- VOLID\_SORT - orders the cleaning cartridges by the volume identifier. This uses up a cleaning cartridge before moving to the next one. If you select this option, ACSLS uses and returns cleaning cartridges in the same order as in previous releases of the ACSLS software. This is the default value when ACSLS is installed or updated.
- LEAST\_USED - orders the cleaning cartridges by usage. If you select this option, ACSLS sorts the volume list in reverse order of usage and returns the cartridges with the fewest usages first. This spreads out usage of cleaning cartridges uniformly.
- MOST\_CAPACITY - orders the cleaning cartridges by number of uses left. If you select this option, ACSLS sorts the volume list based on the number of uses left on the cleaning cartridge and returns the cartridges with the most uses left first. This uses up all cleaning cartridges close to the same time.

- **Prompt:** *Enable Transport Auto Clean Option (TRUE/FALSE) [TRUE]:*

**Variable:** AUTO\_CLEAN

Valid options are:

- TRUE - when a transport requires cleaning, ACSLS automatically cleans the transport before the next mount.

**Note:** The drive cleaning operation in a SCSI or fibre-attached library is managed by the library firmware, not by ACSLS. Be sure to enable drive cleaning from the LSM control panel. Otherwise, you can periodically mount a cleaning cartridge from ACSLS by manual command as needed.

- FALSE - does not enable automatic cleaning

- **Prompt:** *Library Server startup state (RUN/IDLE) [RUN]:*

**Variable:** AUTO\_START

This option specifies the initial ACSLS state after recovery completes during server software initiation. Valid options are:

- RUN - user requests are processed immediately after recovery completes.
- IDLE - prevents user requests from being immediately processed after recovery completes.

Setting this option to IDLE could be useful if you need to vary device states or perform some operational activity before you allow server access to your users.

- **Prompt:** *Changes to the number of mount processes ACSLS supports will not take effect until the product is restarted. Number of mount processes [2]:*

**Variable:** MAX\_ACSTM

Valid entry is 1 to 5.

StorageTek recommends that you accept the default value at initial configuration, then change the value as required. Increasing this value may improve performance. For large configurations (those having more than eight LSMs), this value may need to be increased to improve mount/dismount performance.

**WARNING:** If this number is set too high, StorageTek ACSLS may not be able to start up properly. In this case, either lower the number or raise the maximum allowable processes per user.

Default is 2.

- **Prompt:** *Enable QUERY persistent processes (TRUE/FALSE) [TRUE]:*

**Variable:** ENABLE\_ACSTQ

This option allows you to execute queries as one or more persistent processes. Queries may be executed as persistent or request processes.

StorageTek recommends that you accept the default value at initial configuration, then change the value as required. Increasing this value may improve performance. Valid options are:

- TRUE - enables persistent query processes.

**CAUTION:** With a minimum configuration system, higher than 10 query persistent processes could use up system resources and not allow StorageTek ACSLS to start up.

- FALSE - disables persistent query processes. Queries are invoked as request processes.
- **Prompt:** *Changes to the number of query processes ACSLS supports will not take effect until the product is restarted. Number of processes processes [2]:*

**Variable:** MAX\_ACSQY

This option specifies the number of persistent query processes to create. This option is valid only if you enabled it in the above step. Valid numbers are 1 to 5.

StorageTek recommends that you accept the default value (2) at initial configuration, then change the value as required. For large configurations (more than eight LSMs), this value may need to be increased to improve performance.

**CAUTION:** If this number is set too high, StorageTek ACSLS may not be able to start up properly. Either lower the number or increase the maximum allowable process per user.

**Note:** StorageTek ACSLS must be restarted for this option to take effect.

- **Prompt:** *Changes to the maximum number of ACSLS processes will not take effect until the product is restarted. Number of ACSLS processes [40]:*

**Variable:** MAX\_ACS\_PROCESSES

Valid numbers are: 32 to 100.

A transient process is used to satisfy all requests except: mount; dismount; lock; unlock; clear\_lock; and query\_lock. The default, 40 processes, works for all StorageTek ACSLS processes except extremely large configurations. Default is 40.

**CAUTION:** It is recommended you contact Support for advice before changing this value.

**Note:** StorageTek ACSLS must be restarted for this option to take effect.

- **Prompt:** *Enable automatic enter tracing facility (TRUE/FALSE) [FALSE]:*

**Variable:** TRACE\_ENTER

This option specifies if the results of automatic enter operations are written in the event log. Valid options are:

- TRUE - enables messages to be written to the event log at the end of each automatic enter operation. This is the only method for determining why volumes were not entered during an automatic enter operation.

- FALSE - disables this feature and helps minimize the number of messages written to the event log.
- **Prompt:** *Enable volume tracing facility (TRUE/FALSE) [FALSE]:*

**Variable:** TRACE\_VOLUME

This option specifies if unsolicited messages are displayed when adding/deleting a volume(s) in the database. Valid options are:

- TRUE - enables unsolicited messages to be displayed whenever a volume is added or deleted in the database. Operations that can generate this messages are: audit; mount; dismount; enter; eject; recover; and vary.
- FALSE - disables this feature and helps minimize the number of messages written to the event log.
- **Prompt:** *Number of days to retain volumes that are identified as ABSENT or EJECTED in the database. [5]:*

**Variable:** ABSENT\_VOLUME\_RETENTION\_PERIOD

A dynamic variable, it sets the number of days (0-999) to keep absent or ejected cartridges in the database. Unless you reenter the volume, StorageTek ACSLS automatically deletes the volume from the database when the retention period expires.

If you never want the volume to be deleted, enter 999. To delete the volume immediately, enter 0.

**CAUTION:** Setting a high retention period can cause a large number of absent or ejected volumes to be retained. This uses more space in the database and causes it to fill up faster.

- **Prompt:** *Report ABSENT or EJECTED volumes to ACSAPI clients. [FALSE]:*

**Variable:** ENABLE\_STATUS\_VOLUME\_ABSENT

Valid options are:

- TRUE - reports absent and ejected volumes to ACSAPI clients.
- FALSE - absent and ejected volumes are not reported to ACSAPI clients (as occurred in previous versions of StorageTek ACSLS).
- **Prompt:** *Status of MISSING volumes reported to ACSAPI clients: TRUE=MISSING FALSE=IN TRANSIT [FALSE]:*

**Variable:** ENABLE\_STATUS\_VOLUME\_MISSING

This option sets the status code to be returned to ACSAPI clients for missing volumes. Valid options are:

- TRUE - reports missing cartridges to ACSAPI clients.
- FALSE - missing volumes are not reported to ACSAPI clients (as occurred in previous versions of StorageTek ACSLS).
- **Prompt:** *Support alphanumeric volume ranges for commands and utilities. Alphanumeric ranges will include all valid vol\_ids, in ASCII collating sequence. Note - Changes to alphanumeric volume range support will not take effect until the product is restarted. (TRUE/FALSE) [FALSE].*

#### **Variable: ALPHANUM\_VOL\_RANGES**

Specifies whether alphanumeric volume range support is active for commands and utilities. Valid options are:

- FALSE (default) - when specifying volume range, the first characters of a *vol\_id* range must be the same and the last variable characters must be numeric. Example: AAA000-AAA999
- TRUE - Any valid *vol\_id* for the range can be specified, as long as the alphanumeric volume range includes all valid volume IDs. Valid volume ranges consist of any combination of numbers (0-9), letters (A-Z), dollar sign (\$), pound sign (#), and spaces (leading and trailing).

Example: A1Z27BC-G\$123R

- **Prompt:** *During eject processing, send an intermediate response containing ejected volumes when the CAP is filled, rather than waiting for MAX\_ID volumes to be ejected. (TRUE/FALSE) [FALSE].*

#### **Variable: EJECT\_RESPONSE\_ON\_CAP\_FULL**

This option specifies whether the eject process should send an intermediate response when a CAP is filled, or wait for MAX\_ID volumes to be ejected. On configurations with CAPs larger than MAX\_ID cells, this does not affect any behavior, as an intermediate response is still generated when MAX\_ID volumes are ejected. This setting will have no effect on cmd\_proc, and cmd\_proc will always receive a response when the CAP has been filled.

**WARNING:** Changing the value of this variable will affect ACSAPI clients that expect intermediate eject responses to always contain MAX\_ID volumes.

- **Prompt:** *Delay in minutes before queued mount and dismount requests are retried or ACSLS checks if a temporarily offline library or drive is available. Mount and dismount requests are queued and retried when the library is busy or temporarily unavailable. Valid range of 1-6.*

#### **Variable: MOUNT\_RETRY\_DELAY**

To prevent mount and dismount request failures, requests are automatically queued when the library is busy or temporarily unavailable.

These requests are periodically re-tried to check for library and drive availability. The MOUNT\_RETRY\_DELAY specifies the time interval, in minutes, between attempts to retry the request.

Default is 2 minutes.

- **Prompt:** *Time limit in minutes to queue mount and dismount requests when the library is busy or temporarily unavailable. When a request has been queued and retried longer than this time limit, the request fails. Range of 10-80.*

#### **Variable: MOUNT\_RETRY\_TIME\_LIMIT**

To prevent mount and dismount request failures, requests are automatically queued when the library is busy or temporarily unavailable. These requests are periodically re-tried to check for library and drive availability . The MOUNT\_RETRY\_TIME\_LIMIT is the maximum time, in minutes, that ACSLS continues to queue a mount or dismount request.

Default is 20 minutes.

## Setting Access Control Variables

Option 4 allows you to set or change the following access control variables:

- **Prompt:** *Changes to command access control will not take effect until the product is restarted. Access control is active for commands. (TRUE/FALSE) [FALSE].*

#### **Variable: AC\_CMD\_ACCESS**

Specifies if access control is active for commands. This allows control over which StorageTek ACSLS command each network client is allowed to execute.

The default, false, disables access control.

**Note:** You must stop, then restart StorageTek ACSLS for this change to take effect.

- **Prompt:** *Default access for commands (ACCESS/NOACCESS) [ACCESS].*

#### **Variable: AC\_CMD\_DEFAULT**

Specifies the default access to commands if there is no relevant access control lists.

The default, ACCESS, allows command access unless otherwise denied through configuration information provided in the access control files.

- **Prompt:** *Changes to volume access control will not take effect until the product is restarted. Access control is active for volumes. (TRUE/FALSE) [FALSE].*

**Variable:** AC\_VOL\_ACCESS

Specifies if access control is active for volumes. This allows control over which StorageTek ACSLS clients can access specific volumes. You must restart StorageTek ACSLS for this option to take effect.

The default, false, disables access control for volumes.

**Note:** You must stop, then restart StorageTek ACSLS for this change to take effect.

- **Prompt:** Default access for volumes (ACCESS/NOACCESS) [NOACCESS].

**Variable:** AC\_VOL\_DEFAULT

Specifies the default access to volumes if there is no relevant access control lists.

The default, NOACCESS, disallows volume access unless otherwise granted through configuration information provided in the access control files.

- **Prompt:** Messages will be logged when access to commands or volumes is denied (TRUE/FALSE) [FALSE].

**Variable:** AC\_LOG\_ACCESS

Specifies if a message is logged in the event log when access to a command or volume is denied. The command or volume id is logged, as well as the access id and host id if this option is enabled.

## Setting Automatic Backup Variables

Option 5 allows you to set or change the following automatic backup variables:

- **Prompt:** Would you like to modify the automatic backup settings? ( y or n)

**Variable:** None. The automatic backup settings are saved in crontab. Please use acsss\_config to modify these settings.

Valid options are:

- Y - If yes, you are asked if you want to back up everyday. If "yes", then you must enter the time in HH:MM format.  
If no, you must select the day(s) of the week to back up. Then you must enter the time in HH:MM format.
- N - you go to the next question regarding the retention period of SDM-managed database backup files.
- **Prompt:** Set the number of days for the retention period of SDM-managed database backup files. See Help for explanation. [5].

**Variable:** RETENTION\_PERIOD

The option sets how many days DSM tracks the data on your storage cartridges before the cartridge is designated as not eligible for reuse. Valid number of days: 4-30

The retention period is the period of time for which you retain backups. Transaction log files are *retained* with each backup, increasing the space needed in the backup partition. When choosing a retention period, consider the following conditions specific to your site:

- The size and activity of your library
- The number of automatic and manual backups performed in a given period of time

**Notes:**

When you run a manual backup with the bdb.acsss utility, an automatic backup to local disk is also done, thereby increasing the number of backups in the backup partition.

The retention period should be greater than the interval between backups. For example, if you have a retention period of four days, you should take automated or manual backups at least three times a week, with no more than three days between backups.

- The period of time for which you would like to retain backups and transaction log files, keeping in mind that long retention periods increase the space needed in the backup partition.

## Rebuilding Access Control Information

Option 6 rebuilds your access control tables, if access control is alive and/or has been changed.

## Defining Event Notification Settings

Option 7 allows you to define your event notification settings.

- **Prompt:** *Set the number of event messages sent to a client between two successive client checks by ACSLS. [100]*

**Variable:** CLIENT\_CHECK\_MESSAGE\_COUNT

This option specifies the number of event notification messages to send a client and the minimum check interval (set with next question) before StorageTek ACSLS checks to verify the registered client is still alive.

Valid entry: 10 - 1000 messages

- **Prompt:** *Enter the minimum interval between two successive client checks by ACSLS (in minutes). [30]*

**Variable:** CLIENT\_CHECK\_MIN\_INTERVAL

StorageTek ACSLS checks periodically if a registered client is still alive. This check is performed when the minimum interval and the event notification message count is exceeded.

Valid entry: 1 - 600 minutes

- **Prompt:** *Enter the time a client has to respond to a client check with a check registration request (in seconds) [30]:*

**Variable:** CLIENT\_CHECK\_RESPONSE\_TIME

When StorageTek ACSLS checks periodically if a registered client is still alive, the client must respond with a check registration request within the specified response time. If the client does not respond within this time period, the client's Event Notification registration is cancelled.

Valid entry: 5 - 300 seconds

- **Prompt:** *Enter the polling interval for confirming Event Notification client registration (in minutes) [60]:*

**Variable:** CLIENT\_CHECK\_POLLING\_INTERVAL

StorageTek ACSLS checks periodically if a registered client is still alive. At the polling interval specified, StorageTek ACSLS sends a client check response to all clients who have not issued register, unregister, or check registration requests within this polling interval.

Valid entry: 10 - 1440 minutes

**WARNING:** Reboot Your System If You Have Set Any Static Variable(s)

You do not have to do this for the dynamic variables.

## Configuring or Updating your Library Hardware

You must use acsss\_config (option 8) to create your library hardware for the first time or to add new libraries or re-configure existing libraries. After your initial library configuration, you can then use the config utility, to dynamically add, reconfigure, and remove ACSs, LSMs and tape drives and port connections to libraries. For more information and procedures, refer to ["Dynamic Configuration \(config\) utilities" on page 131](#).

See ["Installing and Configuring Your Library Hardware" on page 13](#) for more information.

# Access Control

Access Control provides StorageTek ACSLS the means to secure your library resources.

- *Volume Access Control* is a mechanism that enables you to own specific volumes and to limit which other users may have access to those volumes.
- *Command Access Control* allows administrators to limit specific StorageTek ACSLS commands to specific users.

Both *volume access control* and *command access control* apply to users of client applications who submit requests via the ACSAPI. *Access control* does not restrict access to administrative users who submit library requests using the *cmd\_proc*.

## ■ Volume Access Control

Volume access control is the most widely used mode of controlled access in StorageTek ACSLS. When enabled, the volumes that are owned by a specific user are accessible only to that user or to trusted other users.

The first time you configure StorageTek ACSLS for volume access control follow these steps:

1. Enable volume access control in StorageTek ACSLS.
2. Associate a client identity with a user name.
3. Define which other users may have access to the user's volumes.
4. Establish ownership of the volumes you wish to secure.

## Enabling Volume Access Control

To enable *volume access control* in StorageTek ACSLS:

1. Run the configuration utility, *acsss\_config*.  
The main menu displays.
2. Select Option 4 - "Set Access Control Variables".  
Each variable is listed one at a time, and its current setting is displayed.
3. Press <Enter> to accept the current or default setting.
4. Select [TRUE] and press <Enter> when the utility displays the message "Access control is active for volumes".
5. Select one of the following when the utility displays the message "Default access for volumes ACCESS/NOACCESS" ...
  - Select [ACCESS] if your goal is to *disallow* access to *specific* users and allow access to all others.  
This requires specific users to be listed in a *users.ALL.disallow* file or a specific *users.COMMAND.disallow* file. See "["Defining other users that are allowed access to the user's volumes" on page 41](#)
  - Select [NOACCESS] if your goal is to *allow* access to *specific* users and disallow access to all others.  
This requires specific users to be listed in a *users.ALL.allow* file or a specific *users.COMMAND.allow* file. See "["Defining other users that are allowed access to the user's volumes" on page 41](#)

**Note:** If you wish to log instances where access to volumes is denied, select [TRUE] in response to that prompt.

**Note:** Whenever enabling or disabling volume access, you need to restart StorageTek ACSLS for the change to take effect.

## Associating a client identity with a user name

Not all client applications pass a user ID with its StorageTek ACSLS request packets. In cases where the client is not identified by a user name, you can assign a user ID.

1. Go to the *access\_control* configuration directory, *\$ACS\_HOME/data/external/access\_control*.
2. Create a file by the name *internet.addresses* or copy the *internet.addresses.SAMPLE* file.

3. In this file, create a record for each client. Each record contains at least two fields: the client IP address followed by a corresponding user name. You can include additional fields for comments.
  - Separate the fields with spaces or tabs as shown in the following example:
 

```
654.32.10.10 ulyssis payroll department
```
- You can create as many client-user associations as you have client applications.
  - Where client applications pass the user name with the StorageTek ACSLS request, the *internet.addresses* file authenticates the user name with the designated IP address and denies access where both fields do not agree with the values in the request packet. Where multiple clients are hosted from a common platform, the same IP address may be included multiple times in this file and this address can be associated with as many user names as are rightly applied to that IP address.
  - Where client applications do not pass the user name with the request, the *internet.addresses* file is used to establish a user name for that client. In this case, only one user name may be associated with any client IP address.

4. Register any updates to the *internet.addresses* file:

- a. Run *acsss\_config*
- b. Select Option 6 - "Rebuild Access Control Information".

StorageTek ACSLS dynamically recognizes the change.

For SNA and OSLAN clients that do not use TCP/IP, refer to the *lu62.names* or *adi.names* file in the *access\_control* directory.

## Defining other users that are allowed access to the user's volumes

To grant other users access to a user's owned volumes:

1. Create a file *users.ALL.allow* or *users.ALL.disallow* in the *access\_control* directory.  
You can copy the templates *users.SAMPLE.allow* or *users.SAMPLE.disallow*.
2. Add a record in the file for each owner, placing the owner's user ID at the left margin.
3. Specify affected users on the same line with each owner.

4. Separate the user names with spaces or tabs as shown in the following example.

```
owner_john user-Allie user-andre
```

User names listed in the *users.allow* and *users.disallow* files must be unique, without regard to case. The type case of characters in the user name is ignored.

Users who are not listed on the same line with the owner are given the default (ACCESS or NOACCESS) relationship to the owner's volumes.

**Note:** You cannot have the same owner\_ID and user\_ID pair in both the **users.COMMAND.allow** and **users.COMMAND.disallow** files for the same command or **ALL**. You also cannot have the duplicate owner\_ID and user\_ID pair in the same **users.COMMAND.allow** and **users.COMMAND.disallow** files. This includes repeating the same user\_ID on the same line.

5. Optionally, you can establish exceptions to the volume access policy you have defined.

Generally, users are allowed full access, or no access to volumes that are under access control. However, it is possible to allow users certain restricted access to other users' volumes.

For example, you can set a policy that allows any user to query volumes that are owned by a specific user, even though they may not mount or dismount those volumes. Exceptions can be applied to any of the commands that are affected by 'access control':

To configure volume access policy exceptions for certain commands:

- You must create a *users.COMMAND.allow* or *users.COMMAND.disallow* file (where COMMAND is replaced by the specific command you wish to grant or restrict).
- For each owner, place the owner's name at the left margin, followed by the users for whom the policy applies.

6. Register any updates to the policies you define:

- a. Run *acsss\_config*
- b. Select Option 6 - "Rebuild Access Control Information".

StorageTek ACSLS dynamically recognizes the change.

## Establishing ownership of the volumes you wish to secure

Volume access control applies only to volumes that have explicit ownership. Unowned volumes in the library are accessible to any user. To explicitly set volume ownership use the *cmd\_proc* interface:

```
ACSSA>set owner "daffy" volume V00100-V00199
Set: owner set for volumes V00100-V00199
Set: Set completed, Success.
```

You can remove ownership in a similar fashion by using an empty string:

```
ACSSA> set owner "" volume V00100-V00199
Set: owner set for volumes V00100-V00199
```

This operation clears the ownership from all of the volumes in the range. For more information, refer to ["set owner" on page 261](#).

Volume ownership can be set automatically by the *watch\_vols* utility. For more information, refer to ["watch\\_vols" on page 175](#).

## Ownership policies

A policy for setting and removing ownership automatically can also be defined in StorageTek ACSLS. For example, you can set a policy in which any scratch volume that is mounted becomes owned by the user who mounted it.

Thereafter, the volume is secured by that user. The same policy could be enhanced to remove ownership whenever the volume is returned to scratch status. A policy could be written such that all entered volumes are assigned to a default user, or to the user who requested the enter, or if the volume was previously owned, to its prior owner. Considerable flexibility is offered with this feature.

Ownership policies are defined in the *ownership.assignments* file which resides in the *access\_control* directory. You can set a policy in this file to assign or to un-assign ownership automatically with each *enter*, *set scratch*, or *mount scratch* operation. The *ownership.assignments* file allows you to define a default owner. Whenever a volume encounters any of these operations, its ownership can be assigned to:

- Owner\_default (the default owner)
- Same (the previous owner)
- Requestor (the user issuing the current request)
- Unowned (retract ownership from the volume)

Instructions for defining ownership policies are described in detail in the *ownership.assignments* file. This file includes a complete list of commands that can be used to set volume ownership.

## Verifying Ownership

To verify ownership you can run *volrpt* using the *owner\_id.volrpt* template.

```
cd ~acsss/data/external/volrpt
volrpt -f owner_id.volrpt
```

This produces a display of all the volumes in the library listed with their associated owner.

## Volume Access Summary

The following commands are supported by Volume Access Control

**Table 3. Commands used by Volume Access Control**

mount	query_mount	enter	set_scratch
dismount*	query_scratch	eject	set_clean
display	query_volume	lock	unlock

\* Access control does not apply to *dismount force* since the force option instructs StorageTek ACSLS to ignore the volume ID and to dismount to volume unconditionally.

The following table summarizes the contexts that apply when *volume access control* is enabled.

**Table 4. Volume Access is Enabled**

<b>Default access for volumes is ACCESS</b>	<b>Access Allowed</b>	<b>Access Denied</b>
Access is by means of <i>cmd_proc</i>	X	
The specified volume is unowned	X	
The user is the owner of the volume	X	
The user is associated with the owner in <i>users.ALL.disallow</i>		X
If the user is not associated with the owner in <i>users.ALL.disallow</i>	X	
<b>Default access for volumes is NOACCESS</b>	<b>Access Allowed</b>	<b>Access Denied</b>
Access is by means of <i>cmd_proc</i>	X	
The specified volume is unowned	X	
The user is the owner of the volume	X	
The user is associated with the owner in <i>users.ALL.allow</i>	X	
If the user is not associated with the owner in <i>users.ALL.allow</i>		X

## ■ Command Access Control

*Command access control* allows an StorageTek ACSLS administrator to restrict certain classes of commands to specific client applications or specific users across the network. Controlled access applies only to user commands that are submitted via the ACSAPI and it does not apply to local users who submit commands via *cmd\_proc*.

The process to configure StorageTek ACSLS for *command access control* involves four steps:

The first time you configure StorageTek ACSLS for command access control follow these steps:

1. Enable command access control in StorageTek ACSLS.
2. Associate a client identity with a user name.
3. Define what commands are available to which users.

## Enabling Command Access Control

To enable *command access control* in StorageTek ACSLS,

1. Run the configuration utility, *acsss\_config*.  
The main menu displays.
2. Select Option 4 - "Set Access Control Variables".  
Each variable is listed, one at a time, and its current setting is displayed.
3. Press <Enter> to accept the current or default setting.
4. Select [TRUE] and press <Enter> when the utility displays the message "Access control is active for volumes".
5. Select one of the following:
  - Select [ACCESS] if you want is to *allow* all users access to *all* commands.

This requires specific users to be listed in a *command.ALL.disallow* file or a specific *command.XXX.disallow* file, where:

XXX is the command for which access control is intended

- Select [NOACCESS] if you want to *deny* user access to commands.  
This requires specific users to be listed in a *command.ALL.allow* file or a specific *command.XXX.allow* file.

**Note:** If you wish to log instances where access to commands is denied, enter "TRUE" in response to that prompt.

**Note:** Whenever enabling or disabling command access, you need to restart StorageTek ACSLS for the change to take effect.

## Associating a client identity with a user name

Refer to the procedures under [“Associating a client identity with a user name” on page 40](#).

## Defining what commands are available to which users

This process depends upon the default behavior you have selected when you enabled *command access control*. You need to create a policy file in the `$ACS_HOME/data/external/access_control` directory.

- If the default behavior you defined above is [NOACCESS], you need to create a `command.ALL.allow` file that contains the user ID of each client that is to have access to all StorageTek ACSLS commands. Each user ID should be listed on a separate line in the file.

If you wish to grant only specific commands to specific users, you need to create a `command.XXX.allow` file for each command the users are allowed to execute. For example, to grant permission for specific users to enter volumes into the library, you would create a file with the name 'command.ENTER.allow' and list the ID of each qualified 'enter' user on a separate line in the file.

- If the default behavior you defined above is [ACCESS], you need to create a `command.ALL.disallow` file that contains the user ID of each client that is not to have access to all StorageTek ACSLS commands. Each user ID should be listed on a separate line in the file.

**Note:** You cannot have the same user\_ID in both the **command.XXX.allow** and **command.XXX.disallow** files for the same command or **ALL**.

**Table 5. Command Access is Enabled**

<b>Default Access for Commands is NOACCESS</b>	<b>Access Allowed</b>	<b>Access Denied</b>
The request is entered from <i>cmd_proc</i>	X	
The user_ID is listed in command.COMMAND.allow	X	
The user_ID is listed in command.ALL.allow	X	
-- All other conditions --		X
<b>Default Access for Commands is ACCESS</b>	<b>Access Allowed</b>	<b>Access Denied</b>
The request is entered from <i>cmd_proc</i>	X	
The user_ID is listed in command.COMMAND.disallow		X
The user_ID is listed in command.ALL.disallow		X
-- All other conditions --	X	

## ■ Logging Access Control Messages

You can set a policy to log all transactions that failed because the user was denied access. The message displays the user name and the command that was attempted.

To enable access control logging:

1. Run *acsss\_config* and select Option 4 - "Set Access Control Variables"
2. Change [FALSE] to [TRUE] at the following prompt: "Messages will be logged when access to commands or volumes is denied."
3. Select Option 6 - "Rebuild access control information."

StorageTek ACSLS recognizes the change and begins logging each time a command request was denied.

Managing your library(ies) may consist of the following tasks:

- “[Specifying ACS Numbers](#)” on page 49
- “[Auditing the Library](#)”
- “[Adding a SCSI or fibre-attached library to StorageTek ACSLS](#)” on page 52
- “[Using the Extended Store Feature](#)” on page 52
- “[Managing a Mixed-Media Library](#)” on page 54
- “[Managing Dual TCP/IP Connections](#)” on page 60
- “[Managing a Dual-LMU Configuration](#)” on page 60
- “[Managing a Dual-LAN Client Configuration](#)” on page 62
- “[Registering the IP Addresses of Primary and Secondary LANs](#)” on page 63
- “[Setting the TCP/IP Connection Timeout Interval](#)” on page 65
- “[Registering for Event Notification](#)” on page 65
- “[Managing Library and Drive States](#)” on page 66
- “[Queue and Retry Mounts and Dismounts when Library is Temporarily Unavailable](#)” on page 67

## ■ Specifying ACS Numbers

StorageTek ACSLS lets you configure or re-configure libraries without assigning all ACS numbers in sequence.

### **Example:**

You want to migrate from a 9310 library to a StorageTek SL8500. The 9310 ACS is now ACS 0 and the StorageTek SL8500 ACS is ACS 1.

Skipping ACS numbers lets you migrate all of the cartridges and drives to the StorageTek SL8500 ACS and remove the 9310 ACS without having to renumber the StorageTek SL8500 ACS.

If you renumbered the StorageTek SL8500 ACS all volumes would be deleted, and then re-added in a subsequent audit. It would also cause all of the *drive\_ids* to change.

## ■ Auditing the Library

An audit updates the StorageTek ACSLS database to match the actual inventory of library cartridges.

### How Audit Works

An audit ejects duplicate and invalid volumes. The cartridges have:

- An external label that duplicates one already scanned.
- A missing or unreadable external label and no virtual label.
- An invalid media type.
- An invalid volume ID.

StorageTek ACSLS records any database changes from the audit in the event log and also displays cmd\_proc messages during the audit. Audits only apply to LSM storage cells, not to tape drives or CAPs. For information about running an audit, refer to ["audit" on page 182](#).

### When to Run an Audit

You run an audit to:

- Create volume information in the database for newly configured libraries.
- Add volumes to the database when the cartridges were not entered through the CAP.

Example: you added an LSM to your library, opened the LSM door, and manually added cartridges to the LSM.

- Resolve discrepancies between the library and the database.

Example: run an audit if you opened an LSM door and manually removed cartridges instead of ejecting them through the CAP.

The audit either marks the volume absent or deletes the removed volumes from the database.

#### **WARNING:**

You must audit an StorageTek SL3000 after it is configured or re-configured to StorageTek ACSLS. You must also audit an SL3000 after increasing or changing the activated capacity of the library. The library reports the potential cell locations that are not accessible to StorageTek ACSLS when StorageTek ACSLS audits it. Inaccessible cell locations include:

- locations where CAPs, drives, and operator panels are installed.

- cell locations that the robots cannot access.
- cell locations that are not activated.
- cell locations that are not in this partition.

## Audit Intervals

Audit intervals depend on several factors, including: your StorageTek ACSLS configuration; whether the library is reporting cell contents from its database or by examining each cell; your library configuration; the number of database changes required; and the scope of the audit. [Table 3](#) describes how the differences in the scope of an audit affect the audit intervals.

**Figure 3. How the Scope of an Audit Affects the Audit Interval**

This audit takes less time	Then this audit
A diagnostic ACS/LSM	An online ACS/LSM
An ACS/LSM dedicated to the audit	An ACS/LSM processing other requests
A full panel	A (partially or completely) empty panel
A drive panel	A standard panel
An inside panel	An outside panel

In addition, consider the LSM type for the component you audit, as shown in [Table 6](#). For the 4410, 9310, and L5500 the best time can be achieved when all the cells are full, and worst time when cells are empty.

**Table 6. Average Audit Times for Supported LSMs**

LSM Type	Component	Average Audit Time (Best and Worse)
4410	LSM	3 - 8 hours
9310/L5500	LSM	1.2 - 6 hours
9360	LSM	5 minutes
97xx/L700/180	LSM	1 minute
StorageTek SL500	LSM	3 minutes
StorageTek SL8500 or StorageTek SL3000	LSM	5 minutes (if the StorageTek SL8500 physical audit completes before the StorageTek ACSLS audit)
<b>Note:</b> These times assume no other active processes. 4410 and 9310 audit times may be reduced if a high percentage of the cells audited are occupied.		

## ■ Adding a SCSI or fibre-attached library to StorageTek ACSLS

The SCSI Media Changer (mchanger) is the device driver that communicates between StorageTek ACSLS and any SCSI library. An mchanger must be created for each SCSI or fibre-attached library that is connected to StorageTek ACSLS.

For more information, please see [“Adding the SCSI mchanger Device Driver” on page 14](#).

## ■ Using the Extended Store Feature

The following sections provide information about using the Extended Store Feature.

**Note:** This feature does not apply to a single LSM without a pass-thru port.

When a cartridge is mounted, its “home location” is the storage cell from which it was mounted. Normally, when a cartridge is dismounted and its home location is in a different LSM than the drive, StorageTek ACSLS attempts to assign a new home location in the closest LSM (the shortest pass-thru

distance from the tape drive). This is called “floating” a cartridge to a new home location.

StorageTek ACSLS attempts to return a cartridge to its home location after a dismount if that home location is in an LSM that is enabled for the Extended Store feature.

**Note:** Events such as the volume’s home LSM being offline or a label mismatch on a dismount may prevent StorageTek ACSLS from returning a cartridge to its home location. If such an event occurs, the cartridge is stored as close as possible to the LSM from which it was dismounted.

If you have an Extended Store LSM that you use for cartridge archive, this feature helps to ensure that cartridges mounted from that LSM return to their home locations in that LSM. For example, if Extended Store LSM 3 is enabled for this feature and a cartridge from LSM 3 is mounted on a drive attached to LSM 1, after the cartridge is dismounted, StorageTek ACSLS attempts to return the cartridge to its home location in LSM 3. If LSM 3 is not enabled, StorageTek ACSLS tries to store the cartridge in a new cell in LSM 1.

You can only enable entire LSMs for this feature. You cannot enable LSM subcomponents, such as a panel or individual cell. To enable an entire ACS for this feature, you must enable each LSM in the ACS.

**Note:** Enabling the Extended Store feature will increase pass-thru activity when cartridges are dismounted. This may significantly decrease library performance.

To enable an LSM for the Extended Store feature, modify the `lsm_fixed_volume` file (found in the `$ACS_HOME/data/external/fixed_volume` directory) shown in [Figure on page 54](#). After you modify the file, stop and restart StorageTek ACSLS to enable the specified LSMs.

Use the following conventions when you modify the sample file:

- Comment and blank lines are allowed throughout the file.
- Each LSM identifier line consists of the ACS number, followed by a comma, followed by the LSM number. No spaces or tabs are allowed between the ACS number and the LSM number.
- Each LSM identifier must be on a separate line.
- No explicit ordering of the LSM identifier lines is required.
- No explicit end-of-file delimiter is required.

[Figure on page 54](#) shows an example of a modified control file. In this example, the comment (#) character has been removed from the lines shown in bold to specify that LSMs 0,0 and 0,1 are enabled.

**Figure 4. Extended Store Feature Control File**

```
# This lsm_fixed_volume file must be found in the
# $ACS_HOME/data/external/fixed_volume
# directory. This is a sample lsm_fixed_volume file that may be
# edited for your particular configuration.
# Comments may appear anywhere in this file, but must include a
# pound sign in the first column.
# Blanks lines are also allowed throughout the file for
# readability, and
# will be ignored.
# For all the LSM identifiers found in this file, a "best" attempt
# will be
# made to return the volume to its home location at dismount.
# A valid LSM identifier consists of the ACS number, separated by a
# comma,
# and followed by the LSM number. Leading or trailing blanks are
# ignored.
#          ACS,LSM
#          0,0
#          0,1
# ACS 1, LSM 0 through 3
#          ACS,LSM
#          1,0
#          1,1
#          1,2
#          1,3
```

## ■ Managing a Mixed-Media Library

“Mixed media support” means that StorageTek ACSLS supports a mixture of tape drive and media (cartridge) types in the same library. StorageTek ACSLS mixed-media support prevents the LSM robot from mounting incompatible media types in a tape drive. For example, in a 9310 LSM, the robot will not mount a DD3A cartridge (helical recording) in a 9490 tape drive (parallel recording).

StorageTek ACSLS mixed-media support requires Media ID labels with media characters on cartridges. For more information, refer to the *Product Information* guide.

StorageTek ACSLS does **not** support mixed format recording. Because StorageTek ACSLS does not have access to the data path to a tape drive, StorageTek ACSLS cannot detect and prevent mixed-format recording incompatibilities.

**CAUTION:** The yenter command does not provide an option to specify the media type of the cartridge you want to enter. In a mixed-media environment, StorageTek ACSLS cannot prevent tape drive/media incompatibilities for virtually entered cartridges!

## Displaying the StorageTek ACSLS Mixed-Media Settings

The `drives_media.sh` utility displays the drive types, media types, and drive-to-media compatibility settings currently supported by StorageTek ACSLS. As support is added for new drives and media, they are displayed.

To display the StorageTek ACSLS Mixed-Media settings, enter:

**`drives_media.sh`**

The information is written to the screen (standard output).

To output the StorageTek ACSLS Mixed-Media settings to files in the `/tmp` directory, enter:

**`drives_media.sh -f`**

The information will be written to three files. (If the files already exist, they will be overwritten.)

`/tmp/drive_types.txt`  
`/tmp/media_types.txt`  
`/tmp/media_compatibility.txt`

## Using Mixed-Media Support with 3490E Cartridges

An LSM's vision recognition system can determine the media type if the 3490E cartridge has the "E" media label on the cartridge label edge of the cartridge. The media label is a separate, single character, bar code label below the six-character cartridge label. Cartridges without the media label are considered 3480 cartridges by 1/2" cartridge standards.

StorageTek recommends that when you purchase new 3490E cartridges, you order them with the "E" media label to enable StorageTek ACSLS to provide automatic mixed media protection for those cartridges. StorageTek strongly suggests that, if practical for your site, you apply "E" media labels to any existing 3490E cartridges without such labels to allow StorageTek ACSLS to provide automatic protection for those cartridges as well. If you choose to use 3490E cartridges without "E" media labels in a mixed-media environment, you, not StorageTek ACSLS, must explicitly manage those cartridges. For example:

- A 3490E cartridge without the "E" seventh media character appears as a 3480 cartridge on cartridge reports and as a `query volume` response. You must, therefore, know which 3490E cartridges are incorrectly labelled, and must explicitly mount them in a compatible drive (4490 or 9490).
- Similarly, you must explicitly manage incorrectly labelled 3490E scratch tapes as follows:
  - First, you must create a homogeneous scratch pool containing only the incorrectly labelled 3490E tapes. When you create this pool, do not

specify the overflow option unless the common scratch pool is a homogeneous pool that contains only 3490E tapes.

- Next, you must add an entry to the scratch preferences to permit mounting 3480 scratch tapes as an alternate choice for both 4490 and 9490 drives.
- Finally, when you enter a mount scratch command, you must specify the pool ID of the incorrectly labelled 3490E tapes and the ANY\_MEDIA\_TYPE or ANY\_MEDIA\_TYPE keyword.

**CAUTION: If you modify the scratch preferences file as described, a mount scratch command for a 4490 and 9490 drive will mount a 3480 cartridge when the pool no longer contains 3490E cartridges.**

- query mount and query mount scratch commands will not return accurate media type information for incorrectly labelled 3490E cartridges. Again, you must know by volume ID which cartridges that appear as 3480 cartridges are actually 3490E cartridges.

## Mixed-Media Restrictions for SCSI-Attached LSMs

Please note the following restrictions for SCSI-attached LSMs:

- Because some tape drives do not support dynamic write-protect settings by means of the control path, you must use caution when mounting cartridges using the 'read-only' option. All StorageTek drives support this feature. For non-StorageTek drives, you are advised to confirm that dynamic write-protection is supported. Unless the drive supports this feature, you bear the risk of losing data on cartridges that you assumed are to be mounted with the write-disable protection of a 'read-only' mount.
- StorageTek ACSLS does *not* support the venter command for SCSI-attached LSMs with DLT tape drives.
- You cannot do virtual mounts and dismounts to DLT tape drives in SCSI-attached LSMs. Compac tape cartridges, therefore, must have external labels to allow StorageTek ACSLS to manage these cartridges.
- Automatic-cleaning operations in SCSI-attached LSMs is handled by the LSM microcode and not by StorageTek ACSLS. The LSM control panel provides a menu for users to enable LSM control of automatic-cleaning operations. For more information, see your LSM documentation.
- You can select a normal load or fast load option via the 97xx control panel. Not all tape management systems, however, support the fast load option.

## Setting Scratch Preferences

On scratch mount requests you can explicitly specify the media type you want to use, or you can have StorageTek ACSLS select a media type.

In order for StorageTek ACSLS to select a media type, you must pre-define a prioritized list of compatible media types for each drive type. This list is referred to as the “scratch preferences.”

For example, on TimberLine (9490) drives, you may want to use 3490E cartridges before 3490 or 3480 ones. To do this, you would define 3490E cartridges as the highest priority for 9490 drives, followed by 3490 and 3480 cartridges. Note that:

- There is one set of preferences for the entire server; preferences are not defined by client.
- If a compatible media type is not listed for a drive, the media will not be selected.

The following sections describe the user- and system-defined files that StorageTek ACSLS uses in determining scratch preferences.

### User-Defined Mixed-Media Files

[Table 7](#) describes the user-defined mixed-media files that are located in \$ACS\_HOME/data/external/mixed\_media/:

**Table 7. User-Defined Mixed-Media Files**

File	Description
scratch_preferences.dat	User-defined preferences file. Primary source of preference definitions.
scratch_preferences.SAMPLE	Sample preferences file. Can be copied to create the scratch_preferences.dat file.

## System-Defined Mixed-Media Files

[Table 8](#) describes the system-defined mixed-media files that are located in \$ACS\_HOME/data/internal/mixed\_media/:

**Hint:** You cannot modify the system-defined mixed-media files.

**Table 8. System-Defined Mixed-Media Files**

File	Description
media_compatibility.dat	System-defined preferences file. Used only if the user-defined file does not exist or is missing a drive type.
drive_types.dat	System-defined list of supported drive types.
media_types.dat	System-defined list of supported media types.

## How StorageTek ACSLS Uses the Mixed-Media Files

[Table 9](#) describes how StorageTek ACSLS uses the mixed-media files to select a media type for a scratch mount request.

**Table 9. How StorageTek ACSLS Uses Mixed-Media Files**

If the	StorageTek ACSLS does this...
scratch_preferences.dat file ...	
Does not exist.	Uses the definitions in the system file, media_compatibility.dat.
Lists more than one media type for a drive.	Selects the media types in the order listed.
Lists no media type for a particular drive.	Uses the data in the system file, media_compatibility.dat.
Does not list a particular drive type.	Uses the data in the system file, media_compatibility.dat.

## Defining a Scratch Preferences File

Use this procedure to define a `scratch_preferences.dat` file, which contains an ordered list of scratch cartridge types to select for given drive types. StorageTek ACSLS uses this file for `mount *` command where a media type is not explicitly specified. [Figure 5](#) shows the contents of the `scratch_preferences.SAMPLE` file.

**Figure 5. scratch\_preferences.SAMPLE**

Drive Type	Media Type	Preference Name
4480	3480	
4490	3490E	
9490	3490E	
SD3	DD3A	
SD3	DD3B	
SD3	DD3C	

**To define a scratch preferences file, do the following:**

1. Log in as `acsss`.
2. Change to the external mixed media directory:  
`cd $ACS_HOME/data/external/mixed_media`
3. Copy the sample scratch preferences file to create the user-defined file:  
`cp scratch_preferences.SAMPLE scratch_preferences.dat`
4. Using a text editor such as `vi`, modify the list of preferences in the `scratch_preferences.dat` file:
  - Follow the instructions in the comments at the top of the file.
  - If you want to use more than one media type for a drive type, enter each media type on a separate line; the order of preference is from top to bottom.
5. Save the file.
6. From a `cmd_proc`, restart StorageTek ACSLS:  
`start`

See the command, [“set scratch” on page 262](#).

## ■ Managing Dual TCP/IP Connections

Dual TCP/IP is an option that can be purchased for the StorageTek SL8500 and StorageTek SL3000. It provides two TCP/IP connections to the libraries. However, you can continue to use the libraries with only one of the two connections operational.

The purpose of dual TCP/IP is to automatically recognize and avoid a failing communication path. Since this is automated, there is no need for you to manually switch from an inoperative connection. For more information, see [“Dual TCP/IP Support ” on page 318.](#)

## ■ Managing a Dual-LMU Configuration

StorageTek ACSLS supports *Dual-LMU configurations*, which consist of:

- A active LC/LMU that manages an ACS
- A standby LC/LMU that automatically switches to master role to manage the ACS if the active LC/LMU fails

Both LMUs are connected to a LAN that is connected to the LSMs. The first LMU powered on is initially the master, while the second LMU powered on is initially the standby. The LMUs periodically check each other's status so the standby can take over the master role if the master fails.

**Note:** StorageTek ACSLS supports Dual-LMU configurations for only the 9330 and L5530 LMUs with host/LMU microcode compatibility Level 12 (or above) loaded. The same microcode level must be loaded in both LMUs. StorageTek ACSLS communicates with these LMUs by a serial connection, or through TCP/IP. There can be only one Ethernet connection for each TCP/IP connected LMU.

**Limitation:** StorageTek ACSLS **does not** automatically initiate an LMU switch. Even if communication between StorageTek ACSLS and the active LC/LMU is lost, StorageTek ACSLS does not initiate an LMU switch. StorageTek ACSLS continues trying to communicate with the existing active LC/LMU .

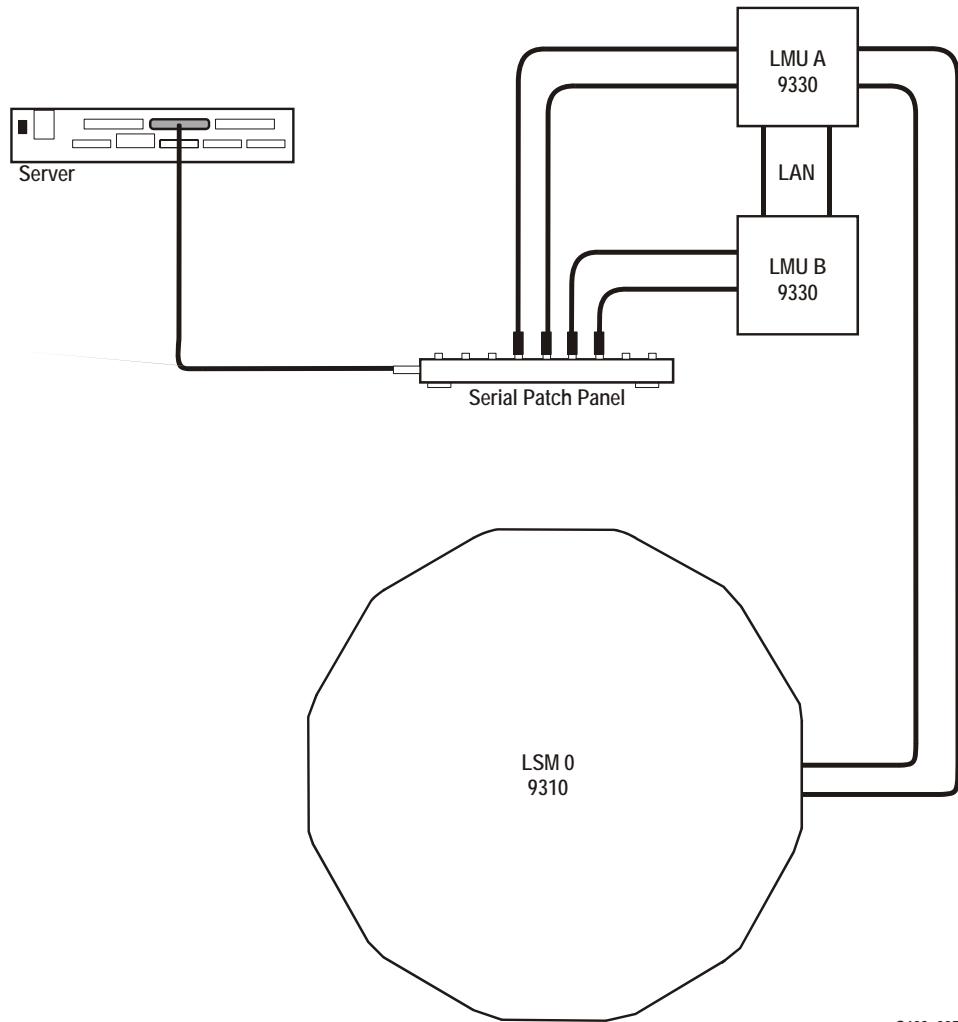
StorageTek ACSLS Dual-LMU support includes:

- StorageTek ACSLS connects to both master and standby LC/LMUs. StorageTek ACSLS constantly monitors its connection to both LMUs. When communication is lost, StorageTek ACSLS reports this condition.
- If the active LC/LMU fails, the standby LC/LMU automatically takes over as the new active LC/LMU. When this happens, StorageTek ACSLS recognizes the automatic switch and sends requests to the new active LC/LMU active LC/LMU . StorageTek ACSLS also recovers transactions in progress (except for audits).

- You can issue the `switch lm` command to manually switch ACS management from the active LC/LMU to the standby LCLMU. StorageTek ACSLS sends a “Force Switchover to Master” transmission to the standby LC/LMU. The standby takes over as the new active LC/LMU. After a manual switchover, StorageTek ACSLS recovers outstanding transactions (except for audits).

**Hint:** To further enhance the redundancy of a serial Dual-LMU configuration, StorageTek recommends that you use dual serial cables to connect the StorageTek ACSLS server to each LMU. [Figure 6 on page 61](#) shows an example of an StorageTek ACSLS server in a Dual-LMU configuration. In [Figure 6 on page 61](#), a port on the server connects to a serial patch panel, which has dual cabling to each LMU.

**Figure 6. StorageTek ACSLS Server in Dual-LMU Configuration**



StorageTek ACSLS Dual-LMU support also enhances single-LMU configurations because the LMU can IPL without bringing down the StorageTek ACSLS server.

The `query lm` command displays LMU and port status for both single-LMU and Dual-LMU ACS configurations; for more information see [“query lm” on page 232](#).

You can also use the `switch lm` command to manually switch ACS management from the ACS’s active LC/LMU to the standby LC/LMU; for more information see [“switch lm” on page 266](#). You can use manual switchover for hardware maintenance, such as replacing a LAN cable connecting dual LMUs. For example, assume that LMU A is in the master role and LMU B is in the standby role. If you need to replace a LAN cable, you can:

1. Switch to LMU B.
2. Vary the port(s) to LMU A offline.
3. Replace the LAN cable.
4. Vary the port(s) to LMU A back online.
5. Switch back to LMU A.

After an LMU switchover (automatic or manual), StorageTek ACSLS recovers all outstanding (active and pending) requests. The time to complete each outstanding request during a switchover is increased by the time required to switch between LMUs and recover any preceding outstanding requests. Request recovery, therefore, can take three to five minutes.

## ■ Managing a Dual-LAN Client Configuration

StorageTek ACSLS 5.2 and above supports *dual-LAN client configurations*, which consist of a primary LAN and a secondary (backup) LAN. If the primary LAN fails, the client switches to the secondary LAN. StorageTek ACSLS removes all outstanding messages to that client and begins communicating via the secondary LAN. Because StorageTek ACSLS removes all outstanding messages before switching over to the secondary LAN, a client will not receive a success message even though a request completed successfully.

For example, a client requests StorageTek ACSLS to eject ten cartridges. StorageTek ACSLS starts ejecting the cartridges, then communications fail between StorageTek ACSLS and the primary client LAN. StorageTek ACSLS removes all outstanding messages to that client and begins communicating via the secondary LAN. StorageTek ACSLS successfully completes ejecting all ten cartridges, but sends no success message to the client. The client must verify that the request completed successfully. In this example, if the client issues a query volume request against the IDs of the ejected volumes, StorageTek ACSLS returns a `volume not found` error message, which confirms that StorageTek ACSLS ejected the cartridges.

StorageTek ACSLS ensures that any transient requests complete successfully if a LAN communications switchover occurs. After switchover, however, the client must cancel any persistent outstanding requests (such as CAP

operations) originally submitted on the primary LAN and resubmit these requests via communications from the secondary LAN. Resources (such as, CAPs, locks, drives, and so forth) allocated via primary LAN communications will remain allocated after switchover to the secondary LAN.

The following sections tell how to configure StorageTek ACSLS for dual-LAN client operations by:

- Register the IP addresses of primary and secondary LANs by creating a `csc_ip_switch.dat` file
- Install a second ethernet port for a multi-homed StorageTek ACSLS server
- Set the TCP/IP connection timeout interval to decrease the system switchover time to the backup LAN.

## ■ Registering the IP Addresses of Primary and Secondary LANs

To register the IP addresses of the primary and secondary LANs with StorageTek ACSLS, create the file `csc_ip_switch.dat` in the `$ACSSS_HOME/data/internal/client_config/` directory. [Figure 7](#) shows an example of a `csc_ip_switch.dat` file.

**Figure 7. Example of `csc_ip_switch.dat` File**

```
#The following entry is System Zed's primary and secondary LAN IP
addresses.

129.80.30.40 129.80.30.50
```

As [Figure 7](#) shows, use a # sign to precede comments. The entries consist of a client system's primary LAN IP address in the left column followed by one or more blanks, then a client system's secondary LAN IP address in the right column. In this example, System Zed's primary LAN IP address is 129.80.30.40 and its secondary LAN IP address is 129.80.30.50.

After you create or update the `csc_ip_switch.dat` file, if StorageTek ACSLS is running, you must stop and restart StorageTek ACSLS.

If StorageTek ACSLS successfully reads the `csc_ip_switch.dat` file on restart, StorageTek ACSLS logs the success message 2010 I DUAL PATH OPTION ACTIVATED in the he StorageTek ACSLS event log. Otherwise, dual-LAN support is not activated.

## ■ Installing a Second Ethernet Port for a Multi-Homed StorageTek ACSLS Server

This section describes the procedure for installing a second ethernet port for a multi-homed StorageTek ACSLS server. The second ethernet port provides the attachment to the second control path adapter, which controls the backup LAN. This procedure requires the StorageTek SBUS Buffered Ethernet card. You can order this Ethernet card from StorageTek as part number X1053A or from StorageTek as part number 309479501.

The installation procedure includes:

- Installing the hardware and rebuilding the kernel
- Defining a host name for the new ethernet port
- Creating the `/etc/notrouter` file

To install a second ethernet port, do the following:

1. Install the SBUS Buffered Ethernet card according to the manufacturer's instructions.
2. Reconfigure the system kernel for the new device:
  - a. Power the system on. When it begins to boot, press `[[STOP]]-[[A]]` to enter the PROM monitor.
  - b. At the `ok` prompt, boot the server:

**boot -r**

3. When the boot has completed, login as root.
4. Create a hostname for the second ethernet port.

```
echo 2nd_host_name > /etc/hostname/hme1
```

Where `2nd_host_name` is the hostname for the second ethernet port.

5. Enter the following:

```
touch /etc/notrouter
```

This creates the `/etc/notrouter` file.

6. Reboot the server:

```
reboot
```

This completes this procedure.

## ■ Setting the TCP/IP Connection Timeout Interval

The UNIX system variable `tcp_ip_abort_cinterval` sets the TCP/IP connection timeout interval between the client and the StorageTek ACSLS server. Changing the default value (180 seconds) of this variable may decrease the switchover time to the backup LAN. Note, however, that actual switchover time depends on the configuration and type of failure. For example, if an StorageTek ACSLS server port fails and multiple clients are communicating via this port, StorageTek ACSLS serially recovers communications with each client. Multi-client recovery for a failing port therefore takes longer than recovery with a single client communicating with a failing port.

To decrease the switchover time to the backup LAN, do the following:

1. Log in as `root` on the StorageTek ACSLS server.
2. From the prompt, enter the following:

```
/usr/sbin/ndd -set /dev/tpc tcp_ip_abort_cinterval 15000
```

This command changes the TCP/IP connection timeout interval to 15 seconds (the default is 180 seconds).

**Hint:** For Solaris only: To make this command persistent (across server reboots), add the command to the `/etc/rc2.d/S69inet` file in the “Set configurable parameters” section.

## ■ Registering for Event Notification

Event notification allows tracking of events occurring in tape libraries for ACSAPI clients. This feature is provided by the CSC Toolkit. Specifically, with event notification, the ACSAPI client can do the following:

- Register for library resource events and/or volume events
- Unregister for these events
- Check registration status for library events and be notified when they occur

Client registration requests and event notification messages are delivered to the client until the registration is dropped. Event notification periodically checks the registration status of the client to verify that the client is alive. This avoids sending responses to clients that are no longer active and avoids the unnecessary use of network resources.

The following types of events can be tracked:

- Addition and deletion of volumes and when maximum usage is exceeded for cleaning cartridges in the StorageTek ACSLS database.

- Changes in library component status such as an LSM or drive changing from online to offline, diagnostic, or recovery; or a CAP that is opened or closed.
- Hardware failures such as an inoperable robotic hand.

## ■ Managing Library and Drive States

ACSLS 7.3.1 has improved the tracking of the current state, as well as the management of the desired state.

- Current state

The current state for an ACS, port, LSM, drive, or CAP is the current availability of the component limited by desired state. After a drive is varied online, its desired state is online. However, its current state could be offline because the drive is inoperative or is in an LSM that is offline or not ready. The current state of an ACS, port, LSM, drive, or CAP is also referred to as the “state” of the component in the results of `query` and `display` commands.

- Desired state

The desired state for an ACS, port, LSM, drive, or CAP is the availability that you want for the component. ACSLS sets desired state when an explicit customer -driven vary operation is performed. (This is a vary from a `cmd_proc` or ACSAPI client command. It is not a vary that ACSLS internally generates because of a library status change.)

For example, you may want to keep a library or tape drive in offline when performing maintenance.

During library recovery, the desired state of devices is honored. ACSLS tries to bring devices back up to their desired state, but will not make them more available than their desired state. For example, after a customer varies a drive offline, it will stay offline.

To view the current state and desired state of ACSs and ports, as well as additional information about ACSLS communications with libraries, use the `query lmu` command:

```
query lmu all
```

To view both the the current state and desired state for LSMs or drives, use the `display` command:

```
display lsm * -f state desired_state
```

## ■ Queue and Retry Mounts and Dismounts when Library is Temporarily Unavailable

During temporary outages, ACSLS now queues and retries mount and dismount requests. When mounts and dismounts:

- fail because library or drives are not ready or not connected, the requests are retried.
- are received, but library or drives are not ready or not connected (i.e. desired state is online, but current state is offline), the requests are queued until the library and drives are available and then sent to the library.

With ACSLS 7.3.1, two new dynamic variables, MOUNT\_RETRY\_DELAY and MOUNT\_RETRY\_TIME\_LIMIT, were introduced for managing the queuing and retrying of mounts and dismounts. The:

- MOUNT\_RETRY\_DELAY variable specifies the time interval, in minutes, between attempts to retry the request. It also checks if a temporarily offline library or drive is now available.
- MOUNT\_RETRY\_TIME\_LIMIT variable is the maximum time, in minutes, that ACSLS continues to queue a mount or dismount request.



# Cartridge Management

StorageTek ACSLS provides sophisticated cartridge management features. These features are provided in several ways:

- Automatically, such as the recovery of lost cartridges.
- Enabled by default, such as retaining information about absent and ejected cartridges.
- Customer defined, such as assigning volume attributes when cartridges are added to the database by audit or when they are entered through a CAP.

Using appropriate cartridge management features enhance the value that StorageTek ACSLS provides.

Cartridge management consists of the following:

- [“Populating the LSM” on page 70](#)
- [“Using the CAP” on page 70](#)
- [“Entering Cartridges” on page 76](#)
- [“Ejecting Cartridges” on page 78](#)
- [“Recovering CAPs” on page 79](#)
- [“Automatically Applying Policies to New and Reactivated Cartridges” on page 83](#)
- [“Cleaning Cartridges” on page 83](#)
- [“Managing Scratch Cartridges” on page 88](#)
- [“Using Absent and Ejected Cartridge Support” on page 92](#)
- [“Absent, Ejected and Missing Cartridges” on page 93](#)
- [“Cartridge Recovery” on page 94](#)
- [“Missing Cartridges” on page 95](#)
- [“Absent and Ejected Cartridges” on page 96](#)
- [“Using the Manual Volume Delete Utility” on page 97](#)
- [“Identifying Expired Cartridges” on page 97](#)
- [“Manually Loading Cartridges Into Drives In a Disabled LSM” on page 100](#)

## ■ Populating the LSM

Cartridges can either be manually placed in cells when the library is offline, or entered into a library through a CAP.

An essential requirement for the library and StorageTek ACSLS to function properly is the availability of a few free cells in each LSM to accommodate dismount, pass through, and eject operations. You should reserve at least one free cell for each tape drive installed in each LSM.

To determine the free cell count of an LSM, issue the command:

```
query lsm lsm_id
```

**Note:** In the StorageTek SL8500, each rail is defined as an LSM.

## ■ Using the CAP

### CAP Types

Each type of CAP has a standard capacity and method for loading it with cartridges. An LSM may have more than one type of CAP. The following table shows the supported CAP types, identifiers and capacities, and loading methods.

**Table 10. CAP Types**

CAP Type	Identifier & Capacity	Loading Method
Standard	CAP00; holds 21 cartridges.	Cartridges are loaded directly into the CAP cells.
Enhanced (4410 and 9310)	CAP00 and CAP01; each holds 40 cartridges.	Cartridges are placed into removable magazines which are loaded into the CAP.
9360	CAP00 holds 20 cartridges; optional CAP01 holds 30 cartridges.	Cartridges are placed into removable magazines which are loaded into the CAP.
Priority (PCAP)	CAP02; holds one cartridge.	Cartridges are entered one at a time, directly into the CAP.

**Table 10. CAP Types**

<b>CAP Type</b>	<b>Identifier &amp; Capacity</b>	<b>Loading Method</b>
9710 or 9740 CAP	CAP00, holds 14 cartridges or magazine, which holds 10 cartridges.	Cartridges are loaded directly into the CAP cells or placed into the removable magazine which is loaded into the CAP.
9714, 9730, or 9738 CAP	CAP00, holds one cartridge	Cartridges are loaded directly into the single-cell CAP.
L180	CAP00, holds 10 cartridges.	5 cartridges are placed into each of 2 removable magazines which are loaded into the CAP.
L700	CAP00 and optional CAP01; each holds 20 cartridges.	5 cartridges are placed into each of 4 removable magazines which are loaded into the CAP.
StorageTek SL500	CAP00; holds between 5 and 25 cartridges	5 cartridges are placed into removable magazines which are loaded into the CAP. One magazine in base module; 2 magazines in expansion modules that contains a CAP.
StorageTek SL8500	CAP00 and optional CAP01; each holds 39 cartridges.	13 cartridges are placed into each of 3 removable magazines which are loaded into the CAP.
StorageTek SL3000	CAP 06 and optionally CAP 01-05, CAP 07-10; each holds 26 cartridges.	13 cartridges are placed into each of 2 removable magazines which are loaded into the CAP.
StorageTek VTL	CAP 0; holds 20 cartridges	Note: Virtual volumes are discovered using Audit. See <a href="#">"VTL Behavior" on page 384</a> .

## CAP States

A CAP's state determines whether it is available for entering and ejecting cartridges. The following table describes the valid CAP states. See “[Displaying CAP Information](#)” on page 76 for procedures for determining the CAP state. See the command, “[vary](#)” on page 271 for information about changing device states.

**Note:** Refer to “[StorageTek SL8500 CAP Behavior](#)” on page 338 for specifics regarding the StorageTek SL8500 library. Refer to “[StorageTek SL500 CAP Behavior](#)” on page 380 for specifics regarding the StorageTek SL500 library.

**Table 11. CAP States**

State	Description	How requests are handled
online	Normal operating state.	<ul style="list-style-type: none"> <li>• All requests are accepted and processed.</li> </ul>
offline	The CAP is logically disabled.	<ul style="list-style-type: none"> <li>• All requests are rejected.</li> </ul>
offline-pending	Transition state. Occurs when the CAP is taken from online to offline.	<ul style="list-style-type: none"> <li>• All new requests are rejected.</li> <li>• Current and pending requests are processed to completion.</li> </ul>
diagnostic	The CAP is available for diagnostic activity without interference from client applications.	<ul style="list-style-type: none"> <li>• Requests from client applications are rejected.</li> <li>• Requests from the cmd_proc are processed.</li> </ul>
recovery	Transition state. Occurs when the CAP is taken from offline to online.	<ul style="list-style-type: none"> <li>• New requests are rejected.</li> </ul>

## CAP Modes

The CAP mode controls how a CAP will be used for cartridge enters and ejects. The following table describes the valid CAP modes. See “[Displaying CAP Information](#)” on page 76 for procedures for determining the CAP mode. See the command, “[set cap mode](#)” on page 254 for information about changing the CAP mode.

**Hint:** You cannot change a CAP's mode while the CAP is in use. That is, if the door is open during either manual or automatic enter operations, you cannot change its mode until you complete the enter operation.

**Table 12. CAP Modes**

Mode	Description	Effects on enter/eject
manual	The CAP is locked when not in use. This is the initial mode for all multi-cartridge CAPs.	<ul style="list-style-type: none"> <li>• You can enter or eject cartridges only after explicitly issuing a command. You either specify the <i>cap_id</i> on the command, or allow StorageTek ACSLS to automatically select a CAP, based on previously defined CAP priorities.</li> </ul> <p><b>Note:</b> Some client applications require CAPs to be in manual mode. See the documentation for your tape management system.</p>

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**Note:** Some client applications require CAPs to be in manual mode. See the documentation for your tape management system.

**Table 12. CAP Modes**

Mode	Description	Effects on enter/eject
automatic	<p>The CAP is unlocked when not in use. This is the initial mode for all priority CAPs.</p> <p><b>Note:</b> You cannot set the CAP mode to automatic in a partitioned library. The exception to this is a dedicated CAP (assigned to only one partition), in the StorageTek SL3000 which can be set to automatic mode.</p> <p><b>Note:</b> When the StorageTek SL8500 access door is opened and closed, the StorageTek SL8500 leaves the CAP locked. When the CAP is locked, it cannot be used for automatic mode enters.</p>	<ul style="list-style-type: none"> <li>You can enter cartridges without explicitly issuing an enter command. The enter is initiated when you open the CAP door, place the cartridge(s) inside, and close the CAP.</li> </ul> <p><b>Note:</b> You cannot cancel an automatic enter operation that is in progress using the cancel command. To terminate an automatic enter in progress:</p> <p><i>If the CAP door is open</i>, remove all the cartridges and close the door.</p> <p><i>If the CAP door is closed</i> and the cartridges are being moved into the library, you must allow the remaining cartridges to be entered into the library. The enter then terminates.</p> <ul style="list-style-type: none"> <li>To eject cartridges you must explicitly issue an <code>eject</code> command. You can either specify the <code>cap_id</code> on the command or allow StorageTek ACSLS to automatically select a CAP, based on previously defined CAP priorities.</li> </ul> <p>If StorageTek ACSLS shows the CAP in automatic mode, but it is locked and cannot be opened and used for automatic enters, you must: synchronize StorageTek ACSLS and the StorageTek SL8500; then return the CAP to automatic enter. To do this:</p> <pre>set cap mode manual cap_id set cap mode automatic cap_id</pre>

## CAP Priorities

CAP priorities specify how StorageTek ACSLS automatically selects CAPs when the CAP request specifies an asterisk (\*) for the CAP ID. The following table describes the CAP priorities and their effect. See ["Displaying CAP Information" on page 76](#) for procedures for determining the CAP priority. See ["set cap priority" on page 256](#) for information about changing the CAP priority.

**Table 13. Cap Priorities**

Priority	Effect
16 (highest)	first used
15 (next highest)	next used
-	
-	
-	
1 (lowest)	last used
0	never automatically selected (initial priority for all CAPs)

CAP priorities and automatic CAP selection apply to the following commands:

- audit
- eject
- enter
- venter

When you enter any of these commands with an asterisk (\*) for all or part of the *cap\_id*, StorageTek ACSLS automatically selects an available CAP with highest non-zero priority for each ACS or LSM specified in the request.

Examples:

`audit * server`

StorageTek ACSLS selects the highest non-zero priority CAP in each ACS

`enter 0,1,*`

StorageTek ACSLS selects the highest non-zero priority CAP in LSM 0,1

## Displaying CAP Information

Following are some guidelines for using the `query cap` command to display current CAP information.

To display information for selected CAPS, enter:

```
query cap cap_id cap_id ...
```

To display information for all CAPS in the library, enter:

```
query cap all
```

The following figure shows a typical example of the results of a `query cap` command.

**Figure 8. Example of Query CAP command**

```
ACSSA> query cap 0,0,0,0,0,1,0,1,0
2004-06-30 13:15:46          CAP Status
Identifier priority Size  State   Mode      Status
000          1       21   online  automatic  enter
001          0       4    online  manual    eject
010          7       21   offline automatic available
```

## ■ Entering Cartridges

You can choose to enter cartridges manually or automatically.

- To enter cartridges manually, you need to issue the `enter` command. This unlocks the CAP so cartridges can be entered.
- An automatic enter is initiated by opening a CAP that is in automatic mode. When a CAP is in automatic mode, you need not issue an `enter` command.

The following steps describes the enter process:

1. Once you start the `enter`, the CAP is unlocked and reserved. It cannot be used by another host.
2. After you open the CAP, place the cartridges into the CAP, and close the CAP, the CAP is locked.

The StorageTek ACSLS library robot inspects/audits the cartridges in the CAP. All cartridges being entered must have valid external labels that do not duplicate other `vol_ids` already managed by this StorageTek ACSLS server.

Note: Virtual enter allows you to enter unlabeled cartridges into some libraries.

3. StorageTek ACSLS allocates home cells in the library to valid cartridges and moves them to their assigned home cell locations.  
Duplicate cartridges and cartridges without external labels are left in the CAP and must be removed.
4. Upon completion, the CAP is unlocked so more cartridges can be entered.
  - If the CAP is in automatic mode, the automatic enter is complete and the CAP is unreserved and available.
  - If this is a manual enter, the CAP is still reserved for the manual enter. To terminate the manual enter, cancel it with either the cancel command or with <CTRL>+C at the cmd\_proc where the enter was started.

For additional information on the enter command, refer to ["enter" on page 205](#).

**Note:** If cartridge tracing is enabled, the event log records all cartridge enters.

**Table 14. Cartridge Enter Commands**

Task	Command
Entering Cartridges in Automatic Mode	set cap mode automatic <i>cap_id</i>
Entering Cartridges in Manual Mode	enter <i>cap_id</i>
Entering Cartridges with Virtual Labels (venter)	venter <i>cap_id vol_id</i> <i>vol_id</i>  Do <i>not</i> open the LSM door and place cartridges with missing or unreadable labels in a storage cell because StorageTek ACSLS cannot manage these cartridges. During an audit, StorageTek ACSLS will eject cartridges with missing or unreadable labels that were placed in storage cells.

## Terminating an Enter Request

Use these procedures to terminate or cancel a current or pending manual enter or virtual enter.

**Note:** You cannot cancel an automatic enter operation that is in progress using the cancel command. To terminate an automatic enter in progress:

- If the CAP door is open, remove all the cartridges and close the door.
- If the CAP door is closed and the cartridges are being moved into the library, you must allow the remaining cartridges to be entered into the library. The enter then terminates.

To cancel a manual enter

1. Display all current and pending library activity:

```
query request all
```

2. Note the *request\_id* of the enter/venter request you want to cancel.

3. From the cmd\_proc, enter:

```
cancel request_id
```

where *request\_id* is the identifier of the request you want to cancel.

4. Wait for the CAP to unlock, open the CAP, and remove all cartridges.

The cmd\_proc will display a message indicating the number of cartridges entered into the library before the cancel request was received. These cartridges will remain under StorageTek ACSLS control.

See also:

- “[query request](#)” on page 247
- “[cancel](#)” on page 188

## ■ Ejecting Cartridges

To eject cartridges from the library you need to issue the eject command.

The following steps describes the eject process:

1. Once you start the eject, the CAP is locked. It cannot be used by another host.
2. The robot places the specified cartridge(s) in the designated CAP, then StorageTek ACSLS makes the cell locations where the cartridges were stored available for other cartridges.
3. Open the CAP, remove all cartridges from the CAP, and close the CAP. StorageTek ACSLS then inspects the CAP to ensure it is empty. The CAP is now available for another operation, such as enter or audit.

**Note:** If you specify more than a CAP full of cartridges on the eject command, empty the CAP when it fills, close the CAP, and StorageTek ACSLS continues the eject process until all cartridges are ejected.

For additional information on the eject command, refer to [“eject” on page 201](#).

**Note:** If cartridge tracing is enabled, the event log records all cartridge ejections.

## ■ Recovering CAPs

### General CAP Recovery Procedures

#### Recover CAP by Varying Offline Then Online

1. Vary the CAP offline.

```
vary cap cap_id offline
```

**Note:** If you have to force the CAP offline:

```
vary cap cap_id offline force
```

Only the current robotic request completes, then the CAP goes offline immediately. Pending requests are discarded and new requests are rejected.

2. Vary the CAP back online.

```
vary cap cap_id online
```

#### CAP in Auto Mode and StorageTek ACSLS not Synchronized with Library

The state of a CAP as managed by ACSLS may become out of synchronization with the CAP's state as managed by the library: after the library is rebooted; the access door is opened and closed; or after a Redundant Electronic switch.

To synchronize the state of the CAP between both StorageTek ACSLS and the library when the CAP is in automatic mode:

1. Set the CAP mode to manual to terminate automatic enter mode.

```
set cap mode manual cap_id
```

2. Set the CAP back to automatic mode.

```
set cap mode automatic cap_id
```

## CAPs Must be Empty Before Enters and Ejects Terminate

StorageTek ACSLS requires that a CAP be empty before it is available for enters and ejects. During initialization, or when an ACS or LSM comes online, StorageTek ACSLS requests that you remove any cartridges found in a CAP. All cartridges must be removed from the CAP before ejects terminate.

During an enter, if cartridges with missing or invalid external labels are present, they are not moved into the library. The CAP is unlocked, and you must remove the invalid cartridges before the enter can proceed.

**Note:** With a 9310 and other libraries, the robot stops scanning when it encounters an empty CAP cell. A CAP with only the first cell empty appears to be completely empty.

## Recovering a CAP After Opening the StorageTek SL8500 Access Door

When the StorageTek SL8500 access door is opened and closed, the StorageTek SL8500 re-initializes. After this re-initialization, the CAP is locked (regardless of whether it was unlocked before).

**Note:** When a 9310 re-initializes, if the CAP was unlocked before, it remains unlocked afterwards.

After the StorageTek SL8500 re-initializes, if the CAP is locked and you need to recover it, follow the appropriate procedure below to recover the CAP.

### ***CAP used for automatic enter will not unlock***

To recover a CAP that will not unlock for an automatic enter, you must synchronize the state of the CAP between both StorageTek ACSLS and the library: To do this:

1. Set the CAP mode to manual to terminate automatic enter mode.

```
set cap mode manual cap_id
```

2. Set the CAP back to automatic mode.

```
set cap mode automatic cap_id
```

### ***CAP used for manual enter will not unlock***

To recover a CAP that will not unlock for an manual enter, you must synchronize the state of the CAP between both StorageTek ACSLS and the library. To do this:

1. Vary the CAP offline.

```
vary cap cap_id offline
```

2. Vary the CAP back online.

```
vary cap cap_id online
```

3. Restart your manual enter.

```
enter cap_id
```

**CAP used for ejects will not unlock**

To recover a CAP where you were doing an eject, you must remove any cartridges left in the locked CAP and synchronize the state of the CAP between both StorageTek ACSLS and the library. To do this:

1. Remove any cartridges in the CAP. To do this:

- a. Vary the CAP offline.:

```
vary cap cap_id offline
```

- b. Vary the CAP back online.

```
vary cap cap_id online
```

2. Select one of the following:

**If the CAP is in auto mode:**

- a. Set the CAP mode to manual to terminate the automatic enter mode.

```
set cap mode manual cap_id
```

- b. Set the CAP to automatic mode. This unlocks the CAP.

```
set cap mode automatic cap_id
```

- c. Remove any cartridges left in the CAP.

**If the CAP is not in auto mode:**

- a. Start a manual enter.

```
enter cap_id
```

- b. Remove any cartridges left in the CAP.

- c. Cancel the enter.

Use either [Control + C] at the *cmd\_proc* that is waiting for the enter, or cancel the enter request ID.

3. Restart your eject.

```
enter cap_id vol_id|volrange...
```

## Recovery Procedures to Unlock a CAP in an L1400, L700, L700e, or L180 Library

If a CAP that is used for an enter or eject in an L1400, L700, L700e, or L180 library does not unlock, you can IPL the library to recover the CAP. Follow the appropriate procedure below to recover the CAP.

### ***CAP used for a manual enter will not unlock***

To recover a CAP that will not unlock for a manual enter:

1. Cancel the enter.

Use either [Control + C] at the *cmd\_proc* that is waiting for the enter, or cancel the enter request ID.

2. Re-IPL the library by pressing the RESET button on the operator panel.
3. Start another enter after the library finishes initialization.

### ***CAP used for an automatic enter will not unlock***

To recover a CAP that will not unlock for an automatic enter:

1. Set the CAP mode back to manual to terminate automatic enter mode.

```
set cap mode manual cap_id
```

2. Re-IPL the library by pressing the RESET button on the operator panel.
3. Set the CAP back to automatic mode after the library finishes initialization.

```
set cap mode automatic cap_id
```

### ***Cannot empty CAP used for an eject because it will not unlock***

To recover a CAP that will not unlock for an eject (after the CAP is full or all volumes have been ejected):

1. Open the access door to the library, remove all cartridges from the CAP, and close the access door.

2. Re-IPL the library by pressing the RESET button on the operator panel.

**Note:** A Re-IPL of the library causes StorageTek ACSLS to terminate the eject with a “library failure”.

3. Optionally, audit the library.

After the library finishes initialization, running an audit is a good idea, but it is not required.

4. Start another eject if all the cartridges were not ejected.

## ■ Automatically Applying Policies to New and Reactivated Cartridges

The `watch_vols` utility can automatically assign attributes to cartridges added to the database or reactivated by audit, as well as when they are entered or re-entered. This utility automatically:

- assigns cartridges to a pool.
- assigns volume ownership based on `vol_id` ranges or specific volumes listed in a `vol_attr.dat` policy table.
- moves new and reactivated cartridges to a specific LSM.

For more information, see “[watch\\_vols](#)” on page 175.

## ■ Cleaning Cartridges

StorageTek ACSLS controls automatic cleaning for HLI-attached libraries (StorageTek SL8500, L5500, 9300, 9740, and 4400 serial or TCP/IP attached libraries), but not for SCSI-attached libraries.

Cartridges must be cleaned periodically to prevent damage to them and the tape media. Drive control units track how much tape passes through each drive and send a message to StorageTek ACSLS when a drive requires cleaning.

### Automatic Cleaning

If auto-cleaning is enabled, StorageTek ACSLS automatically mounts a cleaning cartridge on the drive when required. Automatic cleaning is enabled when the `AUTO_CLEAN` dynamic variable is set to `TRUE` (default).

If all cleaning cartridges are expired (the `max_usage` value is exceeded), StorageTek ACSLS honors the original mount request without cleaning the drive. For that mount and for each subsequent mount to the uncleaned drive, StorageTek ACSLS posts message 376N to the event log. Add more cleaning cartridges of compatible media with the drive type as described in “[Defining Cleaning Cartridges](#)” on page 84.

If auto-cleaning is disabled, StorageTek ACSLS logs a message in the event log and displays cleaning messages at the `cmd_proc` when the drive requires cleaning. You then must manually mount a cleaning cartridge.

Use the `acsss_config` configuration program to enable or disable auto-cleaning. In addition, with `acsss_config` you can specify how cleaning cartridges are ordered for selections and queries. For more information, see Chapter 4, “[Setting Variables that Control StorageTek ACSLS Behavior](#).”

**Note:** You cannot enable auto-cleaning on SCSI-attached libraries.

For more information on cleaning cartridges, refer to:

- “Defining Cleaning Cartridges” on page 84
- “Ejecting Used Cleaning Cartridges” on page 85
- “Manually Cleaning a Drive” on page 85
- “Cleaning Cartridges on SCSI-Attached LSMs” on page 86
- “Correcting Cleaning Cartridge Problems” on page 86

## Defining Cleaning Cartridges

You must use the `set clean` command to define a cleaning cartridge because StorageTek ACSLS does not define cleaning cartridges by `vol_id`.

When you define cleaning cartridges, make sure to:

- Use cleaning cartridges whose media types are compatible with each drive type in your library. StorageTek ACSLS will automatically select the correct type of cartridge for each cleaning operation.
- Define at least one cleaning cartridge for each drive in your library.

To define cleaning cartridges to StorageTek ACSLS:

1. Make the CAP ready for entry.

See “[Entering Cartridges](#)” on page 76 for more information.

2. Enter the cleaning cartridges.

The `cmd_proc` displays messages with the cartridge IDs of the cartridges you enter.

3. To set the cleaning cartridge attribute:

```
set clean max_usage vol_id | volrange
```

Where:

`max_usage` is the number of times a cleaning cartridge is used before StorageTek ACSLS stops selecting the cartridge to clean cartridges.

`vol_id | volrange` specifies the cleaning cartridge or range of cartridges that you entered in Step 2.

See also:

- “[enter](#)” on page 205
- “[set clean](#)” on page 258
- “[query clean](#)” on page 229
- “[volrpt](#)” on page 169

## Ejecting Used Cleaning Cartridges

StorageTek ACSLS logs a message to the event log when a cleaning cartridge has reached the maximum use specified on the set clean command.

StorageTek ACSLS leaves the cartridge in the library, but will no longer select it for cleaning. Eject the used cleaning cartridge and enter a replacement.

To eject used cleaning cartridges:

1. To eject the cleaning cartridges, enter:

```
eject cap_id vol_id|volrange
```

Where:

*cap\_id* specifies the CAP used to eject the cleaning cartridges.

*vol\_id|volrange* specifies the IDs of the cleaning cartridges to eject.

2. Remove the cleaning cartridges.

See also:

- [“query clean” on page 229](#)
- [“eject” on page 201](#)
- [“volrpt” on page 169](#)

## Manually Cleaning a Drive

Use this procedure to clean a drive when auto-clean is disabled or is not working.

To manually clean a drive:

1. Determine which cleaning cartridge types are compatible with the drive to be cleaned.

Refer to the *Product Information Guide* and look in the Drive and Media Compatibility table for a list of the cleaning cartridges for each drive type

If you do not have access to this manual, you can download it from the Customer Resource Center (CRC).

2. Display the available cleaning cartridges:

```
query clean all
```

To display all compatible cleaning cartridges in the same ACS as the drive, use the display command.

```
display volume * -home acs,*,*,*,* -media media_type
```

To display the cartridge's maximum cleaning usage and current usage:

```
display volume * -home acs,*,*,*,* -media media_type  
-field vol_id acs lsm media max_use access_count
```

3. Select a compatible cleaning cartridge from those listed and mount it on the drive:

```
mount vol_id drive_id
```

4. After the drive is cleaned and the cleaning cartridge is unloaded, dismount the cleaning cartridge:

```
dismount vol_id drive_id
```

See also:

- “query clean” on page 229
- “display volume” on page 304
- “mount” on page 214
- “dismount” on page 198

## Cleaning Cartridges on SCSI-Attached LSMs

You cannot use the `acsss_config` configuration program to enable auto-cleaning for drives attached to SCSI-attached LSMs. Using StorageTek ACSLS, you can only clean these drives by manually mounting a cleaning cartridge. The LSM hardware, however, lets you enable auto-cleaning via the LSM control panel. For more information, see your LSM documentation. For 9714, 9730, or 9738 LSMs, if you either enable or disable auto-cleaning via the control panel, for the change to take effect you must do the following:

Rerun `acsss_config` without changing any options but ensuring that you enter Y to the Build/verify library configuration? prompt.

## Correcting Cleaning Cartridge Problems

The following procedures tell how to:

- Change a cleaning cartridge's maximum use count. For example, if the manufacturer recommends that you use a cartridge only 10 times and you set `max_usage` to 20, reset `max_usage` to 10 if the cartridge is unused. If the cartridge was used five times, reset `max_usage` to 5.
- Set a cartridge's cleaning cartridge attribute off. For example, if you incorrectly defined a data cartridge as a cleaning cartridge, set the cartridge's cleaning cartridge attribute off to redefine the cartridge as a data cartridge.

To change a cleaning cartridge's maximum use count:

```
set clean max_usage vol_id | volrange
```

Where:

*max\_usage* is the new maximum use.

*vol\_id | volrange* specifies the cleaning cartridge or range of cartridges.

To turn off a cartridge's cleaning cartridge attribute:

```
set clean off vol_id | volrange
```

Where *vol\_id | volrange* specifies the cartridge or range of cartridges.

## Troubleshooting When Automatic Cleaning is not Working for an StorageTek SL8500 or StorageTek SL3000 Library

If you ever have an issue where automatic cleaning for an StorageTek SL8500 or StorageTek SL3000 is NOT working, check to make sure Automatic Cleaning is NOT enabled for the library using the SLConsole.

### Background

When automatic cleaning is enabled using StorageTek ACSLS, it automatically mounts a cleaning tape before the next mount when it receives a "drive needs cleaning" message from the library after a dismount.

If automatic cleaning is enabled at the library level using the SLConsole, the library is the one doing the automated cleaning. When the library does this, it does NOT send a drive needs cleaning message to StorageTek ACSLS. Thus, StorageTek ACSLS never knows that the drive needs to be cleaned. The library will try to mount a cleaning cartridge from one of its system cells to clean the drive before sending StorageTek ACSLS the dismount response.

### Problem Created

There can be a mix-up where the library is trying to do automated cleaning, but has no cleaning cartridges in the system cells. StorageTek ACSLS can be managing cleaning cartridges in normal cells, but StorageTek ACSLS is not getting the drive needs cleaning message. The result is that the drive will not be cleaned.

### Solution

If StorageTek ACSLS automated cleaning is enabled, but drives are not being cleaned, check if the library also has auto cleaning enabled. If auto cleaning is enabled at the library, disable it using the SLConsole.

To do this:

1. Use the SLConsole or the library operator panel.
2. Select the System Detail tab.

3. Select Library.
4. Select the Auto Clean tab.
5. Select the Configure tab.
6. Check if Auto Cleaning is enabled for this partition (or "Partition 1 or None").
7. Disable automated cleaning if it is enabled.

## ■ Managing Scratch Cartridges

Scratch cartridges either contain no data or data that can be overwritten. A user or application mounts a scratch cartridge to write new data on that cartridge.

You must ensure that the library has enough available scratch cartridges to satisfy scratch mount requests. For more information see:

- ["Adding Scratch Cartridges to the Library" on page 89](#)
- ["Rebalancing Scratch Pools" on page 89](#)

The following sections provide additional information about managing scratch cartridges and scratch pools:

- ["Displaying Scratch Pool and Scratch Cartridge Information" on page 88](#)
- ["Deleting Scratch Pools" on page 90](#)
- ["Mounting Scratch Cartridges" on page 90](#)
- ["Unscratching Cartridges" on page 91](#)

## Displaying Scratch Pool and Scratch Cartridge Information

To display scratch pool information, use the following StorageTek ACSLS functions:

`query pool`

Displays scratch pool attributes, see ["query pool" on page 244](#).

`query scratch`

Displays scratch cartridge information, see ["query scratch" on page 248](#).

`query mount *`

Displays the status of media-compatible cartridges for a specified scratch pool (and, optionally, for a specific cartridge media type within the pool), see ["query mount \\*" on page 242](#).

customized cartridge report

Can be created to report selected scratch cartridge information, see “[Creating a Custom Volume Report](#)” on page 119.

## Adding Scratch Cartridges to the Library

Use this procedure to add scratch cartridges to the library.

To add scratch cartridges to the library:

1. If necessary, create a new scratch pool:

For more information, see the “[define pool](#)” on page 194

2. Enter scratch cartridges into the library.

For more information, see “[Entering Cartridges](#)” on page 76.

3. Define the cartridges you entered in Step 2 as scratch cartridges and assign them to a scratch pool.

For more information, see “[set scratch](#)” on page 262

## Rebalancing Scratch Pools

Use this procedure to rebalance scratch pools by moving scratch cartridges from one pool to another.

To rebalance scratch pools:

1. To display the attributes of all scratch pools, enter:

query pool all

For more information see “[query pool](#)” on page 244

2. Use the query scratch command to display the IDs of scratch cartridges in pools you want to rebalance.

For more information, see “[query scratch](#)” on page 248

3. Use the set scratch command to move scratch cartridges from one pool to another.

For example, to move cartridges YUMA20 through YUMA80 (which currently reside in pool 5) to pool 10, enter:

set scratch 10 YUMA20-YUMA80

For more information, see “[set scratch](#)” on page 262

## Deleting Scratch Pools

To manage scratch pools, you may want to delete any scratch pools that no longer contain scratch cartridges. You cannot delete the common pool (Pool 0). Note that you can delete only empty scratch pools; you cannot delete a scratch pool if it contains either data or scratch cartridges. You can, however, use [“Deleting All Empty Pools” on page 90](#) to delete all empty pools (StorageTek ACSLS will not delete any pools that contain scratch or data cartridges).

### Emptying a Scratch Pool

Use this procedure to empty a scratch pool before deleting it.

To empty a scratch pool:

1. To move data cartridges out of the pool, enter:

```
set scratch off 0 vol_id volrange ...
```

Where the *vol\_id* or *volranges* specify the data cartridges you want to move to the common pool (pool 0). For more information, see [“set scratch” on page 262](#).

2. To move scratch cartridges out of the pool, do one of the following:

- Move the cartridges to another pool.
- See [“Ejecting Cartridges” on page 78](#). If you eject scratch cartridges, however, StorageTek ACSLS no longer manages these cartridges. If you later want to use these cartridges, you must reenter them and assign them to a scratch pool.

### Deleting a Single Pool

To delete a single pool:

```
delete pool pool_id
```

### Deleting All Empty Pools

The `delete pool all` command deletes only empty scratch pools, not pools that contain scratch or data cartridges.

To delete all empty pools:

```
delete pool all
```

## Mounting Scratch Cartridges

Use the following procedures to mount scratch cartridges in single-media and mixed-media environments.

## Single-Media Environments

To mount a cartridge from a specified pool:

```
mount * drive_id pool_id
```

If no cartridge is available from the specified pool and the pool has been set for “overflow,” StorageTek ACSLS will select a cartridge from the common pool (pool 0).

To mount a cartridge from the common pool:

```
mount * drive_id
```

## Mixed-Media Environments

To mount a scratch cartridge with a specified media type from a specified pool:

```
mount * drive_id pool_id media media_type
```

If no cartridge is available from the specified pool and the pool has been set for overflow StorageTek ACSLS will select a cartridge with the specified media type from the common pool (pool 0).

To mount a scratch cartridge from a specified pool with a media type determined by scratch preferences:

```
mount * drive_id pool_id media *
```

If no cartridge is available from the specified pool and the pool has been set for overflow StorageTek ACSLS will select a cartridge from the common pool (pool 0) according to the defined scratch preferences.

To mount a cartridge from the common pool with a specified media type:

```
mount * drive_id media media_type
```

To mount a cartridge from the common pool with a media type determined by scratch preferences:

```
mount * drive_id media *
```

See also:

- [“mount \\*” on page 217](#)
- [“query commands” on page 224](#)
- [“Setting Scratch Preferences” on page 57](#)

## Unscratching Cartridges

Use this procedure to “unscratch” cartridges (return them to data cartridge status) that were scratched in error.

To unscratch cartridges:

1. Use the `query pool` and `query scratch` commands to display the cartridge and pool IDs of the cartridges to unscratch.

For more information see “[query pool](#)” on page 244 and “[query scratch](#)” on page 248.

2. To unscratch the selected cartridges, enter:

```
set scratch off 0 vol_id volrange ...
```

Where the `vol_id` or `volranges` specify the cartridges you want to change from scratch mode and move them to the common pool (pool 0).

For more information, see “[set scratch](#)” on page 262.

## ■ Using Absent and Ejected Cartridge Support

Absent cartridge support in StorageTek ACSLS marks cartridges that cannot be found in the library as absent, instead of deleting them. If these cartridges are later found in the library, StorageTek ACSLS changes them to active status instead of re-adding them to the database. Reactivation preserves the access count and settings, such as pool, volume access control ownership, and locks.

Similarly, ejected cartridge support retains cartridge information when cartridges are ejected. The cartridges are reactivated when they are re-entered.

Absent and ejected volume support is enabled when the `ABSENT_VOLUME_RETENTION_PERIOD` is set to a non-zero number of days. The default value is 5 days.

Additional aspects of absent and ejected cartridge support include:

- The Manual Volume Delete (`del_vol`) utility will retain volumes as absent unless the `-d` option is specified. If this option is specified, the volume is deleted without waiting for the expiration of an absent or ejected status.
- StorageTek ACSLS queries StorageTek SL3000 and StorageTek SL8500 libraries for the location of lost cartridges.
- StorageTek ACSLS improves volume recovery by searching for volumes that are not found in their expected locations in the library. StorageTek ACSLS searches all recorded locations instead of automatically deleting the volume.
- Clients can specify, through the `ENABLE_STATUS_VOLUME_ABSENT` and `ENABLE_STATUS_VOLUME_MISSING` configuration settings, whether they want absent, ejected, and missing statuses to be reported through the ACSAPI.

- The `volrpt` utility with the `-i` option will report volume records with a status of absent or ejected. By default, `volrpt` does not report absent or ejected volumes.

## ■ Absent, Ejected and Missing Cartridges

StorageTek ACSLS reports three cartridge (volume) statuses:

- missing

The cartridge cannot be located in the library, and at least one recorded location for the cartridge cannot be searched because the LSM is offline or a drive is not communicating. The information about the cartridge has been retained.

- absent

The cartridge cannot be located in the library. All recorded locations for the cartridge have been searched, and the cartridge is not in any of them. The information about the cartridge is retained. If the cartridge is found or re-entered into the library (before the retention period expires), it is reactivated.

- ejected

The cartridge was ejected. The information about the cartridge is retained, and if the cartridge is found or re-entered (before the retention period expires), it is reactivated.

## Cartridge (Volume) Status Reporting

StorageTek ACSLS reports cartridges (volumes) with the status “missing”, “absent,” or “ejected,” differently in response to StorageTek ACSLS commands than it does in response to ACSAPI requests.

The information displayed in response to StorageTek ACSLS commands identifies a cartridge as “missing”, “absent”, or “ejected.”

However, the cartridge status information StorageTek ACSLS displays in response to ACSAPI requests is governed by the following StorageTek ACSLS dynamic variables:

1. missing

- a. If the StorageTek ACSLS dynamic variable `ENABLE_STATUS_VOLUME_MISSING` is TRUE, StorageTek ACSLS reports:  
`STATUS_VOLUME_MISSING`.
- b. If the StorageTek ACSLS dynamic variable `ENABLE_STATUS_VOLUME_MISSING` is FALSE, StorageTek

ACSLS reports:  
*STATUS\_VOLUME\_IN\_TRANSIT.*

2. absent
  - a. If the StorageTek ACSLS dynamic variable *ENABLE\_STATUS\_VOLUME\_ABSENT* is TRUE, StorageTek ACSLS reports:  
*STATUS\_VOLUME\_ABSENT*
  - b. If the StorageTek ACSLS dynamic variable *ENABLE\_STATUS\_VOLUME\_ABSENT* is FALSE, StorageTek ACSLS treats the volume as if it had been deleted from the StorageTek ACSLS database and reports: *STATUS\_VOLUME\_NOT\_IN\_LIBRARY*.
3. ejected
  - a. If the StorageTek ACSLS dynamic variable *ENABLE\_STATUS\_VOLUME\_EJECTED* is TRUE, StorageTek ACSLS reports:  
*STATUS\_VOLUME\_EJECTED*
  - b. If the StorageTek ACSLS dynamic variable *ENABLE\_STATUS\_VOLUME\_EJECTED* is FALSE, StorageTek ACSLS treats the volume as if it had been deleted from the StorageTek ACSLS database and reports:  
*STATUS\_VOLUME\_NOT\_IN\_LIBRARY*.

#### **ABSENT\_VOLUME\_RETENTION\_PERIOD Dynamic Variable**

The *ABSENT\_VOLUME\_RETENTION\_PERIOD* dynamic variable controls how long absent and ejected volumes are retained in the StorageTek ACSLS database and specifies the number of days these volumes are retained. There are two special values:

- The value 0 (zero) days specifies that volumes are deleted and will not be marked absent or ejected. (This is the behavior of StorageTek ACSLS releases previous to StorageTek ACSLS 6.1.)
- The value 999 days specifies that absent and ejected volumes are retained forever in the database.

## **■ Cartridge Recovery**

Cartridge Recovery (acscre) is an StorageTek ACSLS internal process that is called to resolve discrepancies whenever the actual content of a storage cell or tape drive does not match the information saved in the StorageTek ACSLS database. It does this by:

- Having the library examine the volume's home cell and, possibly, the drive, and then updating the StorageTek ACSLS database with the results.

- With the StorageTek SL3000 and StorageTek SL8500 libraries, StorageTek ACSLS recovers a cartridge by asking the library where a cartridge is located, and then using the library's reply to update the StorageTek ACSLS database.

If Cartridge Recovery finds a discrepancy (e.g., a cartridge that is recorded at another location), it creates another recovery request and adds it to its request queue. (This is called a “cascade”.)

Other processes pass recovery requests to Cartridge Recovery when they encounter a discrepancy between the StorageTek ACSLS database and the actual contents of the library. Because of this, Cartridge Recovery is the central location where cartridges are marked as missing, changed to absent, and reactivated. Thus, what appears to be the behavior of many other StorageTek ACSLS commands and utilities is actually done by Cartridge Recovery when it updates the database to match the information reported by the library.

When other processes pass recovery requests to Cartridge Recovery, you can:

1. continue and let Cartridge Recovery continue asynchronously (Cartridge Recovery proceeds independently), or
2. if you need a specific cartridge that is lost, wait for Cartridge Recovery to finish processing this recovery request and report what it found.

## ■ Missing Cartridges

A cartridge is marked missing when:

- Cartridge Recovery cannot find a cartridge in the library, and
- it cannot examine all recorded locations for a cartridge (home cell and drive, if the cartridge has a recorded drive location).

For example, when Cartridge Recovery cannot examine the home cell in an offline LSM or an offline drive, and when it doesn't find the cartridge in other locations, it marks the cartridge missing.

Cartridge Recovery preserves the cartridge's home location unless it examines the cartridge's home cell and finds another cartridge there. In this situation it marks the cartridge “homeless,” with a minus one (-1) in the home\_lsm field.

When Cartridge Recovery finds a cartridge that was missing, it changes that cartridge's status to “home” or “in drive” in the database, depending where it found the missing cartridge.

1. If the cartridge is found in a cell other than its recorded home cell, Cartridge Recovery checks the cartridge's home cell to see whether it has found a duplicate cartridge.
2. If the cartridge is not in its recorded home cell, Cartridge Recovery records the cell in which it was found as its new home cell.
3. If the new cartridge is a duplicate, Cartridge Recovery reports this on the Event Log. The duplicate cartridge is **not** ejected.
4. If Cartridge Recovery finds a “homeless” cartridge in a drive, it does not assign a new home cell. When the cartridge is dismounted, the dismount process assigns a new home cell.

## ■ Absent and Ejected Cartridges

### Cartridges Not Found

When Cartridge Recovery can examine all recorded locations and it cannot find a cartridge:

1. If the *ABSENT\_CARTRIDGE\_RETENTION\_PERIOD* is 0, Cartridge Recovery
  - deletes the cartridge record from the database.
  - marks the cell record in the database for the cell that was the cartridge's home cell as “empty.”
2. If the *ABSENT\_CARTRIDGE\_RETENTION\_PERIOD* is greater than 0, Cartridge Recovery
  - changes the status of the cartridge record in the database to “absent” if the cartridge has not already been marked absent or ejected.
  - records the cartridge as “homeless” (with a minus one (-1) in the *home\_lsm* field).
  - marks the cell record in the database of the cartridge's former home cell as “empty.”

### Cartridges Found

If Cartridge Recovery finds an ejected or absent cartridge, it reactivates the cartridge.

If the ejected or absent cartridge is found in a storage cell, this becomes its new home cell, and Cartridge Recovery changes the cartridge's status to “home” in the database.

If the cartridge is found in a drive, StorageTek ACSLS assigns a new home cell when the cartridge is dismounted.

## ■ Using the Manual Volume Delete Utility

The Manual Volume Delete utility, `del_vol`, allows you to access a volume that is in an offline, unavailable LSM. If you manually remove the cartridge from the LSM and try to re-enter it into another LSM, StorageTek ACSLS will issue a `duplicate volume` message and will not enter the cartridge. Using the `del_vol` utility, you can first delete the volume from the database, then manually remove it from the offline LSM and successfully re-enter it into an online LSM.

The `del_vol` utility now retains volumes as absent, with the option to delete the volume. The volume can be deleted without waiting for the expiration of an absent or ejected status.

### Notes:

- To remove a cartridge from an online LSM, issue an `eject` command for the cartridge. If the cartridge is not actually in the LSM, you can run `del_vol` with the `-f` (force option).
- StorageTek ACSLS and the database must be up and running to use this utility. Do not run `del_vol` while the system is in recovery; unpredictable results may occur.

For more information about this utility, see “[del\\_vol](#)” on page 142.

### Note:

To delete a cartridge using the `del_vol` utility:

1. Log in as `acsss`.
2. Delete the cartridge:

`del_vol vol_id`

For more information see about switch options you can use with `del_vol`, see “[del\\_vol](#)” on page 142.

## ■ Identifying Expired Cartridges

When tape cartridges exceed their design life, the media can wear thin, and mechanical parts, like the cartridge’s gate, can wear out. When cartridges reach the end of their engineered life, you should consider migrating the data on them to new cartridges and retiring the old cartridges. This avoids the slight risk of either mechanical cartridge components failing or the data being unreadable.

A cartridge’s chronological age and its usage are different. Some 9840 cartridges have been in use for a decade, but they have different usage patterns. Some have been used daily while others are used for deep archive

and are rarely accessed. Identifying the cartridges that are past their design life is critical.

To identify the cartridges that need to be retired, you need to determine their usage. A cartridge's usage is recorded in the cartridge's directory, and before a cartridge is dismounted, the drive updates the directory.

For cartridges in libraries controlled by StorageTek ACSLS:

- For some of the libraries that StorageTek ACSLS 7.3.1 manages, cartridge usage is displayed as a percentage of "warranty life" and "end-of-life".
- For prior StorageTek ACSLS releases and libraries, the StorageTek ACSLS access\_count can be displayed with the display command and the volrpt utility.

## Cartridge End-of-Life Percentages

With modern libraries running the latest firmware and StorageTek drives running the latest firmware, the tape drive reports the cartridge's "end-of-warranty-life" and "end-of-life percentages" to the library when the cartridge is dismounted. Then, the library reports this to StorageTek ACSLS. StorageTek ACSLS 7.3.1 saves this information in its database, and you can see it by running the StorageTek ACSLS display volume command. Refer to ["display volume" on page 304](#).

**Example:** To display all T9840 cartridges, with ACS, LSM, media, and end\_of\_life information, sorted by end\_of\_life:

```
display volume * -media STK1R -f acs lsm media  
end_of_life warranty_life -s end_of_life
```

Specifically this information is reported to StorageTek ACSLS for these libraries and drives:

### Libraries:

- StorageTek SL3000
- StorageTek SL8500 (with the 4.10 firmware)

### Tape Drives:

- All T10000 tape drives - with 1.38 firmware
- T9840A, T9840C, and T9840D (All T9840 tape drives except the T9840B.) – with 1.42 firmware
- T9940A and T9940B tape drives – with 1.42 firmware

## Access Counts

In many cases, cartridge end-of-life reporting is not available. In these cases, the StorageTek ACSLS `access_count` is the best information available. The StorageTek ACSLS database records the number of times that volumes have been selected or accessed. This can be used to estimate the number of times that they have been mounted, as long as the cartridge has stayed in a group of connected libraries (within an ACS).

This information is collected regardless of library type, so it is maintained for 9310s, 4410s, and 9360s, as well as SL8500s and SL3000s. StorageTek ACSLS has saved this information for decades, so even if you are still on down-level releases, you still have this information. However, this data has limits. The biggest one is that when a cartridge is entered into a library, the count is set to zero (0).

Information is retained about volumes for the *retention period* you have set, so counts are preserved when a cartridge is ejected from an ACS and re-entered into the same or different ACS within the retention period. The default retention period is five days. However, if a volume is ejected from a library and remains offsite for longer than the retention period for volume information, the information about the volume is deleted from the StorageTek ACSLS database.

For cartridges that have remained in a single library these StorageTek ACSLS access counts are very useful. For a T9840 cartridge, if the StorageTek ACSLS `access_count` is over 11,000, the cartridge in question is near the end of its life, if not already over its end of life. T10000 cartridges have an end-of-life value of 16,000 mounts.

Because StorageTek ACSLS provides tools so you can preserve and migrate your database information when you install new releases of StorageTek ACSLS, this information can go back over a decade. In the absence of data from the cartridge, this is the only option.

## StorageTek ACSLS Cartridge Mount Count Details

The StorageTek ACSLS field is called `access_count`. It counts:

- mounts (dismounts are not counted),
- enters and ejects (enters and ejects are often rare),
- moves (although the move command using `cmd_proc` is rarely used, and it is not available to ACSAPI clients).

The `access_count` is mainly a count of the number of times the cartridge was mounted. StorageTek ACSLS remembers ejected volumes for the `ABSENT_VOLUME_RETENTION_PERIOD` (default of 5 days). So when cartridges are moved between ACSs and sent off-site and brought back on-site, StorageTek ACSLS can remember the `access_count`.

You can see the StorageTek ACSLS access\_count using both:

- The StorageTek ACSLS display command.

To see all 9840 data cartridges, sorted by access count, and also showing media type, ACS, and LSM:

```
display volume * -media STK1R -s access_count -f media
access_count acs lsm
```

- The volrpt utility.

volrpt can be sorted by use (access\_count), and can only include selected fields. For example, a custom volrpt containing vol\_id, media type, access\_count, and location, can be output to a flat file for further processing by a script.

## Cartridge Warranty and End-of-life Thresholds

The warranty and end-of-life thresholds are:

Threshold	Mounts
9x40 (T9840 and T9940) Warranty	10,000
9x40 End-of-life	11,000
T10000 Warranty	15,000
T10000 End-of-life	16,000

## ■ Manually Loading Cartridges Into Drives In a Disabled LSM

If your LSM fails and you take it off line, you can still manually load cartridges into the library drives if the data path is still operational.

To manually load cartridges into drives in a disabled LSM:

1. Open the LSM door.
2. Note the cartridge labels of any cartridges that are already in drives and remove these cartridges.  
You will need to replace these cartridges at the end of this procedure.
3. Load the drives with the cartridges you want to read from or write to.

Repeat this step as often as necessary until the LSM is repaired, then continue with Step 4.

**CAUTION:** **In this step, you can remove cartridges from library cells and load these cartridges in the drives. Note the cell locations of these cartridges and ensure that you return the cartridges to these locations in Step 4.**

4. After the LSM is repaired, remove all cartridges from the drives and replace them with the original cartridges you noted in Step 2.
5. Close the LSM door, vary the LSM back online, and resume normal operations.



# Database Administration

## 8

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The database contains all information about the library configuration and the location of all library cartridges.

StorageTek ACSLS control files that are backed up and are recovered include the customer-configurable files located in \$ACS\_home under data/external and some files associated located in data/internal/client\_config.

This chapter discusses: importing and exporting the database; verifying the imported database and library configuration; backing up the database; and restoring and recovering the database.

- Exporting and Importing the database includes:
  - Exporting the database to a disk file or local tape device
  - Importing the database from a disk file or local tape device
  - Importing StorageTek ACSLS control configuration files
  - Merging any customized dynamic variables
  - Verifying the imported database and library configuration
- Backing up the database and StorageTek ACSLS control files includes:
  - Automatic database backup
  - Performing manual backups to a local tape device or to disk
  - Backing up to a UNIX File
  - Creating a backup that can be restored to a different server
- Recovering and restoring the database and StorageTek ACSLS control files includes:
  - Restoring the database to the most recent backup
  - Recovering from a specific file
  - Restoring StorageTek ACSLS control files
  - Restoring a backup created on a different server
  - Restarting the database

## ■ Utilities Used

You will use the following utilities:

- the `bdb.access` utility for backups to a:
  - specified UNIX file
  - tape device
  - default file and location
- the `rdb.acsss` utility for
  - recovering the database from corruption
  - from changes that produce unintended results
  - from server failure
- the `db_export.sh` and `db_import.sh` utilities for migrating between versions of StorageTek ACSLS. This includes going to a later release or going to a previous release.

When you install StorageTek ACSLS, you also automatically install the database management software. The StorageTek ACSLS database is initialized after StorageTek ACSLS is installed when you:

- configure the library hardware using `acsss_config`
- import a previous exported database using `db_import.sh`
- recover a database backup created on a different server using `rbd.acsss.sh`

## ■ Exporting the Database

This section describes how to migrate the StorageTek ACSLS database and its associated StorageTek ACSLS control files from either a previous version of StorageTek ACSLS, the same release level of StorageTek ACSLS, or return to a prior release.

The `db_export.sh` utility creates an ASCII representation of the database on tape or a specified file to disk. It is also responsible for gathering StorageTek ACSLS control files. This utility can be used in two different ways.

- If it is executed without any options, the exported files are copied to the default tape device: `/dev/rmt/0n`  
`db_export.sh`
- If you wish to use a different tape device, use the `-f` option, followed by the desired tape device:

```
db_export.sh -f /dev/rmt/3n
```

- If you wish to export to a local file on the same machine, specify the file path name using the **-f** option:

```
db_export.sh -f /export/backup/acsls_export.03_Dec_2009
```

When saving to a file, the result will be two separate files. The database tables will be saved in the file name you specify. The miscellaneous control files will have the identical path name with a .misc extension.

The files generated by `db_export.sh` are then used as input to the `db_import.sh` utility at the time of an upgrade or recovery.

**Note:** This is the preferred method to use to migrate from all previous versions of StorageTek ACSLS to the most current version.

When executing the `db_export.sh` utility either with the **-f** option or without, you will be prompted to choose the version of StorageTek ACSLS to which you are exporting. Selections are:

- 1: ACSLS 5.3.2 or 5.4
- 2: ACSLS 6.0 or 6.0.1
- 3: ACSLS 6.0.1 with L700e
- 4: ACSLS 6.0.1 with PUT0201
- 5: ACSLS 6.1, 7.0, 7.1/7.1.1 before PUT0701
- 6: ACSLS 7.1/7.1.1 with PUT0701 or ACSLS 7.2 (any)
- 7: ACSLS 7.3 or later
- E: Exit

Choose the appropriate version.

**WARNING:** If you select an earlier StorageTek ACSLS release that does not support a library, you will be prompted to remove the library from your configuration before exporting your database.

## Exporting to a Disk File

You can export the StorageTek ACSLS database and StorageTek ACSLS control files to a disk file, as shown in the following procedure.

**To export the StorageTek ACSLS database and StorageTek ACSLS control files to a disk file:**

1. Log in as `acsss`.
2. Shut down StorageTek ACSLS and the database:

```
db_command stop (from a UNIX command prompt)
```

3. Start the db\_export.sh utility.

```
db_export.sh -f /path/db_file
```

4. Select the desired option for the version to which you are migrating.

- As it executes, the utility displays output indicating successful table data being exported.
- When the export is complete, a message is displayed indicating that the export has been successful.
- The db\_export.sh utility creates two files: *db\_file* and *db\_file.misc* in the location specified with the -f option.

5. Ensure that these files are placed in or moved to a secure location where they won't be removed.

Do **not** put these files in or under the following directories, because these directories may be removed or deleted when StorageTek ACSLS maintenance is installed:

- \$ACS\_HOME  
(the ACSSS home directory)
- \$ACSDB\_BACKUP\_DIR  
(directory where StorageTek ACSLS backups are stored)
- /tmp

**Note:** If you plan to install a new release of the operating system, do **not** save the exported files on the StorageTek ACSLS server.

6. To start StorageTek ACSLS and the database, enter the following command:

```
rc.acsss
```

## Exporting to Tape

You can export the StorageTek ACSLS database and StorageTek ACSLS control files to tape, as shown in the following procedure.

### To export the database and StorageTek ACSLS control files to tape:

1. Log in as acsss.
2. Shut down StorageTek ACSLS and the database:  

```
db_command stop (from a UNIX command prompt)
```
3. Insert a blank tape into the default tape device.
4. Start the db\_export.sh utility;

```
db_export.sh -f tape_device
```

Example: db\_export.sh -f /dev/rmt/0mn

5. Select the desired option from which you are exporting.

As it executes, the utility displays output indicating successful table data being exported and successful StorageTek ACSLS files being backed up. A message displays when the export is completed.

6. Remove the cartridge from the drive only when the program completes and the prompt re-appears.

**CAUTION:** You will lose files if you remove the cartridge before the program completes the export. Write protect the cartridge and clearly mark it to identify the contents as the exported database.

Do not leave the cartridge in the library.

7. To start StorageTek ACSLS and the database, enter the following command:

```
rc.acsss
```

## ■ Importing the Database

The following attributes are imported into the new database when you use the db\_import.sh utility.

- Volumes: These database tables include all of the information associated with each volume in the library, such as:
  - where the volume resides
  - type of cartridge (data, scratch, cleaning, etc.)
  - last associated scratch pool
  - current status of the cartridge (home, mounted, etc.)
  - entry date and last accessed date
  - number of mounts since the entry date
  - maximum use (for cleaning cartridges)
  - associated lock ID and user ID (if the cartridge is locked)
- ACS and Library: database tables include the ACSs and library components, such as: LSMs, drives, panels, and cells
- StorageTek ACSLS control files include all configuration updates since the initial installation, including:

- access control information
- fixed volume preferences
- scratch media preferences
- custom volrpt templates
- Dynamic and static variables: dynamic variables that have been customized in a previous release can be imported.

This section describes how to use the `db_import.sh` utility to:

- recreate the StorageTek ACSLS database
- recover important StorageTek ACSLS control files
- recover customized dynamic variables from data exported using the `db_export.sh` utility.

## Importing From a Disk File

You can import the StorageTek ACSLS database and StorageTek ACSLS control files from a disk file, as shown in the following procedure.

**To import the StorageTek ACSLS database, StorageTek ACSLS control files, or customized dynamic variables from a disk file:**

1. Log in as `acsss`.

2. Shut down StorageTek ACSLS and the database:

`db_command stop` (from a UNIX command prompt)

3. Start the `db_import.sh` utility.

`db_import.sh -f db_file`

The following menu displays:

StorageTek ACSLS Import Utility

Would you like to do:

- 1) Import database only from either a different platform or from an earlier release
- 2) Import customizable configuration files (`$ACS_HOME/data/external` only) exported from a different platform or from an earlier release
- 3) Recover a previous environment on the same platform and version (Disaster Recovery) - database, `$ACS_HOME/data/external` and internal
- 4) Merge customized dynamic variables from a previous installation

E) Exit

Please select one of the above:

- **Option 1 - importing only database files**

Use this option to import the database files only. This option destroys the existing database tables, rebuilds them, and then populates them with the data provided from the exported database. Output from selecting option one is similar to the following:

**WARNING:**

This script will destroy all tables from the ACSLS database. The results are final and there is no recovery without rebuilding the database. If you wish to preserve information in existing tables, you should not continue unless you have exported the table data using db\_export.sh.

You will need to rebuild the database tables using acsss\_config if you are not using db\_import.sh utility.

Do you wish to continue? (y or n): y

... removing ACSLS database tables.

```
Creating acstable
Creating porttable
Creating lemtable
Creating captable
Creating lockidtable
Creating drivetable
Creating volumetable
Creating celltable
Creating pooltable
Creating audittable
Creating csitable
Creating paneltable
Creating vactable
Creating scr_distr_table
Creating displaycommand table
Creating displayfields table
Creating displayoptions table
Creating displayoptval table
Creating displaysubfields table
Creating ptptable
Creating clienttable
Creating handtable
Creating imutable
db_import.sh 1657: Beginning database import phase.
db_import.sh 1658: Start copy of data into empty tables.
```

Loading Display database reference tables.

db\_import.sh 1660: Database Import Phase Complete.

ACSLS mandates backup of database in this scenario. Would you like to make an additional backup on tape? (y or n):

Selecting Y initiates an extra tape backup of the database. A backup to disk is created regardless of how you answer.

- **Option 2 - recovering ACSLS control files**

Use this option to recover StorageTek ACSLS control files either from a previous version or the same version. This recovers all files in the directory `acs.home` under `data/external` including access control files. If access control is configured, it will also recover `data/internal/client_config`. Output is similar to the following:

```
extract_misc.sh 1663: Extracting ACSLS data files.  
db_import.sh 1575: Restoring ACSLS control files...  
db_import.sh 1577: ACSLS control files  
(/export/home/ACSSS/data/external) have been restored
```

- **Option 3 - recreating an ACSLS environment**

Use this option to recreate an StorageTek ACSLS environment. This would be used:

- recovering from a hardware failure or during a hardware upgrade
- when you need to rebuild the StorageTek ACSLS server to be identical to the StorageTek ACSLS server from which the data was exported

This option is a combination of options 1 and 2. When finished with this option, you have the option of backing the database up to tape.

Selecting “N” at this option, performs a local disk backup.

- **Option 4 - recovering customized dynamic variables**

Use this option to recover customized dynamic variables from previous environments. This is a very useful option for upgrading versions of StorageTek ACSLS without having to record previous customized dynamic variables.

**Note:** The dynamic variable, `ISOLATION_LEVEL`, was removed in StorageTek ACSLS 7.2.0 and is no longer used.

If you are importing dynamic variables from a version prior to StorageTek ACSLS 7.2.0, you receive a message similar to the following. You can ignore this message.

```
variable <variable name> is obsolete was removed
```

Selecting this option gathers the settings from the database export, and then re-configures shared memory with the new variable settings.

**WARNING:** If you are importing from ACSLS 7.2.0 and if you start StorageTek ACSLS prior to executing this option, certain data could be lost. If you are upgrading StorageTek ACSLS from a previous version and had

customized dynamic variables, these changes must be made to your new environment PRIOR to starting StorageTek ACSLS.

Output for this option, depending on your settings, is similar to the following:

```
extract_misc.sh 1663: Extracting ACSLS data files.
File
(/export/home/ACSSS/tmp/backup/data/internal/dynamic_variables/
dv_extract) is readable
Saved current configuration into file saved_cfg_20040915_1403 in
/var/tmp/saved_cfgs/
Changing the current configuration to the previously saved
configuration. Setting (TIME_FORMAT) to %Y-%m-%d)
Change complete

Configuration change complete, no errors detected.
Please review /tmp/reset_cft.tmp7.
ACSLS dynamic variables have been successfully merged.
```

4. Verify the install as described under ["Verifying the Imported Database and Library Configuration" on page 112](#).
5. To start StorageTek ACSLS, enter the following command:

```
rc.acsss
```

## Importing from Tape

Use the following procedure to import the StorageTek ACSLS database, recover StorageTek ACSLS control files, and rebuild customized dynamic variables from tape.

1. Log in as acsss.
2. Shut down StorageTek ACSLS and the database:  
`db_command stop` (from a UNIX command prompt)
3. Insert the exported database tape that you exported with the `db_export.sh` command into the tape drive.
4. Run the database import utility by entering the following at a UNIX command prompt.

```
db_import.sh
```

The `db_import.sh` utility displays its main menu as shown in ["Importing From a Disk File" on page 108](#).

**Note:** The following options are valid when importing.

- Select option '1' and then option '2'.
- Select option '1' and then option '3'.
- Select option '1' and then option '4'.

If you use any other combination, you must: exit from the import utility after executing any of the options above; then restart the db\_import utility.

**Note:** You receive an “unsuccessful” message if you are running the db\_import utility from one terminal and doing a tape rewind from a different terminal.

5. Refer to the step “[Start the db\\_import.sh utility.](#)” on page 108 for menu options.
6. Verify the install as described in “[Verifying the Imported Database and Library Configuration.](#)”
7. Import from tape, other than the default tape device (no rewind).
8. To start StorageTek ACSLS, enter the following command:

```
rc.acsss
```

## ■ **Verifying the Imported Database and Library Configuration**

Use the following procedure to mount or dismount a cartridge to verify StorageTek ACSLS.

### **Mount/dismount a cartridge to verify StorageTek ACSLS:**

1. Verify that you are logged in as acsss.
2. If StorageTek ACSLS is not running, start it by entering  

```
rc.acsss
```
3. Query the server from the cmd\_proc by entering  

```
query server
```

If messages are displayed indicating that the server is in recovery mode, wait for a message indicating that the server is running.
4. Verify that at least one of the following are online. If not, bring them online with the vary command.  

```
query port all
```

```
query acs all
```

```
query lsm all
```

query drive all

5. Do you have at least one cartridge in an LSM?

---

YES Continue with the procedure.

---

NO Enter a cartridge into an LSM.

---

6. Mount a cartridge by entering:

`mount vol_id drive_id`

**Hint:** Use the `query drive` command to get the ID of an available drive and the `query volume` command to get the ID of a library cartridge. See [Chapter 11, “Command References.”](#)

7. Did you see a message indicating a successful mount?

A successful mount message is:

Mount: `vol_id` mounted on `drive_id`

---

YES Procedure is complete.

---

NO If an error message appears, run this verification procedure again, ensuring that you specified a valid, available drive and a library cartridge. If the mount/dismount still fails, call StorageTek for assistance.

---

8. Dismount the cartridge by entering:

`dismount vol_id drive_id force`

where `vol_id` is the volume and `drive_id` is the drive you specified in Step 6.

## ■ Automatic Database Backup

StorageTek ACSLS automatically creates a backup file of the database to disk every 24 hours at midnight or the time of day and days of the week you specified in the backup options in `acsss_config`.

## ■ Performing Manual Backups to Tape

In addition to the automatic database backups that StorageTek ACSLS creates, you should periodically run the `bdb.acsss` utility to manually create tape backups that can be stored offsite and used, if needed, for disaster recovery of the database.

Regular backups transferred to an offsite device can enable rapid restoration in the event of disaster to the StorageTek ACSLS server.

StorageTek recommends that you use `bdb.acsss` to manually back up the database to tape after:

- Running `acsss_config`.
- Importing the database.
- An audit of the entire library.
- Any database recovery.

## ■ Backing up to a Specified Tape Device Attached to the StorageTek ACSLS Server

**To back up the StorageTek ACSLS database to a specified tape device attached to the StorageTek ACSLS server, do the following:**

1. Log in as `acsss`.
2. Insert a blank tape into the tape device.
3. From a terminal window, enter the following command:

```
bdb.acsss -f tape_device
```

Where `tape_device` specifies a tape device attached to the StorageTek ACSLS server.

4. Messages reporting the progress of the backup appear.

Wait for the following message to appear:

Check tape device (/dev/rmt/0mn) to make sure you have a tape in the tape drive.

[Hit RETURN to continue or Ctrl-C to exit]

Press [[Return]].

5. Wait for the following message to appear:

ACSLS database backup successfully completed.

**Example** - To back up the StorageTek ACSLS database to tape device /dev/rmt/0mn, enter the following command:

```
bdb.acsss -f /dev/rmt/0mn
```

## ■ Backing up to a UNIX File

**Hint:** In the interest of disaster recovery, StorageTek does not recommend that you back up to a UNIX file unless the file is on a remote disk.

Refer to “[bdb.acsss](#)” on page 129.

**To back up the StorageTek ACSLS database to a UNIX file, do the following:**

1. Log in as acsss.
2. From a terminal window enter the following command:

```
bdb.acsss -f db_file
```

Where *db\_file* specifies a UNIX file to contain the StorageTek ACSLS database. You must have write permissions to the file.

3. Wait for the following message to appear:

```
ACSLS database backup successfully completed.
```

## ■ Recovering and Restoring

This section describes the following restoration/recovery procedures:

- Restoring a corrupted or lost database to the most recent backup
- Restoring a corrupted or lost database to a specified date and time
- Recovering from a disk failure
- Disaster recovery for a failed server
- Recovering from a specific backup file
- Restoring non-database, StorageTek ACSLS control files

Most of these procedures use the `rdb.acsss` utility, which provides options for restoring a database from the most recent backup or from a specified date and time; disaster recovery using a backup created by `bdb.acsss`; and restoring StorageTek ACSLS control files created by `bdb.acsss`. For more information about these options, see [“rdb.acsss” on page 160](#).

**Note:** If the home cell of a cartridge changes from its last location after a backup, then the restored database will not be up-to-date. To avoid cartridge movement on dismounts:

- each LSM must be the only LSM in its ACS (true in most SCSI libraries), or
- the Extended Store Feature must be enabled for all LSMs that are connected to other LSMs via a pass-thru-port.

For more information, see [“Using the Extended Store Feature” on page 52](#). If the Extended Store Feature is not enabled for all connected LSMs or cartridges have been entered or ejected, you must audit the library after the restoration to make the database current.

**Note:** Do not specify the `-f` option as a general option for the `rdb.acsss` utility. If you backed up your database to an external network file or to an alternate tape device, you use the `-f` option only after entering `rdb.acsss` and then choosing the third recovery option. When prompted, enter `-f` and the path name to your external network file or alternate tape device. See ["Select option 2." on page 117](#) for more information.

## ■ Restoring the Database to the Most Recent Backup

In this procedure you restore the database to the most recent backup created on the local disk by automatic backups. StorageTek ACSLS control files are also restored.

### **To restore a corrupted or lost database to the most recent backup:**

1. Log in as `acsss`.
2. Shut down StorageTek ACSLS and the database.  
`db_command stop`
3. Enter the following command:  
`rdb.acsss`
4. Select option 1:
  1. Restore from a current local disk backup
5. Refer to ["rdb.acsss" on page 160](#) for procedures.
6. To start StorageTek ACSLS, enter the following command:  
`rc.acsss`

## ■ Recovering from a Failed Server

Use this procedure for a disaster recovery when you have lost or corrupted both primary and secondary disks.

### **To recover from a failed server:**

1. Install the operating system.
2. Install StorageTek ACSLS.
3. Log in as `acsss`.

**CAUTION:** You *must* install StorageTek ACSLS in the same directory you used before the disk failure.

4. Shut down StorageTek ACSLS and the database:

```
db_command stop
```

5. Enter the following command:

```
rdb.acsss
```

6. Select option 2:

2. Restore from a previous tape or network file backup

7. Refer to “[rdb.acsss](#)” on page 160 for procedures.

8. To start StorageTek ACSLS, enter the following command:

```
rc.acsss
```

9. You must run `acsss_config` to re-specify automated backup date and time and retention periods *unless* you want to accept the default settings.

## ■ Restoring StorageTek ACSLS Control Files

In this procedure you restore StorageTek ACSLS control files. These are non-database files that include all files in the data/external directory such as access control files, the fixed volume file, the scratch preferences file, and custom volrpt files. These files are restored from a `bdb.acsss` backup to tape or an external network file.

### To restore StorageTek ACSLS control files:

1. Log in as `acsss`.

2. Shut down StorageTek ACSLS and the database:

```
db_command stop
```

3. Enter the following command:

```
rdb.acsss
```

4. Select option 4:

4. Restore only ACSLS non-database control files

5. Refer to “[rdb.acsss](#)” on page 160 for procedures.

6. To start StorageTek ACSLS and the database, enter the following command:

```
rc.acsss
```



---

In this chapter, you will learn how to:

- Create a custom volume report
- Create a report for volume movement statistics

## ■ Creating a Custom Volume Report

You can use the `volrpt` utility to create a volume report; for more information, see the “[volrpt](#)” on page 169. `$ACS_HOME/data/external/volrpt/owner_id.volrpt` is a sample input file that you can run or use as a template to create customized volume reports. You can also save your customized volume reports in the `$ACS_HOME/data/external/volrpt` directory. Use this procedure to create an input file to the `volrpt` utility to create a custom volume report.

**To create a custom volume report, do the following:**

1. Log in as `acsss`.
2. Open a UNIX command tool.
3. Change to the custom volume report directory:  
`cd /home/ACSSS/data/external/volrpt`
4. Copy the sample volume report file to a new, custom file.  
`cp owner_id.volrpt my.volrpt`  
*my.volrpt* is the name you want to assign to the new file.
5. Using a text editor, such as `vi`, edit the *my.volrpt* file to specify the fields and formats you want to see on the custom report.
  - You can specify any of the fields listed in the sample file.
  - The format for each entry is:  
`field_name field_length delimiter_length`
  - You can make the field lengths and delimiters any size you wish. Just be sure all the fields you specify will fit on one line when the report prints.
  - Detailed editing instructions are given in the sample file.
6. When you are finished editing the file, save it.

## Custom Volume Report

You create a customized report by designating fields, field length, and delimiter lengths in an input file, such as the one shown in [Figure 9](#):

**Figure 9. Sample Volrpt Input File**

```
#####
#
# File name: owner_id.volrpt
#
# This file describes the report layout for volrpt invoked with the -f option.
#     volrpt -f <filename>
#
# The format of a line is:
#     field_name      field_length      delimiter_length
#
# The field length is the number of characters which will be printed for
# the field. The delimiter length is the number of spaces that will be
# printed after the field. If you leave out the lengths, or specify a
# value of -1, the default values will be used. Default delimiters are
# always 2. Here are the fields and their default lengths.
#
# ACCESS_COUNT      5  2
# ACCESS_DATE       15 2
# CELL_ID          14  2
# DRIVE_ID         10  2
# ENTRY_DATE        15 2
# LABEL_ATTR        5  2
# LOCK_ID          5  2
# LOCK_TIME        15 2
# MAX_USE          5  2
# MEDIA_TYPE        7  2
# OWNER_ID         20  2
# POOL_ID          5  2
# VOLUME_ID         6  2
# VOL_STATUS        17 2
# VOLUME_TYPE       4  2
#
# Revision History:
# xx/xx/xx  Name      Changes
#
#####
VOLUME_ID      6  2
MEDIA_TYPE      7  2
DRIVE_ID        12 2
CELL_ID          14 2
OWNER_ID        -1 0
```

From this input file you generate the customized report shown. Among other uses, a customized report ([Figure 10](#)) allows you to report the owners of volumes.

**Figure 10. Customized Volume Report Using Input File**

```
1998-06-30 13:22:07

TOTAL VOLUMES: 2      SEQUENCE:      sort by volume identifier

Volume  Media          Home          Owner
Label   Type           Drive ID     Location     ID

RB1400 3480           Not-in-drv   0, 1, 1, 0, 0  cray
RB1401 DD3A           0, 0, 1, 0    0, 1, 2, 0, 0  cray
```

## Custom Volume Report Example

The following volrpt includes ACSs 0 and 1, absent and ejected volumes, and shows the status of volumes ([Figure 11](#) and [Figure 12 on page 122](#)).

The input volrpt options are:

```
volrpt -f my.volrpt -a 0 1 -i
```

These control statements are used to select and format the output:

**Figure 11. Sample volrpt Control Statements**

CELL_ID	14	2
VOLUME_ID	6	2
VOL_STATUS	17	0
POOL_ID	5	2
ACCESS_COUNT	5	1
LOCK_ID	5	1
OWNER_ID	20	0

**Figure 12. Customized volrpt Showing Absent and Ejected Volumes**

VOLUME REPORT UTILITY 2002-06-03 15:27:48							
TOTAL VOLUMES: 61		SEQUENCE: sort by volume identifier					
Home Location---	Volume Label	Volume Status	Pool ID	Times Mount	Lock ID	Owner ID-----	
1, 0, 0, 0, 0	ABC001	VOLUME_HOME	0	2	0	presc	
0,-1, 0, 0, 0	ABC002	VOLUME_ABSENT	0	0	0		
0,-1, 0, 0, 0	ABC003	VOLUME_ABSENT	0	0	0		
1, 3, 0, 0, 3	ABC004	VOLUME_MISSING	0	0	0		
1, 3, 0, 0, 4	ABC005	VOLUME_MISSING	4	0	28001	tom	
1, 3, 0, 0, 5	ABC006	VOLUME_MISSING	0	0	0		
0,-1, 0, 0, 0	ABC007	VOLUME_ABSENT	0	0	0		
1, 0, 0, 0, 7	ABC008	VOLUME_HOME	0	0	0		
0,-1, 0, 0, 0	ABC009	VOLUME_ABSENT	0	0	0		
0,-1, 0, 0, 0	ABC010	VOLUME_ABSENT	0	0	0	presc	
1, 0, 0, 0, 10	ABC011	VOLUME_HOME	0	0	0		
1, 0, 0, 0, 12	ABC012	VOLUME_HOME	0	0	2371	abc012	
1, 0, 0, 0, 13	ABC013	VOLUME_HOME	0	0	28001		
1, 0, 0, 0, 14	ABC014	VOLUME_HOME	0	0	28001		
0,-1, 0, 0, 0	ABC015	VOLUME_ABSENT	1	0	29712		
0,-1, 0, 0, 0	ABC016	VOLUME_EJECTED	1	0	29712		
0,-1, 0, 0, 0	ABC017	VOLUME_ABSENT	1	0	29712		
0,-1, 0, 0, 0	ABC018	VOLUME_ABSENT	1	0	29712		
1, 0, 0, 0, 19	ABC019	VOLUME_HOME	1	0	0		
1, 0, 0, 0, 20	ABC020	VOLUME_HOME	1	0	0		
0,-1, 0, 0, 0	ABC021	VOLUME_ABSENT	0	0	0		
0,-1, 0, 0, 0	ABC022	VOLUME_ABSENT	4	0	0		

## ■ Creating a Logging Volume Statistics Report

You can use the volume statistics log file (`acsss_stats.log`) to log volume movement statistics (Figure 13 on page 123). These statistics consist of entries for each time StorageTek ACSLS detects that a volume's location changed. StorageTek ACSLS logs entries for enters, ejects, mounts, dismounts, and for each time an audit detects that a volume's location has changed (typically, by being manually moved).

You use the `acsss_config` configuration program to do the following:

- Enable or disable volume statistics logging via the `LIB_VOL_STATS` variable
- Specify the maximum size of the volume statistics log file
- Specify the number of rollover files for the volume statistics log file

The `stats_report` utility uses the `acsss_stats.log` to report all mounts and tape drive usage

The volume statistics log file contains collection mode entries that tell if volume statistics logging is enabled or disabled and *volume statistics entries*.

**Figure 13. Example of Volume Statistics Log File Entries**

```

1998-06-30 08:53:00 CONFIG
Library volume statistics on.

1998-06-30 09:23:08 EJECT
U01120 Home 0,0,1,3,5 Cap 1,0,0 Client Host Id 129.81.15.25

1998-06-30 10:36:05 ENTER
PB0444 Home 0,0,4,3,5 Cap 0,0,0 Client Host Id 129.81.15.25

1998-06-30 10:42:48 MOUNT
PB0478 Home 0,0,1,35,1 Drive 0,0,1,0 Client Host Id Local

1998-06-30 10:43:19 DISMOUNT
PB0478 Home 0,0,1,35,1 Drive 0,0,1,0 Client Host Id Local

1998-06-30 10:43:19 AUDIT
RB0478 0,0,1,35,1 STATUS_VOLUME_NOT_FOUND Client Host Id JBHUTTO

1998-06-30 10:43:19 AUDIT
PB0444 0,0,1,32,1 STATUS_VOLUME_FOUND Client Host Id JBHUTTO

1998-06-30 10:45:00 CONFIG
Library volume statistics off.

2001-01-16 09:51:07 ACSCR
0A1235 Home 0,0,5,14,14 STATUS_VOLUME_NOT_FOUND Client Host Id Local

2001-01-16 09:40:13 ACSCR
0A123A Home 0,0,5,14,15 STATUS_VOLUME_FOUND Client Host Id Local

```

In [Figure 13](#), the collection mode entries show that statistics collection started at 8:53 a.m. on May 30, 1998 and ended at 10:45 a.m. the same day. These collection start and stop times bracket the volume statistics entries for this collection period.

The format of the volume statistics entries is:

*yyyy-mm-dd hh:mm:ss command*  
*vol\_id home\_loc function\_loc client\_host\_ID*

Where:

*yyyy-mm-dd*  
 is the year, month, and day of the entry. Four-digit year formats are supported. You specify the date format via the `acsss_config` program.

*hh:mm:ss*  
 is the hour, minute, and second of the entry.

*command*

is the StorageTek ACSLS command or client request that either moved the volume or (for audits) detected that the volume was moved.

MOUNT

mount request.

DISMOUNT

dismount request.

ENTER

manual or automatic mode enter request.

EJECT

eject request.

AUDIT

audit request.

ACSMV

move request

ACSCR

Volume Recovery activity. This activity is generated automatically by StorageTek ACSLS processing.

*vol1\_id*

is the volume IDs

*home\_loc*

is the volume's home (storage cell) location.

*function\_loc*

is the volume's location for the requests that used the volume as follows:

mount or dismount requests

location is a transport ID.

enter or eject requests

location is a CAP ID.

audit requests

specifies that an audit detected one of the following errors:

STATUS\_VOLUME\_FOUND

The audit found a volume in a location that did not match the location specified in the database.

STATUS\_VOLUME\_NOT\_FOUND

The audit did not find a volume in the location specified in the database.

Volume Recovery activity

Location may be a cell ID or a transport ID, indicating that Volume Recovery detected one of the following situations:

STATUS\_VOLUME\_FOUND

A volume was found which was not recorded in the database, and is being added.

STATUS\_VOLUME\_NOT\_FOUND

A volume in the database was not found in any recorded location, and is being deleted.

*client\_host\_ID*

is one of the following:

- For client application requests, the host IP address.
- For cmd\_proc commands, if the environment variable LIBVOLSTATS\_CMD\_PROC\_ID is set (ASCII characters only) in the environment of the shell that started the cmd\_proc, the entry is the first 12 characters of the value of the environment variable.
- For cmd\_proc commands, if the environment variable LIBVOLSTATS\_CMD\_PROC\_ID is not set or contains non-ASCII characters, the entry is Local.



# Utility Reference

This chapter discusses the following StorageTek ACSLS utilities:

[“bdb.acsss” on page 129](#)

backs up the StorageTek ACSLS database and StorageTek ACSLS control files.

[“Dynamic Configuration \(config\) utilities” on page 131](#)

dynamically implements configuration changes to StorageTek ACSLS libraries (and components) while StorageTek ACSLS remains online and running. These configuration utilities are:

[“config acs” on page 133](#)

dynamically adds an ACS or re-configures an existing ACS and its components.

[“config drives” on page 135](#)

on existing drive panels, it dynamically adds drives, changes drive types, and deletes drives.

[“config lsm” on page 136](#)

dynamically re-configures an existing LSM and all of its components. These components include CAPs, panels, and drives.

[“config ports” on page 138](#)

dynamically re-configures the port connections to an ACS.

[“db\\_command” on page 139](#)

starts or stops the database, changes database logging level, and determines database status.

[“db\\_export.sh” on page 140](#)

exports the StorageTek ACSLS database information and StorageTek ACSLS control files in preparation for an upgrade installation or reinstallation of StorageTek ACSLS.

[“db\\_import.sh” on page 141](#)

imports the StorageTek ACSLS database information and StorageTek ACSLS control files exported when you used the db\_export.sh utility.

[“del\\_vol” on page 142](#)

deletes a volume from an offline LSM.

[“drives\\_media.sh” on page 144](#)

displays all drive types, media types and the drive-to-media compatibilities that are supported by the current release of StorageTek ACSLS.

[“ejecting.sh” on page 144](#)

determines a list of volumes that are to be ejected and creates a file containing the set of eject commands for the specified CAP.

[“fix\\_rc.sh” on page 146](#)

enables you to either enable or disable automatic startup and shutdown of StorageTek ACSLS during system startup or shutdown.

[“free\\_cells.sh” on page 147](#)

allows you to monitor and manage the free cells in libraries controlled by StorageTek ACSLS.

[“get\\_license\\_info” on page 150](#)

has been removed beginning with releases StorageTek ACSLS 7.3.1 as software enforcement of the right-to-use license is no longer employed in StorageTek ACSLS. The software no longer checks for a valid license key. To display and manage the number of free cells in StorageTek ACSLS controlled libraries use [“free\\_cells.sh” on page 147](#).

[“greplog” on page 150](#)

filters the acsss\_event log to include or exclude messages containing specific keywords.

[“kill.acsss” on page 151](#)

terminates StorageTek ACSLS.

[“moving.sh” on page 151](#)

moves multiple cartridges to one or more LSMs.

[“probeFibre.sh” on page 159](#)

displays the model number, revision level, and Target-LUN address of each device connected behind an Emulex (LP10000) or QLogic (QLA2300) fibre-channel HBA.

[“rc.acsss” on page 159](#)

starts StorageTek ACSLS.

[“rdb.acsss” on page 160](#)

restores the StorageTek ACSLS database and StorageTek ACSLS control files.

[“showDevs.sh” on page 164](#)

shows detail for every mchanger device configured on Solaris.

[“stats\\_report” on page 167](#)

gathers library volume statistical information.

[“volrpt” on page 169](#)

creates a volume report.

[“watch\\_vols” on page 175](#)

automatically assigns ownership and pool association to volumes as they are entered through the CAP.

## ■ Using the StorageTek ACSLS Utilities

Follow these general guidelines for using the StorageTek ACSLS utilities:

- You must log in as `acsss` to ensure the proper environment to run StorageTek ACSLS utilities.  
You should not `su` to `acsss`.
- StorageTek recommends that you use `bdb.acsss` to manually back up the database to tape after:
  - Configuring your library hardware.
  - Importing the database. After you upgrade to a new version of StorageTek ACSLS, do not use database backups created with previous versions. Make sure, however, to create a new backup as soon as you have upgraded.
  - Any database recovery.
- To ensure that you recover an accurate and consistent database, always use the most current database backup.

If a utility fails, retain all event logs. These logs will aid StorageTek in resolving any problems.

## ■ `bdb.acsss`

The `bdb.acsss` utility backs up the StorageTek ACSLS database contents and StorageTek ACSLS control files that you need to rebuild the StorageTek ACSLS environment. The backup is either placed in a tar file or tape device you have named, or in the directory defined as the default.

This utility performs StorageTek ACSLS database backups without requiring StorageTek ACSLS to be down (hot backup).

Without the `-f` option, a `/export/backup/<time_stamp>.tar` file is created. `Time_stamp` is the time the `bdb.acsss` command was executed.

**Note:** To verify the contents of the tape after running `bdb.acsss` please modify the following examples for your specific tape devices.

- For Solaris:

```
tar tvbf 2048 /dev/rmt/0mn
```

- For AIX:

```
tar tvbf 20 /dev/rmt1.1
```

After running the `tar tvbf` command, the tape advances to the next block. Make sure you have rewound or re-positioned the tape if you intend to run `rdb.acsss` after running the `tar tvbf` command.

## Format

```
bdb.acsss -f [backup_file | tape_device]
```

If you enter `bdb.acsss` with no options, a default backup is performed that provides you the ability to restore the database back to the time when this backup was performed.

## Options

- f *backup\_file*  
specifies a UNIX file to contain the StorageTek ACSLS database backup.  
You must have write permissions to the file and directory.
- f *tape\_device*  
specifies any tape device attached and configured to the StorageTek ACSLS server.

## Usage

Use the `bdb.acsss` utility to back up the StorageTek ACSLS database to tape or to an external network file to create backups that can be used, if needed, for recovery of the database.

It is recommended that you use `bdb.acsss` to manually back up the database after:

- Running `acsss_config`.
- Importing the database. After you upgrade to a new version of StorageTek ACSLS, *do not* use database backups created with previous versions.
- An audit of the entire library.
- Any database recovery.

### Example 1

```
$ bdb.acsss -f /export/backup/my_backup
```

In this example, a file named `my_backup` was created in the directory `/export/backup`. You can now choose whether to keep the file where it is or to move it to another file system, another server, or a writable CD device.

This file can then be used to restore the database to the state it was in when the backup was performed.

For example, if the backup was performed at 1:00 pm on Friday and a restore is performed at 6:00 am on Monday, the database will revert back to its state as of 1:00 pm on Friday.

Within this same *-f* option, you can give a tape device instead of a file name and the backup will go to the named tape device.

### Example 2

```
$bdb.acsss -f /dev/rmt/0mn
```

In this example, a tape archive on the tape device `/dev/rmt/0mn` was created. This can be stored for later use in an offsite location.

See also:

- “[rdb.acsss](#)” on page 160
- “[Database Administration](#)” on page 103

## ■ Dynamic Configuration (config) utilities

The dynamic configuration (config) utility allows you to implement configuration changes to StorageTek ACSLS libraries (and components) while StorageTek ACSLS remains online and running. These configuration changes are recorded in the `acsss_config.log` file.

The following dynamic configuration utilities are supported:

- `config acs`
- `config drives`
- `config lsm`
- `config ports`

Using the `config` utility provides the following benefits:

- StorageTek ACSLS can continue running, allowing you to perform mount requests to unaffected library components.
- Allows you to reconfigure specified library components while all other configuration information remains unchanged. For example, when specifying:
  - An ACS, the configurations of other ACSs are not affected.
  - An LSM, the configurations of other LSMs are not affected.
  - A drive panel, the drives on a panel, mounts and dismounts to all existing drives are not affected.

### Important

- StorageTek ACSLS must be running to use the dynamic `config` utility.

- You must use `acsss_config` to create your initial StorageTek ACSLS configuration. Refer to “[Setting Variables that Control StorageTek ACSLS Behavior](#)” on page 23.
- Event notification reports all dynamic configuration changes.
- Before running dynamic configuration, ensure that all components being added or re configured are ready.
- The `acsss_config.log` file provides details regarding messages displayed.
- If you have not confirmed the configuration change, you can cancel the operation with `[[CTRL]]+C`.
- Dynamic configuration performs an automatic backup before and after the configuration change.
- After a configuration change is confirmed, it cannot be cancelled. If you want to reverse a configuration change, you should shut down StorageTek ACSLS and restore the backup that was taken immediately before the configuration change was made.

You have 10 minutes to confirm a configuration change before it times out.

- You cannot remove the only (or last) ACS.
- Do not remove the last CAP in an ACS or the last drive defined to StorageTek ACSLS.

## Limitations of Dynamic Configuration

The dynamic configuration utility has two significant limitations:

- You cannot delete an ACS, or delete or change a port (connection) to a library.
- With an existing SCSI/fibre-attached library, you can **only update** drive configurations. The `config drives` utility works without limitations. The `config acs` and `config lsm` utility will only update the drives in a SCSI/fibre-attached library. You cannot update panel cell or CAP configurations in a SCSI/fibre-attached library. `config acs new` works for SCSI/fibre-attached libraries.

### **Solution:**

For these configuration changes that are not supported through dynamic configuration, you need to shutdown StorageTek ACSLS and use `acsss_config`.

## Things You Should Not Do

- Do **not** use dynamic configuration to display status information for a library and its components because it involves extensive I/O to the library
 

Use the `query` or `display` commands instead.
- Try to perform more than one configuration task at a time.
 

Only one dynamic configuration task can be performed at a time. This:

  - Minimizes performance problems caused by the I/O between StorageTek ACSLS and the library it is configuring,
  - Avoids complex interactions between multiple configuration tasks.

## ■ config acs

The `config acs` utility allows you to:

- Add an ACS or re-configure an existing ACS and its components
- You can configure or re-configure libraries without assigning all ACS numbers in sequence.

Example: You want to migrate from a 9310 library to a StorageTek SL8500 and then remove the 9310. The 9310 ACS is numbered ACS 0 and the StorageTek SL8500 ACS is ACS 1. Using this feature, you can now migrate all of the cartridges and drives to the StorageTek SL8500 ACS and remove the 9310 ACS without having to renumber your StorageTek SL8500 ACS.

- Configure a partitioned ACS
- Add or remove LSMs, since the `config lsm` utility only allows you to reconfigure an existing LSM.

### **WARNING:**

- Each ACS must have at least one CAP. This can be a CAP that is shared with another partition.
- There must be at least one drive configured to the entire StorageTek ACSLS system.

Example: StorageTek ACSLS supports four libraries. Three of the libraries can contain zero (0) drives. However, the fourth library must contain at least one drive.

## Format

To add a new ACS, enter:

```
config acs new
```

To reconfigure an existing ACS, enter:

```
config acs acs_id
```

## Adding a new ACS

To add a new ACS:

1. Enter:

```
config acs new
```

2. Specify the ACS number for the new ACS.

StorageTek ACSLS 7.3.1 lets you configure or re-configure libraries without assigning all ACS numbers in sequence.

The ACS numbers already used and the first five available ACS numbers are displayed.

3. Enter the ACS number for your new ACS.
4. Select whether the ACS is in a partitioned library (StorageTek SL8500).
  - If you enter **y**, you are asked for the partition ID for the ACS.  
This partition ID must match the partition ID on the SLConsole.
  - If this is not a partitioned library, enter **n**.
5. Enter the number of connections to the ACS followed by the device or host ID(s).

You can have a maximum of fifteen connections.

**CAUTION: Ensure that all ports are connected to the same ACS.**

The new ACS configuration is displayed.

6. Confirm the addition of the new ACS.

After confirmation, the configuration information is displayed and the database is updated.

## Reconfiguring an existing ACS

The ACS should, if possible, be online or in diagnostic mode when you reconfigure the ACS.

To reconfigure the ACS:

1. Enter:

```
config acs acs_id
```

The old and new configurations are displayed.

2. Confirm the new configuration.

After confirmation, the database is updated.

If the configuration is unchanged, the configuration is displayed without asking for confirmation, and the utility exits. Examples of this are:

- Only drive types and/or serial numbers change
- LSM serial number changes
- Only LSM type changes between 4410 and 9310
- Number of hands, such as StorageTek SL8500 robots, change.

However, if these changes occur with other changes requiring confirmation, then you must confirm the new configuration. The database is then updated.

The ACS and its components are removed from the database

### **Limitation of config acs**

The config acs utility will only update drive configurations in a SCSI/fibre-attached library. A SCSI-attached library must be IPLed to recognize drives that are added, removed, or changed. All drives must be ready when the library is IPLed.

For a SCSI-attached library, config acs will not update panel or CAP configurations. In order to update them, you must shutdown StorageTek ACSLS and use acsss\_config.

## **■ config drives**

The config drives utility allows you to reconfigure all drives on an existing drive panel. This includes, adding drives, updating drive types and serial numbers for existing drives, and deleting drives that were removed from the database.

Use the config drives utility for dynamic changes to drive configurations, which include installation, replacement, or removal of drives on an existing drive panel. Other changes to tape library hardware configurations such as changes in the number and/or location of storage cells, number or size of

CAPs, or replacement of a storage cell panel with a drive panel must be made using the `config lsm` or `config acs` utility. Please note:

- The LSM containing the panel with the changed drive configuration must be online or in diagnostic mode.
- On the drive panel being re-configured, all drives must be ready.
- A SCSI-attached library must be IPLed to recognize drives that are added, removed, or changed. All drives must be ready when the library is IPLed.
- When new drives replace existing drives, varying the LSMS or drive types online or running `config drives` automatically updates the drive types and drive serial numbers.

## Format

`config drive panel_id` or `config drives panel_id`

## Usage

To reconfigure all drives on an existing drive panel:

1. Enter:

`config drive panel_id` or `config drives panel_id`

The old and new drive configurations are displayed for the panel.

2. Confirm the configuration change.

After confirmation the database is updated.

- If the configuration has not changed, the configuration is displayed without asking for confirmation, and the utility exits.
- If only drive types or serial numbers changed, the StorageTek ACSLS database is updated without requesting confirmation.

## ■ config lsm

This utility allows you to reconfigure an existing LSM and all of its components. These components include CAPs, panels, and drives.

If you want to add or delete an LSM in an ACS, you must use the `config acs` utility.

### Procedures for when Panels Change:

- If there are panels that are being removed or changed and have been emptied of cartridges, the LSM can remain online.

- If there are panels that are being removed or changed and contain cartridges, it is recommended that you vary the affected LSM to diagnostic until you re-configure the LSM and audit the panels affected. If you do not do this, mounts and dismounts may fail.
- If you have added panels and have manually placed cartridges in these panels, please run an audit to reconcile the database.

## Format

```
config lsm lsm_id
```

## Usage

To reconfigure the LSM:

1. Enter:

```
config lsm lsm_id
```

The old and new configurations are displayed.

A “y” next to the panel notifies you that the panel type(s) have changed. Look in the `acsss_config.log` file for details.

2. Confirm the new configuration.

After confirmation, the database is updated.

If the configuration is unchanged, the configuration is displayed without asking for confirmation, and the utility exits.

Minor changes are made automatically without confirmation. Examples are:

- Only drive types and/or serial numbers change
- LSM serial number changes
- Only LSM type changes between the 4410 and 9310
- Number of hands, such as StorageTek SL8500 robots, change.

However, if these changes occur with other changes requiring confirmation, then you must confirm the new configuration. The database is then updated.

## Limitation of config lsm

- The `config lsm` utility will only update drive configurations in a SCSI/fibre-attached library. A SCSI-attached library must be IPLed to recognize

drives that are added, removed, or changed. All drives must be ready when the library is IPLed.

- It will not update panel or CAP configurations. In order to update them, you must shutdown StorageTek ACSLS and use `acsss_config`.

## ■ config ports

The `config ports` utility allows you to dynamically add port connections to an ACS.

**CAUTION:** All new ports must be connected to the same ACS as existing ports.

Run `config acs acs_id` and then `config ports acs_id`.

**Important:** If you want to replace one ACS with another ACS or change port connection addresses, you must shutdown StorageTek ACSLS and use `acsss_config`.

### Format

`config ports acs_id` or `config port acs_id`

### Usage

To add ports:

1. Enter:

`config port acs_id` or `config ports acs_id`

The current port connection for the specified ACS are displayed.

2. Enter the number of port connections for the specified ACS.

You can have a maximum of fifteen connections.

3. Specify the device or host ID (s).

**Note:** Ensure that new ports are connected to the same ACS as existing ports.

The old and new configurations are displayed.

A change in the order of the ports is not a configuration change. The connections are displayed on the order they are currently recorded in the database.

4. Confirm the new configuration.

After confirmation, the database is updated.

If the configuration is unchanged, the configuration is displayed, and the utility exits.

## Limitations of config ports

The config\_ports *acs\_id* utility is not supported on a SCSI-attached library.

The config\_ports utility will not delete or change a port (connection) to a library. In order to do this, you must shutdown StorageTek ACSLS and use acsss\_config.

## ■ db\_command

The db\_command command allows you to start or shut down the database, check its running status, as well as change database logging levels without interruption to StorageTek ACSLS and its database.

**CAUTION:** You must terminate StorageTek ACSLS using the *idle* command and the *kill.acsss* utility before you stop the database.

### Format

```
db_command
[ start | stop | stop_force | status | log_normal | log_verbose | log_level ]
```

### Menu Options

**Figure 14. db\_command Menu Options:**

<pre>\$ db_command</pre> <p>where command is one of:</p> <ul style="list-style-type: none"> <li>start        Start the StorageTek ACSLS database</li> <li>stop        Gently bring down the ACSLS database (wait for ACSLS to disconnect)</li> <li>stop_force    Quickly bring down the ACSLS database (does not wait for ACSLS to disconnect)</li> <li>status        Display whether database is running or not</li> <li>log_normal    Log errors on ACSLS database activity</li> <li>log_verbose    Log details about ACSLS database activity</li> <li>log_level     Display current database logging level</li> </ul>
--

## Options

`db_command start`  
starts the database.

`db_command stop`  
waits for StorageTek ACSLS to disconnect, then brings down the database.

**Note:** This is the preferred method to shutting down StorageTek ACSLS.

`db_command stop_force`  
does not wait for StorageTek ACSLS to disconnect before it brings down the database.

**Note:** This is not a method that should be used to shut down the database. You should only use this method when instructed by Software Support when they are troubleshooting a problem with StorageTek ACSLS.

`db_command status`  
displays if the database is running or not running.

`db_command log_normal`  
logs errors on the StorageTek ACSLS database activity.

`db_command log_verbose`  
logs details on the StorageTek ACSLS database activity.

`db_command log_level`  
displays the current database logging level. (normal or verbose) without looking at the postgresql.conf file

## ■ **db\_export.sh**

The `db_export.sh` utility exports the StorageTek ACSLS database table data and StorageTek ACSLS control files in preparation for an upgrade installation or a reinstallation of StorageTek ACSLS.

### Format

`db_export.sh -f [ db_file | tape_device ]`

### Options

`-f db_file`  
specifies a UNIX file to contain a backup of the StorageTek ACSLS database. You must have write permissions to both the file and directory.

### Notes:

- If you export the database to a file, the file must reside in a non-volatile directory. If your intention is to re-install StorageTek ACSLS, the re-installation will destroy the `$ACS_HOME` directory. Consequently, you should place the exported file elsewhere in your file system.
- If you specify the filename without a path, `db_export` saves the database file under that filename in the current working directory, and it saves the `misc` file in the `$ACS_HOME` directory

`-f tape_device`  
 specifies any tape device attached and configured to the StorageTek ACSLS server.

If no options are specified, the system defaults to the tape device.

## Usage

Use the `db_export.sh` utility to prepare for a reinstallation of StorageTek ACSLS or an upgrade installation of StorageTek ACSLS.

## Examples

Refer to [Chapter 8, “Database Administration”](#) for examples.

See also:

- [“db\\_import.sh”](#)
- [“rdb.acsss” on page 160](#)
- [“Exporting the Database” on page 104](#)

## ■ db\_import.sh

The `db_import.sh` utility imports the StorageTek ACSLS database table data and the StorageTek ACSLS control files that you exported when you used the `db_export.sh` utility. The StorageTek ACSLS control files are located in `$ACS_HOME/data/external` and consist of user definable variables and configuration for StorageTek ACSLS. They specify Access Control settings, scratch preferences, Extended Store LSMs, custom `volrpt` settings, volume attributes (for `watch_vols` utility), etc. The `db_import.sh` utility also provides disaster recovery capabilities, as well as the retention of your customized dynamic variables when moving to a different operating system or from an earlier release.

## Format

`db_import.sh -f [ db_file | tape_device ]`

## Options

`-f db_file`

specifies a UNIX file created by db\_export.sh.

**-f tape\_device**

specifies any tape device attached and configured to the StorageTek ACSLS server.

If no options are specified, the system defaults to the tape device.

## Usage

Use the db\_import.sh utility to import the StorageTek ACSLS database that you exported using the db\_export.sh utility.

**CAUTION:** The db\_import utility will not run if StorageTek ACSLS is running.

See also

- “[db\\_export.sh](#)” on page 140
- “[rdb.acss](#)” on page 160
- “[Importing the Database](#)” on page 107

## ■ **del\_vol**

StorageTek ACSLS and the database must be up and running (*not idle*) to use the del\_vol utility.

This utility looks for a volume in the library, and either marks it absent or deletes it if it cannot be found.

- If the volume is in the library, it remains an active volume in the database unless the -f option is specified.
- If the volume is not found in the library (because libraries or drives are offline or inoperative), a message appears requesting confirmation that the volume be either marked absent or deleted from the database depending on the following.
  - If the ABSENT\_VOLUME\_RETENTION period is non-zero, the volumes that cannot be found in the library are marked absent, and are not deleted, unless the -d option is specified.
  - If the -n (no\_confirm\_flag) option is specified, you do not receive a confirmation message before marking a volume absent or deleting it.

When a volume is deleted, all information associated with it, such as scratch pool membership and current and pending locks, is removed from the database.

Volume-related information is displayed unless the -q (quiet\_flag) has been entered.

## Format

`del_vol [-n] [-d] [-f] [-q] vol_id`

If multiple options are used, they can be formatted either as separate options or as a contiguous string.

## Options

`-n`

Optional; no-confirm mode; without prompting the user for confirmation, it marks a volume absent or deletes it when it cannot be located.

`-d`

deletes the specified volume without waiting for the expiration of an absent or ejected status.

`-f`

permits you to re-enter cartridges that were stuck in a tape drive. With the `-f` option, you can delete a volume or mark it absent without verifying if the volume is actually in the library.

This permits you to delete a volume that was in a faulty tape drive from the database. Using this option, you can remove the volume from the drive, delete it from the database, then re-enter the volume for normal library use while the drive is being repaired.

`-q`

Optional; quiet mode; does not print out all information extracted from the database.

`-vol_id`

The volume serial number to be deleted.

## Usage

To use `del_vol` to remove a cartridge from an offline LSM and then re-enter it in an online LSM, so it can be automatically mounted:

- Remove the cartridge from the offline LSM.
- Use `del_vol` to mark the cartridge as absent.
- Enter the cartridge into the online LSM.

**CAUTION:** If you mistakenly delete a cartridge or mark it absent, you should audit the sub-panel containing the home cell of the deleted cartridge to activate or add the cartridge.

Running `del_vol` while the system is in recovery can produce unpredictable results. Recovery sequence happens during an ACSLS startup and when ACSs and LSMs are varied online.

## Example

To delete cartridge U01102 without a printout of the cartridge information:

**del\_vol -q U01102**

## See Also

[“Using the Manual Volume Delete Utility” on page 97](#)

## ■ **drives\_media.sh**

This routine displays all drive types, media types and drive-to-media compatibility that is supported by the current release of StorageTek ACSLS. The information is normally displayed to standard output. Refer to the *StorageTek ACSLS 7.3.1 Product Information Guide* for the current list of drive types, media types and drive-to-media compatibility supported.

### Format

`drives_media.sh [ -f, -h ]`

### Options

`-f`

the information is written to three files:

- `/tmp/drive_types.txt`
- `/tmp/media_types.txt`
- `/tmp/media_compatibility.txt`

`-h`

displays the syntax message.

## ■ **ejecting.sh**

The `ejecting.sh` utility takes a list of cartridges intended for ejecting and creates a file containing a set of eject commands optimized for the specified CAP. The input file must contain a simple list of cartridges that are to be ejected. The resulting series of optimized eject commands must be input to `cmd_proc` to eject the volumes. The eject commands from `ejecting.sh` are sent to standard out and can be piped directly to `cmd_proc`.

### Format

`ejecting.sh <CAP-id> <volume list file>`

## Options

-CAP-id  
the CAP containing the cartridges to be ejected.

-volume list file  
list of cartridges to be ejected.

**Note:** The volume IDs in the file must follow these rules:

- One cartridge-id per line.
- The vol\_ids must be valid StorageTek ACSLS volume IDs.

## Usage

- This script checks for the validity of the CAP-id argument and if the specified CAP does not exist, it displays the message "CAP <CAP-id> not found".
- The script also determines the number of cells in the specified CAP and then formats an eject command to completely fill the CAP (as long as the CAP contains 42 cartridges or less). The script continues to create eject commands to completely fill the CAP. This is repeated until all of the cartridges in the incoming cartridge list have been included in the output.

**Note:** A maximum of 42 cartridges can be ejected to the CAP in a single eject command. Thus, only 42 cartridges are ejected to an StorageTek SL3000 AEM at a time.

## Examples

### Example 1:

In this example a series of optimized eject commands are sent to standard out and piped directly to cmd\_proc:

```
ejecting.sh 0,0,0 volume_list_file | cmd_proc -1q
```

### Example 2:

The output is redirected to a file by one of the following methods:

```
ejecting.sh 0,0,0 volume_list_file > eject.dat
```

```
ejecting.sh 0,0,0 volume_list_file | tee eject.dat
```

**Note:** The "tee" directs the output to both a terminal screen and the specified file.

**Note:** If the output of this script has been redirected to a file, you may use that file as input for cmd\_proc as follows:

```
cmd_proc -lq < eject.dat
```

## ■ **fix\_rc.sh**

This utility enables you to either enable or disable automatic startup and shutdown of StorageTek ACSLS during system startup or shutdown. Although you are presented with the option to allow automatic restart of StorageTek ACSLS during installation, you may later choose to enable or disable this option. The command `fix_rc.sh` is located in the install directory of StorageTek ACSLS, usually located in `/export/home/ACSSS`.

### **Format**

```
fix_rc.sh
```

### **Options**

none

### **Usage**

- **To install `fix_rc.sh`:**

As "root":

```
# /export/home/ACSSS/install/fix_rc.sh
```

Your system is currently configured in such a manner that when it reboots, it will **\*NOT\*** automatically restart the ACSLS.

Do you want your system configured so that when it reboots it automatically restarts the ACSLS? (y or n): y

```
fix_rc.sh 1864: Adding commands to automatically restart ACSLS on reboot.
```

This creates the necessary files in `/etc/init.d` to allow the system init process to start and stop StorageTek ACSLS at system startup and shutdown.

- **To remove `fix_rc.sh`:**

As "root":

```
# /export/home/ACSSS/install/fix_rc.sh
```

Your system is currently configured in such a manner that when it reboots, it will automatically restart the ACSLS.

Do you want your system configured so that when it reboots it automatically restarts the ACSLS? (y or n): n

```
fix_rc.sh 1865: Removing commands to automatically restart ACSLS on reboot.
```

This prevents StorageTek ACSLS from changing states at system start and shutdown.

It is highly recommended that you allow the system init process handle startup and shutdown of StorageTek ACSLS. This prevents errors caused when StorageTek ACSLS is not properly brought down prior to system shutdown.

**Note:** If you choose not to automatically restart ACSCLS upon a reboot, then 'not classified' messages similar to the following are seen in the acsss\_event.log after the server is rebooted:

```
2007-03-27 13:37:12 storage server[0] :
1328 N di_pri_get_status_code.c Unknown 188
di_pri_get_status_code:
    DBMS error. Return code (28000) and message ("[unixODBC]")
not mappable to DI_STATUS

2007-03-27 13:37:12 storage server[0] :
1328 N di_pri_get_status_code.c Unknown 188
di_pri_get_status_code:
    DBMS error. Return code (28000) and message
(" [unixODBC] Communication closed during authentication,
```

## ■ **free\_cells.sh**

The free\_cells.sh utility allows you to monitor and manage the free cells in libraries managed by StorageTek ACSLS. This utility reports the free cell count for LSM, ACS, and the StorageTek ACSLS server.

**Note:** Since free\_cells.sh reads every cell record in the database, it is recommended that you run this utility infrequently, such as only during periods of low database activity.

This utility is located in the \$ACS\_HOME/utils directory

### **Format**

free\_cells.sh

### **Option**

-a

displays the free cells, allocated cells and the total number of cells in each ACS and LSM, as well as those managed by the StorageTek ACSLS server.

### **Examples**

#### ***Free cells in each LSM***

- LSM is not a L5500 (lists only the total free cells)

- No options selected

```
LSM 1,3
      Total free cells      = 2,345
```

- -a option (also lists allocated cells and total cell count)

```
LSM 1,3
      Total free cells      = 3,345
      Allocated cells       = 3,155
      Total cells            = 6,500
```

- LSM is a L5500 (lists LTO and non-LTO free cells separately)

- No options selected

```
LSM 0,2
      LTO free cells        = 573
      non-LTO free cells     = 467
      Total free cells       = 1,040
```

- -a option (also lists allocated cells and total cell count)

```
LSM 0,2
      LTO free cells        = 573
      non-LTO free cells     = 467
      Total free cells       = 1,040
      Allocated cells        = 4,460
      Total cells              = 5,500
```

### ***Free cells in each ACS***

If there is only one LSM in the ACS, only the ACS is listed as shown in the following examples.

- ACS does not include any L5500s

- No options selected (displays only the total free cell count)

```
ACS 1
      Total free cells      = 5,342
```

- -a option (also displays allocated cells and total cell count)

```
ACS 1
      Total free cells      = 5,342
      Allocated cells        = 5,658
      Total cells              = 11,000
```

- ACS includes L5500 (displays LTO and non-LTO free cells separately)

- No options selected

```
ACS 0
```

```

LTO free cells      = 1,573
non-LTO free cells = 968
Total free cells   = 2,541

```

- -a option (also displays allocated cells and total cell count)

```
ACS 0
```

```

LTO free cells      = 1, 573
non-LTO free cells = 968
Total free cells   = 2,541
Allocated cells    = 2,959
Total cells         = 5,500

```

### ***Free cells managed by the StorageTek ACSLS server***

- ACS does not include any L5500s

In this case only the total free cell count is displayed

- No options selected

```
ACSLS Server
```

```
Total free cells      = 7,883
```

- -a option

```
ACSLS Server
```

```

Total free cells      = 7,883
Allocated cells       =14,117
Total cells           =22,000

```

- ACS includes L5500s

In the case where there are L5500 libraries being managed, only the LTO free cell and total free cell count is displayed. Non-LTO free cells are not displayed since the L5500 library is the only library that separates LTO from non-LTO cells.

- No options selected

```
ACSLS Server
```

```

LTO free cells      = 1,573
Total free cells   = 7,883

```

- -a option

```
ACSLS Server
```

```

LTO free cells      = 1,573
Total free cells   = 7,883
Allocated cells    =14,117
Total cells         =22,000

```

## ■ **get\_license\_info**

This utility has been removed beginning with releases StorageTek ACSLS 7.3.1 as software enforcement of the right-to-use license is no longer employed in StorageTek ACSLS. The software no longer checks for a valid license key. To display and manage the number of free cells in StorageTek ACSLS controlled libraries use “[free\\_cells.sh](#)” on page 147.

## ■ **greplog**

Use the `greplog` utility to filter the `acsss_event` log to include or to exclude messages containing specific keywords. The syntax of this routine is similar to the Unix 'grep' function. `greplog` is specifically designed for use with the `acsss_event.log`, but it may function with any type of message file where the records are separated by an empty line.

### **Format**

```
greplog -[v|i] <keyword> <logfile>
```

### **Options**

- v

Optional. `greplog` displays all the messages in the log except those which include the keyword.

- i

Optional. `greplog` ignores the characters in the specified keyword.

- keyword

returns the complete multi-line message containing the keyword.

- logfile

list of log files.

### **Usage**

Since the utility is specifically designed for log files, `greplog` returns the complete multi-line message containing the keyword rather than a single line containing that word. Using the `- i` option, `greplog` ignores the characters in a specified keyword. Using the `- v` option, `greplog` displays all of the messages in the log except those which include the keyword. `Greplog` is specifically designed for use with the `acsss_event.log`, but it may function with any type of message file where the records are separated by an empty line.

## ■ kill.acsss

The `kill.acsss` utility terminates StorageTek ACSLS.

**CAUTION:** StorageTek ACSLS generates an error in the event log if you reboot the StorageTek ACSLS server without shutting it down.

Refer to “[fix\\_rc.sh](#)” on page 146.

### Format

`kill.acsss`

### Options

None.

### Usage

Use the `kill.acsss` utility to terminate StorageTek ACSLS.

### See also

- “[rc.acsss](#)” on page 159
- “[idle](#)” on page 209

**CAUTION:** Do not run `kill.acsss` while an StorageTek ACSLS request is in progress! You must first idle StorageTek ACSLS (with the `idle` command) before you run `kill.acsss`.

**Note:** `kill.acsss` does *not* shut down the database. You must issue `db_command stop` if you want to shut down the database after you shut down StorageTek ACSLS.

## ■ moving.sh

The `moving.sh` utility moves multiple cartridges to one or more LSMs. This utility reads a file that lists the cartridges to be moved. These cartridges can be:

- Cartridges in one or more LSMs
- Cartridges on a panel being moved to other panels in the same LSM or other LSMs
- Any group of cartridges you select

The limitations of `moving.sh` are:

- All destination LSMs and cartridges in the `vol_list_file` must be in same ACS

- If any destination LSM is offline or does not contain any free cells, no cartridges are moved to that LSM

#### Notes:

- The `moving.sh` utility runs only if StorageTek ACSLS is running
- Internally, `moving.sh` moves only one cartridge at a time to avoid impacting library performance (mounts and dismounts)
- You can run multiple move utilities in parallel after creating separate lists of volumes. Please note that if:
  - the destination LSM is same, you should make sure that there are enough free cells in the LSM to accommodate all cartridges
  - you are moving within one StorageTek SL8500 library - there are only two elevators, so running more than two move utilities at a time will not increase performance

## Format

```
moving.sh -f vol_list_file -t lsm_id...
```

Where:

- `-f vol_list_file`

The file containing the list of volumes to be moved.

**Note:** The volume IDs must follow these rules:

- One cartridge-id per line.
- The vol\_ids must be valid StorageTek ACSLS volume IDs.
- If the vol\_ids include trailing or leading spaces, they must be enclosed within single quotes or double quotes.

- `-t lsm_id`

Specifies one or more LSM IDs to which the cartridges will be moved.  
Each LSM ID should be separated by a space

## Usage

Use the `moving.sh` utility to move a list of cartridges to other LSM(s) or from one panel to other panels in the same LSM.

You can use either a custom volume report or the `display volume` command to create a file containing the list of volumes to be moved from an LSM.

You want to use the `moving.sh` utility:

- When a StorageTek SL8500 is initially partitioned or repartitioned, and one or more rails (LSMs) are removed from an existing partition (ACS), `moving.sh` can move cartridges from the LSM being removed from the partition to the LSM(s) that will remain in the partition
- When any LSM(s) is removed from an ACS, `moving.sh` can move cartridges to the LSMs that will remain in the ACS.

For example, if SL8500s are removed from a library complex (ACS), `moving.sh` moves cartridges from the SL8500s that are being removed to the LSMs that will remain in the library. This also applies when 9310 LSMs are removed from an ACS of 9310s.

- When a storage expansion module(s) is removed from an StorageTek SL8500, cartridges can be moved from the panels being removed to the panels that will remain in the library
- To optimize library performance you may need to move inactive cartridges to an LSM with few or no drives that are used to archive cartridges. This frees up space in LSMs with drives for new, active cartridges.

### ***Creating the Volume List File***

Before you begin, you must create a file that contains the list of volumes to be moved from an LSM. You can use either the `volrpt` (custom volume report) or the `display volume` command.

- Using `volrpt` to create `vol_list_file`

```
volrpt -d -f custom_volrpt_input -l lsm_id > vol_list_file
```

Where the `custom_volrpt_input` file is:

VOLUME\_ID 6

Sample output

```
$ volrpt -d -f my_custom -l 0,2 > my_file_list
$ cat my_file_list
ABC744
ABC748
ABC756
ACS151
EN0823
O00373
```

- Using the `display volume` command to create the `vol_list_file`

- Display the list of volumes.

Example:

```
display volume * -home acs,lsm,panel,*,* -f vol_id
```

This example selects all volumes on the panel identified by the `-home` parameter. Row and column are wild-carded. Only the `vol_id` is output.

### Sample output

```
ACSSA> display volume * -home 0,3,5,*,* -f vol_id
2007-02-12 15:31:45                               Display Volume
Vol_id
PG0350
PG0353
PG0356
PG0358
PQ0616
```

- b. Create and name your *vol\_list\_file*.
- c. Cut and paste the list of volumes (created from the display command) into this file.
- d. Edit the output.

The *vol\_list\_file* cannot contain any blank lines and leading spaces. Use the following vi command to eliminate them.

```
:%s/^[\ ]*//g
```

If you do not do this, you get an error message as shown in the following example.

```
$ moving.sh -f my_file_list -t 0,2
      Error in file my_file_list.
      Invalid entry
      ABC748
      ABC756
      ACS151
      EN0823
```

This error message was generated because there was an extra space before volumes ABC748 and 756.

### **Procedures for Moving a Group of Cartridges**

The following procedures describe how to:

- move cartridges before removing an LSM from an ACS
- move cartridges before changing or removing panels

### **Moving Cartridges Before Removing an LSM from an ACS**

After a library is re-configured or re-partitioned and if an LSM is removed from an ACS, all cartridges in the LSM become inaccessible. So, before the LSM is removed, all its cartridges should be moved to LSM(s) that will remain in the ACS. Use the following procedure:

- When a rail (LSM) is removed from a partition in a partitioned StorageTek SL8500.
- When an LSM(s) is removed from an ACS. The ACS can include 9310s or an StorageTek SL8500 library.

1. Plan your new configuration.
  - Organize the cartridges and drives for performance.
  - Empty an LSM shortly before you change the library configuration.
  - Determine how many cartridges you have in the LSMs that you are emptying, and how many free cells in the LSMs to which you are moving cartridges.

Use `free_cells.sh -a` to find out the number of cartridges in these LSMs (allocated cells) and free cells.

2. Schedule the move and reconfiguration.
  - Schedule the move to minimize the impact on your system.
  - Moving the cartridges takes time, and reconfiguring a library or repartitioning an StorageTek SL8500 is disruptive.
  - Make sure there are enough free cells in the target LSM(s) for the cartridges being moved. If you have to, eject cartridges to free up space.

3. Vary all of the drives in the LSM being removed offline.

This prevents:

- Contention for robots in the LSM.
- Mounts to this LSM.

Otherwise, cartridges mounted to this LSM can float to new home cells in the LSM, filling up the LSM that you are trying to empty.

4. Vary the LSM being emptied to diagnostic mode to restrict access to only the `cmd_proc` using:

`vary lsm lsm_id diagnostic`

Example: `vary lsm 0,1 diagnostic`

5. Run a custom volrpt to output all of the cartridges in the LSM being emptied to a file, using the following command:

`volrpt -f custom_volrpt_input -l from_lsm_id > move_vols_list`

Where the `custom_volrpt_input` is:

`VOLUME_ID 6`

Example: `volrpt -f volrpt_input -l 0,1 > move_vols_list`

Refer to “[Creating a Custom Volume Report](#)” on page 119 for more information.

6. Move the cartridges out of the LSM being emptied, using the following:

moving.sh -f *move\_vols\_list* -t *dest\_lsm\_id(s)*

7. Check that the LSM is empty using volrpt since cartridges may have been entered into the LSM or may have “floated” into it.

```
volrpt -l from_lsm_id
```

If it is not empty run the custom volrpt again to select the volumes that are now in the LSM. Then, run moving.sh again (steps 3 and 4).

**Note:** Do not run moving.sh again with the original list of volumes.

8. Vary the LSM being emptied offline to prevent volumes from being moved to it.

```
vary lsm lsm_id offline
```

9. Remove the LSM from the partition and/or ACS.

10. Reconfigure the ACS, using either config acs *acs\_id* or acsss\_config.

### ***Moving Cartridges Before Changing or Removing Panels***

You need to move the cartridges before changing a cell panel to a drive panel in a 9310 or removing a storage expansion module in an StorageTek SL8500.

Steps 1 - 4 as procedures as “[Moving Cartridges Before Removing an LSM from an ACS](#)” on page 154.

Step 5: Select the cartridges in the panel being emptied, and output them to a file.

a. Run a custom volrpt to output all of the cartridges in the LSM being emptied to a file. Include the panel number (in the home cell ID).

```
volrpt -f custom_volrpt_input -l from_lsm_id > move_vols_list_1
```

Where the *custom-volrpt\_input* is:

```
VOLUME_ID 6
CELL_ID 14
```

Select the volumes in the panel(s) being emptied and output these vol\_ids to your *move\_vols\_list\_2*.

b. Select the cartridges in a panel being emptied using the display volume command.

```
display volume * -home acs,lsm,panel,*,* -f volume >
move_vols_list_2
```

This selects all volumes on the panel identified by the *-home* parameter. The row and column are wild-carded. Only the *vol\_id* is output, and the output is written to the file.

Edit the output, removing any leading spaces and the trailing blank line.

**Note:** If the destination or “to” LSM is the same as the source or “from” LSM and more than one panel is being emptied, some of the volumes will be moved back to the panels being emptied. You will have to select the volumes off the panels and move them repeatedly to clear out the panels.

Steps 6 - 9 same procedures as “[Moving Cartridges Before Removing an LSM from an ACS](#)” on page 154.

Step 10. Reconfigure the LSM, using either `config lsm lsm_id` or `acsss_config`.

## Examples

- Moving cartridges from LSM 0,4 to LSM 0,0 and 0,1

To move cartridges from LSM 0,4 to LSM 0,0 and 0,1, you must first create a file containing the list of cartridges in LSM 0,4 using `volrpt`, and then run the `moving.sh` utility as below:

Sample output:

```
$ moving.sh -f vol_list.txt -t 0,0 0,1
Number of free cells in LSM 0,0 : 308
Number of free cells in LSM 0,1 : 362
-----
Total number of free cells : 670
Total number of volumes to move : 7

Cartridge CAB001 moved to 0,0,3,0,0
Cartridge CAB002 moved to 0,0,4,0,0
Cartridge CAB003 moved to 0,0,5,0,0
Cartridge CAB004 moved to 0,0,6,0,0
Cartridge CAB005 moved to 0,0,7,0,0
Cartridge CAB006 moved to 0,0,8,0,0
Cartridge CAB007 moved to 0,0,9,0,0

Summary
=====
Number of free cells remaining in LSM 0,0 : 301
Number of free cells remaining in LSM 0,1 : 362
-----
Total number of free cells remaining : 663
Number of cartridges moved : 7
Number of cartridges not moved : 0
```

- Moving cartridges from LSMs 0,4 0,5 0,6 and 0,7 to LSMs 0,0 0,1 0,2 and 0,3,

To optimize performance by moving each LSM to the adjacent LSM:

1. Prepare files containing the list of cartridges in LSM 0,4 0,5 0,6 and 0,7 using *volrpt*.
2. Run four *moving.sh* utilities at the same time but in separate Unix command terminals.

There is no contention between the separate instances of *moving.sh* because the source and destination LSMs and the pass-thru ports used are all different:

### Sample output

```
moving.sh -f vol_list_0-4.txt -t 0,0
moving.sh -f vol_list_0-5.txt -t 0,1
moving.sh -f vol_list_0-6.txt -t 0,2
moving.sh -f vol_list_0-7.txt -t 0,3
```

## Managing Cartridges for Performance

The *moving.sh* utility can be used to move inactive cartridges to archival LSMs. An archival LSM is an LSM with few or no drives that is used to store cartridges that have a low probability of being mounted. The top rail in an StorageTek SL8500 is a good choice for an archival LSM because it does not have direct access to the CAP.

Inactive cartridges that do not need to be in a library can be ejected, while inactive cartridges that still need to be available for automated mounts should be moved to archival LSMs.

To move inactive cartridges to an archival LSM:

1. Identify the inactive cartridges. For example to select cartridges that have not been accessed in the last three months:
2. Run a custom *volrpt* to output all of the cartridges in the LSM being examined, and output the results to a file.

```
volrpt -f custom_volrpt_input -1 from_lsm_id > move_vols_list_1
```

Where the *custom-volrpt\_input* is:

VOLUME\_ID 6

ACCESS\_DATE 15

3. Select the cartridges where the *access\_date* is earlier than three months ago and output these *vol\_ids* to a file with the list of volumes to be moved.
4. Move the inactive cartridges to the archival LSM.

```
moving.sh move_vols_list_2 archival_lsm_id
```

## See also

- “display volume” on page 304
- “volrpt” on page 169

## ■ **probeFibre.sh**

This utility displays all attached libraries connected behind a Sun-branded HBA, or behind a contemporary Emulex or QLogic HBA. In the case of native Emulex or QLogic cards, `probeFibre.sh` relies on the Emulex 'hbacmd' or the QLogic 'scli' utility to collect the vital product data. The `probeFibre.sh` utility displays the model number, revision level and *target:lun i.d.* of each fibre-attached library. Using the `-v` option, you can display the model number of the attached HBA. This utility requires *root* access.

The `probeFibre.sh` utility can be run even before the `mchanger` devices are created for each library.

### Format

`probeFibre.sh`

## ■ **rc.acsss**

The `rc.acsss` utility brings StorageTek ACSLS up and automatically starts the database. There is no need to manually start the database.

### Format

`rc.acsss [idle]`

### Options

`idle` brings StorageTek ACSLS up in the idle state.

### Usage

Use the `rc.acsss` utility to start StorageTek ACSLS. When you start StorageTek ACSLS, it goes through recovery mode to online state. StorageTek ACSLS initialization includes checking its database and the recovering status of the library cartridges and library hardware. StorageTek ACSLS initialization takes from 30 to 60 seconds, the time it takes to launch StorageTek ACSLS processes and to true up the database with library status information.

On Solaris installations, an ASCII status bar displays initialization status in graphical form from start to completion. If desired, this display can be suppressed using `rc.acsss -q`. To view detailed status, showing the specific processes as they are launched, use `rc.acsss -s`.

**Note:** If you are not logged in as `acsss` and try to run `rc.acsss`, the system prompts you for the `acsss` password.

You can run only one copy of StorageTek ACSLS on the server. `rc.acsss` will not restart StorageTek ACSLS if it is already running.

**Note:** `rc.acsss` automatically starts the database when it starts StorageTek ACSLS.

## See Also

["kill.acsss" on page 151](#)

## ■ **rdb.acsss**

The `rdb.acsss` utility restores the StorageTek ACSLS database and the StorageTek ACSLS Control files using a backup created by either the automatic backup function or the `bdb.acsss` utility. The StorageTek ACSLS Control files are located in `$ACS_HOME/data`, and define several different environmental variables for StorageTek ACSLS. They specify Access Control settings, scratch preferences, Extended Store LSMs, custom `volrpt` settings, and volume attributes (for `watch_vols` utility), etc.

**Note:** You need to rewind or position the tape device before you restore the StorageTek ACSLS database and control files from tape. To do this, rewind or position the tape to the exact location where the backup files resided before running `rdb.acsss`.

- For Solaris use one of the following:
  - `mt -f /dev/rmt/0mn rewind`
  - `mt -f /dev/rmt/0mn nbsf 1`
- For AIX use one of the following:
  - `mt -f /dev/rmt1.1 rewind`
  - `mt -f /dev/rmt1.1 bsf 1`

## Format

`rdb.acsss`

## Menu Options

When you run `rdb.acsss`, a menu displays four options:

**Figure 15. rdb.acsss Menu Options**

Please enter the number followed by Return for your choice from the following menu.

Press? followed by the Return key for help.

- 1: Restore from a current local disk backup
- 2: Restore from a previous tape or file backup
- 3: Restore database only (do not include StorageTek ACSLS control files)
- 4: Restore only ACSLS non-database control files
- E: Exit

1. Restore from a current local disk backup

**Explanation:** The database is restored to the backup. StorageTek ACSLS Control files are restored from the backup only. The backups are saved in the default backup directory (`$ACSDB_BKUP`). The database is restored to any database backup listed and selected. Usually there are 8 different dates listed, but this varies depending on the database retention period set in `acsss_config`.

**Usage:** Use this option to restore a corrupted database. With this option, all backups are displayed and you can restore to any displayed database backup.

**Example:**

Menu choice: 1

`rcvr_previous.sh 2642: ACSLS database recovery started.`

You have taken backups on the following days. Please enter the corresponding date and time to the backup that you wish to recover from. ACSLS database and control files will be restored to that time.

2007-02-02 04:38:48

2007-02-03 00:00:01

2007-02-04 00:00:01

2007-02-05 00:00:01

2007-02-05 11:49:06

Please enter the recovery date and time (YYYY-MM-DD HH:MM:SS) :

HINT: You may copy and paste to enter the date and time.

You need to enter the desired date and time from the relevant backup and the database is restored to that point.

2. Restore from previous tape or file backup

**Explanation:** Select this option to recover a database that was copied to a different file system (such as NFS) or to a backup device (such as tape). StorageTek ACSLS Control files are restored.

**Usage:** Use for a catastrophic event such as hardware failure when the database needs to be restored to either the server or even an entirely different server. The platform (OS version/update and StorageTek ACSLS release/PUT level) must be the same.

**Option 2:**

Menu choice: 2.

rcvr\_manual.sh 2635: ACSLS recovery started

To recover the ACSLS environment either:

- Mount a ACSLS backup tape in a tape device and specify this tape device with '-f tape\_device', or
- Specify a file name containing a ACSLS backup with '-f backup\_file'.

The ACSLS database will be recovered from the file specified.

Please enter -f [ backup\_file | tape\_device ]:

**Example 1: Specifying a file with '-f backup\_file'**

Please mount tape (if used) and enter backup source: -f /export/backup/my\_backup.bak

This would restore a backup called my\_backup.bak. Both database and StorageTek ACSLS Control files would be restored and StorageTek ACSLS would be put back in the state that it was when the backup was run.

**Example 2: Restoring a backup created on a tape device**

Restoring a backup created on a tape device uses the same option but works a little differently. When a backup is created to a tape device, the tar archive is created on the tape but it doesn't have a name. When restoring a backup from a tape, only the tape device is given.

**Hint:** You should use a **no rewind** tape device.

Please mount tape (if used) and enter backup source: -f /dev/rmt/0mn

This goes to the device "/dev/rmt/0mn" and verifies there is a valid database backup. If it does exist and is valid, it is restored.

### Procedure to Rewind a Tape:

The tape needs to be REWOUND or POSITIONED at the correct location where the backup files reside before rdb.acsss' is attempted.

**Note:** After running "tar tvbf" command, the tape is advanced to the next block. Make sure you have rewound/repositioned the tape if you intend to run rdb.acsss after running the "tar tvbf" command.

- a. The tape can be rewound/positioned using:

```
mt -f /dev/rmt/0mn rewind" or "mt -f /dev/rmt/0mn nbsf 1 ---> SOLARIS
mt -f /dev/rmt1.1 rewind" or "mt -f /dev/rmt1.1 bsf 1 ---> AIX
```

- b. To verify, the contents of tape after bdb.acsss, use the following commands:

```
tar tvbf 2048 /dev/rmt/0mn ---> SOLARIS
tar tvbf 20 /dev/rmt1.1 ---> AIX
```

3. Restore database only (do not include ACSLS control files)

**Explanation:** The option provides to ability to restore data only. In some environments you may need to restore the StorageTek ACSLS database including its data, but you do not need to restore the StorageTek ACSLS non-database control files.

### Option 3:

Menu choice: 3

To recover the ACSLS database data only either:

- Mount an ACSLS backup tape in a tape device and specify this tape device with '-f tape\_device', or
- Specify a file name containing an ACSLS backup with '-f backup\_file'.

The ACSLS database data will be recovered from the file specified.

\*\*\*\*\*This option does NOT include the ACSLS control files\*\*\*\*\*

Please enter -f [ backup\_file | tape\_device ]:

4. Restore only ACSLS non-database control files

**Explanation:** Restores only the StorageTek ACSLS control files. Prior to restoring any file located in the \$ACS\_HOME/data/internal directory, backups will be made of the existing files, appending the end with a ".bak" extension.

```
$ACS_HOME/data/internal/dynamic_variables/dv_config.dat.bak
$ACS_HOME/data/internal/dynamic_variables/dv_trace.dat
$ACS_HOME/data/internal/release.vars.bak
```

This is not the case for files located in \$ACS\_HOME/data/external. No backups are performed of the StorageTek ACSLS control files prior to recovery.

**Option 4:**

Menu choice: 4

To recover the ACSLS non-database control files either:

- Mount an ACSLS backup tape in a tape device and specify this tape device with '-f tape\_device', or
- Specify a file name containing an ACSLS backup with '-f backup\_file'.

ACSLS non-database control files will be recovered from the file specified.

Please enter -f [ backup\_file | tape\_device ]:

**Example:**

Please enter -f [ backup\_file | tape\_device ]: -f /export/home/my\_file.bak

- -f /export/home/my\_file.bak recovers the StorageTek ACSLS control files from the specified file
- -f /dev/rmt/0mn recovers StorageTek ACSLS control files from the specified tape device

5. Exit

When you exit the rdb.acsss utility, a backup is initiated to the default directory, \$ACSDB\_BKUP.

## See Also

Recovery procedures for:

- ["Restoring the Database to the Most Recent Backup" on page 116](#)
- ["Recovering from a Failed Server" on page 116](#)
- ["bdb.acsss" on page 129](#)

## ■ showDevs.sh

The showDevs.sh utility displays the critical device attributes associated with each mchanger instance in the /dev directory. Critical attributes include the library model number, cell capacity, number of attached drives, and Target-LUN address. The utility also displays the model number of the host bus adapter that is associated with each mchanger device. Additional attributes can be displayed using the following options.

## Format

showDevs.sh [-s][-w][-q][-sq][-wq]

## Usage

The utility can be run as `root` or as `acsss`. Each user ID provides a different set of capabilities. For example:

- `acsss`
  - `user acsss` can list the serial number and the number of cells and drives associated with each library
- `root`
  - `root` can extract serial number and the number of cells and drives only for libraries that are not online to StorageTek ACSLS.
  - However, `root` is able to reveal the Wide Node Name and World Wide Port Name of each fibre-attached library.

## Options

This utility can be run with several options.

`no argument`

reveals each HBA and the model, revision level, target and LUN of each attached library.

`-s`

Optional. This option displays the serial number of each library along with the number of cells and the number of attached drives associated with each library.

`-w`

Optional. This option displays the World Wide Names (WWNN and WWPN) for each HBA and for each attached target library.

This option is not available for user `acsss`.

`-q`

Optional. This option displays only essential mchanger data, while excluding information about the HBAs.

`-sq`

Optional.

`-wq`

Optional.

## Examples

```

# whoami
root

# pwd
/export/home/ACSSS/diag/bin

# ./showDevs.sh
QLogic QLA2300 QLGC,qla@1
/dev/mchanger0: STK L700 V-1012 Target-3 LUN-0
/dev/mchanger1: STK L700 V-1012 Target-3 LUN-1
/dev/mchanger2: STK VLIBRARY V-1012 Target-4 LUN-1
/dev/mchanger3: STK VLIBRARY V-1012 Target-4 LUN-2

LSILogic 53c1030 LSILogic,scsi@1
/dev/mchanger4: STK StorageTek SL500 Target-0 LUN-0

Emulex LP10000 fibre-channel@2
/dev/mchanger5: STK L180 Target-0 LUN-0

# ./showDevs.sh -q
/dev/mchanger0: STK V700 216-cells 10-drives
/dev/mchanger1: STK V700 384-cells 10-drives
/dev/mchanger2: STK VLIBRARY 1000-cells 50-drives
/dev/mchanger3: STK VLIBRARY 10000-cells 461-drives
/dev/mchanger4: STK StorageTek SL500 Target-0 LUN-0
/dev/mchanger5: STK L180 Target-0 LUN-0

# ./showDevs.sh -wq
Target-3 WWNN-50-01-04-F0-00-7E-B3-39 WWPN-50-01-04-F0-00-7E-B3-3A
/dev/mchanger0: STK L700 V-1012 Target-3 LUN-0
/dev/mchanger1: STK L700 V-1012 Target-3 LUN-1

Target-4 WWNN-50-01-04-F0-00-7E-B3-45 WWPN-50-01-04-F0-00-7E-B3-46
/dev/mchanger2: STK VLIBRARY V-1012 Target-4 LUN-1
/dev/mchanger3: STK VLIBRARY V-1012 Target-4 LUN-2

/dev/mchanger4: STK StorageTek SL500 Target-0 LUN-0

Target-0 WWNN-50:01:04:F0:00:41:18:46 WWPN-50:01:04:F0:00:41:19:32
/dev/mchanger5: STK L180 V-0310 Target-0 LUN-0

# ./showDevs.sh -w
QLogic QLA2300 QLGC,qla@1
HBA: WWNN 20-00-00-E0-8B-07-AA-3A WWPN 21-00-00-E0-8B-07-AA-3A

Target-3 WWNN-50-01-04-F0-00-7E-B3-39 WWPN-50-01-04-F0-00-7E-B3-3A
/dev/mchanger0: STK L700 V-1012 Target-3 LUN-0
/dev/mchanger1: STK L700 V-1012 Target-3 LUN-1

Target-4 WWNN-50-01-04-F0-00-7E-B3-45 WWPN-50-01-04-F0-00-7E-B3-46
/dev/mchanger2: STK VLIBRARY V-1012 Target-4 LUN-1
/dev/mchanger3: STK VLIBRARY V-1012 Target-4 LUN-2

LSILogic 53c1030 LSILogic,scsi@1
/dev/mchanger4: STK StorageTek SL500 Target-0 LUN-0

Emulex LP10000 fibre-channel@2
HBA: WWNN 20:00:00:00:c9:46:57:b3 WWPN 10:00:00:00:c9:46:57:b3

Target-0 WWNN-50:01:04:F0:00:41:18:46 WWPN-50:01:04:F0:00:41:19:32

```

```

/dev/mchanger5: STK L180 V-0310 Target-0 LUN-0

# su - acsss
$ whoami
acsss

$ showDevs.sh -sq
/dev/mchanger0: STK V700 S/N-0004300022 216-cells 10-drives
/dev/mchanger1: VL700 S/N-0004300040 10-drives in use by ACSLS.
/dev/mchanger2: STK VLIBRARY S/N-0004300037 1000-cells 50-drives
/dev/mchanger3: STK VLIBRARY S/N-0004300045 10000-cells 461-drives
/dev/mchanger4: StorageTek SL500 S/N-5220000032 6-drives in use by
ACSLs.
/dev/mchanger5: L180 S/N-MPC01000124 4-drives in use by ACSLS.

$ showDevs.sh -s
QLogic QLA2300 QLGC,qla@1
/dev/mchanger0: STK V700 S/N-0004300022 216-cells 10-drives
/dev/mchanger1: VL700 S/N-0004300040 10-drives in use by ACSLS.
/dev/mchanger2: STK VLIBRARY S/N-0004300037 1000-cells 50-drives
/dev/mchanger3: STK VLIBRARY S/N-0004300045 10000-cells 461-drives

LSILogic 53c1030 LSILogic,scsi@1
/dev/mchanger4: StorageTek SL500 S/N-5220000032 6-drives in use by
ACSLs.

Emulex LP10000 fibre-channel@2
/dev/mchanger5: L180 S/N-MPC01000124 4-drives in use by ACSLS.

```

## ■ stats\_report

The stats\_report utility generates library volume statistics reports. To run this utility, you must be logged in as acsss.

### Format

```
stats_report [vol_statsX.log ...]
```

Where:

vol\_statsX.log -

1. Using this optional argument, you can specify one or more archived volume statistics log file names.

The archived files have the format vol\_statsX.log (where 0 <= X <= 8 ).

Using one archived file as input:

```
$stats_report vol_stats0.log
```

The time centric and drive centric reports are generated with the name of the user input file pended to (and shown before) the report file name.

For example, if you specify `vol_stats0.log` then the reports will be generated in the `$ACS_HOME/log` directory as

`vol_stats0_drive_centric.txt` and  
`vol_stats0_time_centric.txt`

2. To generate a report for all the archived volume stats files at once, follow the procedure below:

- a. Generate the full log from individual files

```
$cd $ACS_HOME/log
$cat vol_stats8.log .... vol_stats0.log
acsss_stats.log > vol_statsXXXX.log
```

where `vol_statsXXXX.log`

is the concatenated file of all `vol_statsX.log` (where  $0 \leq X \leq 8$ ) and `acsss_stats.log` in reverse order.

The string `vol_stats` is necessary but `XXXX` can be anything, such as `FULL`, etc.

- b. Run `stats_report`.

```
$stats_report vol_statsXXXX.log
```

Reports are generated as `vol_statsXXXX_drive_centric.txt` and `vol_statsXXXX_time_centric.txt`.

If no filename is given as an argument, then the time centric and drive centric reports are generated from  
`$ACS_HOME/log/acsss_stats.log`.

## Usage

- The `stats_report` uses the current `acsss_stats.log` to prepare two reports of volume statistics. You must enable library volume statistics gathering by setting the variable `LIB_VOL_STATS` to on. This can be done through the `acsss_config` process or through the command line command `dv_config -p LIB_VOL_STATS`. ACSLS then automatically rolls and maintains 9 `acsss_stats.log` files when the log reaches the default size of 500 KB.
- The size of the log files and the number of files to retain is controlled through the variables `LIB_STATS_FILE_NUM` and `VOL_STATS_FILE_SIZE`. These variables are set using the same method as `LIB_VOL_STATS` discussed above.
- The two types of reports are:
  - `drive_centric.txt`

This report contains an ordered list of drives. Each drive record contains all cartridges mounted to the drive, the requestor, the time of the request and the duration of the mount.

- time\_centric.txt

This report contains the usage of drive resources listed on an hourly time scale. Each record in a time period includes the requestor, the specific drive, the number of mounts during that period for that drive, and the duration of drive usage during the hour. Note: if the drive usage exceeds 60 minutes for a time period it is an indication that the mount spanned two time periods and the mount will not be listed in the second time period. The first report created by stats\_report is a drive view.

#### **Notes on processing details:**

- If there is a DISMOUNT record in the log but there is no corresponding MOUNT record, the reason could be that:
  - The log was rolled over, or
  - The operation was logged due to some unknown logging problem.
 In this case the record is omitted from the report generated.
- If there is a MOUNT record in the log but there is no corresponding DISMOUNT record, the reason could be that:
  - The DISMOUNT has not yet happened, or
  - The operation was not logged due to some unknown logging problem.
 In this case the mount duration is set to -1, which is an indication of cases mentioned above. These records are omitted from calculating the total mount duration in the time centric report.
- In the cases of going from day light savings time to standard time, scenarios where the calculated mount duration is negative can arise. To suppress them, the absolute value of the mount duration is taken.

## ■ **volrpt**

The volrpt utility creates a volume report.

### **Format**

```
volrpt [-s vol|loc|use] [-d] [-f filename] [-z] [-a|-1|-v
identifier_list] [-i]
```

## Options

-s

specifies the sort order. If you do not specify this option, the default is to sort by volume ID. If you specify this option, you must specify one of the following values:

vol

sort by volume ID.

loc

sort by volume home location.

use

sort by volume use (number of mounts).

-d

specifies that the output contains no page breaks or header information. The output can be used as input to other programs such as pr.

-f *filename*

*filename* specifies a custom volrpt template.

-z

zero fills identifier fields.

-a

restricts the report to the specified ACS. You can specify multiple ACSs (use blanks to separate the *acs\_ids*).

-l

restricts the report to the specified LSM. You can specify multiple LSMs (use blanks to separate the *lsm\_ids*).

-v

restricts the report to the specified volumes (or volume ranges). You can specify a single *vol\_id*, a list of *vol\_ids* separated by blanks, or a volume range indicated by *vol\_id*-*vol\_id*.

*identifier\_list*

described by the -v, -a, and -l options. This is a list of ACSs, LSMs, and volumes (or volume ranges).

-i

reports all volumes, including absent and ejected cartridges.

If this option is not specified, absent and ejected cartridges are not reported.

## Usage

Use the volrpt utility to create a report of library cartridges, including their physical location, history, attributes, and use. You can also use volrpt to verify

the database after you restore it. You can use the -a, -l, or -v options to specify the ACSs, LSMs, or cartridges for the report. If you do not specify any of these options, volrpt reports on all volumes.

**Note:** Special consideration for leading and trailing spaces

When specifying arguments for volumes that contain leading or trailing spaces, you should enclose the arguments in single quotes. And to assure that the single quote will be passed from one shell component to another, the quote must be tagged with an escape character. In UNIX, the standard escape character is the backslash (\).

**Examples:**

- To formulate a volrpt command on the local machine where you wish to reference volume id's with a leading space, you would submit the command as follows:

```
volrpt -v '\ 0000\-\ 9999\'
```

- To submit the same command through a remote shell (rsh) you would enclose the entire argument inside double quotes:

```
rsh <acsis_hostname> -l acsss bin/volrpt -v "\ 0000\-\ 9999\""
```

[Figure 16](#) shows an example of a standard volume report, which contains fields for volume id, location, label type, media type, and history of usage.

### Figure 16. Standard Volume Report

VOLUME REPORT UTILITY								
2002-06-30 14:01:21								
TOTAL VOLUMES: 400 SEQUENCE: sort by volume identifier								
Volume Label	Home Location	Label Attr	Volume Type/Media	Times Mounted	---Entered--- Date	Last Time	Used-- Date	Time
CLN000	0,0,1,0,3	Ext	C/STK1U	1	08/22/01 09:30		10/04/01 14:26	
RB0000	0,1,2,1,10	Ext.	D/STK1R	3	10/01/01 08:16		10/01/01 08:18	
RB1400	0,0,10,1,3	Ext.	S/STK1R	243	10/01/01 09:30		10/06/01 11:04	
RB1401	0,0,10,3,5	Virt.	D/STK1R	12	10/01/01 03:29		10/05/01 23:11	
"	"	"	"	"	"	"	"	"
"	"	"	"	"	"	"	"	"
"	"	"	"	"	"	"	"	"
TB1440	0,1,3,1,9	Ext.	D/STK2P	43	08/12/01 09:11		09/28/01 17:52	
"	"	"	"	"	"	"	"	"
"	"	"	"	"	"	"	"	"
"	"	"	"	"	"	"	"	"

In the Volume Type/Media column: C denotes cleaning cartridges; D denotes data cartridges; and S denotes scratch cartridges.

Use the `-f filename` option to create a customized report; see [“Creating a Custom Volume Report” on page 119](#), for more information.

`$ACS_HOME/data/external/volrpt/owner_id.volrpt` is a sample input file that you can run or use as a template to create customized volume reports. You can also save your customized volume reports in the `$ACS_HOME/data/external/volrpt` directory.

You can redirect the volume report to a file with standard UNIX redirection:

```
volrpt > file
```

## Examples

To report the cartridges in both ACS 0 and ACS 1, enter:

```
volrpt -a 0 1
```

To report the cartridges in LSMs 0,1 and 2,1 sorted by home cell location, enter:

```
volrpt -s loc -l 0,1 2,1
```

## Notes

- `volrpt` displays the specified volume report if it completes successfully. `volrpt` prints a message to `stderr` and exits if you specify the `-f` option and `volrpt` cannot find the specified file or you specify more than one input file. For field errors within the input file, `volrpt` prints a message to `stderr` and ignores the line in error but does not exit.
- If cartridges are not found in the volume ID list or range or library component you specified, `volrpt` returns a `no volumes found` message.
- If a library component(s) is specified through the `-a`, `-l`, or `-v` option, but no volumes are found, messages such as the following are displayed:

- `-a` option (ACS)

### Messages:

When a single `acs_id` is provided and no volumes are present, the following error displays: `No Volumes found for ACS: (<acsid>)`

### Example:

```
$ volrpt -a 2
No Volumes found for ACS: (2)
```

When multiple `acs_ids` are provided and none of them have any volumes, the following error displays: `No Volumes found for ACS: (<acsid1>)(<acsid2>)`

### Example:

```
$ volrpt -a 0 1
No Volumes found for LSM: (0) (1)
```

- `-l` option (LSM)

### Messages:

When a single `lsm_id` is provided and no volumes are present, the following error displays: `No Volumes found for LSM: (<lsmid>)`

### Example:

```
$ volrpt -l 1,1
No Volumes found for LSM: (1,1)
```

When multiple lsm\_ids are provided and none of them have any volumes, the following error displays: No Volumes found for LSM: (<lsmid1>)(<lsmid2>)

Example:

```
$ volrpt -l 1,1 1,2
No Volumes found for LSM: (1,1) (1,2)
```

- **-v** option (VOLUME)

Messages:

When a single valid is provided and no volumes are present, the following error displays: Volume(s) not: (<valid>)

Example:

```
$ volrpt -v BBB112
No Volumes found: (BBB112)
```

When multiple valids are provided and none of them have any volumes, the following error displays: Volume(s) not found: (<valid1>)(<valid2>)

Example:

```
$ volrpt -v BBB112 BBB114
No Volumes found: (BBB112) (BBB114)
```

The **-v** option can also be used for volume range, and produces similar messages when no volumes are present.

When a single volume range is provided and no volumes are present, the following error displays: Volume(s) not: (<volrange>)

Example:

```
$ volrpt -v BBB112-BBB116
No Volumes found: (BBB112-BBB116)
```

When multiple volume range is provided and no volumes are present, the following error displays: Volume(s) not: (<volrange1>) (<volrange2>)

Example:

```
$ volrpt -v BBB112-BBB116 BBB220-BBB224
No Volumes found: (BBB112-BBB116) (BBB220-BBB224)
```

- When an ACS or LSM has not been configured

When volrpt is used with an acs\_id or lsm\_id that does not exist, it displays a message according to the identifier.

- **-a** (ACS)  
ACS identifier (<acsid>) not configured
- **-l** (LSM)  
LSM identifier (<lsmid>) not configured

## See Also

[“Creating a Custom Volume Report” on page 119](#)

## ■ **watch\_vols**

This utility applies pre-defined policies for volumes that are:

- newly entered
- discovered by audit or cartridge recovery
- re-activated by audit, cartridge recovery, or an enter

These policies are defined in the file:

`$ACS_HOME/data/external/vol_attr.dat`

This file contains a list of user-defined volume IDs or volume ranges and a user-specified policy for each volume recorded. For each volume or volume range listed in that file, you can define volume ownership, pool association and/or preferred LSM location when a volume is entered. Specific instructions for defining policies are explained in detail in the `vol_attr.dat` file.

The `watch_vols` utility uses the `acsss_stats.log` to identify the existence of newly entered volumes or volumes discovered or re-activated during an audit or by cartridge recovery. To enable this capability, you must enable volume statistics with `acsss_config` (option 3). With volume statistics enabled, `watch_vols` monitors the tail of the `acsss_stats.log`, looking for matching volumes with the entries defined in `vol_attr.dat`. Wherever a match is found, the defined policy for that volume is automatically applied.

**Note:** The volume IDs must follow these rules:

- One `vol_id` or volume range per line.
- The `vol_ids` must be valid StorageTek ACSLS volume IDs.
- If the `vol_ids` include trailing or leading spaces, they must be represented as underscores (\_).

## Format

`watch_vols [start|stop]`

## Usage

You can check the running status of the utility by invoking `watch_vols` with no parameter. If you are unsure of the status of `watch_vols` (running or stopped), the command `watch_vols` with no argument will display the current status.

There are two options for `watch_vols`, *start* and *stop*.

- `watch_vols start`

When the `start` parameter is invoked, `watch_vols` reviews the policies defined in `vol_attr.dat`. If there are errors in format or syntax, `watch_vols` displays the error and prompts you to make the necessary correction to `vol_attr.dat`. Once the defined policy is accepted by `watch_vols`, the utility invokes a daemon to run in the background. The daemon continues to run as long as StorageTek ACSLS is running. It starts automatically whenever StorageTek ACSLS is restarted.

The policy table in `vol_attr.dat` can be updated at any time. You need not stop `watch_vols` in order to update the policy. Just run `watch_vols start` to commit the updates to the running program.

- `watch_vols stop`

A log of all `watch_vols` activities is maintained in the log file:

**`$ACS_HOME/log/watch_vols_event.log`**

Each change of volume ownership, pool\_id, or LSM home location is logged in this file.

## Example

You are performing an enter operation and you want to move specific volumes to a target LSM when they are entered.

1. Audit the target LSM with `watch_vols disabled`.
2. Once the target LSM has been audited, start `watch_vols`.
3. Enter the volumes that have policies defined in `vol_attr.dat`.

`watch_vols` then moves the specified volumes to the destination LSM after they are entered.

---

In this chapter, you will learn how to use the StorageTek ACSLS commands, including general command syntax and reference information.

[“audit” on page 182](#)

Creates or updates the database inventory of the volumes in a library component.

[“cancel” on page 188](#)

Cancels a current or pending request.

[“clear lock” on page 192](#)

Removes all active and pending locks on drives or cartridges.

[“define pool” on page 194](#)

Creates or modifies scratch pools.

[“delete pool” on page 196](#)

Deletes empty scratch pools.

[“dismount” on page 198](#)

Dismounts a cartridge.

[“eject” on page 201](#)

Ejects one or more cartridges from the ACS.

[“enter” on page 205](#)

Sets a CAP to enter mode.

[“idle” on page 209](#)

Stops StorageTek ACSLS from processing new requests.

[“lock” on page 211](#)

Locks (dedicates) a cartridge or drive to a user.

[“logoff” on page 213](#)

Exits from cmd\_proc.

[“move” on page 223](#)

moves a specified cartridge to an available storage cell in a specified LSM.

[“mount” on page 214](#)

Mounts a data or scratch cartridge.

[“query commands” on page 224](#)

Displays the status of a library component.

[“set commands” on page 253](#)

Sets various attributes of different library components.

[“show” on page 264](#)

Displays your lock ID or user ID.

[“start” on page 265](#)

Starts StorageTek ACSLS request processing.

[“switch lmu” on page 266](#)

Manually switches ACS management from the ACS's active LC/LMU to the standby LC/LMU.

[“unlock” on page 269](#)

Removes active locks on cartridges or drives.

[“vary” on page 271](#)

Changes the state of an ACS, LSM, CAP, drive, or port.

[“venter” on page 278](#)

Enters one or more cartridges with missing or unreadable labels into the ACS.

**Note:** The L5500, StorageTek SL500, and StorageTek SL8500 libraries do not support unlabeled cartridges (venters).

## ■ General Command Syntax

This section describes the general syntax of the StorageTek ACSLS commands. The following sections fully describe each command, including its syntax.

StorageTek ACSLS commands use the following general syntax:

*command type identifier state options*

Where:

*type identifier*

is the ACS component and its identifier; see [“Component Types and Identifiers” on page 179](#) for more information.

*state*

is a device state for the *vary* command only.

*options*

are command options; see the description of the command you want to run.

Also note the following syntax rules:

- You must enter commands in the order shown above (command name, followed by the component and its identifier, followed by the state and any options).
- This chapter shows commands in lowercase, but you can enter commands in any combination of lowercase and uppercase letters.
- Underlines show minimum abbreviations for commands and keywords. For example, `query server` and `q ser` are both valid forms of the `query server` command.
- Ellipses (...) indicate that you can repeat an identifier.
- Brackets [ ] enclose optional options.

## ■ Component Types and Identifiers

**Table 15** describes the valid ranges of values for each of the ACS component identifiers. You can specify a maximum of 42 identifiers for each type. See specific command descriptions for the valid component types for each command.

**Note:** The identifiers specified in **Table 15** represent valid ranges of values supported by the software. Your LSM type and library configuration determine what identifier values are valid for your particular site.

**Table 15. StorageTek ACSLS Component Types and Identifiers**

Component	Type	Identifier	Valid Values
entire library	<u>server</u>	none	none
ACS	<u>acs</u>	<i>acs_id</i>	<code>acs(0-31), lsm(0-99)</code>
LSM	<u>lsm</u>	<i>lsm_id</i>	<code>acs(0-31), lsm(0-99)</code>
LSM panel	<u>panel</u>	<i>panel_id</i>	<code>acs(0-31), lsm(0-99), panel(0-50),</code>
LSM subpanel *	<u>subpanel</u>	<i>subpanel_id</i>	<code>acs(0-31), lsm(0-99), panel(0-50), startrow(0-51), startcolumn(0-23), endrow(0-51), endcolumn(0-23)</code>

**Table 15. StorageTek ACSLS Component Types and Identifiers**

Component	Type	Identifier	Valid Values
LSM storage cell	<u>subpanel</u>	<i>cell_id</i>	acs(0-31), lsm(0-99), panel(0-50), row(0-51), column(0-23)
			* The ending row (and column) must be greater than or equal to the beginning row (and column). Only cells within the beginning and ending matrix are audited: the matrix starts with the beginning row and beginning column and extends to the ending row and ending column.
CAP	<u>cap</u>	<i>cap_id</i>	acs(0-31), lsm(0-99), cap(0-11)
			An asterisk (*) in the <i>cap_id</i> does the following:  acs,lsm,* - causes StorageTek ACSLS to select the highest priority available CAP in the LSM.  acs,* - causes StorageTek ACSLS to select the highest priority available CAP in the ACS.  * - for an enter request causes StorageTek ACSLS to select the CAP in the LSM with the most free cells.  * - for an eject request causes StorageTek ACSLS to select the highest priority CAP in each ACS with a cartridge designated for ejection.
drive	<u>drive</u>	<i>drive_id</i>	acs(0-31), lsm(0-99), panel(0-50), drive(0-31)
drive type	<u>drive</u>	<i>drive_type</i>	Up to a 10-character drive type identifier; can be any combination of numbers (0-9) or letters (A-Z). Spaces are not allowed.
port	<u>port</u>	<i>port_id</i>	acs(0-31), port(0-3)

**Table 15. StorageTek ACSLS Component Types and Identifiers**

Component	Type	Identifier	Valid Values
volume serial number of a data or scratch cartridge or a cleaning cartridge	<u>volume</u> , <u>scratch</u> , <u>clean</u>	<i>vol_id</i>	Six-character identifier consisting of any combination of numbers (0-9), letters (A-Z), dollar sign (\$), pound sign (#), and spaces  Use single or double quotes to enclose volsers with leading or trailing spaces.  <i>Do not</i> specify volsers with embedded spaces.
range of volume serial numbers	<u>volume</u>	<i>volrange</i>	Specifies an ascending range of volumes separated by a dash (-)  If the ALPHANUM_VOL_RANGES dynamic variable is set to FALSE (default): StorageTek ACSLS supports the starting and ending vol_ids of the range that are specified as complete vol_ids (Ex: AAA000-AAA999). Specify only the right-most numeric portions of the volsers as the range. All preceding characters must be identical. ***  If the ALPHANUM_VOL_RANGES dynamic variable is set to TRUE: StorageTek ACSLS supports volume ranges consisting of any combination of numbers (0-9), letters (A-Z), dollar sign (\$), pound sign (#), and spaces (leading and trailing). ***  *** Use single or double quotes to enclose volsers in a range with leading or trailing spaces. The range must be in ascending sequence per the ASCII collating sequence.
volume media type	<u>media</u>	<i>media_type</i>	Up to a 10-character media type identifier; can be any combination of numbers (0-9), letters (A-Z), and dashes (-). Spaces are not allowed.

**Table 15. StorageTek ACSLS Component Types and Identifiers**

Component	Type	Identifier	Valid Values
volume owner	<u>owner</u>	<i>owner_id</i>	
scratch pool	<u>pool</u>	<i>pool_id</i>	Decimal number (0-65534). Specifying an asterisk (*) for the <i>pool_id</i> reassigns the volume to its current <i>pool_id</i> .
StorageTek ACSLS request	<u>request</u>	<i>request_id</i>	Unique decimal number (0-65535) assigned by StorageTek ACSLS.
drive or volume lock	<u>lock</u>	<i>lock_id</i>	Decimal number (0-32767)
StorageTek ACSLS request	<u>request</u>	<i>request_id</i>	unique numeric (0-65535) request identifier assigned by StorageTek ACSLS.

## ■ Common Command Error Messages

A common error message appears if StorageTek ACSLS rejects a command because of a syntax error, invalid identifier, type, or option, process failure, database error, and so forth. For more information on common error messages, see *StorageTek ACSLS Messages*.

If you enter a command that you cannot use, the following message appears:

Command access denied.

If you specify a volume that you cannot access, the following message appears:

Volume access denied.

## ■ audit

The audit command updates the StorageTek ACSLS database to match the actual inventory of library cartridges.

You must always perform an audit if:

- This is a new library
- To re-synchronize the StorageTek ACSLS database with the contents of the library.
- One or more modules have been added, removed, or swapped.
- Cartridges have been manually added or removed through the door
- After library configuration settings have changed.

- If StorageTek ACSLS does not know the location of one or more cartridges in the library.
- If a library has been expanded and you are auditing it for the first time

When a StorageTek SL8500 has been expanded please see the procedures, [“Expanding the StorageTek SL8500” on page 345](#), to audit it for the first time.

### Format

`audit cap_id type identifier...`

*cap\_id*

specifies the CAP that StorageTek ACSLS uses to eject any errant volumes. You can specify a particular cap or enter an asterisk (\*), which causes StorageTek ACSLS to select the highest priority CAP.

You can specify the server or multiple ACSs only if CAP priority has been set in each ACS. You must specify an asterisk for the *cap\_id* to allow automatic selection of a CAP in each ACS.

A single LSM audit waits until StorageTek ACSLS updates the database, then reserves the CAP if required to eject errant volumes.

*type identifier*

specifies a library component. [Table 16](#) lists the components you can audit.

**Table 16. Valid Components for Audit**

Library Component	<i>type</i>	<i>identifier</i>
all libraries	<code>server</code>	<code>none</code>
ACS	<code>acs</code>	<code>acs_id</code>
LSM	<code>lsm</code>	<code>lsm_id</code>
LSM panel	<code>panel</code>	<code>panel_id</code>
LSM subpanel	<code>subpanel</code>	<code>subpanel_id</code>

You can specify multiple ACSs, LSMs, panels, or subpanels in a single audit request. You cannot specify overlapping subpanels.

You can specify the server or multiple ACSs only if CAP priority has been set in each ACS. You must specify an asterisk for the *cap\_id* to allow automatic selection of a CAP in each ACS. If this is not done, audit is unable to eject any invalid cartridges found.

When you audit the server or an ACS, the parent audit process creates a separate audit process for each LSM. These LSM audits run in parallel and process panel-by-panel in ascending *panel\_id* sequence. To audit all LSMs in

all libraries or an ACS, just audit the server or ACS. There is no need to run multiple, separate LSM audits.

However, within an LSM, regardless of the order in which you specify multiple components the audit processes these components in ascending order by *acs\_id*, *lsm\_id* *panel\_id*, *subpanel\_id*. For example, the audit will process panel 0,0,9 before subpanel 0,0,10,1,7 even if you specify the subpanel first.

### **Usage**

An audit updates the StorageTek ACSLS database to match the actual inventory of library cartridges. You run an audit to:

- Create volume information in the database if you do not enter cartridges through the CAP. For example, run an audit if you add an LSM to your library, open the LSM door, and manually add cartridges to the LSM.
- Resolve discrepancies between the library and the database. For example, run an audit if you open an LSM door and manually remove cartridges instead of ejecting them through the CAP. The audit deletes information for the removed cartridges from the database.
- View the contents of cells specified by the audit (you must have a display monitor connected to the LSM robot's vision system).

**Note:** Audit recognizes particular models of cleaning cartridges and will record them in the database as cleaning cartridges. However, the audit command does not set the *max\_uses* for new cleaning cartridges it encounters. You will have to set the *max\_uses* for these using the set clean command on pages 160 and 300.

When audit cannot find a cartridge in any recorded location (cell and possibly drive), audit either marks the cartridge as absent (if absent volume retention is enabled) or deletes the volume. When audit deletes the volume, it removes all information about the volume from the database, including volume information and customer-supplied information about access control, scratch status, lock IDs, and pool IDs. If audit later finds the cartridge in another location, it re-adds the volume information, but the customer-supplied information is lost.

An audit ejects errant volumes and deletes their information from the database. An errant volume has:

- An external label that duplicates one already scanned.
- A missing or unreadable external label and no virtual label.
- An invalid media type.

Audits only apply to LSM storage cells, not to drives or CAPs. StorageTek ACSLS displays *cmd\_proc* messages during the audit and records any database changes from the audit in the event log. If volume statistics logging

is enabled, StorageTek ACSLS records additional volume found and volume not found messages in the `acsss_stats.log`. See [“Creating a Logging Volume Statistics Report” on page 122](#) for more information.

**Hint:** Use the following guidelines for running an audit:

- The ACS or LSM being audited must be either online or in diagnostic state. Normal library processing (including mounts and dismounts) can occur during an audit, although library processing slows down the audit.

The difference between online and diagnostic states is: an audit in diagnostic state can only be performed through the `cmd_proc`. Client requests are rejected while the LSM is in the diagnostic state. This state is faster because the audit now has exclusive run of the library without competing mount/dismount requests that could otherwise be submitted from the client.

- After you start an audit on an entire LSM, you cannot start another audit on the same LSM. You must cancel and rerun the audit.
- You can cancel any audit request, but StorageTek ACSLS will always finish auditing the current panel or subpanel. When you cancel an audit, some or all of the cartridges marked for ejection may not be ejected. When you cancel an audit, cartridges already ejected are not re-entered.

**CAUTION:** If you cancel an audit or if there is a library or StorageTek ACSLS hardware or software failure during the audit, you must rerun the same audit. Cartridges marked for ejection but not actually ejected during the first audit are no longer in the database and are not under StorageTek ACSLS control.

### Examples

To audit the entire library and specify the highest priority CAP in each ACS for ejections:

```
audit * server
```

To audit LSM 0,1 and specify CAP 0,1,1 for ejections:

```
audit 0,1,1 lsm 0,x
```

To audit panel 10 of LSM 0,1 and specify the highest priority CAP in LSM 0,1 for ejections:

```
audit 0,1,* panel 0,1,10
```

### Notes

A cell cannot be audited if it is reserved by another process. If a cell is reserved, StorageTek ACSLS rechecks the database until the cell becomes available up to a maximum of 60 retries. If the cell is still unavailable, the audit skips the cell and logs a message to the event log.

**See Also**

For information about...	See...
Guidelines for auditing the library	<a href="#">"Auditing the Library" on page 50</a>
Cancelling a command	<a href="#">"cancel" on page 188</a>
Displaying CAP status	<a href="#">"query cap" on page 227</a>
Displaying StorageTek ACSLS and library status	<a href="#">"query server" on page 250</a>
Displaying ACS status	<a href="#">"query acs" on page 225</a>
Displaying LSM status	<a href="#">"query lsm" on page 238</a>
Setting CAP selection priority	<a href="#">"set cap priority" on page 256</a>
Setting CAP mode (manual or automatic)	<a href="#">"set cap mode" on page 254</a>
Changing the state of a library component	<a href="#">"vary" on page 271</a>

**Command Area Messages****Success Messages**

The following message appears when the audit completes successfully.

Audit: Audit completed, Success.

In addition, one of the following messages appears to confirm which component was audited:

Audit: Audit of storage server, valid  
 Audit: Audit of ACS, acs\_id, status valid  
 Audit: Audit of LSM, lsm\_id, panel\_id, valid  
 Audit: Audit of panel, panel\_id, valid  
 Audit: Audit of subpanel, subpanel\_id, valid

**Hint:** If you audit an invalid cell location (that is, just above or below a drive or on an extra column), StorageTek ACSLS returns a success message to allow audits to work with PTPs.

**Intermediate Messages**

Intermediate messages consist of a two-line display with the following first line:

Audit: Intermediate response: Audit activity.

One of the following messages appears on the second line.

Audit: Volume ejected, unreadable label.

**Explanation:** StorageTek ACSLS ejected a cartridge that had:

- No external label
- No virtual label, or
- An unreadable label

Audit: Volume *vol\_id* will be ejected, duplicate label.

**Explanation:** StorageTek ACSLS ejected with a duplicate external label within the range of cells being audited.

**Variable:** *vol\_id* is the volume with the duplicate label.

Audit: Volume *vol\_id* found.

**Explanation:** The audit found a volume in the ACS that is not in the StorageTek ACSLS database. The audit added the volume to the database.

**Variable:** *vol\_id* is the volume added to the database.

Audit: Volume *vol\_id* not found.

**Explanation:** A volume listed in the StorageTek ACSLS database is not in the ACS. The volume is deleted from the database.

**Variable:** *vol\_id* is the volume deleted from the database.

Audit: Volume will be ejected, invalid media type

**Explanation:** StorageTek ACSLS ejected a volume with an invalid media type.

## Error Messages

Audit in progress.

**Explanation:** StorageTek ACSLS did not start the audit because another audit for the same LSM is in progress.

CAP *cap\_id* in use.

**Explanation:** The CAP specified for the audit is in use.

**Variable:** *cap\_id* is the CAP in use.

Multiple ACS audit.

**Explanation:** The audit failed because the audit command specified multiple ACSs without specifying an \* for the *cap\_id*.

Not in same ACS.

**Explanation:** The audit failed because the *cap\_id* and the *identifier* specified are not in the same ACS.

**Variable:**

- *cap\_id* is the CAP specified for the audit.
- *identifier* is the library component specified for the audit.

### **Display Area Messages**

*cap\_id* Remove cartridges from CAP.

**Explanation:** The audit filled the CAP with ejected cartridges. Empty the CAP, then close it to continue the audit.

**Variable:** *cap\_id* is the CAP that contains the ejected cartridges.

CAP *cap\_id*: Place magazines in CAP.

**Explanation:** The CAP requires magazines for the audit. Open the CAP, place magazines inside, then close the CAP.

**Variable:** *cap\_id* is the CAP that requires magazines.

CAP *cap\_id*: No CAP available, waiting...

**Explanation:** No CAP is available to eject cartridges.

**Variable:** The *cap\_id* appears as it was specified in the audit command:

- *acs, lsm, cap* if the audit command explicitly specified the CAP.
- *acs, lsm, \** if the audit command specified the CAP as *acs, lsm, \**.
- *acs, \*, \** if the audit command specified the CAP as *acs, \* or \**.

## ■ **cancel**

The cancel command cancels a current or pending request.

### **Format**

cancel *request\_id*

### **Options**

*request\_id*

specifies the identifier of the request to cancel.

Use the cancel command to cancel current or pending request issued by an audit, define pool, delete pool, eject, enter, lock, query, set, or venter command or client application. Use the query request command to display the ID of the request you want to cancel.

You can cancel an audit of a server, ACS, or LSM. Because StorageTek ACSLS internally translates server, ACS, or LSM audits into a series of panel audits, StorageTek ACSLS completes the audit of the current panel before cancelling the remainder of the audit. You cannot cancel an audit of a panel or

subpanel. When you cancel an audit, cartridges already ejected are not re-entered.

**CAUTION:** If you cancel an audit or if there is a library or StorageTek ACSLS hardware or software failure during the audit, you must rerun the same audit. Cartridges marked for ejection but not actually ejected during the first audit are no longer in the database and are not under StorageTek ACSLS control.

**Hint:** You must enter a `cancel` command from a different `cmd_proc` than the `cmd_proc` that issued the request you want to cancel.

The `cancel` command immediately cancels any pending requests and handles current requests as follows:

*audit*

Because StorageTek ACSLS internally translates server, ACS, or LSM audits into a series of panel audits, StorageTek ACSLS completes the audit of the current panel before cancelling the remainder of the audit.

**CAUTION:** If you cancel an audit or if there is a library or StorageTek ACSLS hardware or software failure during the audit, you must rerun the same audit. Cartridges marked for ejection but not actually ejected during the first audit are no longer in the database and are not under StorageTek ACSLS control.

*define pool*

StorageTek ACSLS stops defining scratch pools but does not delete any scratch pools already defined.

*delete pool*

StorageTek ACSLS stops deleting scratch pools but does not redefine any scratch pools already deleted.

*eject*

StorageTek ACSLS stops the ejection and the `cmd_proc` displays a message to remove any cartridges already ejected, which are not reentered.

The eject does not terminate until the cartridges are removed, the CAP is closed, and StorageTek ACSLS verifies that the CAP is empty.

*enter*

StorageTek ACSLS stops the enter and, if any cartridges remain in the CAP, `cmd_proc` displays a message to remove these cartridges. Any cartridges already entered into the LSM are not ejected.

The enter does not terminate until the cartridges are removed, the CAP is closed, and StorageTek ACSLS verifies that the CAP is empty.

**Note: Automatic enter.** You cannot cancel an automatic enter operation that is in progress using the `cancel` command. To terminate an automatic enter in progress:

- If the CAP door is open, remove all the cartridges and close the door.
- If the CAP door is closed and the cartridges are being moved into the library, you must allow the remaining cartridges to be entered into the library. The enter then terminates.

*lock*

Resource locking by the specified request is stopped. If the request has not yet acquired all specified resources, none of the resources are locked.

*query*

StorageTek ACSLS cancels the query.

*set*

For set cap, StorageTek ACSLS stops setting CAP attributes, but does not change any attributes already set.

For set scratch or set clean requests, StorageTek ACSLS stops setting scratch cartridge or cleaning cartridge attributes, but does not change any attributes already set.

*venter*

StorageTek ACSLS stops the enter and, if any cartridges remain in the CAP, cmd\_proc displays a message to remove these cartridges. Any cartridges already entered into the LSM are not ejected.

### **Examples**

To display request IDs for all current and pending requests:

```
query request all
```

Example output of query request all:

Identifier	Command	Status
13	enter	Current
15	query	Pending

To cancel request 13 (current enter request) in the example above:

```
cancel 13
```

### **Notes**

None.

### **See Also**

---

For information about...	See...
Updating the StorageTek ACSLS database to match the actual inventory of library cartridges	<a href="#">"audit" on page 182</a>

For information about...	See...
Creating or modifying scratch pools	<a href="#">"define pool" on page 194</a>
Deleting empty scratch pools	<a href="#">"delete pool" on page 196</a>
Ejecting cartridges from the library	<a href="#">"eject" on page 201</a>
Making a CAP (manual mode) ready to enter labelled cartridges into the library	<a href="#">"enter" on page 205</a>
Locking (dedicating) drives and cartridges to your current lock ID	<a href="#">"lock" on page 211</a>
Displaying the status of a library component	<a href="#">"query commands" on page 224</a>
Setting various attributes of different library components	<a href="#">"set commands" on page 253</a>
Making a CAP ready to enter unlabeled cartridges into the library	<a href="#">"venter" on page 278</a>

## **Command Area Messages**

### **Success Messages**

Request *request\_id* cancelled.

**Explanation:** StorageTek ACSLS cancelled the requested command.

**Variable:** *request\_id* is the request identifier of the cancelled command.

### **Intermediate Messages**

None.

### **Error Messages**

Request *request\_id* can not be cancelled: *status*.

**Explanation:** StorageTek ACSLS cannot cancel the specified command.

**Variable:**

- *request\_id* is the request identifier of the command that StorageTek ACSLS cannot cancel.
- *status* is one of the following:

Request identifier *request\_id* invalid.

The cancel command specified an invalid request identifier.

Request identifier *request\_id* not found.

The cancel command specified an request identifier for a request that is not current or pending.

### ***Display Area Messages***

None.

## ■ **clear lock**

The clear lock command removes all active and pending locks on a specified drive or cartridge.

### ***Format***

clear lock *type identifier*

### ***Options***

*type identifier*

specifies a library component. [Table 17](#) lists the components whose resource locks you can clear.

**Table 17. Valid Components for Clear Lock**

Library Component	<i>type</i>	<i>identifier</i>
drive	drive	drive_id
volume	volume	vol_id

### ***Usage***

Use the clear lock command to remove all active and pending locks on a specified drive or cartridge. Your current lock ID must either be 0 or it must match the lock ID of the driver or cartridge.

The unlock command removes only active locks on drives or cartridges. You can, however, use the unlock command to remove active locks on all drives or all cartridges.

**Note:** The clear lock command always resets your lock ID to 0.

### ***Examples***

To clear all locks for drive 1,1,5,2:

`clear lock drive 1,1,5,2`

To clear all locks for volume NN0108:

`clear lock volume NN0108`

### ***Notes***

You cannot cancel a clear lock command.

## See Also

For information about...	See...
Locking drives and cartridges	<a href="#">"lock" on page 211</a>
Displaying the lock status of a drive or cartridge	<a href="#">"query lock" on page 236</a>
Setting your lock ID	<a href="#">"set lock" on page 259</a>
Displaying your lock or user ID	<a href="#">"show" on page 264</a>
Removing active locks for drives or cartridges	<a href="#">"unlock" on page 269</a>

## Command Area Messages

### Success Messages

The following message appears when a clear request succeeds:

Clear: Completed, Success.

In addition, for each identifier in the request, one of the following messages appears depending on the library component (*type*):

Clear: Drive *drive\_id* all locks cleared.

Clear: Volume *vol\_id* all locks cleared.

### Intermediate Messages

None.

### Error Messages

Clear: Clear lock of drive *drive\_id* failed,  
Drive identifier *drive\_id* available.

**Explanation:** StorageTek ACSLS cannot clear locks because the specified drive is not locked.

**Variable:** *drive\_id* is the identifier of the specified drive.

Clear: Clear lock of volume *vol\_id* failed,  
Volume identifier *vol\_id* available.

**Explanation:** StorageTek ACSLS cannot clear locks because the specified volume is not locked.

**Variable:** *vol\_id* is the identifier of the specified volume.

## Display Area Messages

None.

## ■ **define pool**

The define pool command creates or modifies scratch pools.

### **Format**

```
define pool low_water_mark high_water_mark  
pool_id...[overflow]
```

### **Options**

*low\_water\_mark*

is the low volume warning threshold. If the scratch cartridge count falls below this threshold, StorageTek ACSLS logs a warning message in the event log. Valid values are 0 to 2<sup>31</sup>-1. The default is 0.

*high\_water\_mark*

is the high volume warning threshold. If the scratch cartridge count reaches or exceeds this threshold, StorageTek ACSLS logs a warning message in the event log. This value must be greater than the value for *low\_water\_mark*.

*pool\_id*

specifies the pool identifier. Pool 0 is the common scratch pool, which always exists. You can modify the common scratch pool attributes.

*overflow*

specifies that if this pool cannot satisfy mount scratch requests, StorageTek ACSLS will select cartridges from the common pool (Pool 0).

### **Usage**

Use the define pool command to create or modify scratch pools.

### **Examples**

To define a low threshold of 0, a high threshold of 600, and overflow for new pool 1:

```
define pool 0 600 1 overflow
```

To define a low threshold of 0, a high threshold of 600, and no overflow for existing pool 5:

```
define pool 0 600 5
```

### **Notes**

Scratch pools are not owned by one client application or user ID. You can, however, use volume access control to restrict access for specific scratch cartridges.

## See Also

For information about...	See...
Cancelling a command	<a href="#">"cancel" on page 188</a>
Deleting empty scratch pools	<a href="#">"delete pool" on page 196</a>
Guidelines and procedures for managing scratch cartridges	<a href="#">"Managing Scratch Cartridges" on page 88</a>
Mounting a scratch cartridge on a drive	<a href="#">"mount *" on page 217</a>
Displaying scratch pool attributes	<a href="#">"query pool" on page 244</a>
Setting or clearing cartridge scratch attributes	<a href="#">"set scratch" on page 262</a>

## Command Area Messages

### Success Messages

The following message appears when a define pool command succeeds:

Define: Define completed, Success.

In addition, the following message appears for each created or modified pool:

Define: Pool *pool\_id* created.

### Intermediate Messages

None.

### Error Messages

None.

## Display Area Messages

Pool *pool\_id*: low water mark warning.

**Explanation:** The number of volumes in the specified scratch pool is less than or equal to the low volume threshold.

**Variable:** *low\_water\_mark* is the low volume threshold of the specified scratch pool.

Pool *pool\_id*: high water mark warning.

**Explanation:** The number of cartridges in the specified scratch pool is greater than or equal to the high volume threshold.

**Variable:** *high\_water\_mark* is the high volume threshold of the specified scratch pool.

## ■ **delete pool**

The delete pool command deletes empty scratch pools.

### **Format**

delete pool *pool\_id...* | all

### **Options**

*pool\_id*

specifies the pool ID.

Pool 0 is the common pool, which you cannot delete.

*all*

specifies all empty scratch pools.

### **Usage**

Use the delete pool command to delete empty scratch pools. If a pool contains scratch cartridges, you must reassign these cartridges to another pool before deleting the first pool. If a scratch cartridge is mounted, it becomes a data cartridge but remains in its scratch pool. Use the set scratch off command to reassign the data cartridge to the common pool.

### **Examples**

To delete all empty scratch pools:

**delete pool all**

**Hint:** Only the empty pools will be deleted; pools with cartridges assigned will not be affected.

To delete scratch pool 1:

1. Query scratch pool 1:

**query scratch 1**

1998-06-30 09:35:30	Scratch	Status	Identifier	Home	Location	Status	Type
Scratch Pool							
1	34813		0,0,1,8,8	home			3480
1	34815		0,0,1,8,1	home			3480

Pool 1 has two cartridges, 34813 and 34815.

2. Empty pool 1 by reassigning its cartridges to pool 5:

**set scratch 5 348013 348015**

3. Delete pool 1:

**delete pool 1**

### Notes

None.

### See Also

For information about...	See...
Cancelling a command	<a href="#">"cancel" on page 188</a>
Creating or modifying scratch pools	<a href="#">"define pool" on page 194</a>
Guidelines and procedures for managing scratch cartridges	<a href="#">"Managing Scratch Cartridges" on page 88</a>
Displaying scratch pool attributes	<a href="#">"query pool" on page 244</a>
Displaying the location and media type of a cartridge	<a href="#">"query volume" on page 251</a>
Setting or clearing cartridge scratch attributes	<a href="#">"set scratch" on page 262</a>

### Command Area Messages

#### Success Messages

The following message appears when a `delete pool` command completes successfully:

Delete: Delete completed, Success.

In addition, the following message appears for each deleted pool.

Delete: Pool `pool_id` deleted.

#### Intermediate Messages

None

#### Error Messages

Delete: Pool `pool_id` failed, Pool not empty.

**Explanation:** StorageTek ACSLS cannot delete the scratch pool because it is not empty.

**Variable:** `pool_id` is the identifier of the requested pool.

## ■ **dismount**

The dismount command dismounts a cartridge from a drive.

### **Format**

`dismount vol_id drive_id [force]`

### **Options**

*vol\_id*

specifies the cartridge.

*drive\_id*

specifies the drive.

*force*

forces a dismount of the actual volume in the specified drive, even if the *vol\_id* of the cartridge in the drive does not match the specified *vol\_id*.

This option also forces a dismount even if the drive is not unloaded.

### **Usage**

Use the dismount command to dismount a volume from a drive and place the cartridge in an available storage cell.

### **Dismount**

Use the dismount command without the force option to dismount a specified cartridge from a specified drive. A successful unforced dismount requires the following:

- The drive must be online
- The *vol\_id* of the cartridge in the drive must match the *vol\_id* you specify on the dismount command
- The drive must be unloaded

### **Dismount force**

Use the dismount command with the force option to force a dismount of the actual cartridge mounted in a specified drive. The *vol\_id* of the cartridge in the drive does not have to match the *vol\_id* you specify on the dismount command. In addition, if the cartridge is not ready for dismounting, StorageTek ACSLS forces the drive to automatically rewind, unload, and dismount the cartridge. The drive must be online.

You can use the force option to dismount a cartridge with an unreadable or unknown label or a cartridge that a client application did not dismount. Note that StorageTek ACSLS returns the cartridge to an available storage cell, even if the label is unreadable or missing.

**CAUTION:** Dismounting a cartridge with dismount force will unconditionally abort any read/write activity between the drive and any application that is currently using the drive.

This is due to the fact that a forced dismount immediately rewinds and unloads the cartridge in the drive specified.

### Examples

To dismount cartridge EDU200 from drive 0,1,10,2:

```
dismount EDU200 0,1,10,2
```

### Notes

None.

### See Also

For information about...	See...
Cancelling a command	<a href="#">"cancel" on page 188</a>
Ejecting cartridges from the library	<a href="#">"eject" on page 201</a>
Making a CAP (manual mode) ready to enter labelled cartridges into the library	<a href="#">"enter" on page 205</a>
Mounting a scratch cartridge on a drive	<a href="#">"mount *" on page 217</a>
Mounting a data cartridge on a drive	<a href="#">"mount" on page 214</a>
Displaying CAP status	<a href="#">"query cap" on page 227</a>
Displaying drive status	<a href="#">"query drive" on page 230</a>
Setting CAP mode (manual or automatic)	<a href="#">"set cap mode" on page 254</a>
Setting CAP selection priority	<a href="#">"set cap priority" on page 256</a>

### Command Area Messages

#### Success Messages

Dismount: *vol\_id* dismounted from *drive\_id*.

**Explanation:** A forced dismount succeeded.

#### Variable:

- *vol\_id* is the identifier of the dismounted cartridge.

**Note:** The *vol\_id* displayed is the volume that was actually dismounted, not necessarily the volume that was specified in the dismount force command.

- *drive\_id* is the identifier of the specified drive.

Dismount: Forced dismount of *vol\_id* from *drive\_id*.

**Explanation:** A forced dismount succeeded.

**Variable:**

- *vol\_id* is the identifier of the dismounted cartridge.

**Note:** The *vol\_id* displayed is the volume that was actually dismounted, not necessarily the volume that was specified in the dismount force command.

- *drive\_id* is the identifier of the specified drive.

**Intermediate Messages**

None

**Error Messages**

Dismount: Dismount failed, ACS *acs\_id* full.

**Explanation:** StorageTek ACSLS cannot dismount the cartridge because the ACS has no free storage cells. You must eject at least one other cartridge from the ACS so that StorageTek ACSLS can dismount the cartridge from the drive.

**Variable:** *acs\_id* is the identifier of the ACS that contains the cartridge.

**Note:** Only online LSMs are used in locating free cells; therefore this message can occur even when there is an LSM with free storage cells if that LSM is offline.

Dismount: Dismount failed, Audit in progress.

**Explanation:** StorageTek ACSLS cannot dismount the cartridge because an audit in progress has locked out access to the last unoccupied cell location in the ACS.

Dismount: Dismount failed, Cartridge in drive *drive\_id*, unreadable label

**Explanation:** StorageTek ACSLS cannot dismount the cartridge because the cartridge either has no external label, an unreadable external label, or no virtual label. Use a forced dismount to dismount the cartridge.

**Variable:** *drive\_id* is the identifier of the specified drive.

Dismount: Dismount failed, Drive identifier *drive\_id* available.

**Explanation:** No cartridge is mounted in the specified drive.

**Variable:** *drive\_id* is the identifier of the specified drive.

Dismount: Dismount failed, Drive identifier *drive\_id* in use.

**Explanation:** StorageTek ACSLS cannot dismount the cartridge because the cartridge is not rewound and unloaded. Either wait for the client application must either rewind and unload the cartridge, then enter a dismount command or use a forced dismount to dismount the cartridge.

**Variable:** *drive\_id* is the identifier of the specified drive.

Dismount: Dismount failed, Misplaced tape.

**Explanation:** StorageTek ACSLS cannot dismount the cartridge because the external label of the cartridge does not match the cartridge identifier in the StorageTek ACSLS database. The cartridge identifier in the StorageTek ACSLS database is updated to match the external label of the cartridge. Retry the dismount.

Dismount: Dismount failed, Cartridge not in drive.

**Explanation:** StorageTek ACSLS cannot dismount the cartridge because the external label of the cartridge does not match the cartridge identifier specified in the dismount. Reenter the dismount command with the correct cartridge identifier.

### ***Display Area Messages***

None.

## ■ **eject**

The eject command directs the robot to take cartridges from inside an LSM and place them into a CAP, where they can be removed by the operator.

If you select the *lsm\_id* option, you can use multiple CAPs in a single LSM to eject cartridges.

### ***Format***

*eject cap\_id|lsm\_id vol\_id|volrange...*

### ***Options***

*cap\_id*

specifies the CAP used to eject the cartridges.

*lsm\_id*

If you select the *lsm\_id* option, you can use multiple CAPs that are available in a single LSM to eject cartridges. All CAPs that satisfy the requirements (such as manual, non zero priority, available) are unlocked for ejecting cartridges. You can eject cartridges through any or all the

CAPs selected, and in any order. Eject initially fills the CAPs with cartridges in order of highest priority.

Example: You have two CAPs - one with priority 2 and one with priority 5; eject fills the CAP with priority 5 status first, then the CAP with priority 2 status. If there are only enough cartridges to be ejected for one CAP, then CAP with priority 5 is filled.

*vol\_id | volrange*

specifies the external or virtual label types of the cartridge or range of cartridges to eject.

### **Usage**

Use the `eject` command to eject cartridges from the library, which removes them from StorageTek ACSLS control. The robot places the specified cartridge in the designated CAP, then StorageTek ACSLS frees the cell locations where the cartridges were stored. Cartridge information is either retained if the `ABSENT_VOLUME_RETENTION_PERIOD` variable has a non-zero value, or deleted if the `ABSENT_VOLUME_RETENTION_PERIOD` is set to zero. If you specify more than a CAP full of cartridges on the `eject` command, empty the CAP when it fills, close the CAP, and continue the ejection until all cartridges are ejected.

You can use a single `eject` command to eject multiple cartridges not in a range by specifying multiple cartridge IDs separated by a space.

**Hint:** If your library has two connected LSMs and the PTP is down, to successfully eject cartridges, either:

- Specify a CAP in the LSM where the cartridge is stored. For example, if cartridge NN0100 is stored in LSM 0,0, to eject this cartridge through CAP 0,0,0:

**eject 0,0,0 NN0101**

- For the *cap\_id*, specify the LSM where the cartridge is stored but use a wildcard (\*) for the CAP number; StorageTek ACSLS will select the highest priority CAP in the LSM. For example, if cartridge NN0114 is stored in LSM 0,0, to eject this cartridge through LSM 0,0's highest priority CAP:

**eject 0,0,\* NN0114**

### **Examples**

To eject cartridge NN0101 through CAP 0,0,0:

**eject 0,0,0 NN0101**

To eject cartridge range NN0101-NN0109 through the highest priority CAP on ACS 0:

**eject 0,\* NN0101-NN0109**

To eject cartridges NN0101, NN0103, NN0105, and NN0107 through the highest priority CAP on ACS 0:

```
eject 0,* NN0101 NN0103 NN0105 NN0107
```

To use multiple non-zero priority CAPs for ejecting cartridges in LSM 1,2:

```
eject 1,2 RB1000-RB2000
```

### Notes

Make sure you remove all ejected cartridges from the CAP. You must complete the ejection by unloading all ejected cartridges and closing the CAP door before you can use the CAP for another operation (such as an enter or audit).

### See Also

For information about...	See...
Cancelling a command	<a href="#">"cancel" on page 188</a>
Dismounting a cartridge from a drive	<a href="#">"dismount" on page 198</a>
Guidelines and procedures for ejecting cartridges	<a href="#">"Ejecting Cartridges" on page 78</a>
Making a CAP (manual mode) ready to enter labelled cartridges into the library	<a href="#">"enter" on page 205</a>
Displaying CAP status	<a href="#">"query cap" on page 227</a>
Displaying drive status	<a href="#">"query drive" on page 230</a>
Displaying the location and media type of a cartridge	<a href="#">"query volume" on page 251</a>
Setting CAP mode (manual or automatic)	<a href="#">"set cap mode" on page 254</a>
Setting CAP selection priority	<a href="#">"set cap priority" on page 256</a>

### Command Area Messages

#### Success Messages

Eject: Eject complete, *a* cartridges ejected  
 Eject: *vol\_id* ejected from *cap\_id*

**Explanation:** StorageTek ACSLS ejected the specified cartridges.

#### Variable:

- *nn* is the number of cartridges ejected.
- *vol\_id* is the cartridge identifier of the ejected cartridge.

- *cap\_id* is the CAP that contains the ejected cartridge.

### Intermediate Messages

None

### Error Messages

Eject: *vol\_id* Eject failed, CAP *cap\_id* full.

**Explanation:** A cartridge was not ejected because the CAP is full.

#### Variable:

- *vol\_id* is the cartridge identifier of the cartridge that was not ejected.
- *cap\_id* is the CAP specified for the ejection.

Eject: *vol\_id* Eject failed, CAP *cap\_id* in use.

**Explanation:** A cartridge was not ejected because the CAP is in use.

#### Variable:

- *vol\_id* is the cartridge identifier of the cartridge that was not ejected.
- *cap\_id* is the CAP specified for the ejection.

Eject: *vol\_id* Eject failed, Misplaced tape.

**Explanation:** StorageTek ACSLS cannot eject the cartridge because the external label of the cartridge does not match the database's cartridge identifier for the storage cell. The database updates the cartridge identifier, media type, and cleaning cartridge attribute for the cartridge in the storage cell.

**Variable:** *vol\_id* is the cartridge identifier of the cartridge that was not ejected.

Eject: *vol\_id* Eject failed, Not in same ACS.

**Explanation:** A cartridge was not ejected because it is not in the ACS specified in the *cap\_id*.

**Variable:** *vol\_id* is the cartridge identifier of the cartridge that was not ejected.

Eject: *vol\_id* Eject failed, Volume identifier *vol\_id* not found.

**Explanation:** A cartridge was not ejected because it is not:

- In the storage cell specified in the database,
- In-transit, or
- In a drive.

StorageTek ACSLS deletes the volume entry from the database.

**Variable:** *vol\_id* is the cartridge identifier that was deleted from the database.

Eject: *vol\_id* Eject failed, Cartridge in drive.

**Explanation:** A cartridge was not ejected because it is mounted in a drive.

**Variable:** *vol\_id* is the cartridge identifier of the cartridge that was not ejected.

Eject: *vol\_id* Eject failed, Volume *vol\_id* in use.

**Explanation:** A cartridge was not ejected because it is reserved for use by another request.

**Variable:** *vol\_id* is the cartridge identifier of the cartridge that was not ejected.

### **Display Area Messages**

CAP *cap\_id* Remove cartridges from CAP.

**Explanation:** Either the CAP is full or all requested cartridges are in the CAP. Empty the CAP.

**Variable:** *cap\_id* is the CAP that contains the ejected cartridges.

CAP *cap\_id* Place magazines in CAP.

**Explanation:** The CAP requires magazines for the ejection. Open the CAP, place magazines inside, then close the CAP.

**Variable:** *cap\_id* is the CAP that requires magazines.

## ■ **enter**

This command allows you to set the CAP to operate in either manual or automatic mode. For procedures for setting the CAP to automatic mode or manual mode, refer to the section “[Entering Cartridges](#)” on page 76.

- Automatic mode

When a CAP is in automatic mode, you can initiate an enter operation without issuing an enter command. You do this by opening the CAP door, placing one or more cartridges inside, and closing the CAP. The CAP is locked while the enter is being processed; when the enter operation is compete, the CAP is unlocked.

- Manual mode

When in manual mode, the CAP is locked and can only be used by issuing the following command prior to opening the CAP and entering the cartridges.

`enter cap_id`

### **Options**

`cap_id`

specifies the CAP. This can be wild-carded with an asterisk (\*) to select the CAP with the highest non-zero priority in an LSM (e.g.: 1,1,\*) or an ACS (e.g.: 0,\*,\*).

`lsm_id`

If you select the `lsm_id` option, you can use multiple CAPs that are available in a single LSM to enter cartridges. All CAPs that satisfy the requirements (such as manual, non zero priority, available) are unlocked for entering cartridges. You can enter cartridges through any or all the CAPs selected, and in any order. `enter` is not valid and returns a CAP invalid error.

### **Usage**

Use the `enter` command to make a manual mode CAP ready to enter labelled cartridges.

### **Examples**

To make CAP 0,0,2 ready to enter cartridges:

**enter 0,0,2**

To make the highest non-zero priority CAP in LSM 0,0 ready to enter cartridges:

`enter 0,0,*`

To use multiple CAPs for entering cartridges in an LSM 1,2:

**enter 1,2**

### **Notes**

Cartridges being entered into an LSM must be compatible with that LSM. For example, only T9840, T9940, and LTO cartridges can be entered into an L5500 LSM. See Also

---

For information about...	See...
Cancelling a command	<a href="#">“cancel” on page 188</a>
Creating or modifying scratch pools	<a href="#">“define pool” on page 194</a>

---

For information about...	See...
Ejecting cartridges from the library	<a href="#">“eject” on page 201</a>
Guidelines and procedures for entering cartridges	<a href="#">“Entering Cartridges” on page 76</a>
Mounting a scratch cartridge on a drive	<a href="#">“mount *” on page 217</a>
Mounting a data cartridge on a drive	<a href="#">“mount” on page 214</a>
Displaying CAP status	<a href="#">“query cap” on page 227</a>
Setting CAP mode (manual or automatic)	<a href="#">“set cap mode” on page 254</a>
Setting CAP selection priority	<a href="#">“set cap priority” on page 256</a>
Making a CAP ready to enter unlabeled cartridges into the library	<a href="#">“venter” on page 278</a>

## **Command Area Messages**

### **Success Messages**

After all labelled cartridges have been entered, the following message appears, with the second line of the message repeated for each cartridge successfully entered:

Enter: Enter complete, *nn* volumes entered

Enter: *vol\_id* Entered through *cap\_id*

- *nn* is the total number of cartridges entered
- *vol\_id* is the cartridge identifier of the entered cartridge
- *cap\_id* is the CAP used to enter the cartridges

### **Intermediate Messages**

None.

### **Error Messages**

Enter: *vol\_id* Enter failed, ACS *acs\_id* full.

**Explanation:** A cartridge was not entered because the ACS has no free storage cells. You must eject at least one cartridge from the ACS so that StorageTek ACSLS can enter the cartridge.

#### **Variable:**

- *vol\_id* is the external label of the cartridge that was not entered.
- *acs\_id* is the identifier of the ACS that has no free storage cells.

**Note:** StorageTek ACSLS only searches online LSMSs for free cells; this message can occur even if offline LSMSs have free cells.

Enter: *vol\_id* Enter failed, Audit in progress.

**Explanation:** A cartridge was not entered because an audit has locked out access to a cell location required for the enter.

**Variable:** *vol\_id* is the external label of the cartridge that was not entered.

Enter: *vol\_id* Enter failed, CAP *cap\_id* in use.

**Explanation:** A cartridge was not entered because the specified CAP is in use for auditing, ejecting cartridges, or another enter process.

**Variable:**

*vol\_id* is the external label of the cartridge that was not entered.

*cap\_id* is the in-use CAP.

Enter: *vol\_id* Enter failed, Duplicate label.

**Explanation:** A cartridge was not entered because the cartridge identifier of a cartridge in the CAP already exists in the StorageTek ACSLS database.

**Variable:** *vol\_id* is the external label of the cartridge that was not entered.

Enter: Enter failed, Unreadable label.

**Explanation:** A cartridge was not entered because the cartridge either has no external label or an unreadable external label.

Enter: *vol\_id* Enter failed, Unknown media type label.

**Explanation:** A cartridge was not entered because the cartridge does not have a media identifier on its externals label.

**Variable:** *vol\_id* is the external label of the cartridge that was not entered.

### **Display Area Messages**

CAP *cap\_id*: Place cartridges in CAP.

**Explanation:** The CAP is ready for cartridge entry. Open the CAP and enter cartridges.

**Variable:** *cap\_id* is the CAP used to enter cartridges.

CAP *cap\_id*: Remove cartridges from CAP.

**Explanation:** One or more cartridges cannot be entered.

**Variable:** *cap\_id* s the CAP used to enter cartridges. Open the CAP and remove the cartridges.

CAP *cap\_id*: CAP *cap\_id* Place magazines in CAP.

**Explanation:** The CAP uses magazines for cartridge entry. Load cartridges in the correct magazine, open the CAP, and insert the magazines.

**Variable:** *cap\_id* s the CAP used to enter cartridges.

## ■ **idle**

The idle command stops StorageTek ACSLS from processing new requests.

### **Format**

idle [force]

**Hint:** You *must* enter the full command name for the idle command. StorageTek ACSLS will reject all other forms of the command, such as *i*, *id*, or *idl*.

### **Options**

*force*

forces termination of new request processing.

### **Usage**

Use the idle command to stop StorageTek ACSLS from processing new requests. For example, you idle StorageTek ACSLS before doing maintenance or before terminating StorageTek ACSLS.

**Note:** Use the start command to restart the request processing.

*idle*

Entering an idle command without the force option puts StorageTek ACSLS in the idle-pending state. StorageTek ACSLS completes current and pending requests (except pending lock requests, which are cancelled) and rejects new requests except those listed in “Notes.” StorageTek ACSLS then goes to idle state and does not process subsequent requests until request processing is restarted.

*idle force*

Entering an **idle** command with the force option puts StorageTek ACSLS in the idle state. StorageTek ACSLS cancels all current and pending requests and rejects new requests except those listed in “Notes.” StorageTek ACSLS does not process subsequent requests until restarted. Because StorageTek ACSLS does not complete current requests, forcing StorageTek ACSLS to idle state

may leave the database in an inconsistent state with the hardware, which requires an audit to correct.

**Hint:** Depending on the current requests processing when you enter an `idle force`, the event log may report process failures. If so, vary the affected LSMs offline and back online. See “Vary” on page 313 for information about the `vary` command.

### Examples

To put StorageTek ACSLS in idle-pending state:

`idle`

To force StorageTek ACSLS to idle state:

`idle force`

### Notes

In either idle or idle-pending state, StorageTek ACSLS accepts new requests for the `cancel`, `idle`, `query`, `start`, and `vary` requests.

### See Also

For information about...	See...
Displaying the status of a library component	<a href="#">“query commands” on page 224</a>
Starting StorageTek ACSLS request processing	<a href="#">“start” on page 265</a>
Changing the state of a library component	<a href="#">“vary” on page 271</a>

### Command Area Messages

#### Success Messages

The following message appears when StorageTek ACSLS request processing stops.

ACSLM Request Processing Stopped: Success.

#### Intermediate Messages

None

#### Error Messages

ACSLM Request Processing Stopped: status

**Explanation:** StorageTek ACSLS did not stop processing requests.

**Variable:** status is the reason for the failure. For more information on common status messages, see StorageTek ACSLS Messages.

### ***Display Area Messages***

**Variable:**

Server system idle

**Explanation:** Request processing has stopped, and StorageTek ACSLS is in idle state.

Server system idle is pending

**Explanation:** StorageTek ACSLS is processing current or pending requests; idle state is pending.

## **lock**

The `lock` command locks a cartridge or drive to a lock ID that StorageTek ACSLS assigns.

**Format**

`lock type identifier...[wait]`

**Options**

`type identifier`

specifies a library component. Table 24. lists the components that you can lock. You can specify either a drive or a cartridge but not both in a single Lock command. You can, however, use the same Lock ID for both drives and cartridges.

Table 18. Valid Components for Lock

Library Component	type	identifier
drive	<code>drive</code>	<code>drive_id</code>
volume	<code>volume</code>	<code>vol_id</code>

`wait`

specifies that the lock is pending if the component is unavailable (locked or in use). StorageTek ACSLS then locks the component when it is available.

You can clear or cancel a pending lock request. Idling StorageTek ACSLS also cancels a pending lock request.

**Usage**

Use the lock command to lock a cartridge or drive to a lock ID that StorageTek ACSLS assigns. You can only lock available (not locked or in use) cartridges or drives.

**Note:** When you enter a lock command to lock a cartridge or drive, StorageTek ACSLS assigns a lock ID to the cartridge or drive and then changes your lock ID to the lock ID of the cartridge or drive. You cannot use the set lock command to set your lock ID and then use the lock command to lock a cartridge or drive with the lock ID that you set with set lock.

### Examples

To lock drive 0,1,10,2:

**lock drive 0,1,10,2**

To lock volume EDU445:

**lock volume EDU445**

### Notes

None.

### See Also

For information about...	See...
Removing all active or pending locks on a specified drive or cartridge	<a href="#">“clear lock” on page 192</a>
Displaying the lock status of a drive or cartridge	<a href="#">“query lock” on page 236</a>
Setting your lock ID	<a href="#">“set lock” on page 259</a>
Displaying your lock or user ID	<a href="#">“show” on page 264</a>
Removing active locks on drives or cartridges	<a href="#">“unlock” on page 269</a>

### Command Area Messages

#### Success Messages

The following message appears when a lock request succeeds:

Lock: Lock completed, Success.

In addition, for each identifier in the request, one of the following messages appears:

Lock: Drive *drive\_id* locked under lock\_id *lock\_id*.  
 Lock: Volume *vol\_id* locked under lock\_id *lock\_id*.

Where:

- *drive\_id* is the locked drive.
- The *vol\_id* is the cartridge identifier of the locked cartridge.

- *lock\_id* is the lock ID.

### Intermediate Messages

None.

### Error Messages

One of the following messages appears if the lock request fails:

Lock: Lock of drive *drive\_id* failed, Drive in use.

**Explanation:** StorageTek ACSLS cannot lock the specified drive because the drive is already locked or in use.

**Variable:** *drive\_id* is the drive that StorageTek ACSLS cannot lock.

Lock: Lock of drive *drive\_id* failed, Lock failed.

**Explanation:** StorageTek ACSLS cannot lock the specified drive. Reenter the lock command with the correct syntax and drive identifier.

**Variable:** *drive\_id* is the drive that StorageTek ACSLS cannot lock.

Lock: Lock of volume *vol\_id* failed, Volume in use.

**Explanation:** StorageTek ACSLS cannot lock the specified cartridge because the cartridge is already locked or in use.

**Variable:** *vol\_id* is the cartridge that StorageTek ACSLS cannot lock.

Lock: Lock of drive *vol\_id* failed, Lock failed.

**Explanation:** StorageTek ACSLS cannot lock the specified cartridge. Reenter the lock command with the correct syntax and cartridge identifier.

**Variable:** *vol\_id* is the cartridge that StorageTek ACSLS cannot lock.

### Display Area Messages

None.

## ■ logoff

The logoff command exits from a cmd\_proc.

### Format

*logoff*

### Options

None.

### **Usage**

Use the logoff command to exit from cmd\_proc. If you are running an interactive (window) cmd\_proc, logoff also quits the cmd\_proc window.

### **Examples**

To exit a cmd\_proc:

**logoff**

#### Notes

logoff exits from cmd\_proc only, is valid in any StorageTek ACSLS state, and does not affect StorageTek ACSLS operations.

### **See Also**

For information about...	See...
Starting a cmd_proc	<a href="#">“Starting a cmd_proc” on page 4</a>
Using a cmd_proc	<a href="#">“Using a cmd_proc” on page 2</a>

### **Command Area Messages**

None.

### **Display Area Messages**

None.

## **■ mount**

The mount command mounts a data cartridge.

### **Format**

mount *vol\_id* *drive\_id* [bypass] [readonly]

### **Options**

*vol\_id*

specifies the cartridge.

*drive\_id*

specifies the drive.

*bypass*

this option is no longer used since the new libraries always enforce StorageTek ACSLS verification of compatibility between the drive type and cartridge media.

*readonly*

specifies that the cartridge is mounted write-protected.

**CAUTION:** LTO drives do not support mounts with write protect. If a "mount read-only" is attempted to an LTO drive, it will fail with a "Drive cannot honor write protect" message in the Event Log.

Also, some early 97xx SCSI-attached libraries do not support mounts with write protect. Even if you specify the read-only option on a mount command, the drive may write to the cartridge. To write protect cartridges for these drives, you must use the cartridge's readonly protection (such as a thumbwheel).

### **Usage**

Use the `mount` command to mount a data cartridge. You can only mount one cartridge on one drive each time you enter a `mount` command.

A successful mount requires the following:

- The cartridge and drive must be in the same ACS.
- The cartridge must be available and the drive must be online and available.

### **Examples**

To mount volume EDU010 on drive 0,0,10,2:

```
mount EDU010 0,0,10,2
```

In the following example, YUMA15 is a DD3C volume whose cartridge label is missing the seventh character. The bypass option bypasses the media compatibility checks and forces a mount of the cartridge on drive 0,0,4,0, an SD3 drive.

To mount YUMA15 on drive 0,0,4,0 using the bypass option:

```
mount YUMA15 0,0,4,0 bypass
```

### **Notes**

None.

**See Also**

For information about...	See...
Dismounting a cartridge from a drive	<a href="#">"dismount" on page 198</a>
Making a CAP (manual mode) ready to enter labelled cartridges into the library	<a href="#">"enter" on page 205</a>
Displaying CAP status	<a href="#">"query cap" on page 227</a>
Displaying drive status	<a href="#">"query drive" on page 230</a>
Displaying the lock status of a drive or cartridge	<a href="#">"query lock" on page 236</a>
Displaying the status of media-compatible drives for a specified data cartridge	<a href="#">"query mount" on page 239</a>
Displaying the location and media type of a cartridge	<a href="#">"query volume" on page 251</a>
Setting CAP mode (manual or automatic)	<a href="#">"set cap mode" on page 254</a>
Setting CAP selection priority	<a href="#">"set cap priority" on page 256</a>
Making a CAP ready to enter unlabeled cartridges into the library	<a href="#">"venter" on page 278</a>

**Command Area Messages****Success Messages**

Mount: *vol\_id* mounted on *drive\_id*

**Explanation:** StorageTek ACSLS mounted the specified cartridge.

**Variable:**

- *vol\_id* is the cartridge identifier of the cartridge that StorageTek ACSLS mounted.
- *drive\_id* is the drive that mounted the cartridge.

**Intermediate Messages**

None.

**Error Messages**

Mount: Mount failed, Audit in progress.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because an audit has locked out access to the cell location of the specified cartridge.

Mount: Mount failed, In use.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because either the drive is in use or the requested cartridge is reserved for another command.

Mount: Mount failed, Misplaced tape.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the external label of the cartridge does not match the database's cartridge identifier for the storage cell. The database updates the cartridge identifier, media type, and cleaning cartridge attribute for the cartridge in the storage cell.

Mount: Mount failed, Not in same ACS.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the specified cartridge and drive are not in the same ACS.

Mount: Mount failed, Cartridge in drive.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the specified cartridge is already mounted in a drive.

Mount: Mount failed, Unreadable label.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the cartridge has no label, an unreadable label, or no virtual label.

Mount: Mount failed, Invalid media type.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the specified cartridge's media type is invalid.

Mount: Mount failed, Invalid drive type.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the specified drive's type is invalid.

Mount: Mount failed, Incompatible media type.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the cartridge's media type is incompatible with the specified drive.

### ***Display Area Messages***

None.

## **■ mount \***

The *mount \** command selects a scratch cartridge and mounts it.

### ***Format***

*mount \* drive\_id [pool\_id] [media media\_type | media \*]*

### **Options**

*drive\_id*

specifies the drive.

*pool\_id*

specifies the pool from which StorageTek ACSLS selects the scratch cartridge. *pool\_id* is optional; if you do not specify a *pool\_id* StorageTek ACSLS tries to find a scratch cartridge in the common pool (pool 0).

If you specify a *pool\_id* and the pool does not contain a scratch cartridge (or one of the correct media for mixed-media libraries) if the pool is set for overflow; StorageTek ACSLS tries to find a scratch cartridge in the common pool (pool 0).

*media media\_type | media \**

specifies the cartridge media type. Specifying the media type is optional; see “[Usage](#)” for more information.

### **Usage**

Use the `mount *` command to select a scratch cartridge and mount it. The following sections describe how StorageTek ACSLS selects the scratch cartridge to be mounted and how to specify the cartridge media type for a scratch cartridge.

### **How StorageTek ACSLS Selects Scratch Cartridges**

The `mount *` command selects a scratch cartridge by:

- Creating a list of LSMs in the ACS, based on proximity to the LSM containing the specified drive.
- Examining each LSM in the list, until it finds scratch cartridges that meet the pool and media type criteria.
- Choosing the scratch cartridge with the least recent access date in that LSM.

The selected scratch cartridge is then mounted on the drive.

### **Specifying the Media Type**

You can specify cartridge media type in any of the following ways:

- Explicitly specify the media type in this form of the `mount *` command:

`mount * drive_id [pool_id] media media_type`

Example: To mount a 9940 scratch cartridge from the common pool (pool 0):

`mount * 0,0,10,2 media STK2P`

- Use a wildcard (\*) for the media type so that StorageTek ACSLS selects the media by scratch preferences; for more information see [“Setting Scratch Preferences” on page 57](#). To use scratch preferences, enter this form of the `mount *` command:

```
mount * drive_id [pool_id] media *
```

Example: To use scratch preferences to mount a scratch cartridge from the common pool (pool 0):

```
mount * 0,0,10,2 media *
```

- Omit the media option in this form of the `mount *` command. This instructs StorageTek ACSLS to pick a media type compatible with the drive.

```
mount * drive_id [pool_id]
```

Example: To mount a scratch cartridge compatible with the drive from the common pool (pool 0):

```
mount * 0,0,10,2
```

## Examples

The following sections show mount scratch examples for single-media and mixed-media libraries.

### Single-Media Libraries

To mount a scratch cartridge from pool 5 on drive 0,0,10,2:

```
mount * 0,0,10,2 5
```

**Hint:** If no cartridge is available from pool 5 and it has been set for overflow StorageTek ACSLS will select a cartridge from the common pool (pool 0).

To mount a scratch cartridge from the common pool (pool 0) on drive 0,0,10,0

```
mount * 0,0,10,0
```

### Mixed-Media Libraries

To mount a scratch cartridge from pool 5 with a media type of 3480 on drive 0,0,10,2:

```
mount * 0,0,10,2 5 media 3480
```

**Hint:** If no cartridge is available from pool 5 and it has been set for overflow StorageTek ACSLS will select a cartridge with the specified media type from the common pool (pool 0).

To mount a scratch cartridge from pool 10 with media type determined by scratch preferences on drive 0,0,2,3:

```
mount * 0,0,2,3 10 media *
```

**Hint:** If no cartridge is available from pool 10 and it has been set for overflow StorageTek ACSLS will select a cartridge with the specified media type from the common pool (pool 0).

To mount a scratch cartridge from the common pool (pool 0) with media type of 3480 on drive 0,0,10,2:

```
mount * 0,0,10,2 media 3480
```

To mount a scratch cartridge from the common pool (pool 0) with media type determined by scratch preferences on drive 0,0,2,3:

```
mount * 0,0,2,3 media *
```

To mount a scratch cartridge from the common pool (pool 0) with media compatible with drive 0,0,2,3:

```
mount * 0,0,2,3
```

### Notes

None.

### See Also

For information about...	See...
Creating or modifying scratch pools	<a href="#">“define pool” on page 194</a>
Deleting empty scratch pools	<a href="#">“delete pool” on page 196</a>
Dismounting a cartridge from a drive	<a href="#">“dismount” on page 198</a>
Managing scratch cartridges	<a href="#">“Managing Scratch Cartridges” on page 88</a>
Displaying drive status	<a href="#">“query drive” on page 230</a>
Displaying the lock status of a drive or cartridge	<a href="#">“query lock” on page 236</a>
Displaying the status of media-compatible drives for a specified scratch pool	<a href="#">“query mount *” on page 242</a>
Displaying scratch pool attributes	<a href="#">“query pool” on page 244</a>
Displaying scratch cartridge status	<a href="#">“query scratch” on page 248</a>
Displaying the location and media type of a cartridge	<a href="#">“query volume” on page 251</a>

For information about...	See...
Setting or clearing cartridge scratch attributes	<a href="#">"set scratch" on page 262</a>
Setting scratch preferences	<a href="#">"Setting Scratch Preferences" on page 57</a>

## Command Area Messages

### Success Messages

Mount: *vol\_id* mounted on *drive\_id*

**Explanation:** StorageTek ACSLS mounted the specified cartridge.

#### Variable:

- *vol\_id* is the cartridge identifier of the cartridge that StorageTek ACSLS mounted.
- *drive\_id* is the drive that mounted the cartridge.

### Intermediate Messages

None.

### Error Messages

Mount: Mount failed, Audit in progress.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because an audit has locked out access to the cell location of the specified cartridge.

Mount: Mount failed, In use.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because either the drive is in use or the requested cartridge is reserved for another command.

Mount: Mount failed, Misplaced tape.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the external label of the cartridge does not match the database's cartridge identifier for the storage cell. The database updates the cartridge identifier, media type, and cleaning cartridge attribute for the cartridge in the storage cell.

Mount: Mount failed, Not in same ACS.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the specified cartridge and drive are not in the same ACS.

Mount: Mount failed, Cartridge in drive.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the specified cartridge is already mounted in a drive.

Mount: Mount failed, Unreadable label.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the cartridge has no label, an unreadable label, or no virtual label.

Mount: Mount failed, Invalid media type.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the specified cartridge's media type is invalid.

Mount: Mount failed, Invalid drive type.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the specified drive's type is invalid.

Mount: Mount failed, Incompatible media type.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because the cartridge's media type is incompatible with the specified drive.

Mount: Mount failed, No compatible scratch cartridges in pool.

**Explanation:** StorageTek ACSLS cannot mount the cartridge because there are no scratch cartridges in the ACS of the specified drive that match the scratch cartridge's media type. In addition, if the overflow attribute is set for the pool, there are no scratch cartridges with valid media types.

### ***Display Area Messages***

Pool *pool\_id*: low water mark warning.

**Explanation:** The number of cartridges in the specified scratch pool is less than or equal to the low cartridge threshold.

**Variable:** *low\_water\_mark* is the low threshold of the specified scratch pool.

Pool *pool\_id*: high water mark warning.

**Explanation:** The number of cartridges in the specified scratch pool is greater than or equal to the high cartridge threshold.

**Variable:** *high\_water\_mark* is the high water cartridge threshold of the specified scratch pool.

## ■ move

The move command moves a specified cartridge to an available storage cell in a specified LSM or to a specific storage cell.

**Note:** StorageTek SL3000 allows for cartridges to be moved to a specific cell.

For more information, see [“Moving Cartridges to a Specific Cell in the StorageTek SL3000” on page 396](#).

### **Format**

`move vol_id lsm_id` or `move vol_id cell_id`

### **Options**

*vol\_id*

specifies the cartridge.

*lsm\_id*

specifies the LSM that will contain the moved cartridge.

*cell\_id*

specifies the cell to which the cartridge will be moved.

### **Usage**

Use the move command to move a specified cartridge to an available storage cell in either:

- A different panel in the same LSM. For example, if you want to empty an entire panel in an LSM, you can move all the cartridges in that panel to a different locations in the same LSM.
- A different LSM.

You can move only one cartridge each time you enter the move command. If you specify the LSM where the cartridge currently resides, StorageTek ACSLS will move the cartridge to another panel within that LSM. Otherwise, StorageTek ACSLS will move it to the LSM you specify. You cannot cancel a move command.

A successful move requires the following:

- The cartridge must be available and in the same ACS as the specified LSM.
- The LSM where the cartridge currently resides and the specified LSM must both be online. The specified LSM must have at least one available storage cell. If the move is within the same LSM, there must be at least one available cell in a different panel in that LSM. If the move requires a pass-thru, any LSMs used must also be online.

### Examples

To move cartridge EDU010 (which resides in LSM 0,1) to a different panel in this LSM:

```
move EDU010 0,1
```

To move cartridge EDU010 (which resides in LSM 0,1) to LSM 0,2:

```
move EDU010 0,2
```

### See Also

For information about...	See...
Displaying the lock status of a drive or cartridge	<a href="#">“query lock” on page 236</a>
Displaying the status of an LSM	<a href="#">“query lsm” on page 238</a>
Displaying the location and media type of a cartridge	<a href="#">“query volume” on page 251</a>

### Command Area Messages

#### Success Messages

Move: *vol\_id* moved to location *cell\_id*

**Explanation:** StorageTek ACSLS moved the specified cartridge to the specified cell location.

#### Variable:

- *vol\_id* is the cartridge identifier of the cartridge that StorageTek ACSLS moved.
- *cell\_id* is the new cell location of the specified cartridge.

#### Error Messages

Move: Move failed

#### Intermediate Messages

None.

## ■ query commands

The query commands display the status of a library component. See the following sections for more information about each query command, including format, options, and usage.

#### Format

The following shows the general format of the query commands:

query type [*subtype* | \*] *identifier...* | all

### Notes

If a cancel request is issued against a pending or current query request, the display of information is halted.

### See Also

For information about...	See...
Cancelling a command	<a href="#">"cancel" on page 188</a>
Display Command	<a href="#">"Using display Command Options" on page 284</a>

### Command Area Messages

#### Success Messages

**Note:** If the query succeeds, the requested status appears.

#### Intermediate Messages

None.

#### Error Messages

Library not available.

**Explanation:** The query failed because StorageTek ACSLS is recovering (all queries *except* query server).

Cartridge identifier *vol\_id* not found.

**Explanation:** The query mount \* command cannot display status for the specified cartridge because it is not in the library.

**Variable:** *vol\_id* is the specified cartridge.

Invalid media type

**Explanation:** The query mount \* command cannot display status for the specified cartridge because it either has an invalid media type or you specified an invalid media type on the command.

**Variable:** *vol\_id* is the specified cartridge.

### Display Area Messages

None.

## ■ query acs

The query acs command displays ACS status.

**Format**

```
query acs acs_id... | all
```

**Options**

*acs\_id* | *all*

specifies the ACS to query or all for all ACSs.

**Usage**

Use the `query acs` command to display the status of an ACS in the following format:

yyy-mm-ddhh:mm:ssACS Status							
Identifier	State	Free Cell Count	Audit C/P	Mount C/P	Dismount C/P	Enter C/P	Eject C/P
<i>acs_id</i>	<i>state</i>	<i>count</i>	<i>n/n</i>	<i>n/n</i>	<i>n/n</i>	<i>n/n</i>	<i>n/n</i>

Where:

*acs\_id*

is the ACS identifier.

*state* is one of the following ACS states:

online

The ACS is online.

offline

The ACS is offline.

offline pending

The ACS will process current and pending requests, then go offline.

The ACS will reject any new requests.

diagnostic

The ACS will process only current and pending requests and will reject any new requests. The ACS is unavailable to client applications and can only be controlled via `cmd_proc`. Use the `vary` command to vary the ACS online.

recovery

The ACS is initializing or recovering from errors. Wait for the ACS to go online.

count

is the number of free cells in the ACS.

*n*

is the number of current (C) and pending (P) requests for the ACS for each command that requires library resources (audit, mount, dismount, enter, and eject).

### Examples

To query ACS 1:

```
query acs 1
```

To query all ACSs in the library:

```
query acs all
```

### See Also

For information about...	See...
Changing the state of a library component	<a href="#">“vary” on page 271</a>
Displaying request status	<a href="#">“query request” on page 247</a>

## ■ query cap

The `query cap` command displays CAP status.

### Format

```
query cap cap_id... | all
```

### Options

`cap_id | all`

specifies the CAP to query or all for all CAPs.

**Note:** You cannot specify a `cap_id` that contains asterisks.

### Usage

Use the `query cap` command to display the status of a CAP.

The query cap command displays CAP status in the following format:

<i>yyy-mm-dd</i>	<i>hh:mm:ss</i>	CAP	Status		
Identifier	Priority	Size	State	Mode	Status
<i>cap_id</i>	<i>cap_priority</i>	<i>cap_size</i>	<i>cap_state</i>	<i>cap_mode</i>	<i>status</i>

Where:

*cap\_id*  
is the CAP identifier.

*cap\_priority*  
is the CAP priority.

*cap\_size*  
is the number of cells in the CAP.

*cap\_state*  
is one of the following CAP states:

*online*  
The CAP is online.

*offline*  
The CAP is offline.

*offline-pending*  
The CAP will process current and pending requests, then go offline.  
The CAP will reject any new requests.

*diagnostic*  
The CAP will process only current and pending requests and will reject any new requests. The CAP is unavailable to client applications and can only be controlled via `cmd_proc`. Use the `vary` command to vary the CAP online.

*recovery*  
The CAP is initializing or recovering from errors. Wait for the CAP to go online.

*cap\_mode*  
is one of the following CAP entry modes:

*manual*  
You must unlock the CAP before entering cartridges.

*automatic*  
The CAP is ready for cartridge entry.

*status*  
is one of the following CAP statuses:

*available*  
The CAP is available.

*enter*  
The CAP is unavailable (reserved for entering cartridges).

*eject*  
The CAP is unavailable (reserved for ejecting cartridges).

*audit*

The CAP is unavailable (reserved for audit processing).

### Examples

To query CAP 0,1,0:

```
query cap 0,1,0
```

To query all CAPs in the library:

```
query cap all
```

### See Also

For information about...	See...
Displaying request status	<a href="#">"query request" on page 247</a>
Setting CAP mode (manual or automatic)	<a href="#">"set cap mode" on page 254</a>
Setting CAP selection priority	<a href="#">"set cap priority" on page 256</a>
Changing the state of a library component	<a href="#">"vary" on page 271</a>

## ■ query clean

The `query clean` command displays cleaning cartridge status. Absent or ejected cartridges are not displayed.

### Format

```
query clean vol_id... | all
```

### Options

`vol_id | all`

specifies the cleaning cartridge to query or all for all cartridges.

### Usage

Use the `query clean` command to display the status of a cleaning cartridge in the following format:

<i>yyy-mm-ddhh:mm:ss</i>	Cleaning	volume	Status					
Identifier	Home	Location	Max	Usage	Current	Use	Status	Type
<i>vol_id</i>		<i>cell_id</i>		<i>max_usage</i>	<i>current_use</i>		<i>status</i>	<i>type</i>

Where:

*vol\_id*

is the cartridge identifier of the cleaning cartridge.

*cell\_id*

is the location of the cleaning cartridge.

*max\_usage*

is the number of times the cleaning cartridge can be used.

*current\_usage*

is the number of times the cleaning cartridge has been used.

*status*

is the location of the cleaning cartridge:

home

The cartridge is in a storage cell.

in drive

The cartridge is in a drive.

in transit

The cartridge is being moved.

*type* is the cartridge media type (for example, 3480, DD3D, DLTIII, or STK1R).

### **Examples**

To display status information for cleaning cartridge J35992:

```
query clean J35992
```

To query all cleaning cartridges:

```
query clean all
```

### **See Also**

For information about...	See...
Guidelines and procedures for cleaning drives	<a href="#">"Cleaning Cartridges" on page 83</a>
Setting cleaning cartridge attributes	<a href="#">"set clean" on page 258</a>

## ■ **query drive**

The query *drive* command displays drive status.

### **Format**

```
query drive drive_id... | all
```

## Options

`drive_id | all`

specifies the drive to query or all for all drives.

## Usage

Use the `query drive` command to display the status of a drive in the following format:

yyy-mm-ddhh:mm:ssDrive Status				
Identifier	State	Status	volume	Type
<code>drive_id</code>	<code>state</code>	<code>status</code>	<code>vol_id</code>	<code>type</code>

Where:

`drive_id`

is the drive identifier.

`state`

is one of the following:

`online`

The drive is online.

`offline`

The drive is offline.

`diagnostic`

The drive will process only current and pending requests and will reject any new requests. The drive is unavailable to client applications and can only be controlled via `cmd_proc`. Use the `vary` command to vary the drive online.

`recovery`

The drive is initializing or recovering from errors. Wait for the drive to go online.

`status`

is one of the following drive statuses:

`In use`

The drive has a cartridge mounted or is reserved for a mount.

**Possible Scenario:** You perform a `query drive all` and get a message saying the drive is in use. You then perform a `display drive *` and get a message saying the drive is reserved. This means: the reserved status for the drive implies that a mount request is in progress and that a

cartridge is on its way to the drive. At the same time the drive is considered to be in use.

#### Available

The drive is available for a mount.

#### *vol\_id*

is the identifier of the cartridge in the drive. This field is blank if there is no cartridge in the drive or if the cartridge's external label is unreadable or unknown.

#### *drive\_type*

is the drive type.

### Examples

To query drive 0,3,1,0:

**query drive 0,3,1,0**

To query all drives:

**query drive all**

### See Also

For information about...	See...
Changing the state of a library component	<a href="#">“vary” on page 271</a>
Dismounting a cartridge from a drive	<a href="#">“dismount” on page 198</a>
Drive serial numbers	<a href="#">“Using display Command Options” on page 284</a> and <a href="#">“display drive” on page 291</a>

## ■ **query lmu**

The `query lmu` command is the best way to monitor ACSLS communication with the libraries it manages. `query lmu`:

- Shows the status of ACSLS connections to the library.
- Shows Redundant Electronics (RE) if any library in a string reports RE.
- Shows single or Dual-LMU for non- RE libraries or a non- SL8500.
- Displays the desired state for ACSs, port connections, LSMs, and tape drives.
- Displays the partition ID of a partitioned library.

**Note:** StorageTek ACSLS supports Dual-LMU configurations for only the 9330 LMU with host/LMU microcode compatibility Level 12. The same microcode level must be loaded in both LMUs.

### Format

query lmu *acs\_id...* | *all*

### Options

*acs\_id* | *all*

specifies the ACS whose LMUs you want to query or all to query LMUs for all ACSSs.

### Usage

Use the `query lmu` command to display LMU and port status, as well as desired state, for both single-LMU and Dual-LMU ACS configurations in the following format:

```
yyyy-mm-ddhh:mm:ssLMU Status

ACS: acs_id      Mode: mode Active Status: status
      partition_status           Standby Status: status

      ACS State      Desired State
      acs_state      acs_desired_state

      Port      Port State  Desired State      Role  CL
      port_id  port_state  desired_state      role  compat_lvl  Port Name
                                         dev_name
```

### Output Example without Redundant Electronics

This example shows a library without the Redundant Electronics option.

```
ACSSA> q lmu all
2010-04-02 14:43:54
      ACS: 0      Mode: Single LMU
      Not Partitioned
          ACS State      Desired State
          online      online
          Port      Port State  Desired State      Role  CL
          0, 0      online      online      -      21  springtime:9997
      ACS: 1      Mode: Dual LMU
      Not Partitioned
          ACS State      Desired State
          online      online
          Port      Port State  Desired State      Role  CL
          1, 0      online      online      Active(A)  13  springtime:51100
          1, 1      online      online      Standby(B)  13  springtime:51101
ACSSA>
```

### Output Example with Redundant Electronics

This example shows a library with the Redundant Electronics option

```
ACSSA> q lmu all
2010-05-03 11:03:11          LMU Status
  ACS: 0      Mode: Redundant  Active Status: Communicating
  Not Partitioned          Standby Status: Communicating
          ACS State  Desired State
          online    online
  Port  Port State  Desired State  Role      CL
  0, 0  online     online      Standby(A) 21 10.80.92.43
  0, 1  online     online      Standby(A) 21 10.80.93.33
  0, 2  online     online      Active(B)   21 10.80.92.52
  0, 3  online     online      Active(B)   21 10.80.93.47
  0, 4  online     online      Standby(B) 21 10.80.92.44
  0, 5  online     online      Active(A)   21 10.80.92.53
```

This example shows a library with the Redundant Electronics option.

Where:

*acs\_id*

is the ACS identifier.

*mode*

is the LMU mode (Dual LMU, Single LMU, or SCSI LMU).

*status*

is the active or standby LC/LMU status (Communicating, Not Communicating, or Offline).

*partition\_status*

shows if the library is partitioned. If it is partitioned it shows the partition to which you are connected. The partition status is:

Not Partitioned

Partition 1-n

The partition number.

*acs\_state*

is the actual ACS state. States are:

online

The ACS is online.

diagnostic

The ACS will process only current and pending requests and will reject any new requests. The ACS is unavailable to client applications and can only be controlled via `cmd_proc`. Use the `vary` command to vary the ACS online.

offline

The ACS is offline.

offline pending

The ACS will process current and pending requests, then go offline.

The ACS will reject any new requests.

*acs\_desired\_state*

is the state in which you want this ACS. The desired states are:

online

diagnostic

offline

*port\_id*

is the port identifier.

*port\_state*

is one of the following actual port states:

online

The port is online.

offline

The port is offline.

*port\_desired\_state*

you want to port to be in this state. The desired states are:

online

offline

*role (des)*

is the LMU's role and designation (A or B) where roles are:

Active

LMU is in active role (the LMU is managing the ACS).

Standby

LMU is in standby role (not managing the ACS, communicating with the active LC/LMU and available for switch over).

**Note:** During switch over, the *role* field information is not current, and may display as a single dash (-). As the information becomes current, StorageTek ACSLS refreshes the *role* field with the actual role of each LMU.

*compat\_level*

is the host/LMU microcode compatibility level. Level 11 or above is required for Dual-LMU configurations.

*dev\_name*

is the port device name.

### Examples

To display LMU and port status for all LMUs managing all ACSs:

```
query lmu all
```

To display LMU and port status for all LMUs managing ACSs 0 and 1:

```
query lmu 0 1
```

### See Also

For information about...	See...
Manually switching ACS management from the ACS's active LC/LMU to the standby LC/LMU	<a href="#">“switch lmu” on page 266</a>

## ■ query lock

The `query lock` command displays the lock status of a drive or cartridge.

### Format

```
query lock type identifier... | all
```

### Options

`type identifier | all`

specifies the drive or cartridge to query or all for all drives or cartridges as shown in [Table 19](#).

**Table 19. Valid Lock Types for query lock**

Library Component	type	identifier
drive	<code>drive</code>	<code>drive_id</code>
volume	<code>volume</code>	<code>vol_id</code>

## Usage

Use the `query lock` command to display the lock status of a drive or cartridge in the following format:

yyy-mm-ddhh:mm:ssLock Status					
Identifier	Lock-id	Duration	Pending	Status	User Identifier
<i>vol_id</i>	<i>lock_id</i>	<i>duration</i>	<i>pending</i>	<i>status</i>	<i>user_id</i>
or					
<i>drive_id</i>	<i>lock_id</i>	<i>duration</i>	<i>pending</i>	<i>status</i>	<i>user_id</i>

Where:

*vol\_id*

is the identifier of the specified cartridge.

*drive\_id*

is the identifier of the specified drive.

*lock\_id*

is the lock ID.

*duration*

is the amount of time, in seconds, that the lock has been active.

*pending*

is the number of lock requests that are waiting for cartridge or drive.

*status* is one of the following statuses:

*available*

The cartridge or drive is available.

*in use*

The cartridge or drive is in use or is reserved for a mount.

*user\_id*

is the user ID that has locked the cartridge or drive. The *user\_id* wraps after 80 characters.

## Examples

To display lock status information for drive 1,0,4,0:

**q loc dr 1,0,4,0**

To display lock status information for all drives:

**query lock drive all**

To display lock status information for cartridge SL4493:

**query lock cartridge SL4493**

To display lock status information for all cartridges:

**query lock cartridge all**

### See Also

For information about...	See...
Removing all active or pending locks on a specified drive or cartridge	<a href="#">“clear lock” on page 192</a>
Locking drives and cartridges	<a href="#">“lock” on page 211</a>
Setting your lock ID	<a href="#">“set lock” on page 259</a>
Displaying your lock or user ID	<a href="#">“show” on page 264</a>
Removing active locks	<a href="#">“unlock” on page 269</a>

## ■ **query lsm**

The `query lsm` command displays LSM status.

### Format

`query lsm lsm_id... | all`

### Options

`lsm_id | all`

specifies the LSM to query or `all` for all locks.

Use the `query lsm` command to display the status of an LSM in the following format:

Identifier	State	Free Cell Count	Audit C/P	Mount C/P	Dismount C/P	Enter C/P	Eject C/P
<code>lsm_id</code>	<code>state</code>	<code>count</code>	<code>n/n</code>	<code>n/n</code>	<code>n/n</code>	<code>n/n</code>	<code>n/n</code>

Where:

`lsm_id`

is the LSM identifier.

`state` is one of the following LSM states:

**diagnostic**

The LSM will process only current and pending requests and will reject any new requests. The LSM is unavailable to client applications and can only be controlled via `cmd_proc`. Use the `vary` command to vary the LSM online.

**offline**

The LSM is offline.

**offline pending**

The LSM will process current and pending requests, then go offline. The LSM will reject any new requests.

**online**

The LSM is online.

**recovery**

The LSM is initializing or recovering from errors. Wait for the LSM to go online.

***count***

is the number of free storage cells in the LSM.

***n***

is the number of current (C) and pending (P) requests for the LSM for each command that requires library resources (`audit`, `mount`, `dismount`, `enter`, and `eject`).

***Examples***

To display status information for LSM 1 of ACS 0:

`query lsm 0,1`

To display status information for all LSMs:

**query lsm all**

***See Also***

For information about...	See...
Displaying request status	<a href="#">"query request" on page 247</a>
Changing the state of a library component	<a href="#">"vary" on page 271</a>

## ■ **query mount**

The `query mount` command displays the status of media-compatible drives for a specified data cartridge. These drives are not displayed if a cartridge(s) is absent or rejected. In addition:

- When selecting the list of drives to be returned to a query mount request, the drives must be compatible with the volume specified.
- Drives are ordered primarily by pass-thru distance. The drives in LSMS closest to the cartridge are listed first.
- With StorageTek ACSLS 7.3.1 and later releases, drives that are the same pass-thru distance from the cartridge are in least-recently-used order.

Example: The compatible drive with the longest time since a cartridge was dismounted, is first; the drive with the next longest time, is second, etc.

### **Format**

`query mount vol_id`

### **Options**

`vol_id` specifies the cartridge to query.

### **Usage**

Use the `query mount` command to display the status of all library drives attached to the same ACS as the cartridge and compatible with the media type of the specified cartridge. `query mount` displays drive status for LSMS in any state (online, offline, offline pending, or diagnostic).

The compatible drives are ordered by proximity to the specified cartridge in the following format:

<code>yyy-mm-dd</code>	<code>hh:mm:ss</code>	Mount	Status	Identifier	Status	Drive	State	Status	Volume	Drive	Type
<code>vol_id</code>				<code>vol_stat</code>	<code>drive_id</code>	<code>state</code>		<code>drive_stat</code>	<code>inu_id</code>		<code>drive_type</code>

Where:

`vol_id`

is the identifier of the specified cartridge.

`vol_stat`

is the location of the cartridge:

`home`

The cartridge is in a storage cell.

`in drive`

The cartridge is in a drive.

*in transit*

The cartridge is being moved or is missing.

*drive\_id*

is a list of all library drives compatible with the media type of the specified cartridge.

*drive\_id*

is the drive identifier.

*state*

is one of the following drive states:

*online*

The drive is online.

*offline*

The drive is offline.

*diagnostic*

The drive will process only current and pending requests and will reject any new requests. The drive is unavailable to client applications and can only be controlled via `cmd_proc`. Use the `vary` command to vary the drive online.

*recovery*

The drive is initializing or recovering from errors. Wait for the drive to go online.

*status*

is one of the following drive statuses:

*In use*

The drive has a cartridge mounted or is reserved for a mount.

*Available*

The drive is available for a mount.

*inu\_id*

is the identifier of the cartridge in the drive. The cartridge id appears only if the `drive_stat` is *In use*.

*drive\_type*

is the drive type.

## **Examples**

To display status information of drives ordered by proximity to cartridge ZUNI14:

`query mount ZUNI14`

**See Also**

For information about...	See...
Mounting a data cartridge on a drive	<a href="#">"mount" on page 214</a>
Displaying the lock status of a drive or cartridge	<a href="#">"query lock" on page 236</a>
Displaying the location and media type of a cartridge	<a href="#">"query volume" on page 251</a>
Changing the state of a library component	<a href="#">"vary" on page 271</a>

**■ query mount \***

When selecting the list of drives to be returned with a `query mount` request, the drives must be compatible with the media type of the volume specified.

The `query mount` command returns drives with the oldest dismount time. The drive with the oldest dismount time is considered the least-recently-used drive and the compatible drives are listed (returned from the query) in the following order:

- Drives are ordered primarily by pass-thru distance. The drives in LSMs closest to the cartridge are listed first.
- Within a given pass-thru distance, the least-recently-used drive is returned first and the most recently used drive is returned last. This causes drives to be used evenly within a given pass-thru distance.

The `query mount *` command displays the status of media-compatible drives for a specified scratch pool (and, optionally, for a specific cartridge media type within the pool).

**Format**

`query mount * pool_id... [media media_type | media *]`

**Options**

`pool_id`

specifies the scratch pool to query.

`media media_type | media *`

specifies the media type.

**Usage**

Use the `query mount *` command to display the status of all library drives compatible with all cartridge media types in a specified scratch pool and in the same ACS as the cartridges. Pool 0 is the common scratch pool. Specify the

*media\_type* option to restrict the display to drives compatible with a specific cartridge media type within the pool. The displayed drives are ordered by proximity to the densest scratch pools. `query mount *` displays drive status for LSMs in any state (online, offline, offline-pending, or diagnostic).

The `query mount *` command displays drive status in the following format:

<i>yyy-mm-dd hh:mm:ss</i>	<i>Mount</i>	<i>Scratch</i>	<i>Status</i>	<i>Identifier</i>	<i>Drive</i>	<i>State</i>	<i>Volume</i>	<i>Status</i>	<i>Drive Type</i>
<i>pool_id</i>					<i>drive_id</i>	<i>state</i>	<i>vol_id</i>	<i>drive_stat</i>	<i>drive_type</i>

Where:

*pool\_id*

is the specified scratch pool.

*drive\_id*

is a list of all library drives compatible with all media types of the specified pool (or a specific media type within the pool if a media type was specified).

*state*

is one of the following drive states:

online

The drive is online.

offline

The drive is offline.

diagnostic

The drive will process only current and pending requests and will reject any new requests. The drive is unavailable to client applications and can only be controlled via `cmd_proc`. Use the `vary` command to vary the drive online.

recovery

The drive is initializing or recovering from errors. Wait for the drive to go online.

*vol\_id*

is the identifier of the cartridge in the drive. The cartridge id appears only if the *drive\_stat* is In use.

*drive\_stat*

is one of the following drive statuses:

In use

The drive has a cartridge mounted or is reserved for a mount.

Available

The drive is available for a mount.

*drive\_type*

is the drive type.

### Examples

To display status of compatible drives listed by proximity to the largest concentration of scratch tapes in pool 5:

```
query mount * 5
```

To display status of compatible drives listed by proximity to the largest concentration of 3480 scratch tapes in common pool 0:

```
query mount * 0 media 3480
```

### See Also

For information about...	See...
Creating or modifying scratch pools	<a href="#">“define pool” on page 194</a>
Deleting empty scratch pools	<a href="#">“delete pool” on page 196</a>
Mounting a scratch cartridge on a drive	<a href="#">“mount *” on page 217</a>
Displaying the lock status of a drive or cartridge	<a href="#">“query lock” on page 236</a>
Displaying scratch pool attributes	<a href="#">“query pool” on page 244</a>
Displaying scratch cartridge status	<a href="#">“query scratch” on page 248</a>
Setting or clearing cartridge scratch attributes	<a href="#">“set scratch” on page 262</a>
Changing the state of a library component	<a href="#">“vary” on page 271</a>

## ■ query pool

The `query pool` command displays scratch pool attributes.

### Format

```
query pool pool_id... | all
```

### Options

*pool\_id* | all

specifies the scratch pool to query or all for all pools. Pool 0 is the common pool.

### **Usage**

Use the `query pool` command to display scratch pool attributes in the following format:

yyy-mm-dd hh:mm:ss Pool Status					
Identifier	Volume Count	Low Water Mark	High Water Mark	Attributes	
<i>pool_id</i>	<i>vol_count</i>	<i>low_water_mark</i>	<i>high_water_mark</i>	<i>attribute</i>	

Where:

*pool\_id*

is the specified scratch pool.

*vol\_count*

is the number of scratch cartridges in the pool.

Absent and ejected scratch cartridges are not counted.

*low\_water\_mark*

is the low cartridge warning threshold. If the scratch cartridge count falls below this threshold, StorageTek ACSLS logs a warning message in the event log.

A “-” after the value means that the scratch cartridge count is below the low cartridge threshold.

*high\_water\_mark*

is the high cartridge warning threshold. If the scratch cartridge count reaches or exceeds this threshold, StorageTek ACSLS logs a warning message in the event log. A “+” after the value means that the scratch cartridge count is at or above the high cartridge threshold.

*attribute*

is displayed if `overflow` is set (via the `set scratch` command) for the specified scratch pool. `overflow` specifies that scratch cartridges are selected from the common scratch pool (Pool 0) if `mount scratch *` requests cannot be satisfied with a cartridge from the specified scratch pool.

### **Examples**

To display status information for scratch pool 5:

**query pool 5**

To display status information for all scratch pools:

```
query pool all
```

### See Also

For information about...	See...
Creating or modifying scratch pools	<a href="#">"define pool" on page 194</a>
Deleting empty scratch pools	<a href="#">"delete pool" on page 196</a>
Displaying scratch cartridge status	<a href="#">"query scratch" on page 248</a>
Setting or clearing cartridge scratch attributes	<a href="#">"set scratch" on page 262</a>

## ■ query port

The `query port` command displays port status.

### Format

```
query port port_id... | all
```

### Options

*port\_id* | all

specifies the port to query or all for all ports.

### Usage

Use the `query port` command to display the status of a port in the following format:

```
yyy-mm-dd  hh:mm:ss  Port Status
State      Identifier
state      port_id
```

Where:

*state*

is one of the following port states:

*online*

The port is online.

*offline*

The port is offline.

*port\_id*  
is the port identifier.

### Examples

To display status information for port 0,0:

query port 0,0

To query all ports:

query port all

### See Also

---

For information about...	See...
Changing the state of a library component	<a href="#">“vary” on page 271</a>

---

## ■ query request

The `query request` command displays request status.

### Format

`query request request_id... | all`

### Options

`request_id | all`

specifies the request to query or `all` for all requests.

### Usage

Use the `query request` command to display the status of a request in the following format:

<i>yyy-mm-dd</i>	<i>hh:mm:ss</i>	Request Status
Identifier	Command	Status
<i>request_id</i>	<i>command</i>	<i>status</i>

Where:

*request\_id*  
is the StorageTek ACSLS request identifier.

*command*

is the StorageTek ACSLS command that corresponds to the request identifier.

*status*

is one of the following request statuses:

Current

StorageTek ACSLS is processing the request.

Pending

The request is waiting to be processed.

Not found

The specified request is not a valid StorageTek ACSLS request.

### **Examples**

To display status information for request 33179:

`query request 33179`

To display all current and pending requests:

`query request all`

### **See Also**

For information about...	See...
Cancelling a command	<a href="#">"cancel" on page 188</a>

## ■ **query scratch**

The `query scratch` command displays the status of scratch cartridges in a pool sorted by ascending order of access date. The cartridges with the earliest access date are at the top of the list with the most recently used cartridges at the bottom of the list. Pool IDs in the first column do not appear in any particular order. Only those cartridges permitted through Access Control are displayed.

### **Format**

`query scratch pool_id... | all`

### **Options**

`pool_id | all`

specifies the scratch pool to query or all for all pools. Pool 0 is the common pool.

## Usage

Use the `query scratch` command to display the status of scratch cartridges in a pool in the following format:

<i>yyy-mm-dd hh:mm:ss</i>	scratch Status			
Scratch Pool <i>pool_id</i>	Identifier <i>vol_id</i>	Home Location <i>cell_id</i>	Status <i>status</i>	Type <i>media_type</i>

Where:

*pool\_id*

is the specified scratch pool.

*vol\_id*

is the identifier of the scratch cartridge.

*cell\_id*

is the storage cell that contains the cartridge.

*status*

is the location of the cartridge:

home

The cartridge is in a storage cell.

in drive

The cartridge is in a drive.

in transit

The cartridge is being moved.

*media\_type*

is the cartridge's media type (for example, 3480, 3490E, DD3D, or DLTIV).

**Note:** Scratch cartridges with a cartridge status of absent, ejected, or missing are not included in the `query scratch` output.

To see cartridges sorted by pool, you issue successive Query Scratch commands for each pool. Alternately, you can issue the Display volume command to see the information and sort it by pool, but you will not be guaranteed of getting the least recently used scratch cartridge.

## Examples

To display status information for scratch cartridges in scratch pool 29015:

`query scratch 29015`

To display status information for scratch cartridges in all scratch pools:

**query scratch all**

**See Also**

For information about...	See...
Creating or modifying scratch pools	<a href="#">"define pool" on page 194</a>
Deleting empty scratch pools	<a href="#">"delete pool" on page 196</a>
Setting or clearing cartridge scratch attributes	<a href="#">"set scratch" on page 262</a>

## ■ **query server**

The `query server` command displays StorageTek ACSLS and library status.

**Format**

`query server`

**Options**

None.

**Usage**

Use the `query server` command to display the status of StorageTek ACSLS and the library in the following format:

yyy-mm-ddhh:mm:ssServer Status					
Identifier	State	Free	CellAudit	Mount	Dismount
		Count	C/P	C/P	C/P
state	count	n/n		n/n	n/n
					n/n

Where:

Identifier  
is blank

state  
is one of the following StorageTek ACSLS states:

idle

StorageTek ACSLS is idle (not processing requests).

idle pending

StorageTek ACSLS will process current and pending request, reject new request, then go idle.

*recovery*

StorageTek ACSLS is initializing (going to run state) or recovering from errors; StorageTek ACSLS is not processing requests.

*run*

StorageTek ACSLS is running (processing requests).

*count*

is the number of free storage cells in the library.

*n*

is the number of current (C) and pending (P) StorageTek ACSLS requests for each command that requires library resources (audit, mount, dismount, enter, and eject).

**Hint:** You cannot cancel a query server request.

### Examples

To display status information on the server:

query server

### See Also

For information about...	See...
Changing the state of a library component	<a href="#">“vary” on page 271</a>
Displaying request status	<a href="#">“query request” on page 247</a>

## ■ query volume

The query volume command displays the location of a cartridge.

### Format

query volume *vol\_id...* | all

### Options

*vol\_id* | all

specifies the volume to query or all for all volumes.

### Usage

Use the `query volume` command to display the location of a volume in the following format:

<i>yyy-mm-dd</i>	<i>hh:mm:ss</i>	Volume	Status	
Identifier		Status	Current Location	Type
<i>vol_id</i>		<i>status</i>	<i>location</i>	<i>media_type</i>

Where:

*vol\_id*  
is the volume identifier.

*status*  
is the location of the cartridge.

home  
The cartridge is in a storage cell.

in drive  
The cartridge is in a drive.

in transit  
The cartridge is being moved or is missing.

absent  
The cartridge cannot be found.

ejected  
The cartridge has been ejected from the library.

*location*  
specifies the location as one of the following:

- If the status is home, the location is a storage cell identifier.
- If the status is in transit, the location is either a cell identifier or a drive identifier.
- If the status is in drive, the location is a drive identifier.

*media\_type*  
is the volume's media type (for example, 3480, 3490E, DD3D, or DLTIV).

### Examples

To display status information for volume 2903B:

**query volume 2903B**

To display all volumes in the library:

**q volume all**

### See Also

For information about...	See...
Other volume information	<a href="#">“Creating a Custom Volume Report” on page 119</a>
Display Command	<a href="#">“Using display Command Options” on page 284</a> and <a href="#">“display volume” on page 304</a>
Mounting a data volume on a drive	<a href="#">“mount” on page 214</a>
Displaying the lock status of a drive or volume	<a href="#">“query lock” on page 236</a>
Displaying the status of media-compatible drives for a specified data volume	<a href="#">“query mount” on page 239</a>
Displaying scratch pool attributes	<a href="#">“query pool” on page 244</a>
Setting or clearing volume scratch attributes	<a href="#">“set scratch” on page 262</a>
Changing the state of a library component	<a href="#">“vary” on page 271</a>

## ■ set commands

The set commands set various attributes of different library components. See the following sections for more information about each set command, including format, options, usage, and messages.

### Format

The following shows the general format of the set commands:

set type [off | subtype] [\*] *identifier...*

### See Also

For information about...	See...
Cancelling a command	<a href="#">“cancel” on page 188</a>

### Command Area Messages

#### Success Messages

The following message appears when a set command succeeds:

Set: Set completed, Success.

See each set command for specific success messages.

### Intermediate Messages

None.

### Error Messages

See each set command for specific messages.

### Display Area Messages

See each set command for specific messages.

## ■ set cap mode

The set cap mode command sets a CAP's entry mode.

### Format

set cap mode *cap\_mode* *cap\_id*

### Options

*cap\_mode*

specifies manual or automatic CAP mode.

*cap\_id*

specifies the CAP identifier.

You cannot specify a CAP identifier that contains an asterisk (\*) unless the priority is set.

### Usage

Use the set cap mode command to set a CAP's entry mode to one of the following modes:

manual

You must enter an enter command before entering cartridges.

automatic

You can enter cartridges without first entering an enter command

**Note:** You cannot set the CAP mode to automatic in a partitioned library.

**Hint:** You cannot change a CAP's mode while the CAP is in use. That is, if the door is open during either manual or automatic enter operations, you cannot change its mode until you complete the enter operation.

### Examples

To set CAP 0,3,1 in manual mode:

```
set cap mode manual 0,3,1
```

To set CAP 0,3,1 in automatic mode:

```
set cap mode automatic 0,3,1
```

## See Also

For information about...	See...
Making a CAP (manual mode) ready to enter labelled cartridges into the library	<a href="#">“enter” on page 205</a>
Displaying CAP status	<a href="#">“query cap” on page 227</a>
Changing the state of a library component	<a href="#">“vary” on page 271</a>
Making a CAP ready to enter unlabeled cartridges into the library	<a href="#">“venter” on page 278</a>

## Command Area Messages

### Success Messages

Set: CAP *cap\_id*, mode changed to *cap\_mode*.

**Explanation:** StorageTek ACSLS changed the mode of the specified CAP.

#### Variable:

- *cap\_id* is the CAP whose mode is changed.
- *cap\_mode* is the new enter mode of the CAP.

### Intermediate Messages

None.

### Error Messages

Set: CAP *cap\_id* Set failed, Incorrect attribute.

**Explanation:** StorageTek ACSLS cannot change the mode of the specified CAP because you specified an invalid CAP mode.

**Variable:** *cap\_id* is the CAP whose mode is not changed.

CAP *cap\_id*: Automatic mode.

**Explanation:** StorageTek ACSLS changed the specified CAP's mode to automatic.

**Variable:** *cap\_id* is the CAP whose mode is changed.

CAP *cap\_id*: Manual mode.

**Explanation:** StorageTek ACSLS changed the specified CAP's mode to manual.

**Variable:** *cap\_id* is the CAP whose mode is changed.

## ■ set cap priority

The set cap priority command sets a CAP's automatic selection priority.

### **Format**

set cap priority *cap\_priority* *cap\_id*

### **Options**

*cap\_priority*

specifies the CAP priority. Valid values are 0 to 16, where 16 is the highest priority. All CAPs initially have a 0 priority, which means that StorageTek ACSLS does not automatically select the CAP.

**Note:** If you are using the AEM option. Since the AEM should not be used for small enters and ejects, the maximum CAP priority is 1. This aids in preventing the AEM from being selected when the CAP ID is wild-carded with an asterisk on an audit, enter, or eject. For more information on the AEM, refer to ["Using the AEM" on page 368](#).

*cap\_id*

specifies the CAP identifier. You must specify a particular CAP; you cannot specify an asterisk (\*) to set the same priority for all CAPs.

### **Usage**

Use the set cap priority command to set a CAP's automatic selection priority.

If a CAP request specifies an asterisk (\*) for the CAP ID, StorageTek ACSLS automatically selects an available CAP with highest non-zero priority for each ACS specified in the request.

### **Examples**

To assign priority 16 to CAP 0,3,1:

**set cap priority 16 0,3,1**

**See Also**

For information about...	See...
Updating the StorageTek ACSLS database to match the actual inventory of library cartridges	<a href="#">"audit" on page 182</a>
Ejecting cartridges from the library	<a href="#">"eject" on page 201</a>
Making a CAP (manual mode) ready to enter labelled cartridges into the library	<a href="#">"enter" on page 205</a>
Displaying CAP status	<a href="#">"query cap" on page 227</a>
Changing the state of a library component	<a href="#">"vary" on page 271</a>
Making a CAP ready to enter unlabeled cartridges into the library	<a href="#">"venter" on page 278</a>

**Command Area Messages**

Updates the StorageTek ACSLS database to match the actual inventory of library cartridges.

**Success Messages**

Set: CAP *cap\_id*, priority changed to *cap\_priority*.

**Explanation:** StorageTek ACSLS changed the priority of the specified CAP.

**Variable:**

- *cap\_id* is the CAP whose priority is changed.
- *cap\_priority* is the new CAP priority.

**Intermediate Messages**

None.

**Error Messages**

Set: CAP *cap\_id* Set failed, Incorrect attribute.

**Explanation:** StorageTek ACSLS cannot change the mode of the specified CAP because you specified an invalid CAP priority.

**Variable:** *cap\_id* is the CAP whose priority is not changed.

**Display Area Messages**

None.

## ■ **set clean**

The set clean command sets cleaning cartridge attributes.

### **Format**

set clean *max\_usage* | off *vol\_id* | *volrange*

### **Options**

*max\_usage* | off

specifies the number of times a cleaning cartridge is used before StorageTek ACSLS stops selecting the cartridge to clean drives. off specifies that StorageTek ACSLS will not select the cartridge and redefines the cartridge as a data cartridge.

**Note:** You cannot:

- specify a maximum cleaning usage for a media type that is reserved for only data cartridges
- set cleaning *off* for a media type that is only a cleaning cartridge

*vol\_id* | *volrange*

specifies the cleaning cartridge or range of cartridges.

### **Usage**

Use the set clean command to set the number of times StorageTek ACSLS will select a cleaning cartridge. You also use set clean to set a cartridge's cleaning cartridge attribute off, which you do if you have incorrectly defined a data cartridge as a cleaning cartridge.

### **Examples**

To set the maximum use to 10 for cleaning cartridges CLN108 - CLN112:

**set clean 10 CLN108-CLN112**

To set the cleaning cartridge attribute off and redefine cartridges HRR234 - HRR244 as data cartridges:

**set clean off HRR234-HRR244**

**See Also**

For information about...	See...
Guidelines and procedures for cleaning drives	<a href="#">"Cleaning Cartridges" on page 83</a>
Displaying cleaning cartridge status	<a href="#">"query clean" on page 229</a>

**Command Area Messages****Success Messages**

Set: volume *vol\_id* is a cleaning cartridge.

**Explanation:** StorageTek ACSLS specified that the cleaning cartridge is valid for drive cleaning.

**Variable:** *vol\_id* is the valid cleaning cartridge.

Set: volume *vol\_id* is not a cleaning cartridge.

**Explanation:** StorageTek ACSLS specified that the cleaning cartridge is not valid for drive cleaning.

**Variable:** *vol\_id* is the invalid cleaning cartridge.

**Intermediate Messages**

None.

**Error Messages**

Set: Clean *vol\_id* Set failed, Incorrect attribute.

**Explanation:** StorageTek ACSLS cannot change the cleaning attribute because the specified cartridge is not a cleaning cartridge.

**Variable:** *vol\_id* is the data or scratch cartridge.

**Display Area Messages**

None.

## ■ **set lock**

The set lock command sets your lock ID.

**Format**

set lock *lock\_id*

**Options**

*lock\_id*

specifies the lock ID. Valid lock IDs are 0 to 32767.

## Usage

Use the `set lock` command to set or change your lock ID. Change your current lock ID when you want to remove locks on a drive or cartridge whose lock ID does not match your current lock ID as follows:

- To clear all locks on a specified drive or cartridge, set your lock ID to 0, then enter a `clear lock` command.
- To remove active locks on drives or cartridges, set your lock ID to the lock ID of the locked components, then enter an `unlock` command.

**Note:** When you enter a `lock` command to lock a cartridge or drive, StorageTek ACSLS assigns a lock ID to the cartridge or drive and then changes your lock ID to the lock ID of the cartridge or drive. You cannot use the `set lock` command to set your lock ID and then use the `lock` command to lock a cartridge or drive with the lock ID that you set with `set lock`.

## Examples

To change your current lock ID lock to new lock ID 354:

```
set lock 354
```

## See Also

For information about...	See...
Removing all active or pending locks on a specified drive or cartridge	<a href="#">“clear lock” on page 192</a>
Locking drives and cartridges	<a href="#">“lock” on page 211</a>
Displaying the lock status of a drive or cartridge	<a href="#">“query lock” on page 236</a>
Displaying your lock or user ID	<a href="#">“show” on page 264</a>
Removing active locks	<a href="#">“unlock” on page 269</a>

## Command Area Messages

### Success Messages

Set: Changed lock identifier from *previous\_lock\_id* to *lock\_id*.

**Explanation:** StorageTek ACSLS changed your lock ID.

#### Variable:

*previous\_lock\_id* was your previous lock ID.

*lock\_id* is your new lock ID.

**Intermediate Messages**

None.

**Error Messages**

None.

**Display Area Messages**

None.

## ■ **set owner**

The set owner command sets volume ownership.

**Format**

set owner *owner\_id* *volume vol\_id | volrange*

**Options**

*owner\_id*

specifies the owner identifier. You must enclose this value in quotes (" ").

*volume vol\_id | volrange*

specifies the volume or range of volumes.

**Usage**

Use the set owner command to set volume ownership. You must enter set owner from cmd\_proc; you cannot set volume ownership from a client application.

**Examples**

To assign ownership of volume YUMA06:

**set owner "cray" volume YUMA06**

**Note:**

To remove volume ownership of volume YUMA06:

**set owner "" volume 0YUMA06**

**Command Area Messages**

None.

**Display Area Messages**

None.

## ■ set scratch

The `set scratch` command sets or clears a volume's scratch attribute and assigns the volume to a pool.

### **Format**

`set scratch [off] pool_id vol_id | volrange`

### **Options**

`off`

specifies that the volume is a data cartridge.

`pool_id`

specifies the cartridge's scratch pool. Specify an asterisk (\*) to reassign a data cartridge to its current pool.

`vol_id | volrange`

specifies the volume or range of volumes.

### **Usage**

Use the `set scratch` command to set or clear a volume's scratch attribute and assign the volume to a pool.

### **Examples**

To define volumes YUMA10-YUMA20 as scratch volumes and assign them to scratch pool 5:

`set scratch 5 YUMA10-YUMA20`

To move scratch volumes YUMA10-YUMA15 to pool 10:

`set scratch 10 YUMA10-YUMA15`

To “unscratch” (change from scratch to data) volumes YUMA16-YUMA20 and move them to the common pool (pool 0):

`set scratch off 0 YUMA16-YUMA20`

To scratch to data volumes YUMA16-YUMA20 and keep them in their current pool:

`set scratch * YUMA16-YUMA20`

### **See Also**

For information about...	See...
Displaying scratch cartridge status	<a href="#">“query scratch” on page 248</a>
Displaying scratch pool attributes	<a href="#">“query pool” on page 244</a>

For information about...	See...
Creating or modifying scratch pools	<a href="#">"define pool" on page 194</a>
Deleting empty scratch pools	<a href="#">"delete pool" on page 196</a>

## Command Area Messages

### Success Messages

Set: volume *vol\_id* in tape pool *pool\_id* is a scratch cartridge.

**Explanation:** StorageTek ACSLS changed the specified data cartridge to a scratch cartridge and assigned it to a pool.

#### Variable:

- *vol\_id* is the specified volume.
- *pool\_id* is the pool to which the volume is assigned.

Set: volume *vol\_id* in tape pool *pool\_id* is a data volume.

**Explanation:** StorageTek ACSLS changed the specified scratch cartridge to a data cartridge.

**Variable:** *vol\_id* is the specified volume.

### Intermediate Messages

None.

### Error Messages

Set: Scratch *vol\_id* Set failed, Incorrect attribute.

**Explanation:** StorageTek ACSLS cannot change the scratch attribute because the specified cartridge is a cleaning cartridge.

**Variable:** *vol\_id* is the cleaning cartridge.

## Display Area Messages

Pool *pool\_id*: low water mark warning.

**Explanation:** The number of cartridges in the specified scratch pool is less than or equal to the low threshold.

**Variable:** *low\_water\_mark* is the low threshold of the specified scratch pool.

Pool *pool\_id*: high water mark warning.

**Explanation:** The number of cartridges in the specified scratch pool is greater than or equal to the high threshold.

**Variable:** *high\_water\_mark* is the high threshold of the specified scratch pool.

## ■ **show**

The `show` command displays your lock ID or user ID.

### **Format**

`show type`

### **Options**

*type*

specifies one of the following types:

lock

Your lock ID.

user

Your user ID.

### **Usage**

Use the `show` command to display your lock ID or user ID.

### **Examples**

To display requestor's user\_id:

`show user`

To display current lock\_id:

`show lock`

### **Notes**

None.

### **See Also**

For information about...	See...
Removing all active or pending locks on a specified drive or cartridge	<a href="#">“clear lock” on page 192</a>
Locking drives and cartridges	<a href="#">“lock” on page 211</a>
Displaying the lock status of a drive or cartridge	<a href="#">“query lock” on page 236</a>
Setting your lock ID	<a href="#">“set lock” on page 259</a>
Removing active locks	<a href="#">“unlock” on page 269</a>

## ***Command Area Messages***

### **Success Messages**

Show: Current lock identifier is *lock\_id*.

**Explanation:** Your current lock ID is *lock\_id*.

Show: User identifier is *user\_id*.

**Explanation:** Your current user ID is *user\_id*.

### **Intermediate Messages**

None.

### **Error Messages**

None.

## ***Display Area Messages***

None.

# **■ start**

The start command starts StorageTek ACSLS request processing.

### ***Format***

start

### ***Options***

None.

### ***Usage***

Use the start command to put StorageTek ACSLS in run state and start StorageTek ACSLS request processing. You typically use the start command to restart request processing if StorageTek ACSLS is idled.

### ***Examples***

To restart StorageTek ACSLS request processing:

**start**

If StorageTek ACSLS is in run state, entering the start command has no effect.

**See Also**

For information about...	See...
Stopping StorageTek ACSLS from processing new requests	<a href="#">"idle" on page 209</a>
Displaying the status of a library component	<a href="#">"query commands" on page 224</a>
Changing the state of a library component	<a href="#">"vary" on page 271</a>

**Command Area Messages****Success Messages**

ACSLM Request Processing Started: Success.

**Explanation:** StorageTek ACSLS started processing requests.

**Intermediate Messages**

None.

**Error Messages**

ACSLM Request Processing Not Started: *status*

**Explanation:** StorageTek ACSLS did not start processing requests.

**Variable:** *status* is the reason for the failure. For more information on common status messages, see StorageTek ACSLS Messages.

**Display Area Messages**

Server system running

**Explanation:** StorageTek ACSLS started processing requests.

## ■ **switch lm**

In Dual-LMU or Redundant Electronics (RE) configurations, the switch lm command manually switches ACS management from the ACS's active Library Controller (LC) or LMU to the standby LC/LMU.

**Notes:**

- StorageTek ACSLS supports Dual-LMU configurations for only the 9330 LMU with host/LMU microcode compatibility Level 11 or above loaded. The same microcode level must be loaded in both LMUs.
- ACSLS 7.3.1 supports RE in the SL8500 library.

**Format**

```
switch lm acs_id
```

**Options**

*acs\_id*

specifies the ACS to switch ACS management from the active to the standby LC/LMU.

**Usage**

Use the `switch lm` command to manually switch ACS management from the ACS's active LC/LMU to the standby LC/LMU. Before you enter a `switch lm` command, make sure that:

- StorageTek ACSLS is in run state.
- The ACS you specify is in online or diagnostic state.
- At least one port is online to each LC/LMU.
- You are only trying to switch a single standalone SL8500 with RE. (At this time, `switch lm` does not work against an ACS with multiple connected SL8500s.)

**Examples**

In Dual-LMU configurations, you can use the `switch lm` command to switch ACS management from the ACS's active LC/LMU to the standby LC/LMU. Assume the following Dual-LMU configuration:

- LC/LMU A is in the active role and LC/LMU B is in the standby role.
- Both LCs/LMUs manage ACS 0.
- The ports to LC/LMU A have port IDs 0,0 and 0,1.

The following procedure tells how to use the `switch lm` command to let you replace a LAN cable between the LMUs.

**To replace a LAN cable between Dual LMUs configured as described above, do the following:**

1. Switch to LMU B:

```
switch lm 0
```

2. Vary the ports to LMU A offline:

```
vary port 0,0 0,1 offline
```

3. Replace the LAN cable.

4. Vary the ports to LMU A back online:

```
vary port 0,0 0,1 online
```

## 5. Switch back to LMU A:

```
switch lmu 0
```

**See Also**

For information about...	See...
Displaying ACS status	<a href="#">"query acs" on page 225</a>
Displaying LMU status	<a href="#">"query lmu" on page 232</a>
Displaying port status	<a href="#">"query port" on page 246</a>
Displaying StorageTek ACSLS and library status	<a href="#">"query server" on page 250</a>
Starting StorageTek ACSLS request processing	<a href="#">"start" on page 265</a>
Changing the state of a library component	<a href="#">"vary" on page 271</a>
Redundant Electronics	<a href="#">"Redundant Electronics" on page 328</a>

**Command Area Messages****Success Messages**

Switch: Switch lmu completed for *acs\_id*, Success.

**Explanation:** StorageTek ACSLS switched ACS management from the active to the standby LC/LMU.

**Variable:** *acs\_id* is the ACS whose LMUs switched roles.

Switch: Switch lmu initiated for *acs\_id*, Success.

**Explanation:** StorageTek ACSLS started switching ACS management from the active to the standby LC/LMU.

**Variable:** *acs\_id* is the ACS whose LMUs are switching roles.

Switch: Switch lmu failed, *acs\_id* not found.

**Explanation:** You specified an invalid ACS.

**Variable:** *acs\_id* is the ACS identifier you specified on the `switch lmu` command.

Switch: Switch lmu failed, *acs\_id* is offline.

**Explanation:** You specified an ACS that is offline. Use the vary command to vary the ACS to online or diagnostic mode.

**Variable:** *acs\_id* is the ACS identifier you specified on the `switch lmu` command.

Switch: Switch lmu failed, *acs\_id* not configured for dual lmu.

**Explanation:** You specified an ACS that is not configured with active and standby LC/LMUs. Either:

- Reconfigure the specified ACS, then reenter the switch lmu command
- Enter a switch lmu command that specifies an LMU that is configured with active and standby LC/LMUs.

**Variable:** *acs\_id* is the ACS identifier you specified on the switch lmu command.

Switch: Switch lmu failed, not communicating.

**Explanation:** An LMU switch failed because the standby LC/LMU is not communicating. Check the standby LC/LMU standby LC/LMU for communications problems.

Switch: Switch lmu failed, switch already active.

**Explanation:** An LMU switch is in progress for the ACS you specified. Wait until the switch completes, then, if desired, reenter the switch lmu command.

Switch: Switch lmu failed, port is offline.

**Explanation:** You specified an ACS with no LMU ports online. Vary at least one port online to each LMU.

Switch: Switch failed, invalid option.

**Explanation:** You issued a switch lmu command against an ACS with more than one connected SL8500.

### ***Display Area Messages***

None.

## ■ **unlock**

The unlock command removes active locks (associated with your current lock ID) on a specified drive or cartridge or removes all active locks.

### ***Format***

unlock *type identifier...* | all

### ***Options***

*type identifier*

specifies a library component. [Table 20](#) lists the components that you can unlock.

**Table 20. Valid Components for Unlock**

Library Component	type	identifier
drive	<u>drive</u>	<i>drive_id</i>
volume	<u>volume</u>	<i>vol_id</i>

all

specifies all active locks.

### Usage

Use the unlock command to remove active locks on specified cartridges and drives or remove all active locks. The lock ID of the component must match your current lock ID.

When you unlock a component that is not in use, StorageTek ACSLS checks for pending locks on the component. If there is a pending lock, StorageTek ACSLS locks the component with the lock ID of the pending lock.

**Note:** The unlock command always resets your lock ID to 0.

### Examples

To remove active locks on drive 0,0,2,0:

```
unlock drive 0,0,2,0
```

To remove active locks on all locked cartridges:

```
unlock volume all
```

### See Also

For information about...	See...
Removing all active or pending locks on a specified drive or volume	<a href="#">“clear lock” on page 192</a>
Locking drives and volumes	<a href="#">“lock” on page 211</a>
Displaying the lock status of a drive or cartridge	<a href="#">“query lock” on page 236</a>
Setting your lock ID	<a href="#">“set lock” on page 259</a>
Displaying your lock or user ID	<a href="#">“show” on page 264</a>

### Command Area Messages

#### Success Messages

Unlock: Unlock completed, Success.

Unlock: drive *drive\_id* unlocked.

**Explanation:** StorageTek ACSLS unlocked the specified drive.

**Variable:** *drive\_id* is the unlocked drive.

Unlock: Unlock completed, Success.

Unlock: volume *vol\_id* unlocked.

**Explanation:** StorageTek ACSLS unlocked the specified volume.

**Variable:** *vol\_id* is the unlocked volume.

### Intermediate Messages

None.

### Error Messages

Unlock: Unlock of drive *drive\_id* failed, *status*.

**Explanation:** StorageTek ACSLS cannot unlock the drive.

**Variable:** *status* is the reason for the failure. For more information on common status messages, see StorageTek ACSLS Messages.

Unlock: Unlock of volume *vol\_id* failed, *status*.

**Explanation:** StorageTek ACSLS cannot unlock the volume.

**Variable:** *status* is the reason for the failure. For more information on common status messages, see StorageTek ACSLS Messages.

### Display Area Messages

None.

## ■ vary

The vary command changes the state of a library component.

### Format

vary *type identifier...state* [force]

### Options

*type* [*identifier*]

specifies a library component. [Table 21](#) lists the components you can vary.

**Table 21. Valid Components for Vary**

ACS Component	<b>type</b>	<b>identifier</b>
ACS	<u>acs</u>	<i>acs_id</i>

**Table 21. Valid Components for Vary**

ACS Component	type	identifier
LSM	<u>lsm</u>	<i>acs_id, lsm_id</i>
CAP	<u>cap</u>	<i>cap_id</i>
drive	<u>drive</u>	<i>drive_id</i>
port	<u>port</u>	<i>port_id</i>

**state**

specifies one of the following device states: online (online to clients and cmd\_proc), offline, or diagnostic (online to cmd\_proc only).

You can vary an ACS, LSM, CAP, or drive online, offline, or diagnostic. You can vary a port either online or offline. See “[Usage](#)” for more information about device states.

**force**

varies an ACS, LSM, CAP, or drive offline after processing only the current robotic request.

**Usage**

Use the vary command to change the state of an ACS, LSM, CAP, drive, or port.

This command brings the current state of each component to the specified value. Changes to the current state of each component are pushed downward as needed. For example, issuing a `vary acs` command may change the current state of each LSM and its drives.

The vary command also changes the desired state of each specified component. But changes to the desired state of each component are NOT pushed downward. For example, a `vary acs` command does NOT affect the desired state of its LSMs or drives. To change the desired state of an LSM or drive, use the `vary lsm` or `vary drive` command, respectively.

Desired state is used to control how ACSLS manages the library components. ACSLS will generally try to bring each component to its desired state when you:

- restart ACSLS
- recover from a temporary library outage (switch operation, lost communications, etc.)
- change the state of a higher-level component (ACS or LSM)

Desired state also affects the availability of a component to clients. If the desired state of a component (and any higher-level components) is online, then ACSLS automatically queues and retries mount or dismount requests

from clients during a temporary outage. But if either the ACS, LSM or drive has a desired state of offline, then those requests fail.

For more information about current and desired states, refer to [“Managing Library and Drive States” on page 66](#).

The following sections tell how each of the device states you can specify affects library components.

### **vary offline**

[Table 22](#) shows the results of `vary offline` for each ACS component. When you vary a component offline and it first goes to offline-pending state, StorageTek ACSLS processes all active and pending requests for the component, rejects new requests, then varies the component offline.

**Table 22. Vary Offline Results**

ACS Component	Results
ACS	ACS and subcomponents go offline-pending, then offline. LSMs must go offline before the ACS goes offline.
LSM	LSM goes offline-pending, then offline.
CAP	CAP goes offline-pending, then offline.
drive	If available, drive goes offline immediately. If in use, drive stays online.
port	Port goes offline immediately if: <ul style="list-style-type: none"> <li>• ACS has other ports online, or</li> <li>• ACS is offline.</li> </ul> Otherwise, the port stays online.

### **vary offline force**

[Table 23](#) shows the results of `vary offline force` for each ACS component. This option is useful if the device must be taken to the offline state while it is involved in extended activity (for example, during an audit).

**Table 23. Vary Offline Force Results**

ACS Component	Results
ACS	Only the current robotic request completes, then the ACS and subcomponents go offline immediately. Pending requests are discarded and new requests are rejected. LSMs must go offline before the ACS goes offline.

**Table 23. Vary Offline Force Results**

ACS Component	Results
LSM	Only the current robotic request completes, then the LSM goes offline immediately. Pending requests are discarded and new requests are rejected.
CAP	Only the current robotic request completes, then the CAP goes offline immediately. Pending requests are discarded and new requests are rejected.
drive	Only the current robotic request completes, then the drive goes offline immediately. Pending requests are discarded and new requests are rejected.
port	Not valid.

**vary diagnostic**

The `vary diagnostic` request places the specified component in the diagnostic state (online to `cmd_proc` only). StorageTek ACSLS processes all active and pending requests for the component, rejects new client application requests, then varies the component to diagnostic state. For an ACS, all of its subordinate LSMs are also varied to diagnostic.

**vary online**

[Table 24](#) shows the results of `vary online` for each ACS component. When you vary a component online and it first goes to recovery state, StorageTek ACSLS processes all active and pending requests for the component, rejects new requests, then varies the component online. When the component goes to online, StorageTek ACSLS processes all requests for the component.

**Table 24. Vary Online Results**

ACS Component	Results
ACS	If ACS is offline, ACS and its LSM go to recovery, then online. If ACS is in diagnostic state, ACS and its LSM go to online immediately.
LSM	LSM goes to recovery, then online. You cannot vary an LSM online if it is attached to an offline ACS.
CAP	CAP goes to recovery, then online.
drive	drive goes to recovery, then online.
port	Port goes online immediately.

## Examples

To vary drive 0,0,9,3 offline:

```
vary drive 0,0,9,3 offline
```

To vary CAP 0,0,0 diagnostic:

```
vary cap 0,0,0 diagnostic
```

To force lsm 0,1 offline:

```
vary lsm 0,1 offline force
```

## Notes

- Installing or re-configuring ACSLS places all components in the online state wherever possible. This overrides any desired states that had previously been set using the vary command.
- IPLing the system does not change nor override existing desired states.
- When two or more partitions of the same library are managed by StorageTek ACSLS, use separate vary commands to vary the same CAP (identified as being in different ACSs).

Example: If ACS 0 and ACS 1 are two partitions of the same library, vary the CAP online or offline independently for each partition (and each ACS). The same CAP can be varied online to one partition (ACS) and offline to another partition (ACS).

## See Also

For information about...	See...
Displaying the status of a library component	<a href="#">"query commands" on page 224</a>

## Command Area Messages

### Success Messages

Vary: *type identifier* Varied *state*

**Explanation:** StorageTek ACSLS changed the state of the specified library component.

#### Variable:

- *type* is the library component type.
- *identifier* is the library component identifier.
- *state* is the new stat of the library component.

### Intermediate Messages

None.

### Error Messages

In-transit volume recovery incomplete.

**Explanation:** The LSM robot cannot dispose of in-transit volumes while the LSM or its ACS is varied online. If you are varying an ACS online, the ACS state is changed to online immediately, but any LSMs that are unable to complete in-transit volume recovery remain offline.

Vary: Vary type identifier failed, Drive in use.

**Explanation:** StorageTek ACSLS cannot change the state of the specified library component because the command involved an in-use drive.

#### Variable:

- *type* is the library component type.
- *identifier* is the library component identifier.

Vary: Vary type identifier failed, Incorrect lockid

**Explanation:** StorageTek ACSLS cannot change the state of the specified library component because the drive lock\_id does not match your lock\_id.

#### Variable:

- *type* is the library component type.
- *identifier* is the library component identifier.

Vary: Vary type identifier failed, State unchanged.

**Explanation:** StorageTek ACSLS cannot change the state of the specified library component because the component is already in the requested state.

#### Variable:

- *type* is the library component type.
- *identifier* is the library component identifier.

Vary: Vary type identifier failed, Vary disallowed.

**Explanation:** StorageTek ACSLS cannot change the state of the specified library component because a vary diagnostic request was issued from a client application.

#### Variable:

- *type* is the library component type.
- *identifier* is the library component identifier.

Vary: Vary type identifier failed, Incorrect state.

**Explanation:** StorageTek ACSLS cannot change the state of the specified library component because you tried to vary:

- A CAP online when the LSM or ACS is in the diagnostic or offline state.
- A CAP diagnostic when the LSM or ACS is offline.
- An LSM online when the ACS is in the diagnostic or offline state.
- An LSM diagnostic if the ACS is offline.

**Variable:**

- *type* is the library component type.
- *identifier* is the library component identifier.

Vary: Vary type identifier failed, Vary in progress.

**Explanation:** StorageTek ACSLS cannot change the state of the specified library component because

- A CAP and the CAP or its LSM or ACS is in a transitory (recovery or offline-pending) state.
- An LSM and the LSM, its ACS, or a subordinate CAP is in a transitory state.
- An ACS and the ACS, a subordinate LSM, or a subordinate CAP is in a transitory state.
- An ACS, LSM, or CAP to the diagnostic or online state and a vary offline/force request overrode the attempt.
- A drive which is in a transition state of recovery.

**Variable:**

- *type* is the library component type.
- *identifier* is the library component identifier.

Vary: Vary type identifier failed, State unchanged.

**Explanation:** StorageTek ACSLS cannot change the state of the specified library component because you tried to vary an ACS, LSM, or CAP offline and a vary offline/force request overrode the attempt.

**Variable:**

- *type* is the library component type.
- *identifier* is the library component identifier.

Vary: Vary type identifier failed, ACS online.

**Explanation:** StorageTek ACSLS cannot change the state of the specified library component because you tried to vary the last port offline in an online ACS.

**Variable:**

- *type* is the library component type.
- *identifier* is the library component identifier.

Vary: Vary type identifier failed, No ports online.

**Explanation:** StorageTek ACSLS cannot change the state of the specified library component because there are no ports online for an ACS.

**Variable:**

- *type* is the library component type.
- *identifier* is the library component identifier.

### **Display Area Messages**

One of the following messages appears when an ACS, LSM, drive, or port changes state.

ACS *acs\_id*: state  
LSM *lsm\_id*: state  
Drive *drive\_id*: state  
Port *port\_id*: state

The following message appears if, during recovery of in-transit volumes, a cartridge label is unreadable or duplicate. The cartridge is moved to the CAP.

CAP *cap\_id*. Remove volumes from CAP.

*cap\_id*  
is the CAP containing the cartridges.

## ■ **venter**

The venter command makes a CAP ready to enter unlabeled cartridges into the library.

**Note:** The L5500 does not support cartridges without medial labels. The StorageTek SL500, StorageTek SL3000, and StorageTek SL8500 libraries do not support unlabeled cartridges (venters).

**Format**

venter *cap\_id* *vol\_id*

**Options**

*cap\_id*

specifies the CAP through which the cartridges are to be entered.

*vol\_id*

specifies the virtual labels of the cartridges to be entered.

### **Usage**

Use the venter command to make a CAP ready to enter cartridges with missing or unreadable labels into the library. You specify virtual labels (volume IDs) on the venter command, which adds cartridge information to the StorageTek ACSLS database. From one to 42 cartridges can be entered at a time.

Unless the media type is “3480”, you cannot venter a cartridge that has no separate media type label.

**CAUTION:** StorageTek ACSLS only supports the venter command for SCSI/Fibre-attached LSMs before the StorageTek SL500 when both:

- the cartridge being ventered has a media label, and
- the cartridge's media label is compatible with drives attached to the SCSI library.

Unless the cartridge's media type is 3480, you cannot venter a cartridge without a separate media label.

Use the venter command to enter cartridges with missing or unreadable labels. Do *not* open the LSM door and place cartridges with missing or unreadable labels in a storage cell because StorageTek ACSLS cannot manage these cartridges. During an audit, StorageTek ACSLS will eject cartridges with missing or unreadable labels and no virtual labels.

The venter command does not provide an option to specify the media type of the cartridge you want to enter. In a mixed-media environment, StorageTek ACSLS cannot prevent drive/media incompatibilities for virtually entered cartridges!

### **Examples**

To assign virtual labels to volumes MAINT1 and MAINT2 and enter these volumes through CAP 0,2,2:

```
venter 0,2,2 MAINT1 MAINT2
```

**See Also**

For information about...	See...
Cancelling a command	<a href="#">"cancel" on page 188</a>
Creating or modifying scratch pools	<a href="#">"define pool" on page 194</a>
Ejecting cartridges from the library	<a href="#">"eject" on page 201</a>
Making a CAP (manual mode) ready to enter labelled cartridges into the library	<a href="#">"enter" on page 205</a>
Mounting a scratch cartridge on a drive	<a href="#">"mount *" on page 217</a>
Mounting a data cartridge on a drive	<a href="#">"mount" on page 214</a>
Displaying CAP status	<a href="#">"query cap" on page 227</a>
Setting CAP mode (manual or automatic)	<a href="#">"set cap mode" on page 254</a>
Setting CAP selection priority	<a href="#">"set cap priority" on page 256</a>

**Command Area Messages****Success Messages**

Venter: Enter complete, *nn* cartridges entered.

**Explanation:** StorageTek ACSLS entered the displayed number of cartridges.

**Variable:** *nn* is the total number of cartridges entered.

Venter: *vol\_id* Entered through *cap\_id*

**Explanation:** StorageTek ACSLS entered the specified virtual cartridge.

**Variable:**

- *vol\_id* is the virtual cartridge label.
- *cap\_id* is the CAP through which the cartridge was entered.

**Intermediate Messages**

None.

## Error Messages

Venter: *vol\_id* Enter failed, *status*

**Explanation:** StorageTek ACSLS did not enter the specified virtual cartridge.

**Variable:**

- *vol\_id* is the virtual cartridge label.
- The *status* is the translated completion status of the request returned by StorageTek ACSLS.

## Display Area Messages

CAP *cap\_id*: Place cartridges in CAP.

**Explanation:** The CAP is ready for cartridge entry. Open the CAP and enter cartridges.

**Variable:** *cap\_id* s the CAP used to enter cartridges.

CAP *cap\_id*: Unknown media type label.

**Explanation:** One or more cartridges cannot be entered because the media type is unknown.

**Variable:** *cap\_id* is the CAP used to enter cartridges. Open the CAP and remove the cartridges.



---

In this chapter you will learn how to use the display command.

If you think in terms of SQL and look at the options, you will realize the power and flexibility in the display command. The display command is a powerful tool for reporting information from the StorageTek ACSLS database. Like a SQL SELECT statement, display allows you to specify:

- the database table (StorageTek ACSLS object) you want to display
- wildcards
- conditions that objects must meet to be selected
- fields to report and the order in which they will be reported
- the sort order in which output will be displayed
- that only the count of the number of objects meeting the selection criteria be displayed

The result is a query facility that lets you customize what you want displayed and how it should be presented. Much more information is available through the display command than is possible through StorageTek ACSLS query commands. For example, display volume gives access to volume information that was only available through a custom volrpt. display lsm and display drive provide LSM and tape drive serial numbers.

The display commands are:

[“display cap” on page 286](#)

Displays specific CAP information based on the options selected.

[“display cell” on page 289](#)

Displays specific cell information based on the options selected.

[“display drive” on page 291](#)

Displays specific drive information based on the options selected.

[“display lock” on page 295](#)

Displays specific lock information based on user ID.

[“display lsm” on page 296](#)

Displays specific LSM information based on the options selected.

[“display panel” on page 299](#)

Displays specific library panel information based on the options selected.

[“display pool” on page 300](#)

Displays specific scratch pool information based on the options selected.

[“display port” on page 302](#)

Displays specific port information based on the options selected.

[“display volume” on page 304](#)

Displays specific volume information based on the options selected.

## ■ Using display Command Options

The `display` command displays various fields of information for different library components. The `display` command allows you to select the order and format in which the output is displayed.

The information displayed can include multiple columns and long lines. To prevent lines from wrapping, you can re-size the terminal window used for `display`. A `cmd_proc -lq` window will probably be your best choice.

Wildcards, numeric or alpha ranges, and selection lists can be used with the `display` command.

## Using Wildcard Characters

- The wildcard character, `*`, can be used to substitute: for certain display operands; for one or more subfields in compound display operands; or at the beginning or end of a volume ID. It must match one or more characters.
- Many of the StorageTek ACSLS library components have a primary key composed of multiple fields.

For example, the primary key of:

- an LSM is `acs,lsm`
- a drive is `acs,lsm,panel,drive`
- When you wild card a primary key that contains multiple fields, you can either specify an asterisk (\*) for all fields in the key or you can wild card individual key fields. If you specify (\*) some of the key fields and wild card others, you must specify all of the key fields.
- Use `'_'` to match a single character in a `vol_id`. The `'_'` is positional, and represents a single character. It may be used more than once in a `vol_id` to represent more than one character.

## Examples

Examples of valid wild cards using the `*` character:

- `display drive *` (display all drives)

- `display drive 0,1,*,*` (displays all drives in LSM 0,1)
- `display volume *100` (displays all volumes ending in 100)
- `display drive * -volume RB0001` (displays the drive(s) that contain volume RB0001)

Examples of invalid wildcard using the \* character:

- `display drive 0,1,*` (Asterisks for both the panel and drive positions must be specified when selecting all drives in LSM 0,1)
- `display cap * *` (Only one asterisk is allowed when selecting all CAPs)
- `display volume 1*111` (The embedded asterisk is not allowed. You must use `display volume 1_111`).

## Using Ranges

- A range is denoted as “-”.
- Rules for using ranges are:
  - Negative numbers are not allowed, except for volume home location.
  - `<n` and `>n` are allowed. `<n` is all numerics less than `n`. `>n` is all numerics greater than `n`.
  - Multiple numbers or ranges can be used, separated by a white space.
  - Volume ranges can be alphanumeric.

## Examples

- Examples of valid ranges:
  - `display volume * -drive 0,1,2,2-5` (displays all volumes in acs 0, lsm 1, panel 2, drives 2 through 5)
  - `display lsm * -state online -free_cells >50 -type 9730` (displays all 9730 lsms in an online state with a freecell count greater than 50)
- Examples of invalid ranges:
  - `display drive 0,1,1,1-*` (\* is not valid in a range)
  - `display volume * -drive 0,1,?,1-5` (?) is not valid in a range)

## Format

```
display type arg ... [ -selection ... ] [ [ -c ] | [ -f
field ... ] [ -s sort_field ... ] [ -n n ] ]
```

## Options

*type*

specifies the object to be displayed. Valid types are: cap, cell, drive, lock, LSMs, panel, pool, port, and volume.

*arg*

(argument) specifies the identifiers for the object type. Only objects that match one or more of the identifiers are returned.

*-selection*

specifies additional selection criteria. To be selected, a component must match at least one of the selection identifiers for each selection criteria.

*- C*

(count) causes the request to display only the number of objects that satisfy the *arg* and *selection* criteria. This option is mutually exclusive with the *-f field*, *-s sort\_field*, and *-n n* options.

*-f field*

specifies the fields of information to be returned and the order in which they are to be returned for each object selected. Each display type has a list of available, key, and default fields. If *-f* is specified, the default fields are not displayed unless they are key fields or have been specified. If *-f* is not specified, then the default fields are returned. Key fields for each type are normally displayed first. However, you can change the order in which the key fields are displayed by specifying them after the *-f* option.

The list of fields is separated by spaces.

*-s sort\_field*

sorts the objects returned by the field(s) selected in the order specified. The default sort order for each display command is discussed under each command. Sorting is based on internal database values and may not always display in alphanumeric order.

All returned fields for a type are valid *sort\_fields*.

*-n n*

specifies the maximum number of objects to be displayed.

## ■ display cap

The `display cap` command displays specific CAP information based on the options selected.

**Note:** On SL3000s and SL8500s with 4.70 and later firmware. To prevent CAP IDs from changing when additional modules are added to the StorageTek SL3000 or additional CAPs are installed, the library returns

all possible CAP locations in its configuration information. CAPs that are not installed will be reported as “not installed” in the CAP Status.

StorageTek ACSLS only adds database records for CAP locations that actually have CAPs installed.

**Note:** See [“Using display Command Options” on page 284](#) details about specifying selection criteria and selecting the data to be displayed.

## Format

```
display cap cap_id ... ]
[ -availability cap_availability ...]
[ -status cap_status ... ][-priority cap_priority ... ]
[ -state cap_state ... ] [ -manual | -automatic ]
[ -condition cap_condition ... ] [ [ -c ] | [ -f field ... ] ]
[ -s sort_field ... ] [ -n n ] ]
```

## Fields

The fields for display cap are:

- key fields: acs, lsm, cap
- default fields: acs, lsm, cap, status, priority, state, desired\_state, mode, size, availability
- returned fields: acs, lsm, cap, status, priority, state, mode, size, condition, availability

## Options

### cap\_id

specifies the CAP(s) to display. A cap\_id is of the format: *acs, lsm, cap*.

Wildcard character, \*, can be used in any cap\_id subfield or used to represent all subfields. However, if it is used to represent all cap\_ids (example: *display cap \** or *display cap \*,\*,\**), additional cap\_ids (either numeric or \*) are not allowed. Numeric ranges apply to any subfield of cap\_id.

### availability *cap\_availability*

specifies one or more cap availabilities as additional selection criteria. CAP availabilities are: lib\_not\_partn, cap\_shared, cap\_dedicated, dedicated\_other, not\_installed.

CAPs that are dedicated\_other or not\_installed are not defined in the StorageTek ACSLS database. These values are only seen when a CAP's availability has changed (since it was configured). Reconfigure to remove these CAPs.

-status *cap\_status*  
specifies one or more CAP statuses as additional selection criteria. CAP statuses are: audit, available, eject, enter, insert\_magazines.

-priority *cap\_priority*  
specifies one or more CAP priorities. Numeric range rules apply. CAP numeric ranges: 0-16.

-state *cap\_state*  
specifies one or more CAP states. CAP states are: diagnostic, offline, offline\_pending, online, recovery.

-manual  
selects CAPs in manual mode.

-automatic  
selects CAPs in automatic mode.

-condition *cap\_condition*  
specifies one or more CAP conditions from which to select. Valid conditions are: inoperative, maint\_required, or operative.

-c  
(count) causes the request to display only the number of objects that satisfy the *arg* and *selection* criteria. This option is mutually exclusive with the -f field, -s sort\_field, and -n *n* options.

-f *field*  
specifies the fields of information to be returned and the order in which they are to be returned for each object selected. Each display type has a list of available, key, and default fields. If -f is specified, the default fields are not displayed unless they are key fields or have been specified. If -f is not specified, then the default fields are returned. Key fields for each type are normally displayed first. However, you can change the order in which the key fields are displayed by specifying them after the -f option.

The list of fields is separated by spaces.

The following is a new CAP field that is not reported by query cap.

- *desired\_state*

The desired state for an ACS, port, LSM, drive, or CAP is the availability that you want for the component. ACSLS sets desired state when an explicit vary operation is performed. (This is a vary from a cmd\_proc or ACSAPI client command. It is not a vary that ACSLS internally generates because of a library status change.)

The current state for an ACS, port, LSM, drive, or CAP is the current availability of the component limited by desired state. When a drive is varied online, its desired state is online. However, its current state could be offline because the drive is inoperative or is in an LSM that is offline or not ready. The current state of an ACS, port, LSM, drive, or

CAP is also referred to as the “state” of the component in the results of query and display commands.

The current state of a CAP, based on availability, is not maintained at this time.

`-s sort_field`

sorts the objects returned by the field(s) selected in the order specified. Sorting is based on internal database values and may not always display in alphanumeric order.

All returned fields for a type are valid sort\_fields.

`-n n`

specifies the maximum number of objects to be displayed.

## Examples

- To display all CAP data:

`display cap *`

- To display CAP data for ACS 1, LSM 1, CAP 1:

`display cap 1,1,1`

- To display all manual mode CAPs in LSM 1, 0:

`display cap 1,0,* -manual`

- To display all CAPs in an offline pending state:

`display cap * -state offline_pending`

## ■ display cell

The display cell command displays specific information about a cell based on the options selected.

**Note:** See “[Using display Command Options](#) on page 284” details about specifying selection criteria and selecting the data to be displayed.

## Format

```
display cell cell_loc ... [ -status cell_status ... ] [ [  
-c ] | [ -f field ... ] [ -s sort_field ... ]  
[ -n n ] ]
```

## Fields

The fields for display cell are:

- key fields: acs, lsm, panel, row, column,
- default fields: acs, lsm, panel, row, column, status
- available fields: acs, lsm, panel, row, column, status

## Options

`-status cell_status`

specifies one or more cell statuses as additional selection criteria. Valid cell statuses: empty, full, inaccessible, reserved.

The wildcard character, \*, can be used in any cell\_id subfield or used to represent all subfields. However, if it is used to represent all cell\_ids (example: *display cell \** or *display cell\_id \*,\*,\*,\**), additional cell\_ids (either numeric or \*) are not allowed. Numeric ranges apply to any subfield of cell\_id.

`-C`

(count) causes the request to display only the number of objects that satisfy the *arg* and *selection* criteria. This option is mutually exclusive with the -f field, -s sort\_field, and -n n options.

`-f field`

specifies the fields of information and the order in which they are to be returned for each object selected. Each display type has a list of available, key, and default fields. If -f is specified, the default fields are not displayed unless they are key fields or have been specified. If -f is not specified, then the default fields are returned. Key fields for each type are normally displayed first. However, you can change the order in which the key fields are displayed by specifying them after the -f option.

The list of fields is separated by spaces.

`-s sort_field`

sorts the objects returned by the field(s) selected in the order specified. Sorting is based on internal database values and may not always display in alphanumeric order.

All returned fields for a type are valid sort\_fields.

`-n n`

specifies the maximum number of objects to be displayed.

## Example

To display information for cells with a reserved status:

```
display cell * -status reserved
```

## ■ display drive

The `display drive` command displays specific drive information based on the options selected.

**Note:** See “[Using display Command Options](#) on page 284” details about specifying selection criteria and selecting the data to be displayed.

### Format

```
display drive drive_id ... [ -status drive_status ... ]  
[ -state drive_state ... ] [ -type drive_type ... ]  
[ -volume vol_id ... ] [ -lock lock_id... ] [ -serial  
drive_serial_num ... ] [ -condition drive_condition ... ]  
[ [ -c ] | [ -f field ... ] [ -s sort_field ... ] [ -n nnn ] ]
```

### Fields

The fields for `display drive` are:

- key fields: `acs`, `lsm`, `panel`, `drive`
- default fields: `acs`, `lsm`, `panel`, `drive`, `status`, `state`, `volume`, `type`
- available fields: `acs`, `lsm`, `panel`, `drive`, `status`, `state`, `volume`, `type`, `lock`, `desired_state`, `serial_num`, `condition`, `wwn`, `last_dismount_time`, `error`

### Options

*drive\_id*

displays the `drive_id` in the following format: `acs`, `lsm`, `panel`, `drive`.

Wildcard character, `*`, can be used in any `drive_id` subfield or used to represent all subfields. However, if it is used to represent all `drive_ids` (example: `display drive *` or `display drive_id * , * , * , *`), additional `drive_ids` (either numeric or `*`) are not allowed. Numeric ranges apply to any subfield of `drive_id`.

`-status drive_status`

displays one of the following statuses as additional selection criteria: `available`, `in_use`, `reserved`.

Possible scenario: You perform a `query drive all` and get a message saying the drive is in use. You then perform a `display drive *` and get a message saying the drive is reserved. This means: the reserved status for the drive implies that a mount request is in progress and that a volume is on its way to the drive. At the same time the drive is considered to be in use.

`-state drive_state`

displays the following states for one or more drives: `diagnostic`, `online`, `offline`, `recovery`.

- type *drive\_type*  
displays drives by transport type.
- volume *vol\_id*  
displays volume(s) mounted on the drive(s) selected. A *vol\_id* can be a 6-alphanumeric string or wildcard string that specifies a tape volume or range of volume IDs.
- lock *lock\_id*  
displays drive information on locked drives by lock ID.
- serial *drive\_serial\_num*  
specifies the drive serial number.
- condition *drive\_condition*  
displays condition of the drive(s) specified. Valid conditions are: operative, inoperative, or maint\_required.
- c  
(count) causes the request to display only the number of objects that satisfy the *arg* and *selection* criteria. This option is mutually exclusive with the -f field, -s sort\_field, and -n n options.
- f *field*  
specifies the fields of information and the order in which they are to be returned for each object selected. Each display type has a list of available, key, and default fields. If -f is specified, the default fields are not displayed unless they are key fields or have been specified. If -f is not specified, then the default fields are returned. Key fields for each type are normally displayed first. However, you can change the order in which the key fields are displayed by specifying them after the -f option.

The list of fields is separated by spaces. The following is a list of new tape drive field descriptions that are not reported by query drive.

- desired\_state

The desired state for an ACS, port, LSM, drive, or CAP is the availability that you want for the component. ACSLS sets desired state when an explicit vary operation is performed. (This is a vary from a cmd\_proc or ACSAPI client command. It is not a vary that ACSLS internally generates because of a library status change.)

The current state for an ACS, port, LSM, drive, or CAP is the current availability of the component limited by desired state. When a drive is varied online, its desired state is online. However, its current state could be offline because the drive is inoperative or is in an LSM that is offline or not ready. The current state of an ACS, port, LSM, drive, or CAP is also referred to as the “state” of the component in the results of query and display commands.

- serial\_num

StorageTek ACSLS can only report drive serial numbers when the drive reports its serial number to the library and the library reports its serial number to StorageTek ACSLS. Only modern libraries and drives report the drive serial numbers to StorageTek ACSLS. This includes T9840, T9940, T10000, LTO, DLT 7000, SDLT, and later drives. SCSI-attached libraries, L5500, 9310's that support T10000 drives, and later libraries report serial numbers to StorageTek ACSLS.

StorageTek ACSLS reports the serial number on the tape drive "brick", not the serial number on the drive tray.

- The serial number on the drive brick is the serial number reported by the drive to the library and to you through SLConsole and StorageTek ACSLS. It is also the serial number reported over the SCSI/Fibre data path (e.g. to the backup application).
- The drive tray is labeled with its own serial number. The serial number on the drive tray's label is used to license service, etc. through StorageTek. The number on the drive tray is used for activation so drives (drive "bricks") can be replaced without needing to update the activated serial number.

There is minimal communication between the drive tray and drive brick. This is displayed by way of a few ready/not ready indicators. The drive tray is basically a power supply for the drive without any smarts.

- wwn

The drive's World Wide Name. The WWN is 8 bytes (binary). It is displayed as 16 hex characters (0-9 and A-F) with dot separators between the pairs of hex characters (bytes).

The WWN displayed is the WWN of the node. The WWN of the first port (Port A) is one number greater. If the drive has two ports, the WWN of Port B is two numbers greater.

- last\_dismount\_time

The date and time of the last time a cartridge was dismounted from the drive. StorageTek ACSLS uses this to order the drives reported to query mount. The drives are listed primarily by LSM closeness (least pass-thrus) to the volume being mounted and secondarily by earliest last\_dismount\_time. Ordering the drives by earliest last\_dismount\_time evens out the use of drives.

#### **Drive statistics:**

These statistics are reported to StorageTek ACSLS when a cartridge is dismounted from a drive. The following statistics fields are only reported for these libraries and drives:

#### Libraries:

- All SL3000s.
- SL8500s with 4.13 and later firmware.

Tape drives:

- T9840A, T9840C, and T9840D with 1.42 and later drive firmware. (T9840B is not supported because of memory limitations.)
- T9940A and T9940B with 1.42 and later drive firmware.
- T10000A and T10000B with 1.38 and later drive firmware.
- error - (drive maintenance required)

This is currently only reported for T10000 drives. Values are:

- none - No drive error reported
- maint\_reqd - Maintenance is required for the tape drive.

This is only reported when the tape drive has determined that the drive is to be avoided and should be taken offline. You should call for service.

**Primary drive error scenarios:**

In these scenarios, the drive and library waits for manual intervention.

Unload failures      The cartridge is stuck in the drive

Drive Leader Off      The drive won't indicate a drive error until  
Hook failures      the media is extracted

Drive IPL failures      The drive stops communicating with the library.

*-s sort\_field*

sorts the objects returned by the field(s) selected in the order specified. Sorting is based on internal database values and may not always display in alphanumeric order. For example, `drive type` is sorted by an internal numeric drive type and not by the literal that is displayed.

All returned fields for a type are valid `sort_fields`.

*-n n*

specifies the maximum number of objects to be displayed.

## Examples

- To display all drives in panel 0,1,1.

```
display drive 0,1,1,*
```

- To display all drives in LSM 0,1.  
`display drive 0,1,*,*`
- To display a maximum of 56 rows for all drives in ACS 1, sorted by panel and drive:  
`display drive 1,*,*,* -s panel drive -n 56`
- To display drive data for ACS 1, LSM 1, with status available:  
`display drive 1,1,*,* -status available`
- To display drive types, serial numbers, and world wide names (wwn) for all drives:  
`display drive * -f type serial_num wwn`

## ■ display lock

The `display lock` command displays specific lock information by *lock\_id* based on the options selected.

**Note:** See “[Using display Command Options](#)” on page 284 details about specifying selection criteria and selecting the data to be displayed.

### Format

```
display lock lock_id ... [ -user user_id ... ] [ [ -c ] |  
[ -f field ... ] [ -s sort_field ... ] [ -n n ] ]
```

### Fields

The fields for `display lock` are:

- key fields: *lock\_id*
- default fields: *lock\_id*, *user\_id*
- available fields: *lock\_id*, *user\_id*

### Options

*lock\_id*

displays the numeric *lock\_id*.

Wildcard character, \*, can be used in any *lock\_id* subfield or used to represent all subfields. However, if it is used to represent all *lock\_ids* (example: `display lock *` or `display lock_id *,*,*`), additional *lock\_ids* (either numeric or \*) are not allowed. Numeric ranges apply to any subfield of *lock\_id*.

*user\_id*

specifies the user name (example: acsss) that has locked the volume or transport. The *user\_id* wraps after 80 characters.

-C

(count) causes the request to display only the number of objects that satisfy the *arg* and *selection* criteria. This option is mutually exclusive with the -f field, -s sort\_field, and -n n options.

-f *field*

specifies the fields of information and the order in which they are to be returned for each object selected. Each display type has a list of available, key, and default fields. If -f is specified, the default fields are not displayed unless they are key fields or have been specified. If -f is not specified, then the default fields are returned. Key fields for each type are normally displayed first. However, you can change the order in which the key fields are displayed by specifying them after the -f option.

The list of fields is separated by spaces.

-s *sort\_field*

sorts the objects returned by the field(s) selected in the order specified. Sorting is based on internal database values and may not always display in alphanumeric order.

All returned fields for a type are valid sort\_fields.

-n *n*

specifies the maximum number of objects to be displayed.

## Example

To display lock information for lock\_id 2:

```
display lock 2
```

## ■ display lsm

The display lsm command displays specific LSM information based on the options selected.

**Note:** See “[Using display Command Options](#)” on page 284 details about specifying selection criteria and selecting the data to be displayed.

## Format

```
display lsm lsm_id ... [ -status lsm_status ... ]  
[ -state lsm_state ... ] [ -free_cells cell_count ... ]  
[ -type lsm_type ... ] [ -serial lsm_serial_num ... ]  
[ -condition lsm_condition ] [ -door_open | -door_closed ]
```

[ [ -c ] | [ -f *field* ... ] [ -s *sort\_field* ... ]  
 [ -n *n* ] ]

## Fields

The fields for display lsm are:

- key fields: acs, lsm
- default fields: acs, lsm, status, state, free\_cells
- available fields: acs, lsm, status, state, desired\_state, free\_cells, type, serial\_num, activity, condition, door\_status

*lsm\_id*

displays the lsm id in the following format: acs, *lsm*.

Wildcard character, \*, can be used in any lsm\_id subfield or used to represent all subfields. However, if it is used to represent all lsm\_ids (example: *display lsm \** or *display lsm\_id \*,\**), additional lsm\_ids (either numeric or \*) are not allowed. Numeric ranges apply to any subfield of lsm\_id.

-status *lsm\_status*

specifies one or more LSM statuses from which to select. Valid statuses are: audit, normal

-state *lsm\_state*

specifies one or more LSM states from which to select. Valid states are: diagnostic, online, offline, offline\_pending, recovery.

-free\_cells *cell\_count*

selects LSMs by the number of free cells.

-type *lsm\_type*

displays LSMs by type.

-serial *lsm\_serial\_num*

displays serial numbers for selected LSMs.

-condition *lsm\_condition*

displays condition of the selected LSMs. Valid conditions are: operative, inoperative, or maint\_required.

-door\_open

displays LSMs with open doors.

-door\_closed

displays LSMs with closed doors.

-c

(count) causes the request to display only the number of objects that satisfy the *arg* and *selection* criteria. This option is mutually exclusive with the -f field, -s sort\_field, and -n n options.

**-f field**

specifies the fields of information and the order in which they are to be returned for each object selected. Each display type has a list of available, key, and default fields. If -f is specified, the default fields are not displayed unless they are key fields or have been specified. If -f is not specified, then the default fields are returned. Key fields for each type are normally displayed first. However, you can change the order in which the key fields are displayed by specifying them after the -f option.

The list of fields is separated by spaces. The following are new lsm fields that are not reported by query lsm.

- `desired_state`

The desired state for an ACS, port, LSM, drive, or CAP is the availability that you want for the component. ACSLS sets desired state when an explicit vary operation is performed. (This is a vary from a cmd\_proc or ACSAPI client command. It is not a vary that ACSLS internally generates because of a library status change.)

The current state for an ACS, port, LSM, drive, or CAP is the current availability of the component limited by desired state. When a drive is varied online, its desired state is online. However, its current state could be offline because the drive is inoperative or is in an LSM that is offline or not ready. The current state of an ACS, port, LSM, drive, or CAP is also referred to as the “state” of the component in the results of query and display commands.

- `serial_num`

The serial number that StorageTek ACSLS reports for the LSM is the library’s serial number that is recorded in the HBC card in StorageTek’s StorageTek SL3000 and StorageTek SL8500 libraries (before StorageTek SL8500 6.00 firmware). With 6.00 and later firmware, the StorageTek SL8500 reports the frame serial number which is the activated serial number.

StorageTek SL8500 and StorageTek SL3000 libraries are activated through the serial number for the base module frame. This serial number is on the UL label on the frame and is recorded in the HBK card in the library. (Manufacturing can re-generate replacement HBK cards.) These serial numbers start with 516 for SL8500s and 571 for SL3000s. The frame serial number can be displayed through the SLConsole (System Detail -> Properties -> General).

In the future, library firmware will report this frame serial number to StorageTek ACSLS. Whenever an LSM serial number changes,

StorageTek ACSLS automatically updates the serial number when an LSM is varied online.

**-s *sort\_field***  
 sorts the objects returned by the field(s) selected in the order specified.  
 Sorting is based on internal database values and may not always display in alphanumeric order.

All returned fields for a type are valid *sort\_fields*.

**-n *n***  
 specifies the maximum number of objects to be displayed.

## Examples

- To display information for all LSMs in the library for type 9714:  
`display lsm * -type 9714`
- To display types all LSMs:  
`display lsm * -f type`
- To display library serial numbers:  
`display lsm * -f serial_num`

## ■ display panel

The `display panel` command displays specific library panel information based on the options selected.

**Note:** See “[Using display Command Options](#)” on page 284 details about specifying selection criteria and selecting the data to be displayed.

## Format

```
display panel panel_id ...[ -type panel_type ... ] [ [ -c ] |  

[ -f field ... ] [ -s sort_field ... ] [ -n n ] ]
```

## Fields

The fields for `display panel` are:

- key fields: acs, lsm, panel
- default fields: acs, lsm, panel, type
- available fields: acs, lsm, panel, type

## Options

*panel\_id*

displays the panel id in the following format: *acs*, *lsm*, *panel*.

Wildcard character, \*, can be used in any *panel\_id* subfield or used to represent all subfields. However, if it is used to represent all *panel\_ids* (example: *display panel \** or *display panel\_id \*, \*, \**), additional *panel\_ids* (either numeric or \*) are not allowed. Numeric ranges apply to any subfield of *panel\_id*.

**-type *panel\_type***

specifies one or more valid panel types.

**-C**

(count) causes the request to display only the number of objects that satisfy the *arg* and *selection* criteria. This option is mutually exclusive with the **-f** field, **-s sort\_field**, and **-n n** options.

**-f *field***

specifies the fields of information and the order in which they are to be returned for each object selected. Each display type has a list of available, key, and default fields. If **-f** is specified, the default fields are not displayed unless they are key fields or have been specified. If **-f** is not specified, then the default fields are returned. Key fields for each type are normally displayed first. However, you can change the order in which the key fields are displayed by specifying them after the **-f** option.

The list of fields is separated by spaces.

**-s *sort\_field***

sorts the objects returned by the field(s) selected in the order specified. Sorting is based on internal database values and may not always display in numeric order.

All returned fields for a type are valid *sort\_fields*.

**-n *n***

specifies the maximum number of objects to be displayed.

## Example

Display panel data for all panels:

```
display panel *
```

## ■ display pool

The *display pool* command displays specific scratch pool information based on the options selected.

**Note:** See “Using display Command Options” on page 284 details about specifying selection criteria and selecting the data to be displayed.

## Format

```
display pool pool_id ... [ -low_water low_water_mark ... |  
-high_water high_water_mark... ]  
[-overflow | -no_overflow ] [ [ -c ] | [ -f field ... ]  
[ -s sort_field ... ] [ -n n ] ]
```

## Fields

The fields for display pool are:

- key fields: pool\_id
- default fields: pool\_id, low\_water, high\_water, overflow
- available fields: pool\_id, low\_water, high\_water, overflow

## Options

pool\_id

displays the pool id of a scratch pool.

Wildcard character, \*, can be used in any pool\_id subfield or used to represent all subfields. However, if it is used to represent all pool\_ids (example: *display pool \** or *display pool\_id \* \*, \**), additional pool\_ids (either numeric or \*) are not allowed. Numeric ranges apply to any subfield of pool\_id.

-low\_water low\_water\_mark

specifies the minimum number of scratch cartridges in the pool. If a low\_water mark is displayed with a hyphen (-) appended to it, the number of cartridges in the library for the selected scratch pool is within the designated low\_water mark.

-high\_water high\_water\_mark

specifies the maximum number of scratch cartridges in the pool. If a high\_water mark is displayed with a hyphen (-) appended to it, the number of cartridges in the library for the selected scratch pool is within the designated high\_water mark.

-overflow

selects pools wherein if a scratch mount is requested and if the pool is empty, the common pool is used to satisfy the request.

-no\_overflow

selects pools wherein if a scratch mount is requested and if the pool is empty, the mount fails without checking the common pool for available tapes.

-c

(count) causes the request to display only the number of objects that satisfy the *arg* and *selection* criteria. This option is mutually exclusive with the -f field, -s sort\_field, and -n n options.

-f *field*

specifies the fields of information and the order in which they are to be returned for each object selected. Each display type has a list of available, key, and default fields. If -f is specified, the default fields are not displayed unless they are key fields or have been specified. If -f is not specified, then the default fields are returned. Key fields for each type are normally displayed first. However, you can change the order in which the key fields are displayed by specifying them after the -f option.

The list of fields is separated by spaces.

-s *sort\_field*

sorts the objects returned by the field(s) selected in the order specified. Sorting is based on internal database values and may not always display in numeric order.

All returned fields for a type are valid sort\_fields.

-n *n*

specifies the maximum number of objects to be displayed.

## Example

- To display all information for pool 5:

display pool 5

- To display all pools with overflow:

display pool \* -overflow

## ■ display port

The display port command displays specific port information based on the options selected.

**Note:** See “[Using display Command Options](#)” on page 284 details about specifying selection criteria and selecting the data to be displayed.

## Format

```
display port port_id ... [ -online | -offline ]  
[ -name port_name ... ] [ [ -c ] | [ -f field ... ]  
[ -s sort_field ... ] [ -n n ] ]
```

## Fields

The fields for display port are:

- key fields: acs, port
- default fields: acs, port, name, state
- available fields: acs, port, name, state, desired\_state

## Options

*port\_id*

displays the port id in the following format: *acs, port*.

Wildcard character, \*, can be used in any *port\_id* subfield or used to represent all subfields. However, if it is used to represent all *port\_ids* (example: *display port \** or *display port\_id \* \*, \**), additional *port\_ids* (either numeric or \*) are not allowed. Numeric ranges apply to any subfield of *port\_id*.

- *online*  
selects and displays ports in an online state.
- *offline*  
selects and displays ports in an offline state.
- *name port\_name*  
specifies the port name.
- C  
(count) causes the request to display only the number of objects that satisfy the *arg* and *selection* criteria. This option is mutually exclusive with the -f field, -s sort\_field, and -n n options.
- f *field*  
specifies the fields of information and the order in which they are to be returned for each object selected. Each display type has a list of available, key, and default fields. If -f is specified, the default fields are not displayed unless they are key fields or have been specified. If -f is not specified, then the default fields are returned. Key fields for each type are normally displayed first. However, you can change the order in which the key fields are displayed by specifying them after the -f option.

The list of fields is separated by spaces. The following is a new port field that is not reported by query port.

- *desired\_state*

The desired state for an ACS, port, LSM, drive, or CAP is the availability that you want for the component. ACSLS sets desired state when an explicit vary operation is performed. (This is a vary from a

cmd\_proc or ACSAPI client command. It is not a vary that ACSLS internally generates because of a library status change.)

The current state for an ACS, port, LSM, drive, or CAP is the current availability of the component limited by desired state. When a drive is varied online, its desired state is online. However, its current state could be offline because the drive is inoperative or is in an LSM that is offline or not ready. The current state of an ACS, port, LSM, drive, or CAP is also referred to as the “state” of the component in the results of query and display commands.

- s *sort\_field*  
sorts the objects returned by the field(s) selected in the order specified. Sorting is based on internal database values and may not always display in alphanumeric order
- All returned fields for a type are valid sort\_fields.
- n *n*  
specifies the maximum number of objects to be displayed.

## Example

To display all ports in an online state:

```
display port * -online
```

## ■ display volume

The display volume command displays specific volume information based on the options selected.

**Note:** See “[Using display Command Options](#)” on page 284 details about specifying selection criteria and selecting the data to be displayed.

## Format

```
display volume vol_id ... [ -home acs, lsm, panel, row, column... ]  
[ -drive drive_loc ... ] [ -data | -scratch | -clean ]  
[ -media media_type ... ] [ -pool pool_id... ] [ -standard |  
-virtual ] [ -status vol_status ... ] [ -entry entry_date ... ]  
[ -access access_date ... ] [ -lock lock_id ... ] [ [ -c ] |  
[ -f field ... ] [ -s sort_field ... ] [ -n n ] ]  
[ -max_use max_use] [ -lock_time lock_time]
```

## Fields

The fields for display volume are:

- key field: vol\_id
- default fields: vol\_id, acs, lsm, panel, row, column, pool, status, media, type
- available fields: vol\_id, acs, lsm, panel, row, column, drive (displayed as lsm, panel, drive), type, media, pool, label\_type, status, entry\_date, access\_date, access\_count, max\_use, lock, lock\_time, recording\_format\_family, recording\_format\_model, encrypt\_status, volsafe\_status, media\_status, warranty\_life, end\_of\_life, load\_limit\_alert

## Options

vol\_id

displays the volume(s) selected.

A vol\_id can be one or more 1-6 alphanumeric strings that specifies a tape cartridge.

The wildcard character, \*, can be used to represent all vol\_ids (example: *display vol \**) or to represent a group of cartridges (example: *.display vol\_id VAP\** displays all cartridges starting with VAP).

The *vol\_id* may contain any valid volume ID characters and \*.

-home *home\_loc*

specifies volume home location(s) from which to retrieve volume information in the following format: *acs,lsm,panel,row,column*. It cannot be used with -drive.

*home\_loc* subfields can use numeric ranges. All *home\_loc* subfields must be specified. A wildcard character, \*, can be used in place of one or more *drive\_loc* subfields. Numeric range rules apply to any subfield or *drive\_loc*.

-drive *drive\_loc*

specifies drive location(s) from which to retrieve volume information in the following format: *acs,lsm,panel,drive*. It cannot be used with -home

*drive\_loc* subfields can use numeric ranges. All *home\_loc* subfields must be specified. A wildcard character, \*, can be used in place of one or more *drive\_loc* subfields. Numeric range rules apply to any subfield or *drive\_loc*.

-data

selects data cartridges.

-scratch

selects cartridges in scratch mode.

- clean
  - selects cleaning cartridges.
- media *media\_type*
  - selects only cartridges with the specified media type.
- pool *pool\_id*
  - selects and displays cartridges from scratch pools. Cartridges retain the ID of the scratch pool even after they have changed to data cartridges.
- standard
  - selects a tape(s) with a scannable volume ID label\_type. It cannot be used with -virtual.
- virtual
  - selects a tape(s) without an external volume ID label\_type that was entered through the venter command. It cannot be used with -standard.
- status *vol\_status*
  - valid entries are: *dismount*, *eject*, *enter*, *mount*, *home*, *in\_drive*, *move*, *missing*, *absent*, *ejected*.
- entry *entry\_date*
  - specifies the date and time the cartridge was entered into the library. It is entered and displayed in ISO standard format (yyyy-mm-dd).
- access *access\_date*
  - specifies the date and time the cartridge was last used. It is entered and displayed in ISO standard format (yyyy-mm-dd).
- lock *lock\_id*
  - specifies the lock ID for the volume.
- max\_use *max\_use*
  - specifies the maximum number of uses for a cleaning cartridge. Non-cleaning cartridges have a max\_use value of zero.
- lock\_time *lock\_time*
  - specifies the date and time the lock was set. It is displayed according to the system default format.
- C
  - (count) causes the request to display only the number of objects that satisfy the *arg* and *selection* criteria. This option is mutually exclusive with the -f field, -s sort\_field, and -n n options.
- f *field*
  - specifies the fields of information and the order in which they are to be returned for each object selected. Each display type has a list of available, key, and default fields. If -f is specified, the default fields are not displayed unless they are key fields or have been specified. If -f is not specified, then the default fields are returned. Key fields for each type are

normally displayed first. However, you can change the order in which the key fields are displayed by specifying them after the `-f` option.

The list of fields is separated by spaces. The following is a list of new volume fields that are not reported by `query volume`. These statistics fields are only reported for these libraries and drives:

Libraries:

- All SL3000s.
- SL8500s with 4.13 and later firmware.

Tape drives:

- T9840A, T9840C, and T9840D with 1.42 and later drive firmware. (T9840B is not supported because of memory limitations.)
- T9940A and T9940B with 1.42 and later drive firmware.
- T10000A and T10000B with 1.38 and later drive firmware.
- `recording_format_family`

This shows the drive family that last recorded data on this cartridge.

- `recording_format_model`

This shows the drive model that last recorded data on this cartridge. This information is useful to:

- avoid mounting a cartridge on a drive that cannot read the data on a cartridge (e.g. A T10000A cannot read data recorded by a T10000B drive) or
- append data to a cartridge (e.g. A T10000B cannot append data to a cartridge written by a T10000A).
- `encrypt_status`

This shows the encryption status of a cartridge, if known.

- `volsafe_status`

This shows whether this is a volsafe cartridge. Volsafe is StorageTek's WORM (Write Once Read Many) cartridge.

- `media_status`

When the tape drive reports a cartridge as "questionable", it should be examined.

- `warranty_life` and `end_of_life`

The volume's `warranty_life` and `end_of_life` percentages are the volume's use as a percentage of its `end_of_life` setting. These are values from 000.0% to over 100.0%. (The `warranty_life` is less than the `end_of_life`.)

This information can be used to identify cartridges that need to be retired after migrating their data to new cartridges.

For more information, refer to [“Cartridge End-of-Life Percentages” on page 98](#).

- `load_limit_alert`

The volume's `load_limit_alert` is a boolean value, where: `True=1` and `False=0`. When a volume that reports an `end_of_life` percentage reaches 100%, its `load_limit_alert` is set to 1. Some drive types only report a `load_limit_alert`.

`-s sort_field`

sorts the objects returned by the field(s) selected in the order specified. Sorting is based on internal database values and may not always display in alphanumeric order. For example, `media_type` is sorted by an internal numeric media type and not by the literal that is displayed.

All returned fields for a type are valid `sort_fields`.

`-n n`

specifies the maximum number of objects to be displayed.

## Examples

- To display volumes based on location:

This example displays all volumes with home locations in panel 0,1,9.

```
display volume * -home 0,1,9,*,*
```

- To display all 9840 data volumes.

```
display volume * -media STK1R
```

- To display 9840 data volumes with their recording formats (if known):

```
display volume * -media STK1R -f media
recording_format_family recording_format_model
```

- To display a cleaning volumes by ACS and media type:

```
display volume * -home acs,*,*,*,* -media media_type
-f vol_id acs lsm media max_use access_count
```

- To display volumes by date:

- To display all volumes entered this year:

```
display volume * -entry 2002
```

- To display all volumes entered in January, 2002

```
display volume * -entry 2002-01
```

- To display all volumes entered on January 27, 2002  
`display volume * -entry 2002-01-27`
- To display all volumes entered on January 27, 2002 between 10:00 a.m. and 11:00 a.m.  
`display volume * -entry 2002-01-27:10`
- To display all volumes entered between January 2002 and April 2002.  
`display volume * -entry 2002-01-2002-04`
- To display all volumes entered between 6:33 a.m. and 6:57:45 April 10 (for example, you may want to do this after an outage).  
`display volume * -entry 2002-04-10:06:33:00- 2002-04-10:6:57:45`
- To display all volumes entered since February 25, 2002.  
`display volume * -entry >2002-02-25`
- To display T10000 data volumes sorted by end\_of\_life usage:  
`display volume * -media T10000T1 T10000TS -f media end_of_life warranty_life -s end_of_life`
- To display all volumes warranty life and end-of-life and sorted by end\_of\_life usage  
**`display volume * -f warranty_life end_of_life -s end_of_life`**



# StorageTek ACSLS Backup and Recovery Tools

A

## ■ StorageTek ACSLS Backup Tools

StorageTek ACSLS offers three robust and distinctly different methods for backing up both its database and StorageTek ACSLS control files. Each utility performs different functions and all methods play an important role in a complete disaster recovery plan.

This appendix:

- Outlines and explains each utility, what they are used for, and why they are important.
- Provides a high level view of disaster recovery scenarios

## Automatic Backups

StorageTek ACSLS provides automated database protection services. These automated protection services safeguard the daily operation of the StorageTek ACSLS database against changes that can produce either unintended consequences or from database corruption

As a result of these automated backup protection services, you have the ability to restore your database back to any backup time from the present to the end of your retention period. The restore tools are discussed later in this appendix.

This section discusses the automated backup methods and why they are used.

- StorageTek ACSLS default backup directory

During the initial installation of StorageTek ACSLS, you were asked to supply the name of the directory to use for backups (/export/backup by default). It is in this directory that backup activity occurs.

- A complete database backup is performed and placed in the directory, using a date naming convention:

`/export/backup/yyyy-mm-dd-hh:mm:ss.tar`

The time at which the daily backup is performed can be modified by changing the “Automatic Backup Variables” within `acsss_config`.

Refer to [“Setting Variables that Control StorageTek ACSLS Behavior” on page 23](#) for information on changing default backup behavior.

- Database retention period

Another configurable parameter within StorageTek ACSLS that affects automatic backups is the database retention period. This is defined as the amount of time StorageTek ACSLS retains the backups.

The default for the retention period is 8 days.

Refer to [“Setting Variables that Control StorageTek ACSLS Behavior” on page 23](#) for information on changing default backup behavior.

The retention period can also be modified by using `acsss_config`.

## Manual Backups

StorageTek ACSLS provides a utility called `bdb.acsss` that backs up the critical StorageTek ACSLS data using the command line. This is also the method used to restore the StorageTek ACSLS database where the environment consists of the same or identical hardware, OS level, and StorageTek ACSLS version. Refer to [“bdb.acsss” on page 129](#).

Used without any command line options, `bdb.acsss` provides the ability to create a database backup and store it in the default backup directory. All critical StorageTek ACSLS database and StorageTek ACSLS control files are backed up to a single file. This file can then be used to restore StorageTek ACSLS to its previous state on the same or identical hardware for scenarios such as an internal disk or motherboard failure.

The `rdb_acsss` utility allows a “-f” option that can be used to either specify a file and location (`rdb.acsss -f /path/my_file`) or a tape device (`-f /dev/rmt/0mn`). When using a tape device, you do not provide a file name, on the tape device.

## Manual Database Exports

StorageTek ACSLS provides a utility called `db_export.sh` to export the StorageTek ACSLS database, StorageTek ACSLS control files, and any customized dynamic variables. The `db_export.sh` utility is responsible for dumping the StorageTek ACSLS database to comma separated ACSII files, making a copy of the StorageTek ACSLS control files, and making a copy of the dynamic variables. This is the method used to migrate to newer versions of StorageTek ACSLS and is not recommended for daily backup operations because both StorageTek ACSLS and the database must be down before performing the export.

The `db_export.sh` command line utility is the preferred method for migrating the database between different levels of server hardware, OS versions, and different releases of StorageTek ACSLS. Without options, it can be used with the local default tape device such as `/dev/0mn`. This tape can then be moved to any location, and StorageTek ACSLS and its associated StorageTek ACSLS control files can be restored into any OS version or level of StorageTek ACSLS.

**Note:** Although any tape device can be selected, a **no-rewind** device should be used. The `db_export` utility creates two files. If a rewind device is selected, the first file (datafiles) would be overwritten when the second file is created.

As in the `bdb.acsss` utility, the “-f” option can be used to specify a tape device other than the system default. Simply execute `db_export.sh /dev/0mn` or any attached tape device to use this option.

The -f option also allows the database to be exported to the named file. When using this method, you will notice that two files are created, the one that you named and also another file with a `.misc` extension. Both files must be transferred to the server where the import will take place to ensure a successful import.

When executing the `db_export.sh` utility either with the -f option or without, you will be prompted to choose the version of StorageTek ACSLS to which you are exporting. Selections are:

- 1: ACSLS 5.3.2 or 5.4
- 2: ACSLS 6.0 or 6.0.1
- 3: ACSLS 6.0.1 with L700e
- 4: ACSLS 6.0.1 with PUT0201
- 5: ACSLS 6.1, 7.0, 7.1/7.1.1 before PUT0701
- 6: ACSLS 7.1/7.1.1 with PUT0701 or ACSLS 7.2 (any)
- 7: ACSLS 7.3 or later
- E: Exit

Choose the appropriate version.

## ■ StorageTek ACSLS Recovery Tools

StorageTek ACSLS uses two different recovery tools to restore all backups and exports. Both offer a menu driven user interface and easily selectable options. These two utilities are:

- `rdb.acsss` - the recovery tool for both automated and manual backups

- `db_import.sh` - restores an exported database and/or StorageTek ACSLS control files from the same version of StorageTek ACSLS, a different version of StorageTek ACSLS, or from a different hardware platform. This option also allows the recovery of customized dynamic variables.

## Using `rdb.acsss`

The `rdb.acsss` utility restores the StorageTek ACSLS database and the StorageTek ACSLS Control files using a backup created by either the automatic backup function or the `bdb.acsss` utility. The StorageTek ACSLS Control files are located in `$ACS_HOME/data`, and define several different environmental variables for StorageTek ACSLS. They specify Access Control settings, scratch preferences, Extended Store LSMs, custom `volrpt` settings, and volume attributes (for `watch_vols` utility), etc

Refer to “[rdb.acsss](#)” on page 160 for options and procedures.

## Using `db_import.sh`

StorageTek ACSLS provides a `db_import.sh` utility to restore an exported database from the same version of StorageTek ACSLS, a different version of StorageTek ACSLS, or it could even be from a different hardware platform. Like `rdb.acsss`, it offers an easy to read menu driven user interface allowing you to select the task that you wish to perform.

The `db_import.sh` utility can work without options or you can supply the “`-f`” option with a path and file name as an argument. Executing `db_import.sh` from the command line without any options causes the utility to look for the exported database on the local tape device. It first checks for the existence of the exported database, verifies that it is a valid database export file, and then displays a menu with four options.

**Note:** You can also supply a `-f` option with a tape device (`-f /dev/rmt/0mn`) for a non-default device. Although you can supply any valid tape device, it is a requirement that you supply a **no-rewind** device. The `db_import.sh` utility uses two files, one for data and one for control files. If you use a rewind device, after data files are recovered, the tape would be rewound and the control files would fail.

If you provide the `-f` option with a path and file name, `db_import.sh` uses the supplied file name as the exported database file. As with the local tape device, it first checks to see if the file exists and then validates that the supplied file name is an exported database file. If the supplied file is a valid export, it displays a menu. The menu options are:

- Option 1 - Import database only from either a different platform or from an earlier release

Whether you are recovering the database from a local tape device or from a file, this option initiates an import of the data only and does not recover

any StorageTek ACSLS control files. This is the desirable method for migrating from one platform to another or if you don't want customizes files from a previous installation.

- Option 2 - Import customizable configuration files (`$ACS_HOME/data/external` only) exported from a different platform or from an earlier release.

These files would include any access control information or customized volume report templates.

- Option 3 - Recover a previous environment on the same platform and version (Disaster Recovery) - database, `$ACS_HOME/data/external` and internal

This option is used to recover or rebuild an identical server from the one from which the data was exported. This can be used in situations where you are retiring a server and building a new one. You are able to restore the StorageTek ACSLS database and StorageTek ACSLS control files to exactly the same state that was exported.

- Option 4 - Merge customized dynamic variables from a previous installation

Even if you are unsure if you have any customized variables, it is a good idea to run this option during migration because it will not change any unchanged variables.

## ■ Disaster Scenarios

### Database becomes corrupted – need to restore the database to a working state

1. As user "acsss", stop StorageTek ACSLS and the database. Then run the database recovery.

```
$ db_command stop
$ rdb.acsss
```

2. Select option 1. Refer to ["rdb.acsss" on page 160](#).
3. When the recovery is complete, start StorageTek ACSLS: `rc.acsss` .

### Ran `acsss_config` against the wrong library

1. Select option 2. Refer to ["rdb.acsss" on page 160](#).
2. Start StorageTek ACSLS and test according to procedures in *"Database Backup and Restore"* chapter.

## **Server failure – rebuilding the same server with new hardware**

1. Install the operating system.
2. Configure the new server and OS with the settings from the previous server.
3. Install StorageTek ACSLS.
4. Insert the backup tape or FTP backup file onto the server.
5. Start the `rdb.acsss` utility.
6. Select option 2. Refer to “[rdb.acsss](#)” on page 160.
7. Exit `rdb.acsss`.
8. Start StorageTek ACSLS and test according to procedures in *Database Backup and Restore*.

## **Server failure – rebuilding another StorageTek ACSLS server with new hardware**

1. Install the operating system.
2. Install StorageTek ACSLS.
3. Place the StorageTek ACSLS server-to-server backup files in the proper location.

### **How/what do they use to do this?**

4. Enter `rdb.acsss`. Refer to “[rdb.acsss](#)” on page 160
5. Select option 3.
6. When the recovery utility completes, start StorageTek ACSLS and test according to procedures in *Database Backup and Restore*.

#### **Note:**

# Enterprise Library Connection Options

B

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This chapter contains an:

- [“Overview” on page 317](#)
- [“Dual TCP/IP Support ” on page 318](#)
- [“Connecting to Multiple SL8500s in an ACS” on page 328](#)
- [“Redundant Electronics” on page 328](#)

## ■ Overview

There are multiple options for connecting ACSLS to SL8500 and SL3000 libraries. These options can be used independently or together for communication between ACSLS and the SL8500 and the SL3000.

In a string of connected SL8500s, customers can implement Dual TCP/IP, and/or Multi-library TCP/IP and/or Redundant Electronics.

In a single SL8500, customers can implement Dual TCP/IP and/or Redundant Electronics.

In an SL3000, customers can implement Dual TCP/IP.

- Dual TCP/IP

Dual TCP/IP provides two separate and independent TCP/IP connections between ACSLS and a Library Controller card. If one of these communication paths fails, ACSLS automatically uses the second path for communication.

To implement Dual TCP/IP support, routing tables on both the ACSLS server and the library must be defined and managed using the “route” command. These routing tables force communication between a pair of ports on the ACSLS server and the library to use a defined network communication path.

Both the SL8500 and the SL3000 support Dual TCP/IP communication with the library.

- Connect to Multiple SL8500s in an ACS

Multi-Library TCP/IP support allows the ACSLS server to connect to multiple SL8500 libraries in a string of connected SL8500s. If communication with one library fails, ACSLS automatically sends library communication to the connections with the other libraries. The libraries automatically forward the messages to the affected library(s).

Configuring and managing Multi-library TCP/IP communication is simpler than Dual TCP/IP because routing tables do not need to be defined on the ACSLS server or the SL8500 libraries. However, Multi-library TCP/IP requires a string of connected SL8500 libraries. It does not apply to single, stand-alone SL8500 or SL3000 libraries

- Redundant Electronics

Redundant Electronics uses a redundant set of Library Controller cards. At any given time, one set is active and the other set is standby. The active Library Controller can failover to the standby in response to a command from ACSLS or the SLConsole. Automatic failover can be initiated by the library in the event of a library card failure.

Redundant Electronics also enables minimally disruptive library firmware (microcode) downloads.

Within a string of connected SL8500s, Redundant Electronics can be implemented on a per library basis. The customer can implement RE in any or all libraries within a complex.

To support Redundant Electronics in the library, ACSLS 7.3.1 is required.

## Displaying the status of ACSLS Communication with Libraries

Use the `query imu` command to view and monitor the status of ACSLS communication with the libraries it manages. The `query imu` command also shows the status of ACSs and port connections to libraries. Refer to “[query imu](#)” on page 232 for more information.

## ■ Dual TCP/IP Support

Dual TCP/IP is an option that can be purchased for the StorageTek SL8500 and StorageTek SL3000 libraries (herein known as the library). It provides two TCP/IP connections to the library. However, you can continue to use the library with only one of the two connections operational.

The purpose of dual TCP/IP is to automatically recognize and avoid a failing communication path. Since this is automated, there is no need for you to manually switch from an inoperative connection.

To use dual TCP/IP support on the library, the routing tables on both the StorageTek ACSLS server and the library must be managed using the “route”

command. This forces a route to the defined network interfaces on the library which in essence, creates a one to one relationship between interfaces. The Customer Systems Administrator (CSA) changes the routing tables on the ACS server and the Customer Systems Engineer (CSE) updates the routing tables on the library. For further information on the UNIX “route” command, please refer to the manpages on your StorageTek ACSLS server.

## Requirements

- Please coordinate with both your system administrator and network administrator to understand your current network environment and to identify all necessary IP addresses in advance.
- Please coordinate with your system administrator to either configure your network interface or to validate that it is configured properly.
- Verify you have StorageTek ACSLS 7.3.1 for Solaris 10 Update 6 or 7 for Solaris/SPARC and Solaris/x86

## Configuration

It is recommended that StorageTek ACSLS keep two connections to the library open since StorageTek ACSLS uses all active connections. If one connection is inoperative StorageTek ACSLS uses the remaining operative connection, while continuing to try to re-establish communication on the failing connection.

The preferred configuration for dual TCP/IP implementations would be two network interfaces on two separate subnets for the StorageTek ACSLS server as shown in Scenario 1. This provides maximum throughput and minimum resource contention with regard to network communications while adding a second physical connection improving reliability.

To configure two TCP/IP connections to a single library use the `acsss_config` utility or Dynamic Configuration (config). You must enter the number (2) of connections there are to the library and the IP addresses of the network devices.

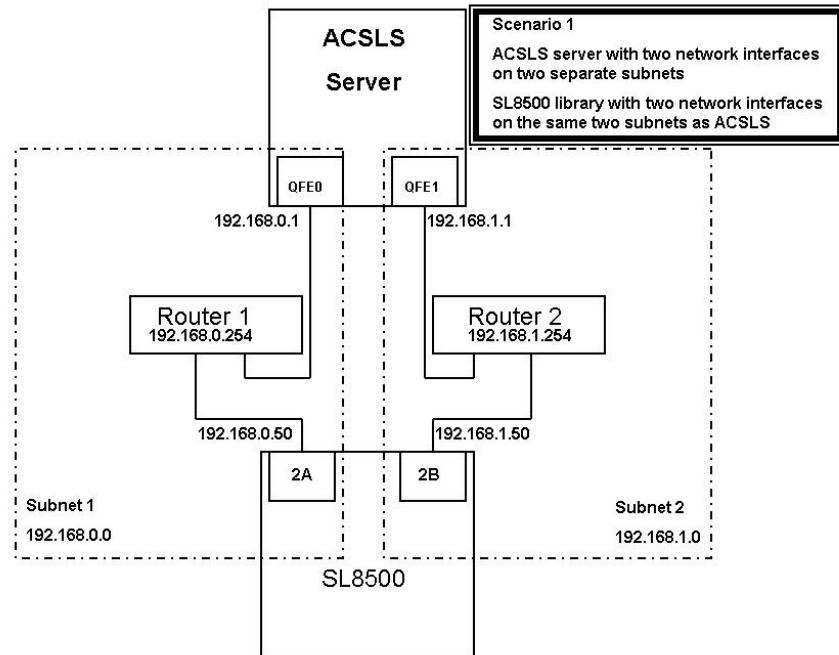
The following scenarios provide examples for configuring the StorageTek ACSLS server. For instructions on configuring the library dual TCP/IP feature, please refer to appropriate library System Dual TCP/IP Feature document.

The following scenarios use private subnet IP addresses and will not be the same in your environment. These scenarios assume that your network devices have been configured and are functioning properly.

## Scenario 1

Scenario 1 is the preferred configuration for the dual TCP/IP feature.

In this configuration, the StorageTek ACSLS server contains two network interfaces that reside on two separate subnets. The StorageTek SL8500 also contains two network interfaces that reside on the same two subnets as the StorageTek ACSLS server.



In this scenario, the StorageTek SL8500 uses a one to one relationship with the network interfaces on the StorageTek ACSLS server in which the:

- qfe0 interface on the StorageTek ACSLS server only communicates with the 2A interface on the StorageTek SL8500
- qfe1 interface on StorageTek ACSLS only communicates with 2B on the StorageTek SL8500.

Using the UNIX "route" commands, you force this relationship. To do this:

- For Solaris: as user `root`, type the following commands:

```
#route add 192.168.0.50 -ifp qfe0 192.168.0.254
#route add 192.168.1.50 -ifp qfe1 192.168.1.254
```

- For AIX: as user `root`, type the following commands:

```
#route add 192.168.0.50 -if qfe0 192.168.0.254
#route add 192.168.1.50 -if qfe1 192.168.1.254
```

The first route command routes any communication with 192.168.0.50 to go through qfe0 on the StorageTek ACSLS server and then go through Router 1.

The second command routes any communication with 192.168.1.50 to go through qfe1 on the StorageTek ACSLS server and then go through router 2.

You can validate that the routes are in the routing table by typing:

```
# netstat -r
```

Routing Table: IPv4

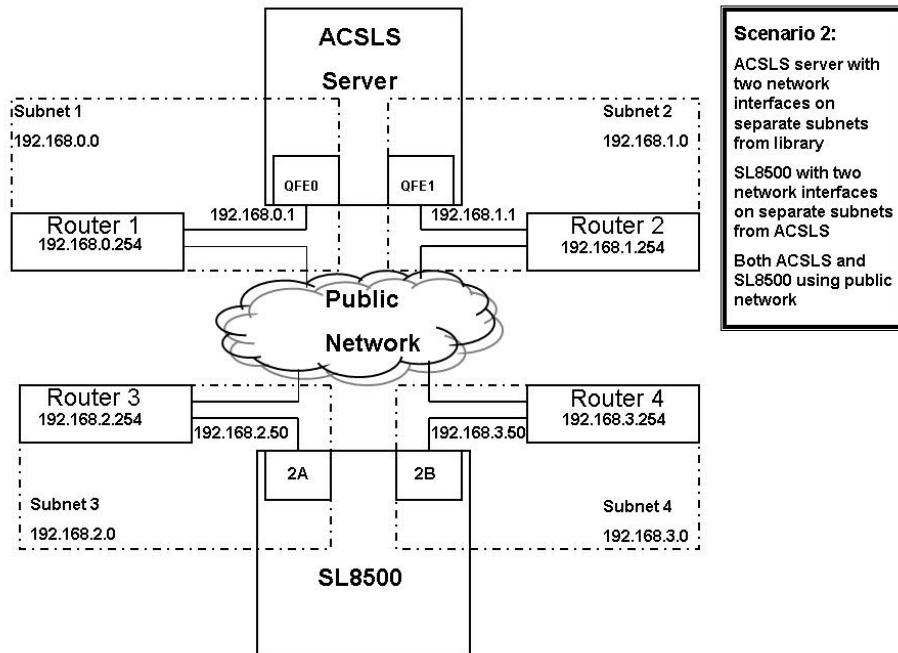
Destination Interface	Gateway	Flags	Ref	Use
<hr/>				
192.168.0.50	192.168.0.254	UGH	1	0
192.168.1.50	192.168.1.254	UGH	1	0
192.168.0.0	192.168.0.1	U	1	7
192.168.1.0	192.168.1.1	U	1	0
BASE-ADDRESS.MCAST.NET	192.168.0.1	U	1	0
default	192.168.0.254	UG	1	33
localhost	localhost	UH	4	77

You can see the first two entries are the ones that were just added. All communication with 192.168.0.50 will go through qfe0 and communication with 192.168.1.50 will go through qfe1.

**Remember:** You must also configure the StorageTek SL8500 routing tables according to the instructions in the *StreamLine StorageTek SL8500 Modular Library System Dual TCP/IP Feature* document.

## Scenario 2

Scenario 2 also shows two interfaces on the StorageTek ACSLS server on two separate subnets but communication to the StorageTek SL8500 will pass through the public network. Even with this difference, the commands stay the same.



Using the UNIX “route” commands, you force this relationship. To do this:

- For Solaris: as `usr root`, type the following commands:

```
#route add 192.168.2.50 -ifp qfe0 192.168.0.254
#route add 192.168.3.50 -ifp qfe1 192.168.1.254
```

- For AIX: as `user root`, type the following commands:

```
#route add 192.168.0.50 -if qfe0 192.168.0.254
#route add 192.168.1.50 -if qfe1 192.168.1.254
```

The default routes for the StorageTek ACSLS remain the same. The routes within the subnets will know how to route communication to the StorageTek SL8500 through the public LAN and you are still forcing the one to one relationship with the interfaces. Again, this is seen using the following command:

```
# netstat -r
```

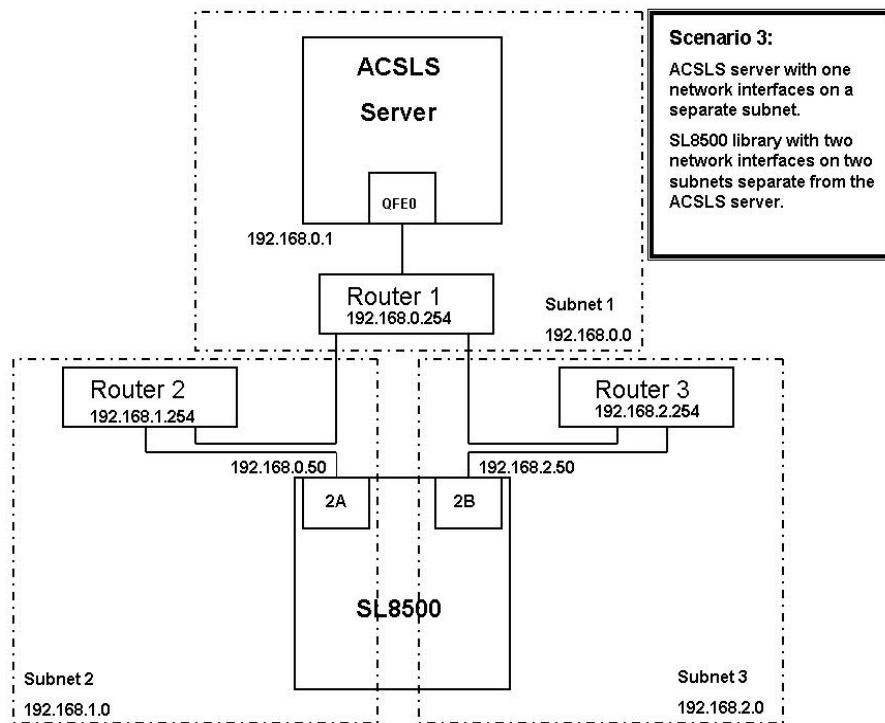
Routing Table: IPv4

Destination	Gateway	Flags	Ref	Use	Interface
192.168.0.50	192.168.0.254	UGH	1	0	qfe0
192.168.1.50	192.168.1.254	UGH	1	0	qfe1
192.168.0.0	192.168.0.1	U	1	7	qfe0
192.168.1.0	192.168.1.1	U	1	0	qfe1
BASE-ADDRESS.MCAST.NET	192.168.0.1	U	1	0	qfe0
default	192.168.0.254	UG	1	33	
localhost	localhost	UH	4	77	lo0

**Remember:** You must also configure the StorageTek SL8500 routing tables according to the instructions in the *StreamLine StorageTek SL8500 Modular Library System Dual TCP/IP Feature* document.

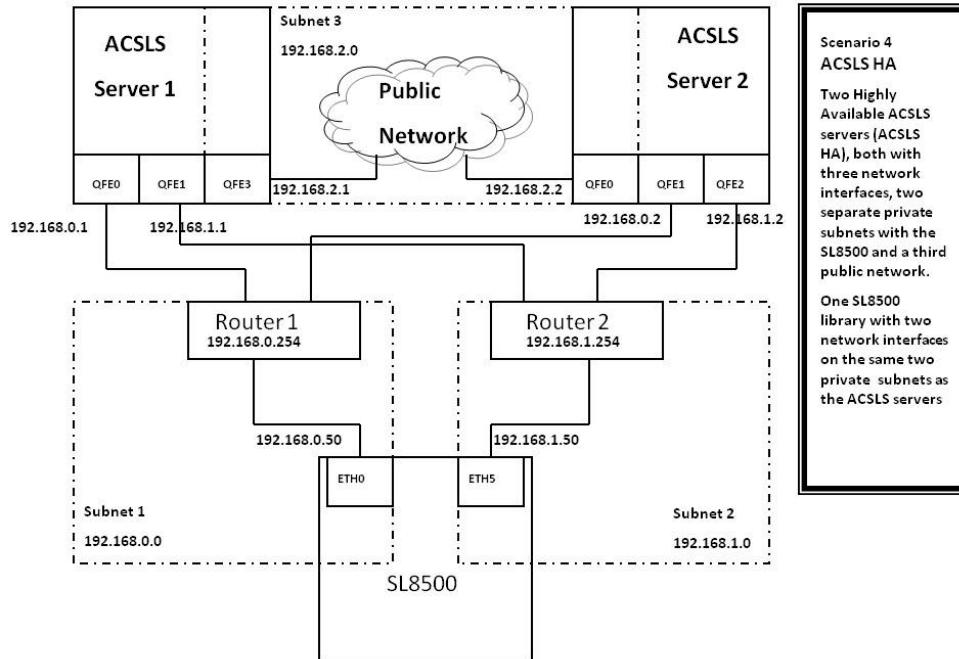
## Scenario 3

Scenario 3 **is not the preferred method** but will work. You can employ the dual TCP/IP feature on the StorageTek SL8500 without using two network interfaces on the StorageTek ACSLS server. This reduces reliability because if the StorageTek ACSLS server network interface fails, communication with the library fails. If you do intend to implement this scenario, there is no need for special configuration on the StorageTek ACSLS server. The default route is already established for normal network configuration, and it would be redundant to add specialized routes using the same default route. It is worth noting here that you still need to configure the StorageTek SL8500 according to the instructions in the *StreamLine StorageTek SL8500 Modular Library System Dual TCP/IP Feature* document.



## Scenario 4

Scenario 4 shows Highly Available StorageTek ACSLS (StorageTek ACSLS HA) in a dual TCP/IP environment.



In this scenario, StorageTek ACSLS HA uses two different servers with each using different network interfaces. This means that custom route entries must be added to both StorageTek ACSLS servers.

For the Solaris user:

- On StorageTek ACSLS server 1, you would type:

```
# route add 192.168.0.50 -ifp qfe0 192.168.0.254
# route add 192.168.1.50 -ifp qfe1 192.168.1.254
```

- On StorageTek ACSLS Server 2, you would type:

```
# route add 192.168.0.50 -ifp qfe1 192.168.0.254
# route add 192.168.1.50 -ifp qfe2 192.168.1.254
```

You must add the IP addresses for both servers to the StorageTek SL8500 configuration. Please refer to the *StreamLine StorageTek SL8500 Modular Library System Dual TCP/IP Feature* document.

It is important that you separate the StorageTek SL8500 network interfaces over two different subnets when on StorageTek ACSLS HA. The purpose of a Highly Available environment is to build in redundancy and eliminate single points of failure.

**Remember:** You must also configure the StorageTek SL8500 routing tables according to the instructions in the StreamLine StorageTek SL8500 Modular Library System Dual TCP/ IP Feature document.

## Retaining Customized Routing Table Entries after a Reboot

Any customized routing table entries will be lost after a system re-boot. This is the nature of system routing tables and is expected behavior.

In order to support the Dual TCP/IP feature on the StorageTek SL8500, it is necessary to add custom entries to the routing tables on the StorageTek ACSLS server. When the StorageTek ACSLS server is re-booted, all routing table entries are flushed and any necessary routes to the StorageTek SL8500 are removed. Since this is the nature of the operating system, there are a couple of different ways to handle this situation:

### Creating Scripts

You can create scripts to add custom routes to be initialized at boot time. See [“Adding Custom Route To Be Initialized At Boot Time” on page 327](#) for procedures.

These scripts can then be placed in the *rc* directory structure for automatic execution at boot time. Please refer to your system documentation for details on the best way to implement this.

Use the StorageTek ACSLS startup scripts to add your custom routing entries at boot up time. The startup scripts check for a file that contains customized route table entries. Any entries found will be added to the routing table automatically using the UNIX route command.

For standalone StorageTek ACSLS installations this is a desirable method to maintain route entries that are necessary for StorageTek SL8500 support.

**Important:** This solution **will not work** if the StorageTek ACSLS installation is a Highly Available StorageTek ACSLS (StorageTek ACSLS/HA) environment.

In this case, you need to use the first method to maintain routing tables.

StorageTek ACSLS HA handles system initialization differently than a standalone StorageTek ACSLS server. StorageTek ACSLS HA relies on Veritas Cluster Server to manage its clustered resources which means StorageTek ACSLS cannot be automatically started by way of the system RC mechanism at boot time. This is handled strictly by the Veritas agents, and the S87ACSLS startup scripts are never used. You need to add a script with the appropriate “route add” commands and locate it within the /etc/rc2.d

directory structure. It is highly recommended that any customers with an StorageTek ACSLS HA environment engage Professional Services – preferably the same PS consultant that originally installed the StorageTek ACSLS HA system.

## Adding Custom Route To Be Initialized At Boot Time

To add custom routing entries:

1. cd to the following directory:

`$ACS_HOME/data/external/ custom_routing.`

This directory contains the template file *custom\_routing\_tables.tpl*.

2. Copy this file and change the file name to *custom\_routing\_tables*.

**`# cp custom_routing_tables.tpl custom_routing_tables`**

3. Edit (vi) the *custom\_routing\_tables* file and add your entries.

The file contains three fields.

- The IP address for the StorageTek SL8500
- The name of the interface on the StorageTek ACSLS server that you wish to establish the one-to-one relationship.
- The IP address of the default route for your subnet.

4. Follow the instructions in the *custom\_routing\_tables* comment section for the format.

**WARNING: Make sure that there are no blank lines.**

When your server reboots, StorageTek ACSLS is automatically initialized, and your custom routes are added to the routing table.

5. Verify all routes in the routing table with:

`# netstat -r`

Please refer to your Unix man pages for complete documentation on both the "route" and "netstat" commands.

## Removing routing commands

Use the route command to remove any special routing commands that have been added erroneously or are no longer needed to the earlier configuration.

Example: As user `root`, type the following commands:

`# route delete 192.168.0.50 192.168.0.254`

This says to remove the route to 192.168.0.50 (the StorageTek SL8500) using the default route of 192.168.0.254. The route is then removed.

## ■ Connecting to Multiple SL8500s in an ACS

When StorageTek SL8500 3.97 or higher firmware is installed, StorageTek ACSLS can connect to more than one StorageTek SL8500 in an ACS (library complex).

StorageTek ACSLS supports up to fifteen connections to an ACS. For example, this can be: fifteen connections to four SL8500s; two connections to each of two SL8500s; two connections to one StorageTek SL8500 and two connections to two other SL8500s; three connections to two or three libraries, etc.

When StorageTek ACSLS is connected to more than one library, the connections should be through different subnets for redundancy. If one subnet fails, communication between StorageTek ACSLS and the library still continues over the other subnet(s).

When StorageTek ACSLS has two connections to one StorageTek SL8500 HBC card, you must configure the StorageTek SL8500 and StorageTek ACSLS server routing tables as described in [“Dual TCP/IP Support ” on page 318](#). If you have only a single connection between the StorageTek ACSLS server and each StorageTek SL8500 HBC card, configuring the StorageTek ACSLS and StorageTek SL8500 routing tables is **not** necessary.

To optimize library performance and minimize inter-library communication among SL8500s, define your first connection (port 0) to the library with the most activity.

Configuring and managing Multi-library TCP/IP communication is simpler than Dual TCP/IP because routing tables do not need to be defined on the ACSLS server or the SL8500 libraries. However, Multi-library TCP/IP requires a string of connected SL8500 libraries. It does not apply to single, stand-alone, SL8500 or SL3000 libraries.

For more information, refer to the *StorageTek SL8500 Modular Library System Technical Brief - Host to Library Communications*.

## ■ Redundant Electronics

The optional SL8500 Redundant Electronics feature provides failover protection in enterprise libraries. If the library controller experiences errors, it automatically switches operations to an alternate library controller, with minimal disruption to library and host operations. This allows your Oracle support representative to replace the faulty card while the library continues normal operations.

The Redundant Electronics feature also provides minimal disruption of library operations during firmware upgrades.

**Note:** The SL8500 offers redundancy in a variety of components, including robots and power systems. The term “Redundant Electronics” refers specifically to redundancy in the library and drive controller components.

The Redundant Electronics feature requires all of the following hardware components:

- Active library controller (HBC) paired with the active drive controller (HBT)
- Standby HBC paired with the standby HBT
- Other redundant components

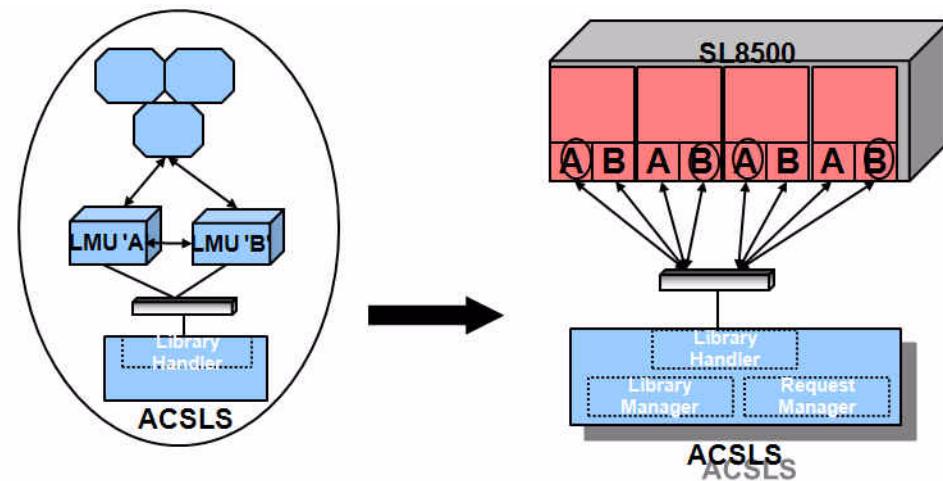
For more information, refer to the *StorageTek SL8500 User’s Guide, part number 96154*.

## ACSLS Support for Redundant Electronics

ACSLS 7.3.1 handles a mix of active and standby SL8500 Library Controller (LC) cards within a single library. This is more complex than the 9330 Dual LMU.

As shown in the following figure, either the A or B cards within each SL8500 can be the active controller card. Within some libraries the A cards are active, while in other libraries the B cards are active.

**Figure 17. ACSLS with Redundant Electronics**



## Enterprise Library Connection Options

Each library in a string of connected SL8500s can now have its own pair of A and B Library Controllers. ACSLS must be able to communicate with all of the active LCs at the same time.

To support RE, ACSLS implemented Query and Retry. For more information, refer to [“Queue and Retry Mounts and Dismounts when Library is Temporarily Unavailable” on page 67](#).

# StorageTek ACSLS Support of the StorageTek SL8500

C

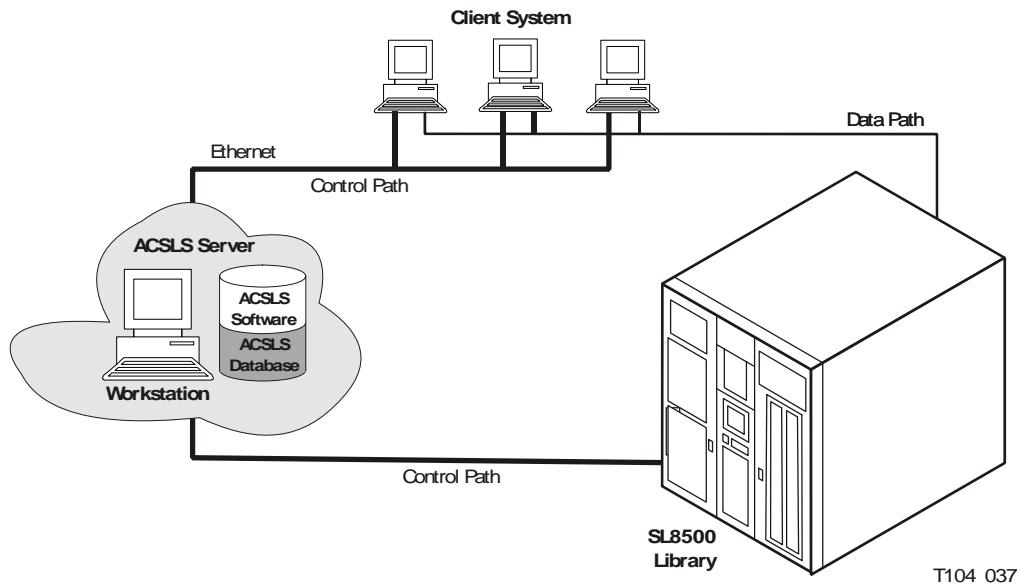
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This appendix discusses the following topics:

- [“Before Configuring StorageTek ACSLS for the StorageTek SL8500” on page 332](#)
- [“Connecting to Multiple SL8500s in an ACS” on page 332](#)
- [“Understanding StorageTek SL8500 Internal Addresses and StorageTek ACSLS Addresses” on page 334](#)
- [“Using SLConsole to Translate Addresses” on page 335](#)
- [“StorageTek SL8500 CAP Behavior” on page 338](#)
- [“Minimizing Elevator and PTP Activity” on page 339](#)
- [“Configuring Tape Drives to Support Your Workloads” on page 340](#)
- [“Managing Cartridge Locations” on page 341](#)
- [“Finding Missing Cartridges” on page 342](#)
- [“Varying the StorageTek SL8500 Offline” on page 342](#)
- [“Using the Dynamic Configuration \(config\) utility” on page 345](#)
- [“Expanding the StorageTek SL8500” on page 345](#)
- [“Connecting SL8500s with Pass-Thru-Ports” on page 350](#)

The following figure shows the StorageTek SL8500 library with an StorageTek ACSLS server.

**Figure 18. StorageTek SL8500 with an StorageTek ACSLS Server**



## ■ Before Configuring StorageTek ACSLS for the StorageTek SL8500

Before you configure StorageTek ACSLS for the StorageTek SL8500:

- Connect one or more SL8500s to StorageTek ACSLS
- Verify that all the components of the StorageTek SL8500 are operational.

StorageTek ACSLS builds its library configuration from the information reported by the library. If StorageTek SL8500 components are not operational, the library information may not be reported to StorageTek ACSLS, and the StorageTek ACSLS configuration of the StorageTek SL8500 will be incomplete.

**Note:** If the components like drives or CAPs are not operational, it is easy to use Dynamic Configuration (config acs, config lsm, or config drives) to add or update them while StorageTek ACSLS is running and the library is online.

## Connecting to Multiple SL8500s in an ACS

The StorageTek SL8500 library uses TCP/IP protocol over an Ethernet physical interface to manage and communicate with the host and StorageTek ACSLS. This interface enables StorageTek ACSLS to connect to and communicate with the StorageTek SL8500.

When StorageTek SL8500 3.97 or higher firmware is installed, StorageTek ACSLS can connect to more than one StorageTek SL8500 in an ACS (library complex).

StorageTek ACSLS supports up to fifteen connections to an ACS. For example, this can be: fifteen connections to four SL8500s; two connections to each of two SL8500s; two connections to one StorageTek SL8500 and two connections to two other SL8500s; three connections to two or three libraries, etc.

When StorageTek ACSLS is connected to more than one library, the connections should be through different subnets for redundancy. If one subnet fails, communication between StorageTek ACSLS and the library still continues over the other subnet(s).

When StorageTek ACSLS has two connections to one StorageTek SL8500 HBC card, you must configure the StorageTek SL8500 and StorageTek ACSLS server routing tables as described in [“Dual TCP/IP Support” on page 318](#). If you have only a single connection between the StorageTek ACSLS server and each StorageTek SL8500 library, configuring the StorageTek ACSLS and StorageTek SL8500 routing tables is **not** necessary.

To optimize library performance and minimize inter-library communication among SL8500s, connect to the libraries with the most activity. Make the first connection that you specify in `acsss_config` or `config acs new` to the StorageTek SL8500 with the most activity.

For more information, refer to the *StorageTek SL8500 Modular Library System Technical Brief - Host to Library Communications*.

## Verifying that all StorageTek SL8500 Components are Operational

To verify that all the components of the StorageTek SL8500 are operational:

1. Logon to the StorageTek Library Console™ (SLConsole).

You can use either the console on the StorageTek SL8500 or a remote Library Console.

2. Select Tools -> System Detail.

- All StorageTek SL8500 components should be green.

**Exception:** Drives that are yellow can be configured now, or later, using dynamic configuration ([“config drives” on page 135](#)).

- Missing components can be added using the Dynamic Configuration (`config acs` or `config lsm`) utility.

- **IMPORTANT:** Before configuring the StorageTek SL8500, the elevators (Elevator Folder) **must** be green. If the elevators are not green, **do not** configure the StorageTek SL8500 to StorageTek ACSLS. The elevators are the logical pass-thru-ports (PTPs). Without PTPs, StorageTek ACSLS will not know that the StorageTek SL8500 rails are connected.

3. Once the StorageTek SL8500 components are operational, configure StorageTek SL8500 to StorageTek ACSLS, as discussed in [“Configuring or Updating your Library Hardware” on page 38](#) or under the [“Dynamic Configuration \(config\) utilities” on page 131](#).

## ■ Understanding StorageTek SL8500 Internal Addresses and StorageTek ACSLS Addresses

There are differences in the internal addresses of the StorageTek SL8500 and other libraries supported by StorageTek ACSLS and HSC.

- The StorageTek SL8500 is *one’s-based* (1) and uses negative numbers.
- Other libraries use a *zero-based* (0) with *no* negative numbers.
- The StorageTek SL8500 uses *five* parameters: library, rail, column, side, and row.
- Legacy StorageTek libraries (e.g. 9310) use: ACS, LSM, panel, row, and column (HLI–PRC).

**Table 25. Addressing Descriptions**

HLI–PRC	StorageTek SL8500	Description
<b>ACS</b>	<b>Library</b>	Number of the specific StorageTek SL8500 library in a library complex. An ACS is a SL8600 library complex. There can be multiple SL8500s in a library complex.
<b>LSM</b> LSM 0 ⇒ LSM 1 ⇒ LSM 2 ⇒ LSM 3 ⇒	<b>Rail</b> Rail 1 Rail 2 Rail 3 Rail 4	The StorageTek SL8500 library has four <i>rails</i> that the HandBots travel, which are numbered from top to bottom 1–4 (one’s-based). StorageTek ACSLS considers <i>each rail</i> to be a separate <i>LSM</i> , numbered from top to bottom 0–3 (zero-based).

**Table 25. Addressing Descriptions**

<b>Panel</b> Panel 0 ⇒ Panel 1 ⇒ Panel 2–n ⇒	<b>Column</b> CAP Drives Storage slots	Columns indicate the <i>horizontal</i> location in the library. As viewed from the front of the library column and panel numbers start at the <i>center</i> of the drive panel (1) and sweep forward with increasing numbers.  <b>Note:</b> The StorageTek SL8500 does not use panels as an address.  An HLI panel spans across the width of the library to include both sides (left and right) and both walls (inner and outer) for <i>each</i> LSM.	
		<b>Side</b>	Wall location 1. Outer wall 2. Inner wall
<b>Row</b>	<b>Row</b>	Rows indicate the <i>vertical</i> location of a tape cartridge and are numbered from the top—down.	
<b>Column</b>		Rows for the <b>HLI</b> address are: <ul style="list-style-type: none"><li>Storage panels start at 2 with Column 0 = left and Column 1 = right</li><li>Rows 0–12 outer walls</li><li>Rows 13–26 inner walls</li><li>Each column in a normal storage panel has 27 rows.</li><li>For a total capacity of 54 cartridges per panel.</li></ul>	Rows for the <b>StorageTek SL8500</b> address are: <ul style="list-style-type: none"><li>Storage slots start at Column -3 = left</li><li>Column +3 = right</li><li>Rows 1–13 outer wall</li><li>Rows 1–14 inner wall</li></ul>
<ul style="list-style-type: none"><li>Zero-based numbering (as with HLI) starts numbering at 0.</li><li>One's-based numbering (as with the StorageTek SL8500) starts numbering at 1.</li><li>This is an important difference in the numbering sequences between software (StorageTek ACSLS or HSC) and hardware (physical StorageTek SL8500 addresses)</li></ul>			

## ■ Using SLConsole to Translate Addresses

You can use the StorageTek Library Console™ (SLConsole) Search utility to translate between the StorageTek SL8500 internal address and the StorageTek ACSLS or HSC panel, row, and column. To locate a cartridge:

1. Log in to the SLConsole.
2. Select Diagnostics -> Search.
3. Select Location.
4. Select one of the following operations in the Location field:

contains	Example: 1,1,-9 lists the contents in Library 1, Rail 1, Column -9 for all rows on both sides
endsWith	Example: 1,5 lists the slot contents for all rails and columns for Side 1, Row 5
equals	Example: 1,1,-9,1,1 lists the contents in that specific location (L,R,C,S,W)
startsWith	Example: 1, 3 lists the slot contents for all columns, sides, and rows in Library 1, Rail 3

5. Select one of the following from the Requestor pull-down menu.

- default

The physical location inside the library (cell, drive, CAP).

If you know the physical location (the internal address), and need to find the HLI-PRC address, enter that address in the *location* and pick *default* as the requester.

- hli1

This is the HLI-PRC address of the cartridge from the library management software.

If you know the HLI-PRC address and want to find the physical location (internal address) enter that address in the *location* and pick *hli1* as the requester.

This option displays both the internal address and the *hli1* Requester address as shown in the following example.

6. Click the Search button in the top right corner of the SLConsole.

The search result lists the location by slot-type (cell, drive, or CAP).

7. Click the *Details* button for more information such as: VOLID: media and cartridge type (LTO, SDLT tape, and T-Series; data, cleaning, or diagnostic); and HLI address for cartridges when you specify a *default Requester*.

## Tape Drive Locations

The tape drives are associated with and belong to an *LSM*. To mount a cartridge tape in a different LSM, the cartridge must go through an internal pass-thru operation (in this case, *the elevator*) to the drive.

The following tables shows the **internal**—software—mapping (viewed from looking *inside* the library at the tape drives), and the **external**—physical

numbering of the drives (looking *outside* at the rear of the Drive and Electronics Module).

**Table 26. Software Drive Numbering**

LSM		StorageTek ACSLS — Drives Numbers			
LSM 0	Rail 1	Drive 0	Drive 4	Drive 8	Drive 12
		Drive 1	Drive 5	Drive 9	Drive 13
		Drive 2	Drive 6	Drive 10	Drive 14
		Drive 3	Drive 7	Drive 11	Drive 15
LSM 1	Rail 2	Drive 0	Drive 4	Drive 8	Drive 12
		Drive 1	Drive 5	Drive 9	Drive 13
		Drive 2	Drive 6	Drive 10	Drive 14
		Drive 3	Drive 7	Drive 11	Drive 15
LSM 2	Rail 3	Drive 0	Drive 4	Drive 8	Drive 12
		Drive 1	Drive 5	Drive 9	Drive 13
		Drive 2	Drive 6	Drive 10	Drive 14
		Drive 3	Drive 7	Drive 11	Drive 15
LSM 3	Rail 4	Drive 0	Drive 4	Drive 8	Drive 12
		Drive 1	Drive 5	Drive 9	Drive 13
		Drive 2	Drive 6	Drive 10	Drive 14
		Drive 3	Drive 7	Drive 11	Drive 15

**Table 27. Physical Drive Numbering**

External—Physical Drive Numbers			
Drive 61	Drive 62	Drive 63	<b>Drive 64</b>
Drive 57	Drive 58	Drive 59	Drive 60
Drive 53	Drive 54	Drive 55	Drive 56
Drive 49	Drive 50	Drive 51	Drive 52
Drive 45	Drive 46	Drive 47	Drive 48
Drive 41	Drive 42	Drive 43	Drive 44
Drive 37	Drive 38	Drive 39	Drive 40
<b>Drive 33</b>	Drive 34	Drive 35	Drive 36
Drive 29	Drive 30	Drive 31	Drive 32
Drive 25	Drive 26	Drive 27	Drive 28
Drive 21	Drive 22	Drive 23	Drive 24
Drive 17	Drive 18	Drive 19	<b>Drive 20</b>
Drive 13	Drive 14	Drive 15	Drive 16
Drive 9	Drive 10	Drive 11	Drive 12
Drive 5	Drive 6	Drive 7	Drive 8
<b>Drive 1</b>	<b>Drive 2</b>	<b>Drive 3</b>	<b>Drive 4</b>

These tables show a matching of drives (the highlighted drives). *For example:*

- Internal/software LSM 0 Drive 0 matches with external/physical Drive 64.
- Internal LSM 1 Drive 15 matches with external/physical Drive 33.
- Internal LSM 2 Drive 3 matches with external physical Drive 20.

## ■ StorageTek SL8500 CAP Behavior

StorageTek SL8500 CAPs span three rails (2-4). For StorageTek ACSLS, this is LSMs 1-3. The StorageTek SL8500 has one CAP with an optional Dual CAP. Each CAP has three magazines with 13 cells per magazine. Each magazine is adjacent to a separate rail, and can only be accessed by the handbots on that rail.

When the Dual CAP is not present, StorageTek ACSLS reports that the CAP is offline or non-operational. To prevent any messages regarding the CAP from being displayed, vary the non-existent CAP to an offline state using the `vary` command. This also prevents any mistaken attempts to use the Dual CAP where it does not exist.

The StorageTek SL8500 CAP is treated as an independent component, and does not belong to any one rail (LSM).

### Examples:

- The StorageTek SL8500 CAP can be online and operational even though the LSM identified in the CAP ID is offline or not operational.
- If LSM 1 is varied offline, the StorageTek SL8500 CAP(s) are not automatically varied offline.
- If LSM 1 is varied online, StorageTek ACSLS will not automatically vary the StorageTek SL8500 CAP(s) online.
- The StorageTek SL8500 CAP(s) can be online and used to enter or eject cartridges to and from StorageTek SL8500 LSM 0, even though some of the StorageTek SL8500 LSMs 1-3 are offline and/or not operational.

**Note:** For CAP behavior in a partitioned library, refer to [“CAP Behavior” on page 393](#).

## Enter or Eject Operations

During an enter, StorageTek ACSLS will always try to move the cartridge to an LSM (rail) adjacent to the CAP magazine. For ejects, StorageTek ACSLS will always try to eject cartridges to a CAP cell adjacent to the LSM containing the cartridge.

If these two operations are not possible, the library controller takes care of moving the cartridge through the elevator to another LSM. This requires movements between two handbots and the elevator.

## Enter, Eject, and Audit Operations for Some StorageTek ACSLS Clients

Unlike other libraries, the StorageTek SL8500 does not have CAPs defined for each LSM ID in an StorageTek SL8500 library. The CAPs on an StorageTek SL8500 contain LSM 1 in their CAP IDs. There are no CAPs in an StorageTek SL8500 with LSM IDs 0, 2, or 3. Partitioning complicates this problem because LSM 1 (the LSM ID in the StorageTek SL8500 CAP ID) may not be assigned to your partition. (Remember, the CAPs are still available to all partitions as a shared resource.)

Some StorageTek ACSLS clients do not query StorageTek ACSLS to identify which CAPs exist and are available before selecting a CAP for an enter, eject, or audit. They may specify *cap\_ids* that do not exist or CAPs that are not online. For example, some ACSAPI clients assume CAPs exist for all LSM IDs. They may automatically specify a CAP with the same LSM ID as the location of cartridges or drives that they manage. Enters, ejects, or audits that specify non-existent CAP IDs will fail.

You need to use the StorageTek ACSLS `cmd_proc` to:

- enter and eject cartridges for clients that specify non-existent CAP IDs.
- run audits for any ACSs and partitions used by these clients.

After entering, ejecting, or auditing, you need to re-synchronize the client application's database with the StorageTek ACSLS database.

## ■ Minimizing Elevator and PTP Activity

There are several things you can do to minimize elevator and PTP activity, such as:

### Mounting cartridges

Whenever possible when mounting a tape, use cartridges and tape drives that are in the same LSM.

LSM refers to a single rail within the StorageTek SL8500 library. Each StorageTek SL8500 contains 4 LSMs.

<b>Using float</b>	Take advantage of the StorageTek ACSLS “float” option (enabled by default by StorageTek ACSLS) by maintaining some free cells within each LSM. Cartridge float is a feature that allows StorageTek ACSLS to place a dismounted tape cartridge in an empty slot in the same LSM or a closer LSM to the tape drive if the tape originally came from a different LSM using a pass-thru operation.  When cartridges are dismounted, StorageTek ACSLS tries to avoid elevator (pass-thru) activity among LSMs by assigning a new home cell whenever the cartridge's old home cell is in a different LSM. StorageTek ACSLS attempts to put the cartridge away:
	<ul style="list-style-type: none"><li>• in the same LSM as the tape drive from which it was dismounted</li><li>• or to the closest LSM (with free storage cells) to the drive</li></ul>
<b>Entering cartridges</b>	Enter cartridges into an LSM that has compatible tape drives for the media being entered.  Example: You have only LTO drives on LSMs 2 and 3, and you want the LTO cartridges to be located in these LSMs. When entering these cartridges, you should place them in the CAP magazines adjacent to LSMs 2 and 3. StorageTek ACSLS then makes every effort to put the cartridges in the LSM that is adjacent to that CAP magazine.
<b>Scratch cartridges</b>	Make sure that scratch cartridges are available in sufficient quantity in each LSM where they will be used. For an StorageTek SL8500, this means having scratch cartridges available on each rail (LSM) of the library.
<b>Free cells</b>	Make sure there are adequate free cells in each LSM.

## ■ Configuring Tape Drives to Support Your Workloads

How tape drives are configured in the StorageTek SL8500 can minimize both elevator and PTP activity while supporting your tape workloads. Strategies to use in determining where tape drives are located in the StorageTek SL8500 include:

- Cluster cartridges by workload, with enough drives to support the maximum drives needed for the workload. Separate the cartridges used by each workload on separate rails, and ensure the rail(s) dedicated to a workload has enough drives to meet the maximum concurrent mounts for the peak usage of the workload. Ensure that the rail has not only the tape cartridges for the workload, but also the scratch cartridges that will be needed.

- Allocate separate rail(s) to each major application workload. This is because some applications, such as Symantic NetBackup and Tivoli, can use their own media and drives.
- Clustering drives and media on a single rail works until the mounts per hour threshold is reached, all drives are in use, or there are too many active cartridges to fit on a rail. When the resources needed for a workload exceeds the capacity of a rail, spread the cartridges and drives over two or more rails.
- Cluster drives by type, placing drives that use different media types on separate rails (LSMs). For example, place T9840 drives on one rail and T10000 drives on a different rail.
- Configure your heavy tape applications so they will not exceed the performance limits of your library configuration.
- Configure the StorageTek SL8500 with 8 HandBots (two HandBots per rail) to provide redundancy. This allows you to always access the cartridges and drives that support a workload.

## ■ Managing Cartridge Locations

How cartridges are originally entered in the library or their status in the library can have an affect on StorageTek ACSLS performance. Considerations are:

**Entering cartridges** *Recommendation:* Enter cartridges through the CAP.

When manually placing cartridges in the library with the front access door open, *library operations cease* and StorageTek ACSLS must perform a *full audit* to update the library database to match the actual contents of the library.

*To maximize performance:* Enter cartridges through the cartridge access port (CAP).

During an enter, *the library stays online, mounts can continue*, and the library management software always tries to move the cartridge to an LSM adjacent to the CAP magazine—minimizing pass-thru activity.

If this is not possible, the library controller moves the cartridge through the elevator to another LSM—which requires additional movement between two HandBots and the elevator.

**Clustering cartridges**

Cluster cartridges by workload on separate rails with enough tape drives to support the maximum activity—peak usage—for that workload.

<b>Using float</b>	<i>Recommendation:</i> When <i>float</i> is on, StorageTek ACSLS selects a new home cell for a cartridge that is in an LSM as close to the drive as possible on a dismount. This option automatically clusters cartridges by the drives for the workload.
<b>Supplying scratch cartridges</b>	Make sure each rail has the correct amount and type of data cartridges <i>plus</i> enough scratch cartridges to support the workload.

## ■ Finding Missing Cartridges

If a cartridge is out of place or unaccounted for by StorageTek ACSLS:

1. Perform a physical audit of the StorageTek SL8500 using the SLConsole.

The physical audit of the StorageTek SL8500 is performed as a background task in between handling mount and other library operation requests.

**Warning:** If the StorageTek SL8500 contents are out of sync with StorageTek ACSLS due to manual operations such as loading cartridges directly, it is not advisable to attempt continued operations.

If you want to manually add tapes, adding them to a particular LSM within the StorageTek SL8500 is a better approach. Adding tapes to a particular LSM and auditing only the affected LSM is a quicker and more reliable solution.

To do this, vary the affected LSM to a diagnostic state to StorageTek ACSLS while the audit is in process. After the StorageTek SL8500 library audit is performed vary the LSM online to StorageTek ACSLS.

2. Run an StorageTek ACSLS audit to update the StorageTek ACSLS database to match the actual inventory of library cartridges.

## ■ Varying the StorageTek SL8500 Offline

You should vary StorageTek SL8500 components offline to StorageTek ACSLS before they are powered off, if they are inoperative, and before you open an StorageTek SL8500 access door. This notifies StorageTek ACSLS that they are unavailable. Once they are available, vary them back online.

### Use StorageTek ACSLS to vary StorageTek SL8500 components offline, not SLConsole

You should vary StorageTek SL8500 components (ACSs, LSMs, and CAPs) offline to StorageTek ACSLS, not the SLConsole.

StorageTek ACSLS allows outstanding requests to complete before taking components offline, unless it is a vary offline force. The SLConsole has no knowledge of outstanding requests to StorageTek ACSLS.

Varying components offline using SLConsole may cause requests in progress to fail.

## When to vary StorageTek SL8500 components offline to StorageTek ACSLS

### *Before opening the access door*

Before opening the StorageTek SL8500 access door vary the ACS or all four LSMs offline.

- For a standalone StorageTek SL8500, vary the ACS offline:

```
vary acs acs_id offline
```

- For a StorageTek SL8500 connected through PTPs, vary all four LSMs (in the StorageTek SL8500 whose access door will be opened) offline using the following command four times (once for each of the four LSMs):

```
vary lsm lsm_id offline
```

**Note:** If any CAPs in the StorageTek SL8500 are in automatic mode, you must:

1. Set them to manual mode before opening the access door.
2. Set them back to automatic mode after you close the access door and the StorageTek SL8500 comes back online.

### *If a CAP is inoperative*

If the CAP is inoperative, vary it offline:

```
vary cap cap_id offline
```

## When closing the Service Safety Door

Whenever replacing hardware requires using the Service Safety Door, it is advisable to keep that Service Safety Door closed for the minimum amount of time possible. This is because the Service Safety Door blocks other hardware components (elevators, CAPs, and cells) to which access may be required for completing specific requests.

- Before closing the Service Safety Door on either the left or right side of the StorageTek SL8500, vary the elevator on that side offline through the SLConsole.

After the Service Safety Door is opened, vary the elevator on that side back online through the SLConsole.

- When the Service Safety Door is closed on the right side, it will block access to the CAP.
  - Before closing the Service Safety Door on the right side of the StorageTek SL8500, vary the CAP offline through StorageTek ACSLS.
  - After the Service Safety Door is opened, vary the CAP online through StorageTek ACSLS.

**Note:** When the StorageTek SL8500 Service Safety Door is closed to separate a service bay from the rest of the library, the CSE can open the access door on that side without taking the LSM or ACS offline.

## **When using the Service Safety Door do not use these StorageTek ACSLS commands and utilities**

There are some StorageTek ACSLS commands and utilities that should not be in progress or initiated when the Service Safety Door is being used. These commands are:

### **When the Service Safety Door is closed on either side, do not use these utilities:**

- acsss\_config
- config (config drives is OK)

### **When the Service Safety Door is closed on the right (CAP) side, do not use these commands:**

- enter
- eject
- set cap mode auto <cap\_id>

### **When the Service Safety Door is closed on the right (CAP) side, the following commands can be used, but special considerations apply:**

- audit

The audit command can be used. However, if there is a need to eject cartridges as a result of the audit (e.g. because the audit encounters duplicates or unreadable labels), the audit will complete and update the StorageTek ACSLS database, but the cartridges will **not** be ejected.

- vary acs and vary lsm

These commands will succeed, but messages will be displayed on cmd\_proc and the event log reporting CAP failures and inoperative CAPs.

## ■ Using the Dynamic Configuration (config) utility

The dynamic configuration (config) utility allows you to implement configuration changes to StorageTek ACSLS libraries (and components) while StorageTek ACSLS remains online and running. These configuration changes are recorded in the `acsss_config.log` file.

The following dynamic configuration utilities are supported:

- `config acs`
- `config drives`
- `config lsm`
- `config ports`

Using the `config` utility provides the following benefits:

- StorageTek ACSLS can continue running, allowing you to perform mount requests to unaffected library components.
- Allows you to reconfigure specified library components while all other configuration information remains unchanged. For example, when specifying:
  - An ACS, the configurations of other ACSs are not affected.
  - An LSM, the configurations of other LSMs are not affected.
  - A drive panel, the drives on a panel, mounts and dismounts to all existing drives are not affected.

## ■ Expanding the StorageTek SL8500

Storage Expansion Modules (SEMs) are added to the StorageTek SL8500 to increase its capacity. The SEMs are inserted between the Customer Interface Module (CIM), which includes the CAP, and the SEM or Robotics Interface Module (RIM) that is currently attached to the CIM.

When an StorageTek SL8500 is expanded:

- The library's configuration changes, and you must reconfigure StorageTek ACSLS using either the StorageTek ACSLS Dynamic Configuration utility while StorageTek ACSLS is up or run `acsss_config` while StorageTek ACSLS is down.
- Cartridges must be removed to expand the StorageTek SL8500. **When placing these cartridges back into the library, please leave the cell arrays that they were formerly in empty.**
- After the expansion is complete, the StorageTek SL8500 must be rebooted twice, first to discover the new configuration, and then to restart all library components with the updated configuration.

- The library must update the locations of all cartridges with a physical audit.

The library begins a physical audit automatically when the access door is closed. The library's physical audit completes when all robot movement stops for at least a minute.

- After the library's physical audit is complete, use the procedure [“Auditing an Expanded StorageTek SL8500” on page 348](#) to update the StorageTek ACSLS database.

**Note:** Do not start automated library operations until the StorageTek ACSLS audits are complete and the StorageTek ACSLS database has been updated with the new cartridge locations

## What is Involved

Physically expanding an StorageTek SL8500 involves the following:

- A new SEM(s) is inserted between the existing SEMs or RIM and the CIM. The panel numbers on the new SEM(s) and the CIM are now higher than the panel numbers on the existing SEMs and RIM.
- Because the CIM must move out, new and higher panel numbers are assigned to the three cell panels (columns) on the CIM. When the cell panels on the CIM are assigned higher panel numbers, the addresses of all the cartridges on the CIM change.
- Many cartridges must be removed to expand the StorageTek SL8500. Cell arrays must be removed to both unbolt existing rails and bolt in new ones and to jack up the CIM.
- After the new rails are installed and the StorageTek SL8500 is expanded, the cartridges that were removed may be loaded back into the library.  
**Please leave the cell arrays that were temporarily removed to expand the library empty.**

After expansion, you must audit the library so StorageTek ACSLS can update its database with the new addresses of these cartridges. When cartridges are placed in new locations, StorageTek ACSLS' attempts to find the cartridges that were previously in the cells can seriously degrade library performance during an audit. To optimize both StorageTek ACSLS and library performance, please:

1. Let the library's physical audit complete before starting an StorageTek ACSLS audit. The combined audits will finish faster if the library is able to just report cartridge locations to StorageTek ACSLS from its database. Otherwise, the library must re-verify cartridge locations before responding to StorageTek ACSLS' audit requests.
2. For the cartridges that were removed to expand the library, use one of these strategies to re-insert them back into the library:

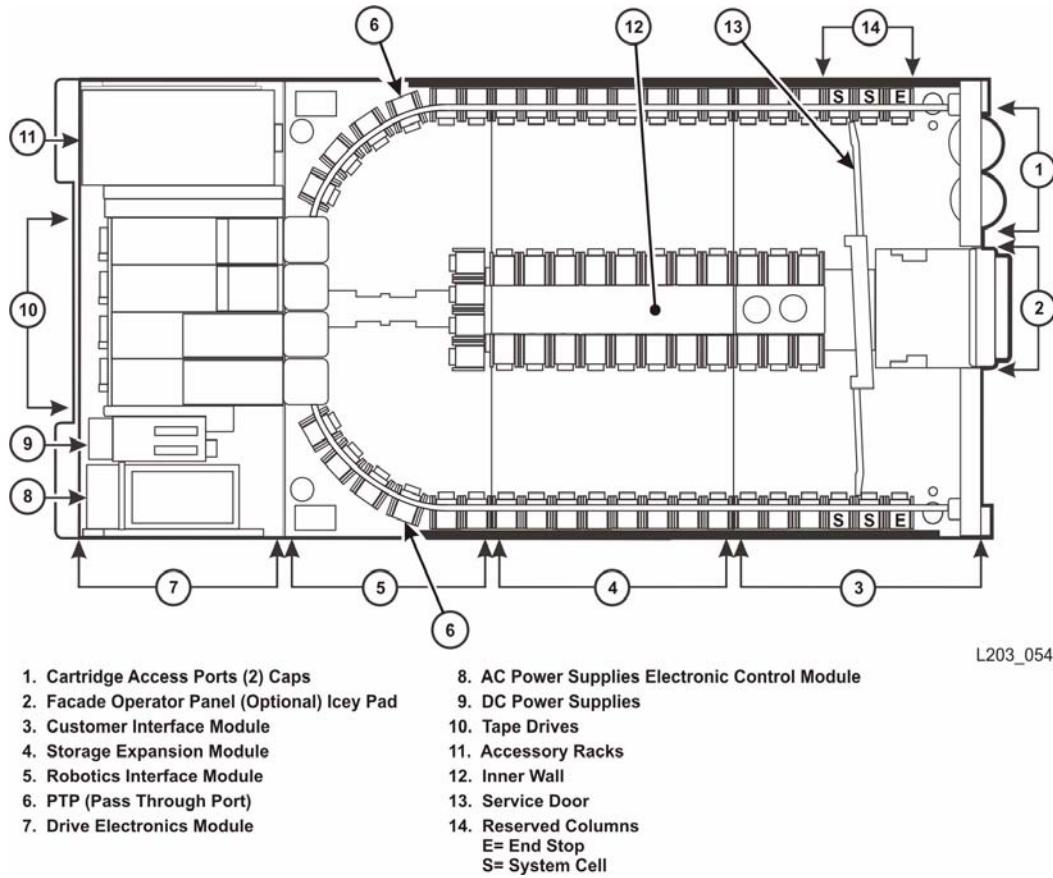
- a. Remove the cartridges from the library, audit the library from StorageTek ACSLS, then enter the cartridges that were removed back into the library.
- b. Insert the cartridges only into the panel numbers that were added to the library, then audit these panels first:
  - Insert the cartridges that were removed into the panels that were added to the library. This means only insert them into panels (columns) beyond the three panels that are closest to the drives in the first new SEM. (The first three panels in the first SEM have the panel numbers that were formerly assigned to the three panels in the CIM.)
  - Then audit the panels in the ACS or LSMs from the highest panel number down, through all of the new panel numbers that were added.  
*Use audit cap\_id panel panel\_id commands.)*
  - Finally, audit the rest of the ACS or LSMs.  
*Use the audit cap\_id acs acs\_id or audit cap\_id lsm lsm\_id commands.)*

This procedure is described in full detail in [“Auditing an Expanded StorageTek SL8500” on page 348](#).

#### Diagram of StorageTek SL8500 Modules:

In the following diagram, the three cell panels in the Customer Expansion Module (# 5) are the three columns of cartridges on both the outside and inside walls on the drive side of the CEM. These are the only cell addresses in the CIM that HandBots can access when the service safety door is activated.

**Figure 19. StorageTek SL8500 Customer Expansion Module**



## Auditing an Expanded StorageTek SL8500

### Before you expand the StorageTek SL8500:

1. Determine the highest panel number for the LSMs in the library by running:

```
display panel acs,1sm,*
```

Where:

- `acs` is the ACS
- `1sm` is one of the LSMs. All rails (LSMs) on the StorageTek SL8500 have the same number of panels.
- `*` displays all panels in the LSM

2. Record the highest panel number.
3. Vary the LSMs to a diagnostic state until the configuration is updated and cartridge addresses have been updated with audit.

4. Backup the StorageTek ACSLS database.

**Expand the StorageTek SL8500:**

5. During the expansion, cartridges must be removed to install new or expanded rails and to add the Storage Expansion Modules.

**CAUTION:** Do NOT insert these cartridges back into the cell arrays that were temporarily removed to expand the library. This avoids a severe degradation in library performance when these locations are first audited.

6. Insert the cartridges that were removed into the panels that were added to the library.

This means, you should only insert these cartridges into panels (columns) beyond the three panels that are closest to the drives in the first new Storage Expansion Module. (The first three panels in the first Storage Expansion Module retain the numbers formerly assigned to the panels in the CIM.)

**After physical expansion of the StorageTek SL8500 is complete:**

7. After the expansion is complete, re-boot the library twice.
8. Leave the LSMs in a diagnostic state.
9. Update the configuration in the StorageTek ACSLS database using one of the following methods:

- StorageTek ACSLS is running:

config acs *acs\_id*

or

config lsm *lsm\_id* (for each LSM (rail) in the StorageTek SL8500)

- Shutting down StorageTek ACSLS:

a. Bring down StorageTek ACSLS: kill.acsss

b. Update the StorageTek ACSLS configuration: acsss\_config

c. Bring up StorageTek ACSLS: rc.acsss

10. Determine the new highest panel number for the LSMs in the library and record this number:

**display panel acs,lsm,\***

Where:

- **acs** is the ACS.
- **lsm** is one of the LSMs. All rails (LSMs) on the StorageTek SL8500 have the same number of panels

- \* displays all panels in the LSM.

11. Audit the panels that were added during the expansion, from the new highest panel number to the old highest panel number+1. Audit these panels in descending order.

audit *cap\_id* panel *panel\_id*

Where:

- *cap\_id* is the CAP where cartridges with duplicate *vol\_ids* or unreadable labels should be ejected.
- *panel\_id* is the panel being audited (acs, lsm, panel)

12. Perform a separate audit for each added panel in each LSM.

**Note:** You can only run as many concurrent audits as you have CAPs in your library complex. Each concurrent audit needs a separate CAP. If the audit ejected any cartridges to the CAP, they must be removed before the audit finishes.

13. Audit each entire LSM in the expanded StorageTek SL8500 (or audit the entire ACS).

14. Backup the StorageTek ACSLS database.

15. Vary the LSMs online.

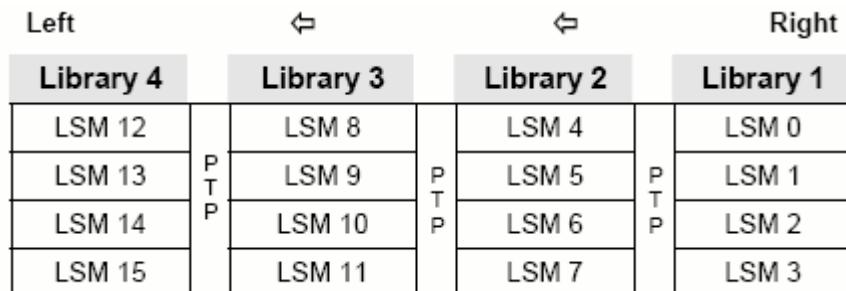
16. Resume automated library operations.

## ■ Connecting SL8500s with Pass-Thru-Ports

You may need to audit StorageTek SL8500(s) to update cartridge addresses when adding StorageTek SL8500 libraries to an existing StorageTek SL8500 library complex.

LSMs in an StorageTek SL8500 complex are numbered from top down and right to left when viewed from the CAP end. This is shown in the following figure.

**Figure 20. Four connected StorageTek SL8500 Libraries**



Depending on how your site is set up, you may be adding a new StorageTek SL8500 to the right or left of an existing StorageTek SL8500. As a result:

- When a new StorageTek SL8500 is added on the left, the new LSMs have higher numbers, and existing LSMs are not re-numbered. The disruption is minimal.
- When a new StorageTek SL8500 is added on the right, all existing LSMs are re-numbered. This causes the home cell addresses of all existing cartridges to change.

## Before You Install StorageTek SL8500 PTP Connections

1. Apply all relevant maintenance to StorageTek ACSLS before installing StorageTek SL8500 connections.
2. Enable absent cartridge support.

When absent cartridge support is enabled, StorageTek ACSLS will not delete cartridges in an LSM that is deleted or when audit does not find them in their old address. These cartridges are marked absent, preserving all information about them, except for the scratch status. When these cartridges are later found by audit, they are reactivated.

- Absent cartridge support is enabled when the “[Variable: ABSENT\\_VOLUME\\_RETENTION\\_PERIOD](#)” on page 33 is **not** zero. The default value is 5 days.
- Use `acsss_config` (option 3). For procedures, refer to the “[Variable: ABSENT\\_VOLUME\\_RETENTION\\_PERIOD](#)” on page 33 under Option 3 - Set General Product Behavior Variables.

3. Update your configuration by one of the following methods.

- With StorageTek ACSLS up:

```
config acs acs_id
```

- Shutting StorageTek ACSLS down:

- a. Bring down StorageTek ACSLS: `kill.acsss`
- b. Update the StorageTek ACSLS configuration: `acsss_config`
- c. Bring up StorageTek ACSLS: `rc.acsss`

StorageTek ACSLS cannot be running when you run `acsss_config`.

For more information, refer to “[Configuring or Updating your Library Hardware](#)” on page 38 or under the “[Dynamic Configuration \(config\) utilities](#)” on page 131.

## Adding New SL8500s

When additional SL8500s are added to an existing StorageTek SL8500 library complex, the new StorageTek ACSLS configuration must be updated. If the addition of new SL8500s causes the LSMs in the existing SL8500s to be renumbered, the cartridge addresses in those LSMs must be updated.

The cartridge addresses should be updated without losing the other information associated with the cartridges. This includes cartridge information, such as scratch status, pool, locks, and ownership, as well as cleaning cartridge usage counts, and the date and time cartridges were entered.

LSMs in connected SL8500s are numbered from top to bottom and right to left when viewed from the CAP end. This is shown in the following figure.

**Figure 21. Four connected StorageTek SL8500 Libraries**

Left	↔	↔	Right
Library 4	Library 3	Library 2	Library 1
LSM 12	P T P	LSM 8	LSM 4
LSM 13		LSM 9	LSM 5
LSM 14		LSM 10	LSM 6
LSM 15		LSM 11	LSM 7
			LSM 0
			LSM 1
			LSM 2
			LSM 3

## Adding a New StorageTek SL8500 to the Left

In the case of the non-disruptive addition of a new StorageTek SL8500 on the left (from the CAP end) of the original StorageTek SL8500(s), you can use the host software (StorageTek ACSLS) to dynamically configure the additional drives and libraries. You do not need to re-cycle StorageTek ACSLS if Dynamic Configuration is installed. Mount requests continue as normal to the existing SL8500s during this phase.

If cartridges were placed in cells in the new StorageTek SL8500, an StorageTek ACSLS audit must be run on the LSMs of the new StorageTek SL8500 to add these cartridges to the StorageTek ACSLS database.

The LSMs in the pre-existing SL8500s can be online during the audit.

### ***Dynamically Configuring the New StorageTek ACSLS Configuration***

1. Add new StorageTek SL8500(s) to the library complex.
2. Backup StorageTek ACSLS before you make the configuration change.
3. Update the StorageTek ACSLS configuration dynamically:

```
config acs acs_id
```

You can also update the StorageTek ACSLS configuration when StorageTek ACSLS is down:

```
acss_config
```

4. Backup StorageTek ACSLS after you make the configuration change.

**Note:** If there are cartridges in the new StorageTek SL8500, audit the LSMs (rails) in the new StorageTek SL8500 to add these cartridges to the StorageTek ACSLS database.

## Adding a New StorageTek SL8500 to the Right

If you wish to add a new StorageTek SL8500 to the right, the existing LSMs will be renumbered, as shown in the following figures

### ***Considerations When Adding an StorageTek SL8500 to the Right***

When new SL8500s are added to the right, all existing LSMs will be renumbered and cartridge addresses will change. The change to LSM numbers causes all existing cartridge addresses to change. If StorageTek ACSLS attempts to mount a cartridge whose address changed, the mount will fail because StorageTek ACSLS cannot find the cartridge.

- Quiesce mount activity until all cartridge addresses have been updated.
- Vary all LSMs in the ACS to diagnostic state to prevent mounts.
- Update the cartridge addresses by auditing the LSMs in the existing and new SL8500s in a specific sequence.

### ***Dynamically Configuring the New StorageTek ACSLS Configuration***

To update the StorageTek ACSLS Configuration Dynamically after adding a new StorageTek SL8500(s):

1. Vary existing LSMs in diagnostic state (vary lsm\_id diag).

**WARNING: These LSMs must remain in diagnostic state until they have been audited. Otherwise these problems will occur:**

- Mounts will fail because cartridges cannot be found in their last-known addresses.
- Until the audits update the StorageTek ACSLS map of the empty cells in the renumbered LSMs:
  - Enters of new cartridges will collide with existing cartridges.
  - Movements of cartridges to existing (renumbered) LSMs will collide with cartridges already in the cells,

2. Add the new StorageTek SL8500(s) to the library complex.
3. Backup StorageTek ACSLS (before making any configuration changes).
4. Update the StorageTek ACSLS configuration dynamically using:

```
config acs acs_id
```

**Note:** As an alternative, you can update the StorageTek ACSLS configurations while StorageTek ACSLS is down. To do this:

- a. Bring StorageTek ACSLS down using the `kill.acsss` command.
- b. Change the configuration with `acsss_config`.
- c. Bring StorageTek ACSLS back up with `rc.acsss`.

**Note:** New LSMs are added when in an online state. Vary these LSMs to a diagnostic state until they have been audited.

5. Backup StorageTek ACSLS (after the configuration change).
6. Audit the library to update cartridge addresses (since they were renumbered).

To do this, use the following the following sequence:

- a. First, audit each LSM in the pre-existing SL8500s that were renumbered.
  - Audit the pre-existing SL8500s in a careful sequence to avoid losing cartridges.Audit each LSM (rail) in sequence from the highest numbered LSM to the lowest numbered LSM ID. The audit finds all of the cartridges in their (renumbered) LSM addresses.
- For StorageTek ACSLS, you must audit each LSM separately, and allow the audit of one LSM to finish before auditing the next LSM.

Audit checks the cartridges' former home cell addresses (in the LSM to the right), and then update the cartridges' addresses. The audits for the LSMs in the left most StorageTek SL8500 will take a long time. The audits in all of the other SL8500s will be faster.

The reason the audits of the left most LSMs take longer is that they will trigger a cascade of Cartridge Recovery requests. When audit finds a cartridge that has a different home cell address, audit checks the cell address recorded in the database. If that cell has a different cartridge, Cartridge Recovery investigates that cartridge, etc. Because all of the LSM addresses have changed, these recoveries will cascade across the StorageTek SL8500 library complex.

- Keep the LSMs in diagnostic state until they have been audited. After they have been audited, you can vary them online. Audit has updated the addresses of cartridges in this LSM, so you can resume automated mount activity with the audited LSM's cartridges.
- b. Last, audit the LSMs in the newly added StorageTek SL8500 (that have the lowest LSM IDs).

After these LSMs have been audited, they can be varied online and cartridges in them can be mounted on tape drives, as shown in the following figures.

**Figure 22. Original Configuration Before an StorageTek SL8500 is added to the Right**

StorageTek SL8500	StorageTek SL8500	StorageTek SL8500
LSM 8	LSM 4	LSM 0
LSM 9	LSM 5	LSM 1
LSM 10	LSM 6	LSM 2
LSM 11	LSM 7	LSM 3

**Figure 23. Correct Audit Order (shown in bold) and New Configuration**

First Four Audits	Second Four Audits	Third Four Audits	Last Four Audits	
Now LSM 12 <b>(Audit # 4)</b>	P T P	Now LSM 8 <b>(Audit # 8)</b>	P T P	Now LSM 4 <b>(Audit # 12)</b>
Now LSM 13 <b>(Audit # 3)</b>		Now LSM 9 <b>(Audit # 7)</b>		Now LSM 5 <b>(Audit # 11)</b>
Now LSM 14 <b>(Audit # 2)</b>		Now LSM 10 <b>(Audit # 6)</b>		Now LSM 6 <b>(Audit # 10)</b>
Now LSM 15 <b>(Audit # 1)</b>		Now LSM 11 <b>(Audit # 5)</b>		Now LSM 7 <b>(Audit # 9)</b>
			P T P	New LSM 0 <b>(Audit # 16)</b>
				New LSM 1 <b>(Audit # 15)</b>
				New LSM 2 <b>(Audit # 14)</b>
				New LSM 3 <b>(Audit # 13)</b>

7. Backup StorageTek ACSLS after the audits have completed.

## Procedures for Merging ACSs

StorageTek SL8500 PTP supports the merging of multiple, separate SL8500s into a single ACS. To minimize the loss of information about cartridges and operational downtime, you should follow these recommended procedures.

**Note:** When the StorageTek ACSLS configuration is updated, global cartridge address changes **are not** made.

For StorageTek ACSLS, two scenarios are described below. In the first, the ACSs to be merged are numbered from right to left (as you face them from the CAP side). In the second, they are numbered from left to right. It is assumed that the resulting ACS will use the lower/lowest ACS ID.

### Merging ACSs Numbered from Right to Left

In the following scenario, the ACSs to be merged are numbered from right to left (as you face them from the CAP side).

**Figure 24. Existing Configuration – Three Separate ACSs**

ACS 2	ACS 1	ACS 0
LSM 2,0	LSM 1,0 LSM 1,1 LSM 1,2 LSM 1,3	LSM 0,0
LSM 2,1		LSM 0,1
LSM 2,2		LSM 0,2
LSM 2,3		LSM 0,3

**Figure 25. Desired Configuration – Single ACS**

ACS 0				
LSM 0,8		LSM 0,4		LSM 0,0
LSM 0,9	P	LSM 0,5	P	LSM 0,1
LSM 0,10	T	LSM 0,6	T	LSM 0,2
LSM 0,11	P	LSM 0,7	P	LSM 0,3

### Procedure for Merging ACSs Numbered from Right to Left

1. Vary all ACSs, except the right most ACS being merged, offline.

This prevents mounts and dismounts while cartridge addresses are being updated.

2. Stop StorageTek ACSLS: `kill.acsss`.

3. Backup StorageTek ACSLS before making any configuration changes.
4. Update the StorageTek ACSLS configuration (while StorageTek ACSLS is down) using `acsss_config`
5. Bring up StorageTek ACSLS: `rc.acsss` .
6. Vary the new LSMs (that were added to the ACS) to a diagnostic state.  
These LSMs were added in while in online state.
7. Backup StorageTek ACSLS after the configuration change.
8. Audit the LSMs that were added to the ACS  
The order in which they are audited does not matter. The entire ACS or all LSMs can be audited at once.  
The cartridges will be re-activated.
9. Backup StorageTek ACSLS after the audits are complete.
10. Vary the new LSMs online and resume normal automated processing.

## Merging ACSs Numbered from Left to Right

In the following scenario the ACSs to be merged are numbered from left to right.

**Figure 26. Existing Configuration - Three Separate ACSs**

ACS 0	ACS 1	ACS 2
LSM 0,0	LSM 1,0 LSM 1,1 LSM 1,2 LSM 1,3	LSM 2,0
LSM 0,1		LSM 2,1
LSM 0,2		LSM 2,2
LSM 0,3		LSM 2,3

**Figure 27. Desired Configuration - Single ACS**

ACS 0				
LSM 0,8	P T P	LSM 0,4	P T P	LSM 0,0
LSM 0,9		LSM 0,5		LSM 0,1
LSM 0,10		LSM 0,6		LSM 0,2
LSM 0,11		LSM 0,7		LSM 0,3

### ***Procedure for Merging ACSs Numbered from Left to Right***

1. Vary all ACSs offline.

This prevents mounts and dismounts while cartridge addresses are being updated.

2. Stop StorageTek ACSLS: `kill.acsss`.
3. Backup StorageTek ACSLS before making any configuration changes.
4. Update the StorageTek ACSLS configuration (while StorageTek ACSLS is down) using `acsss_config`.
5. Bring up StorageTek ACSLS: `rc.acsss`.
6. Vary the new LSMs (that were added to the ACS) to a diagnostic state.  
(These LSMs were added in while in online state).
7. Backup StorageTek ACSLS after the configuration change.
8. Vary the new LSMs that were added to the left to a diagnostic state.  
You do not want to perform mounts and dismounts until you have audited these LSMs.
9. Audit the newly configured LSMs.

The order in which they are audited **does** matter. Audit in this order:

- a. **First, audit the LSMs in the StorageTek SL8500(s) that retains the same ACS number first.**
  - You want audit to find these cartridges in their new LSM addresses before you audit the LSMs that now are assigned to these cartridges' old addresses.
  - The LSM addresses will be updated for all cartridges in these StorageTek SL8500(s).
  - **For StorageTek ACSLS, you must audit each LSM separately, and allow the audit of one LSM to finish before auditing the next LSM.**
  - Keep the LSMs in diagnostic state until they have been audited.  
After they have been audited, you can vary them online. Audit has updated the cartridge's addresses, so you can resume automated mount activity with the audited LSM's cartridges.
- b. Last, audit the SL8500s that were merged into the lowest ACS. The cartridges in these SL8500s will be re-activated.
  - All of these LSMs can be audited at the same time.
  - The order in which these LSMs are audited does not matter.

10. Backup StorageTek ACSLS (after the audits are complete)
11. Vary all LSMs online and resume normal automated processing.

## Removing PTPs and Splitting ACSs

You may decide to remove the PTP mechanisms that connect two SL8500s and split a single ACS into two separate ACSs. This configuration change is the reverse of merging two ACSs into a single ACS.

It is much easier to add the new ACS with the StorageTek SL8500(s) on the left hand side of the split. This assigns the higher numbered LSMs to the new ACS and avoids renumbering the LSMs that remain in the existing ACS.

### ***Splitting ACSs, with the new ACS Created from StorageTek SL8500(s) on the Left - Possible Scenarios***

**Figure 28. Existing Configuration – One ACS**

ACS 0						
LSM 0,12		LSM 0,8		LSM 0,4		LSM 0,0
LSM 0,13	P	LSM 0,9	P	LSM 0,5	P	LSM 0,1
LSM 0,14	T	LSM 0,10	T	LSM 0,6	T	LSM 0,2
LSM 0,15	P	LSM 0,11		LSM 0,7		LSM 0,3

**Figure 29. Desired Configuration - Two ACSs**

ACS 1			ACS 0			
LSM 1,4		LSM 1,0		LSM 0,4		LSM 0,0
LSM 1,5	P	LSM 1,1		LSM 0,5	P	LSM 0,1
LSM 1,6	T	LSM 1,2		LSM 0,6	T	LSM 0,2
LSM 1,7	P	LSM 1,3		LSM 0,7		LSM 0,3

## StorageTek ACSLS Procedure for Splitting an ACS

With Dynamic Configuration, StorageTek ACSLS can add ACSs while it is running. However, Dynamic Configuration does not make global cartridge address changes.

1. Backup StorageTek ACSLS before the configuration change.
2. Vary the LSMs that will be moved to the new ACS offline.

This prevents mounts and dismounts while cartridge addresses are being updated.

The LSMs that are remaining in the existing ACS can remain online.

Mounts and dismounts in these LSMs can continue.

3. Remove the four PTP mechanisms that connect the SL8500s that you want to separate.
4. Reconfigure the existing ACS once the pass-thru ports have been removed.

This will remove the LSMs that are moving to the new ACS.

```
config acs acs_id
```

5. Add the new ACS.

```
config acs acs_id new
```

Alternatively, you can update the StorageTek ACSLS configurations when StorageTek ACSLS is down:

```
acsss_config
```

New LSMs are added in an online state.

6. Vary these LSMs in a diagnostic state until they have been audited.
7. Vary the new ACS to diagnostic state.
8. Backup StorageTek ACSLS after the configuration change.
9. Audit the LSMs in the new ACS.

You do not want to perform mounts and dismounts until you have audited these LSMs.

The order in which they are audited does not matter. They can all be audited at once.

The cartridges will be re-activated.

10. Backup StorageTek ACSLS after the audits are complete.
11. Vary the new LSMs online and resume normal automated processing.

LSMs can be varied online as soon as the audit of that LSM completes.

### ***Adding the New ACS on the Right Hand side of the Split***

If the new ACS is added on the right hand of the split, all cartridge addresses will be re-mapped.

As this is not recommended, a detailed procedure is not provided.

However, some considerations are:

- When the LSMs in the right hand StorageTek SL8500(s) are removed from the existing ACS, the cartridges in these LSMs will be marked absent (if

absent cartridge retention is active). They will be reactivated when the new ACS is audited.

- The LSMs in pre-existing ACS must be audited one LSM at a time to update the addresses of the cartridges in these LSMs. Audit the highest numbered LSM first, followed by the next lower LSM. The audit of one LSM must finish before the next audit is started.



# StorageTek ACSLS Support of the StorageTek SL3000

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The StorageTek SL3000 offers the following benefits:

- Storage capacity from 200 to 4500 storage cells.
- Performance from 1 to 56 tape drives.
- Support of mixed media and a variety of tape drive.
- Ability to partition an StorageTek SL3000 at the storage cell and drive level.
- An option (with StorageTek ACSLS 7.3.1 PUT0801 or later) to install an Access Expansion Module (AEM). This option is discussed under ["Using the AEM" on page 368](#).

## **WARNING:**

You must audit an StorageTek SL3000 after it is configured or re-configured to StorageTek ACSLS. You must also audit an StorageTek SL3000 after increasing or changing the activated capacity of the library.

The library reports the potential cell locations that are not accessible to StorageTek ACSLS when StorageTek ACSLS audits it. Inaccessible cell locations include:

- locations where CAPs, drives, and operator panels are installed.
- cell locations that the robots cannot access.
- cell locations that are not activated.
- cell locations that are not in this partition.

## ■ StorageTek ACSLS Support

StorageTek ACSLS provides support for the following StorageTek SL3000 features:

- New LSM and panel types and panel maps for the StorageTek SL3000 Library
- Up to eight (8) partitions.

The StorageTek SL3000 can partition down to the drive and cell level. If cells are reassigned from one partition to a different partition, cartridges in those cells will be orphaned, and they will no longer be accessible by the

partition that they were in before. To avoid this, before re-partitioning an StorageTek SL3000, move cartridges to cells that will remain in your partition.

- New maximum numbers of CAPs (12), drives per panel (32), and cell rows (52) for the StorageTek SL3000.
- Ability to dedicate a CAP to a partition within the StorageTek SL3000.

CAPS are dedicated to a partition using the SLConsole. The library reports dedicated CAPs to StorageTek ACSLS.

CAPs **dedicated** to a partition managed by StorageTek ACSLS can be set to automatic mode.

- StorageTek SL3000 CAP Aliasing

The StorageTek SL3000 can have up to 12 CAPs, but some backup applications currently only support a maximum of 3 CAPs per LSM. CAP aliasing lets you alias CAPs 3-10 as CAPs 0, 1, or 2.

With PUT0801, you are no longer able to alias CAP 0. CAP 0 is reserved for the Access Expansion Module (AEM) and has special characteristics. Because of this, only CAP numbers 1 and 2 can be used as aliases.

- StorageTek ACSLS 7.3.1 with PUT0801 supports AEMs for bulk enters and ejects.

## ■ Before Configuring StorageTek ACSLS for the StorageTek SL3000

Before you configure StorageTek ACSLS for the StorageTek SL3000:

- Connect the StorageTek SL3000 to StorageTek ACSLS
- Verify that all the components of the StorageTek SL3000 are operational.

StorageTek ACSLS builds its library configuration from the information reported by the library. If StorageTek SL3000 components are not operational, the library information may not be reported to StorageTek ACSLS, and the StorageTek ACSLS configuration of the StorageTek SL3000 could be incomplete.

## Connecting the StorageTek SL3000 to StorageTek ACSLS

The StorageTek SL3000 library uses TCP/IP protocol over an Ethernet physical interface to manage and communicate with the host and StorageTek ACSLS. This interface enables StorageTek ACSLS to connect to and communicate with the StorageTek SL3000.

It is preferable to have the StorageTek SL3000 library on a separate subnet or a controlled network to protect it from floods of ARP broadcasts.

## Verifying that all StorageTek SL3000 Components are Operational

To verify that all the components of the StorageTek SL3000 are operational, logon to the StorageTek Library Console™ (SLConsole).

Refer to the *StorageTek SL3000 User's Guide* for procedures.

## Configuring StorageTek SL3000 to StorageTek ACSLS

Once the StorageTek SL3000 components are operational, configure StorageTek SL3000 to StorageTek ACSLS. You can use either `acsss_config` (see “[Configuring or Updating your Library Hardware](#)” on [page 38](#)) or Dynamic Configuration (see “[Dynamic Configuration \(config utilities\)](#)” on [page 131](#)).

## Auditing the StorageTek SL3000

You must audit an StorageTek SL3000 after it is configured or re-configured to StorageTek ACSLS. Auditing informs StorageTek ACSLS which cells are part of the partition that it is managing in this library, as well as, displaying the cells that are actually present on panel drives or CAPs. To do this:

- First configure or re-configure an StorageTek SL3000 to StorageTek ACSLS.
- Audit the ACS.
- Look at the allocated and free cells by entering any of the following:
  - `free_cells.sh -a`
  - `get_license_info`
  - `display cell * -f status`
- Look at the drives using either:
  - `query drive all`
  - `display drive * -f type serial_num wwn`

## ■ StorageTek SL3000 Addressing

An StorageTek SL3000 can be expanded without changing any of the StorageTek ACSLS addresses for drives and storage cells. Since StorageTek ACSLS addresses map the largest possible StorageTek SL3000 library, you can add modules without changing the addresses of existing cells, drives, and CAPs.

If modules are not installed, the panels on them are simply mapped as “not installed”. If panels are installed, the addresses on these panels become available. In this way, when you install a new module, addresses of the panels on existing modules do not change.

	Center						Line					
Panel Numbers Rear Wall	0	2	4	6	8	10	12	14	16	18	20	22
Module	AEM	CEM	CEM	CEM	CEM	DEM	Base	CEM	CEM	CEM	CEM	AEM
<- TallBot Area of Travel ->												
Front Wall Panel Numbers	1	3	5	7	9	11	13	15	17	19	21	23

The smallest StorageTek SL3000 configuration is a single Base Drive Module (BDM). In a single BDM configuration panels 12 and 13 are installed and all other potential panel locations are not installed. When you add a Drive Expansion Module (DEM), panels 10 and 11 are also installed. If you add a Cartridge Expansion Module (CEM), to the right of the BDM, panels 14 and 15 are now installed. The addresses of the cells and drives on the BDM never change. This ensures that as you increase your StorageTek SL3000 capacity, the StorageTek ACSLS addresses for drives and storage cells do not change.

## CAP Numbering

CAPs are numbered as follows:

- CAP 0 is reserved for the AEM on the left
- CAPs 1-5 - in the CEMs on the left and the DEM
- CAP 6 - in the Base (the only required CAP)
- CAPs 7-10 - in the CEMs on the right
- CAP 11 is reserved for the AEM on the right

If CAPs are not present, StorageTek ACSLS reports them as “not installed”. This keeps CAP locations from changing in StorageTek SL3000 when new CAPs are added.

CAPs can be dedicated to a partition

## StorageTek SL3000 Modules

There are five types of modules in an StorageTek SL3000 library:

- Base module, one, *required*

The Base Module consists of a single frame. This module centralizes the infrastructure for all other modules in the library, which includes the power

configurations, robotics (TallBot), electronic modules, cartridge access port, storage cells, tape drives, and operator controls.

One Base Module, and only one, is required for every library installation.

On the front of this module is:

- A single, 26 cartridge-dual magazine-cartridge access port (CAP).
- A service door for library access.
- A front panel with three LEDs: Library Active, Service Required, and Wait.
- An optional feature for a touch screen operator panel or window.
- Drive expansion module (DEM) one, *on the left side only*

A Drive Expansion Module (DEM) may be attached adjacent to the Base Module on the left side only. This module allows further expansion of tape drives and provides additional data cartridge capacity.

- Cartridge expansion module (CEM) *left or right side*

The Cartridge Expansion Module (CEM) provides additional cartridge cell capacity and growth—no tape drives are in this module. A maximum of four CEMs are supported on a single library in addition to the Base Module (required) and optional drive expansion module.

- Parking expansion module (PEM) *leftmost and the rightmost side* modules.

The Parking Expansion Module (PEM) is the same as the cartridge expansion module with six columns of arrays (three on the front wall and three on the rear wall) that are inaccessible to allow the library to park a defective robot. In the left PEM, it is the three leftmost columns (front and back). In the right PEM, it is the three rightmost columns.

**Note: An StorageTek SL3000 with dual robots has either AEMs or PEMs**

- Access Expansion Module (AEM)

AEM is discussed under [“Using the AEM” on page 368](#).

## New Panel Types

Instead of having specific panel definitions in the StorageTek SL3000 that define each possible cell location, there are generic panel definitions.

The three generic panel types map to a variety of specific panel maps. They are:

- A single StorageTek SL3000 cell panel type.

To find out which cells are present in this library, as well as which are part of the activated capacity and are assigned to this partition, you must audit the library.

- A drive panel type.

StorageTek ACSLS identifies which drives are present by configuring the library. Before you do this, you must make sure all drives are powered-on and ready before configuring the library.

- Not installed

This is a placeholder for the front and rear panels on modules that are not yet installed.

## Understanding Internal StorageTek SL3000 Addressing

There are differences in the internal addresses of the StorageTek SL3000 and other libraries supported by StorageTek ACSLS and HSC.

- The StorageTek SL3000 is *one's-based* (1) and uses negative numbers.
- Other libraries use a *zero-based* (0) with *no* negative numbers.
- The StorageTek SL3000 uses *five* parameters: library, rail, column, side, and row.
- Other libraries use: ACS, LSM, panel, row, and column (HLI-PRC).

The modules of the library consists of walls, columns, and rows that house cartridges, tape drives, cartridge access ports, and robotic units.

You can use the StorageTek Library Console™ (SLConsole) to translate between the StorageTek SL3000 internal address and the StorageTek ACSLS panel, row, and column.

Refer to the *StorageTek SL3000 User's Guide* for detailed information and procedures.

## ■ Using the AEM

The AEM (access expansion module) is essentially a very large CAP that has all the characteristics of a CAP, such as online/offline states and the ability to be shared by partitions.

The AEM lets you to perform bulk loads or unloads of up to 234 cartridges at a time to or from the library the library. It also allows for the non-disruptive maintenance of a library TallBot.

AEMs share many of the features and functions as rotational CAPs, but they also have some unique characteristics. They are:

- Access Door
- Safety Door
- CAP Operations

- Non-Disruptive Maintenance

For detailed information on the AEM, refer to the “*StorageTek StorageTek SL3000 Modular Library System User’s Guide*”, part number 316194401.

## Access Door

The AEM access door is the external door you open to bulk load or unload cartridges to or from the library.

## Safety Door

The safety door is the internal “garage door”, which lowers to separate the AEM from the rest of the library. This door allows for safe access to the inside of the AEM, either for the library operator to load or unload cartridges, or for a StorageTek CSE to perform service on the Talbot or other AEM components.

## CAP Operations

The advantages of the AEM is that it allows you to perform:

- Bulk enters
- Bulk ejects
- Non-disruptive robot maintenance

**WARNING:** When performing a bulk eject using the AEM, ensure all CAP magazines are present. The eject fails if there are missing CAP magazines at locations where ACSLS is attempting to eject cartridges.

**Note:** The AEM should NOT be used for entering or ejecting small numbers of cartridges. It should only be used for bulk enters and ejects.

Using the AEM for small enters and eject is much slower since the service safety door must be lowered when the AEM is accessed to enter or remove volumes and raised when access to the AEM is completed.

For smaller numbers, use CAPs 1-10. See “[CAP Numbering](#)” on [page 366](#).

Since the AEM should not be used for small enters and ejects, the maximum CAP priority is 1. This aids in preventing the AEM from being selected when the CAP ID is wild-carded with an asterisk on an audit, enter, or eject.

## Bulk Enters

Bulk enters lets you enter up to 234 cartridges at a single time.

To do this, start a normal enter specifying the AEM `cap_id`. This can either be a manual enter or you can set the AEM to automatic enter mode.

**Note:** In a partitioned library, you can only set a CAP to automatic enter mode if the CAP is dedicated to your partition. Dedicating an AEM to only your partition makes it unavailable to other partitions. Consider other StorageTek SL3000 users before doing this.

## Bulk ejects

You can eject up to 42 cartridges at a time when you use the `vol_id` command. When specifying volume ranges using the `cmd_proc` or the ACSAPI `xeject` command, you can eject up to 42 volume ranges in a single eject. By specifying volume ranges you can eject many cartridges at a time

## Non-Disruptive Maintenance

The AEM allows a StorageTek CSE access and service a library TallBot, through the use of a safety door (or “garage” door), without having to take the library offline. If the TallBot is defective, it parks itself in the AEM while the library remains online. If redundant TallBots are installed, the library can continue normal operations through the remaining functional TallBot.

The StorageTek CSE uses a special key to unlock the Service Access lock on the safety door. This causes the AEM safety door to lower, sectioning off the AEM from the rest of the library. Once the safety door is fully down, the StorageTek CSE opens the AEM safety door and safely performs maintenance on the defective TallBot or other AEM components, while the library remains online. The AEM itself is taken offline during the maintenance period, causing cartridge load/unload functions to be suspended.

When maintenance is complete the StorageTek CSE: closes the safety door; the safety door raises; the TallBot is re-initialized and performs an audit to the AEM CAP cartridge slots; and the AEM is brought back online.

## ■ Aliasing StorageTek SL3000 CAP IDs

The StorageTek SL3000 has 12 CAPs, but some backup applications currently only support a maximum of 3 CAPs per LSM. CAP aliasing lets you alias CAPs 3-10 as CAPs 1 or 2.

Cap 0 is reserved for the Access Expansion Module (AEM) bulk load CAP. Since CAP 0 in an StorageTek SL3000 has special attributes, it cannot be an alias CAP ID.

Map the Library CAP IDs to alias CAP IDs by using the following template.

```
$ACS_HOME/data/external/StorageTek SL3000/  
SL3000_CAP_Aliases.SAMPLE
```

**Note:** When Setting CAP IDs:

For Library CAP IDs:

- LSM must be zero (0)
- CAP ID must be 3-10
- There can be no duplicate library CAP IDs

For Alias CAP IDs

- CAP number must be 1 or 2
- There can be no duplicate alias CAP IDs

```
# StorageTek SL3000 CAP Aliases (SL3000_CAP_Aliases)
#
# This file maps real library StorageTek SL3000 CAP IDs to CAP ID aliases.
# It is used when ACSAPI clients do not support StorageTek SL3000
# CAP numbers greater than 2.
# (The StorageTek SL3000 can have 12 CAPs, with a maximum CAP number of
# 11.)
#
# Alias a StorageTek SL3000 CAP to an alias CAP number by providing the
# full
# StorageTek SL3000 CAP ID and the aliased CAP number on the same line.
# For example:
# StorageTek SL3000 CAP ID      Alias CAP Number
#          0,0,6                  1
#
# Rules for StorageTek SL3000 CAP IDs:
#     The LSM must be zero.
#     The CAP ID must be between 3 and 10
#     No duplicate StorageTek SL3000 CAP IDs.
#
# Rules for Alias CAP numbers:
#     The CAP number must be 1 or 2.
#     No duplicate alias CAP numbers.
#
# Using the CAP Aliases file:
# (1) A # in the first column comments out a line.
#     The above CAP alias example is commented out.
# (2) Only specify CAP numbers as an alias when there
#     is no actual CAP at that location. For example,
#     use CAP 2 as an alias when there is no CAP 2
#     installed in the StorageTek SL3000 library.
# (3) Only CAP numbers 1 and 2 can be used as aliases.
#     NOTE: CAP number 0 (zero) is reserved for the
#     Access Expansion Module (AEM) and thus cannot
#     be specified as an alias.
# (4) After updating the CAP Aliases file, you must:
#     a) Shutdown StorageTek ACSLS.
#     b) Reconfigure StorageTek ACSLS (using acsss_config) to update
#         the CAPs defined in the StorageTek ACSLS database.
#     c) Restart StorageTek ACSLS.
#
# Save the CAP alias file as:
#   $ACS_HOME/data/external/StorageTek SL3000/SL3000_CAP_Aliases
```

```

# by copying and modifying the template:
#   $ACS_HOME/data/external/StorageTek SL3000/SL3000_CAP_Aliases.SAMPLE
#
#   StorageTek SL3000 CAP ID      Alias CAP Number
#   0,0,6                      1
#   0,0,4                      2

```

This figure shows an example of a modified SL3000\_CAP\_Aliases file. The comment (#) character has been removed from the lines shown in bold to specify that alias CAP number assignments are enabled. In this example, the:

- physical CAP ID 0,0,4 is aliased to CAP number 1.
- physical CAP ID 0,0,6 is aliased CAP number 2.

## ■ Moving Cartridges

The StorageTek SL3000 can partition down to the drive and cell level.

**WARNING:** If cells are reassigned from one partition to another, the cartridges in those cells will be orphaned, and will no longer be accessible by the partition that they were in before. The host managing the other partition could write over the data on the cartridges.

To prevent cartridges from being orphaned when partition boundaries change: before re-partitioning the library move them to cells that will remain in the partition. Since StorageTek SL3000 is a single LSM, the existing StorageTek ACSLS move command does not work, since you would just move them somewhere else in the library. You might also move them to another cell that will also be removed from the partition.

Use one of the following methods to move your cartridges:

- Use the StorageTek Library Console™ (SLConsole).  
You must audit the library to audit your volume's locations.  
Refer to the *StorageTek SL3000 User's Guide* for detailed information and procedures.
- Use the following StorageTek ACSLS procedure:
  1. Use “[volrp](#)” on page 169 or “[display volume](#)” on page 304 to display volume locations.
  2. Display a list of available (empty) cells in a specific panel using the display command:  

```
display cell a,1,p,*,* -status empty -f status
```

For more information, refer to “[display cell](#)” on page 289.

3. Move the cartridges to a specific cell by specifying a free cell instead of an LSM ID. For a cell move, use the move command:

```
move AAAAAA a,1,p,r,c
```

## ■ StorageTek SL3000 CAP Behavior

The StorageTek SL3000 supports up to 12 Cartridge Access Ports (CAPs). There can be a CAP on each StorageTek SL3000 panel.

For CAP behavior in a partitioned library, refer to “[CAP Behavior](#)” on [page 393](#).

**WARNING:** All ACSs must have at least one CAP. This can be **dedicated** or is shared. Because all of the CAPs in an StorageTek SL3000 can be dedicated to other partitions, this is a crucial restriction when configuring StorageTek SL3000 partitions.

## ■ Finding Missing StorageTek SL3000 Cartridges

If a cartridge is out of place or unaccounted for by StorageTek ACSLS:

1. Perform a physical audit of the StorageTek SL3000 using the SLConsole.

The physical audit of the StorageTek SL3000 is performed as a background task in between handling mount and other library operation requests.

**Warning:** If the StorageTek SL3000 contents are out of sync with StorageTek ACSLS due to manual operations such as loading cartridges directly, it is not advisable to attempt continued operations.

2. Run an StorageTek ACSLS audit to update the StorageTek ACSLS database to match the actual inventory of library cartridges.

## ■ Varying the StorageTek SL3000 Offline

You should vary StorageTek SL3000 components offline to StorageTek ACSLS before they are powered off, if they are inoperative, and before you open an StorageTek SL3000 access door. This notifies StorageTek ACSLS that they are unavailable. Once they are available, vary them back online.

### Use StorageTek ACSLS to vary StorageTek SL3000 components offline, not SLConsole

You should vary StorageTek SL3000 components (ACSs, LSMs, and CAPs) offline to StorageTek ACSLS, not the SLConsole.

StorageTek ACSLS allows outstanding requests to complete before taking components offline, unless it is a vary offline force. The SLConsole has no knowledge of outstanding requests to StorageTek ACSLS.

Varying components offline using SLConsole may cause requests in progress to fail.

## When to vary StorageTek SL3000 components offline to StorageTek ACSLS

### *Before opening the access door*

Before opening the StorageTek SL3000 access door vary the ACS offline.

```
vary acs acs_id offline
```

**Note:** If any CAPs in the StorageTek SL3000 are in automatic mode, you must:

1. Set them to manual mode before opening the access door.
2. Set them back to automatic mode after you close the access door and the StorageTek SL3000 comes back online.

### *If a CAP is inoperative*

If a CAP is inoperative, vary it offline:

```
vary cap cap_id offline
```

## ■ Using the Dynamic Configuration (config) utility

The dynamic configuration (config) utility allows you to implement configuration changes to StorageTek ACSLS libraries (and components) while StorageTek ACSLS remains online and running. These configuration changes are recorded in the `acsss_config.log` file.

The following dynamic configuration utilities are supported:

- config acs
- config drives
- config lsm
- config ports

Using the config utility provides the following benefits:

- StorageTek ACSLS can continue running, allowing you to perform mount requests to unaffected library components.

- Allows you to reconfigure specified library components while all other configuration information remains unchanged. For example, when specifying:
  - An ACS, the configurations of other ACSs are not affected.
  - An LSM, the configurations of other LSMs are not affected.
  - A drive panel (the drives on a panel) mounts and dismounts to all existing drives are not affected.

## ■ Auditing New Cartridge Addresses

After an expansion has occurred.

1. Vary the ACS and ports offline.
2. Do one of the following.
  - Add or remove a module(s)
  - Change capacity
  - Re-partition the library
3. Vary the ACS and ports online.
4. Update the configuration in the StorageTek ACSLS database using one of the following procedures.
  - Dynamic:
    - a. `config acs acs_id`  
or  
`config lsm lsm_id`
    - b. Audit the library.
  - Static:
    - a. Bring down StorageTek ACSLS: `kill.acsss`
    - b. Update the StorageTek ACSLS configuration: `acsss_config`
    - c. Bring up StorageTek ACSLS: `rc.acsss`
    - d. Audit the library

## ■ StorageTek ACSLS Dual TCP/IP

Dual TCP/IP connections between the StorageTek ACSLS server and the library is an option that can be purchased for the StorageTek SL3000.

### StorageTek SL3000 Requirements

- Please coordinate with both your system administrator and network administrator to understand your current network environment and to identify all necessary IP addresses in advance.
- Please coordinate with your system administrator to either configure your network interface or to validate that it is configured properly.
- Verify you have StorageTek ACSLS 7.3.1 for Solaris 10 Update 6 or 7 for Solaris/SPARC and Solaris/x86

Refer to [“Dual TCP/IP Support ” on page 318](#) for more information on this feature and the *StreamLine Modular Library System Dual TCP/IP Feature* document.

**Note:** the procedure for implementing Dual TCP/IP connections is the same for both StorageTek SL8500 and StorageTek SL3000 libraries.

# StorageTek ACSLS Support of the StorageTek SL500

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The StorageTek SL500 library is a SCSI-attached, single-LSM library. It requires either a fibre channel or a LVD SCSI connection to the StorageTek ACSLS server for control path operations. This chapter discusses StorageTek ACSLS support for the StorageTek SL500 library.

## ■ StorageTek ACSLS Connectivity

The StorageTek ACSLS server needs a Host-Bus Adapter (HBA) that is compatible with the interface card in the StorageTek SL500 library (either LVD SCSI or Fibre). Refer to the StorageTek ACSLS Product Information Guide for available feature codes and part numbers for library connections.

When you run `$ACS_HOME/install/install_scsi_sol.sh`, the system is probed for the existence of new hardware: either a JNI card or an LSILogic card. If either of these HBA cards is present on the system, but the corresponding driver is not in place, the routine displays a prompt that asks you for permission to locate the appropriate driver package and install it.

## ■ StorageTek ACSLS and StorageTek SL500 Library Differences

### Library Configuration

- ACS, LSM - StorageTek SL500 library is an ACS with a single LSM (1 ACS and 1 LSM)
- StorageTek SL500 does not currently support the pass-thru-port
- StorageTek SL500 has at least 1 base module, and can have up to 4 expansion modules.
- StorageTek ACSLS considers each StorageTek SL500 module as a panel.
- StorageTek SL500 libraries managed by StorageTek ACSLS reports 6-character volser labels through ACSL interface

## Identifying Library Locations

### Addressing schemes

StorageTek ACSLS addressing is ACS, LSM, panel, row, column

- StorageTek SL500 addressing is LSM within the library, module, row, column
- StorageTek ACSLS addresses are zero-based. They start with panel 0, row 0, and column 0.
- StorageTek SL500 libraries are one-based. They start with module 1, row 1, and column 1.
- In order to ensure consistency between the StorageTek SL500 library and StorageTek ACSLS internal addresses, StorageTek ACSLS defines placeholders for panel 0, row 0, and column 0.

### Panels

- Panel 0 = not installed
- Panel 1 = base module
- Panels 2-5 = expansion modules

### Row numbers

- Within each module (panel), rows are numbered 1-12
- Rows are numbered consecutively from the top down
- Numbering is identical between the StorageTek SL500 and StorageTek ACSLS

### Column numbers

- Numbered from 1 to 11 (maximum)
- The current StorageTek SL500 configuration is limited to 9 columns
- Columns 1-4 are on the left side from front to back
- Columns 5-8 on are the right side from back to front
- Column 9 is the back wall where the drives are located
- Numbering is identical between the StorageTek SL500 and StorageTek ACSLS

### Drive addresses

StorageTek SL500 addressing is - LSM, module, row, column

- Row is equal to the drive number or slot number
- Drive number is 1-2 on the base module and 1-4 on the expansion modules
- Column number is always 9 for drives
- StorageTek ACSLS addressing is ACS, LSM, panel, drive
  - Drive number is equal to a row or slot

**Figure 30. Example of drive addressing**

	StorageTek ACSLS Drive Identifier	StorageTek SL500 Drive Address
Base module	0, 0, 1, 1	0, 1, 1, 9
	0, 0, 1, 2	0, 1, 2, 9
Drive expansion module	0, 0, 2, 1	0, 2, 1, 9
	0, 0, 2, 2	0, 2, 2, 9
Next expansion module	0, 0, 2, 3	0, 2, 3, 9
	0, 0, 2, 4	0, 2, 4, 9
etc.	0, 0, 3, 1	0, 3, 1, 9
	etc.	etc.

## ■ StorageTek ACSLS Limitations

- Maximum number of StorageTek SL500 libraries = 31
- Maximum number of LSMS = 127
- Maximum number of panels in a StorageTek SL500 library = 5
  - Expansion modules add 1 panel each
- An StorageTek SL500 with the base module only has just 1 panel
  - The “move” command cannot be used
- The StorageTek SL500 firmware does not support unlabeled cartridges. This means that the “venter” command cannot be used

## ■ Configuring StorageTek SL500 Library Settings

The StorageTek SL500 supports new configuration settings that affect StorageTek ACSLS. They are:

- CAP as storage – CAP cells
  - Only allowed in expansion modules

- Base module CAP is always used as a CAP
- Configured on a per-module basis
- Any CAP used as storage cannot be used in enter/eject operations
- Reserved cells are for library use only (diagnostic, cleaning cartridges)
- Only affects base module
- Number (n) can be configured from 0 to 9 (max row in base module)
- The first (n) cells in column 1 will be reserved
- These cells are considered inaccessible to StorageTek ACSLS

## ■ StorageTek SL500 CAP Behavior

The CAP in the base module has one five-slot magazine. When a drive expansion module is added, the CAP in the drive expansion module has two five-slot magazines. In the case of expansion modules, the CAP can be configured for 10 additional storage slots per expansion module. In addition:

- CAP cells, other than those on a base module, can either be configured as CAP cells or as storage cells.
- The base module CAP is always used as a CAP.
- The StorageTek SL500 must have one active CAP for entering and ejecting cartridges.
- If there are multiple CAPs, the StorageTek SL500 library always reports to StorageTek ACSLS that it has one CAP.
- The doors to all of the CAP sections lock and unlock as one unless the CAP has been configured as a storage cell.

If a module has been configured to use CAP cells as storage cells, the CAP section is not affected by library operations that access the CAP.

- When StorageTek ACSLS audits the CAP, it examines all cells.

## ■ Auditing the Library

You must always perform an audit if:

- This is a new library
- One or more modules have been added, removed, or swapped.
- Cartridges have been manually added or removed through the door
- After library configuration settings have changed

**Note:** A self-audit of the library occurs when you:

- Power-on or re-initialize the library
- Open and close the door

After the self-audit is complete you need to update your database using StorageTek ACSLS.

## When this is a new library

A new library must be audited to synchronize the actual contents of the library with the database.

## After adding, removing, or swapping modules

After a StorageTek SL500 module has been added, removed, swapped, or if you are auditing the library for the first time, perform the following steps:

1. Vary the StorageTek SL500 library offline to StorageTek ACSLS and power down the library.
2. Perform the library change, such as adding a module.
3. Power on or re-initialize the StorageTek SL500 library.
4. Terminate StorageTek ACSLS (if it is running).

kill.acsss

5. Run acsss\_config.
6. Start up StorageTek ACSLS.

rc.acsss

7. Perform an audit of the StorageTek SL500 panel(s) affected.

## After manually adding or removing cartridges through the door

If you have manually added or removed cartridges from the LSM through the library door you must synchronize the databases. To do this, perform an audit as described under [“audit” on page 182](#).

**Note:** After entering or ejecting cartridges through the CAP

If you have entered or ejected cartridges from the LSM through the CAP using the StorageTek ACSLS cmd\_proc, the database is automatically updated.

## After changing library configuration settings

If you have changed library configuration settings you should reconfigure StorageTek ACSLS using `acsss_config` and then audit the library. You should also reconfigure and audit the library after changing the following library settings:

- Number of reserved cells
- CAPS as storage cells

To do this:

1. Vary the StorageTek SL500 library offline to StorageTek ACSLS and power down the library.
2. Perform the library change.
3. Re-initialize the StorageTek SL500 library.
4. Terminate StorageTek ACSLS (if it is running).

`kill.acsss`

5. Run `acsss_config`.
6. Start up StorageTek ACSLS.

`rc.acsss`

7. Perform an audit of the StorageTek SL500 panel(s) affected.

# StorageTek ACSLS Support of the Virtual Tape Library

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StorageTek ACSLS supports a new LSM type (StorageTek VTL), which identifies generic virtual libraries as implemented in the FalconStor-based VTL product line. A VTL library can be configured, managed and operated just like any other single-LSM, SCSI-attached library.

StorageTek ACSLS represents a VTL configuration using the PRC-style identifiers (panel, row, column) to which you are familiar. You use these PRC-style identifiers when issuing StorageTek ACSLS or ACSAPI requests against a VTL library. These include cell identifiers (*acs, lsm, panel, row, column*), drive identifiers (*acs, lsm, panel, transport*) and CAP identifiers (*acs, lsm, cap*).

## ■ Supported Configurations

The StorageTek VTL configuration is recorded in the `acsss_config.log` file when a library is configured to StorageTek ACSLS. This file is generally used only for diagnostic purposes. Panel descriptions are also displayed during dynamic configuration (using the `config` utility).

The following table describes the VTL configurations supported by StorageTek ACSLS.

Number of Storage Cells	Starting Element Address	Number of Drives	Starting Element Address	Number of Import/Export Elements	Starting Element Address
1-10,000	1000	1-100	500	1-20	10

The following describes library components support:

- Panels

Each supported configuration is presented as a set of panels where:

- Panel 0 - contains a CAP only
- Panel 1-10 - contains storage cells and drives
- Panel 11-50- contains storage cells

- CAPs

A single CAP is supported. It is identified as CAP 0 and can contain up to 20 CAP cells. The CAP is defined on panel 0 of a StorageTekVTL.

- Storage Cells

Storage cells are organized into panels containing 200 cells per panel. The largest configuration contains 50 200-cell storage panels for a total of 10,000 cells.

Storage cells are defined on panels 1-50 of a StorageTek VTL.

- Drives

Drives are organized into panels containing up to 10 drives per panel. The largest drive configuration contains 10 drive panels for a total of 100 drives.

Drives are defined on panels 1-10 of a StorageTek VTL.

- PTPs

Pass-through ports are not supported.

## ■ VTL Behavior

The following behaviors apply specifically to the VTL:

- Enter Operations

Enter operations in StorageTek ACSLS are not useful for adding tape volumes to a StorageTek VTL library. In order to discover new volumes in a VTL library, an audit should be performed against that library. This includes discovery of volumes that may have been imported from the VTL virtual vault.

Enter operations are not explicitly rejected for StorageTek VTL. If you do initiate an enter operation, it can simply be cancelled.

- Eject Operations

Eject operations in StorageTek ACSLS are supported. Any ejected volumes are viewed by the VTL product as now residing in the virtual vault, but this is a VTL feature only - StorageTek ACSLS is not aware of the virtual vault.

- Mount and Dismount Operations

StorageTek ACSLS mount options (read-only, bypass) and dismount options (force) are accepted but ignored by the StorageTek VTL library. In addition, a normal dismount (without the force option) appears to function as if the force option had been specified.

**CAUTION:** Be careful when performing dismount operations, as they may dismount a virtual tape volume while data path operations are in progress.

- Virtual Tape Drives

After adding or removing virtual drives in a VTL, you can use the config drives utility to re-examine the drive configuration in StorageTek ACSLS. When removing virtual tape drives from the VTL, you will need to delete the drives, not just un-assign them, using the VTL Console. Assignment or un-assignment of virtual drives affects the data path and does not affect StorageTek ACSLS.

## ■ Configuring the VTL to StorageTek ACSLS

This section describes the prerequisites and installation procedures when configuring the VTL to StorageTek ACSLS.

### Prerequisites

Before configuring the VTL to StorageTek ACSLS you must meet the following prerequisites:

- StorageTek ACSLS has been installed and includes a fibre channel HBA
- VTL system has been installed
- There is fibre channel connectivity between the systems (an StorageTek ACSLS initiator port must be connected to a VTL target port)

### Installation

To configure the VTL to StorageTek ACSLS, perform the following steps:

1. Create a virtual library (StorageTek-VTL) using the VTL console.

Notes:

- When creating a virtual tape library for use by StorageTek ACSLS, the tape identifiers for that library should match the traditional 6-character volume label format supported in StorageTek ACSLS.
- The VTL Console allows you to create a VTL library which exceeds the limits that are supported by StorageTek ACSLS (10,000 slots, 100 drives). But if you try to configure an unsupported configuration to StorageTek ACSLS, the configuration request will fail.
- When creating a new VTL library, the VTL Console gives a warning if you set the slot count higher than 678. This warning limit is based on the L700 capacity, and can be ignored for VTL library model.

For procedures, refer to the *StorageTek Virtual Tape VTL Plus 2.0 (Update 2) Library Software Configuration Guide*.

2. Assign the VTL library to StorageTek ACSLS.

For procedures, refer to the *StorageTek Virtual Tape VTL (Plus 2.0 Update 2) Library Software Configuration Guide*.

3. Create a SCSI mchanger device driver.

StorageTek ACSLS is able to automatically discover VTL libraries and to create the corresponding /dev/mchanger entries. This discovery takes place when running the `install_scsi_sol.sh` scripts during installation.

You can also refer to “[Adding the SCSI mchanger Device Driver](#)” on [page 14](#).

4. Configure VTL to StorageTek ACSLS.

Once the VTL components are operational, configure VTL to StorageTek ACSLS. You can use either `acsss_config` (see “[Configuring or Updating your Library Hardware](#)” on [page 38](#)) or `config_acs new` (see “[Adding a new ACS](#)” on [page 134](#)).

5. Audit the VTL library.

After configuring a VTL library to StorageTek ACSLS, an audit must be performed in order to discover the virtual tape volumes and to identify any inaccessible cells (a panel may only be partially accessible).

6. Use the `display lsm * -f type serial_num` command to view the VTL configuration.

# Library Partitioning



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The StorageTek SL8500 and StorageTek SL3000 support partitioning of their libraries.

One StorageTek ACSLS server can manage multiple partitions in the same library.

- StorageTek SL8500 Modular Library Console

The StorageTek SL8500 can support up to four physical partitions.

For more information on partitioning, refer to the *StorageTek SL8500 Best Practices Guide*.

Partitioning the StorageTek SL8500 library provides the following capabilities:

- StorageTek ACSLS can manage open systems drives and cartridges, and HSC can manage mainframe drives and cartridges sharing the library.
- More than one instance of StorageTek ACSLS can access the library.

One instance of StorageTek ACSLS can manage multiple partitions in the same library.

- Provides protection and isolation of data cartridges in separate partitions.
- A higher level of data organization.
- An increase in user efficiency.

- StorageTek SL3000 Modular Library Console

The StorageTek SL3000 can support up to eight physical partitions.

For more information, refer to the *StorageTek SL3000 User's Guide*.

The StorageTek SL3000 can partition down to the drive and cell level.

**WARNING: You must audit an StorageTek SL3000 after it is configured or re-configured to StorageTek ACSLS.** The library reports the potential cell locations that are not accessible to StorageTek ACSLS when StorageTek ACSLS audits it. Inaccessible cell locations include:

- locations where CAPs, drives, and operator panels are installed.

- cell locations that the robots cannot access.

- cell locations that are not activated.

- cell locations that are not in this partition.

**WARNING:** If cells are reassigned from one partition to another, the cartridges in those cells will be orphaned, and will no longer be accessible by the partition that they were in before. The host managing the other partition could write over the data on the cartridges.

## ■ Guidelines for Partitioning

There are several steps that you need to follow when you are partitioning a library. They are:

1. Plan your new configuration.
2. Schedule an outage to partition or re-partition a library.

When a library is re-partitioned, the library drops its communication to all hosts managing all partitions, even if their partitions are not affected by the change.

3. Have your service representative license and enable partitioning on the StorageTek SL8500 or StorageTek SL3000.
4. Move cartridges from locations where they would not be accessible to locations that will still be in a partition managed by StorageTek ACSLS.
5. Create your partitions using the SLConsole.  
Refer to the SLConsole help for instructions.
6. Activate partitioning using StorageTek ACSLS as described in [“Partitioning a Library or Changing Partition IDs” on page 390](#).

## Plan Your New Configuration

Plan your new partitioned configuration ahead of time.

- Organize the cartridges and drives for performance.
- If you will do a lot of enters into and ejects from a partition, an StorageTek SL8500 partition should include at least one of the bottom three rails. Partitions with few enters and ejects can be on the top rail.

## Minimize Disruptions when Partitioning an StorageTek SL8500 or StorageTek SL3000

When an StorageTek SL8500 or StorageTek SL3000 is partitioned or the partitions in an StorageTek SL8500 or StorageTek SL3000 are modified, access to your data is affected. Tape drives and cartridges that were managed by one host server, may be managed by a different host.

### Changes in Configuration

Changes in configuration occur when a:

- Library's configuration has changed
- Library has been re-partitioned and the partition managed by StorageTek ACSLS has changed (a message is displayed)
- Library capacity has changed and the cells reported as available to StorageTek ACSLS have changed
- When LSM Configuration or capacity have changed

When the configuration may have changed, you are notified by StorageTek ACSLS Event Log and Event Notification messages.

### Keeping Outages to a Minimum

The following procedures provided below ensure that outages are minimized and that you can continue to access your data. These procedures explain how to:

- Partition an un-partitioned StorageTek SL8500 or StorageTek SL3000 into two or more partitions.
- Modify the partitions in an StorageTek SL8500 or StorageTek SL3000 that is already partitioned.
- Merge a partitioned StorageTek SL8500 or StorageTek SL3000 so it is a single un-partitioned ACS.

### Challenges

The biggest challenges arise when: LSMs (StorageTek SL8500 rails) are removed from an StorageTek SL8500 partition; or cells and drives are removed from an StorageTek SL3000 partition.

- If you are combining multiple StorageTek SL8500 rails into fewer rails, you need to move the cartridges off the rails (LSMs) that will be removed from the partition to the LSMs that will remain in the partition. This applies whether you are partitioning a library that was not partitioned before or you are re-partitioning a partitioned library.

- Determine how many cartridges you have in the LSMs that you are emptying, and how many free cells are in the LSMs to which you are moving cartridges.  
Use **free\_cells.sh -a** to find out numbers of cartridges in these LSMs (allocated cells) and free cells.
- Shortly before you change the library configuration, move the cartridges away from the LSMs that will be removed from the partition.  
Refer to the procedures for “[Moving Cartridges Before Removing an LSM from an ACS](#)” on page 154 for details.

## ■ Partitioning a Library or Changing Partition IDs

These procedures describe how to partition an un-partitioned library or to change partition IDs on an existing partitioned library.

**Note:**

1. Move the cartridges before removing an StorageTek SL8500 LSM or StorageTek SL3000 cells from an ACS.  
If StorageTek ACSLS manages one of the partitions in the new library configuration, you must first follow the procedures for “[Moving Cartridges Before Removing an LSM from an ACS](#)” on page 154 to move the cartridges off of LSMs that will be assigned to another partition.
2. Quiesce the library before re-partitioning it and vary the ACS(s) and port(s) offline.
3. Partition the library using the StorageTek Library Console™ (SLConsole).
4. The following then occurs after you press **<Apply>**. The library:
  - Rejects any new requests from StorageTek ACSLS.
  - Drops all host connections.
  - Applies partitioning changes.
  - Accepts new host connections.
5. Reconfigure StorageTek ACSLS to activate the partition changes.  
Because the library was partitioned for the first time or it was re-partitioned and the partition ID changed, StorageTek ACSLS cannot reconnect to the library. In order to reconnect, you must:
  - a. Bring down StorageTek ACSLS: `kill.acsss`.
  - b. Run `acsss_config` to configure the new partition and select Option 8.

A message displays asking if the ACS is in a partitioned library. Refer to ["Configuring or Updating your Library Hardware" on page 38](#) for more information.

6. Start StorageTek ACSLS with the new configuration: `rc.acsss`.
7. Vary the port(s) online and ACS(s) to diagnostic mode.
8. Audit the ACS(s).
9. Vary the ACS(s) online.

## ■ Re-partitioning a Library

These procedures describe how to re-partition an existing partitioned library.

1. Move the cartridges before removing an LSM or cells from an ACS.  
If StorageTek ACSLS manages one of the partitions in the new library configuration, you must first follow the procedures for ["Moving Cartridges Before Removing an LSM from an ACS" on page 154](#) to move the cartridges off of LSMs that will be assigned to another partition.
2. Quiesce the library before re-partitioning it and vary the ACS(s) and port(s) offline.

This causes StorageTek ACSLS to reject new requests from clients while the ACS(s) remain available for dynamic re-configuration (after the re-partition).

3. Re-partition the library using the SLConsole.

The following then occurs after you press **<Apply>**. The library:

- Rejects any new requests from StorageTek ACSLS.
- Drops all host connections.
- Applies partitioning changes.
- Accepts new host connections.

4. Reconfigure StorageTek ACSLS to activate the partition changes.

**Note:** There may be no changes to a specific partition. The changes may only affect other partitions. In this case, no StorageTek ACSLS configuration changes are needed.

**Note:** Because the library was not partitioned the first time or it was re-partitioned and the partition ID did not change, StorageTek ACSLS can reconnect to the library.

To do this, select one of the following:

- Run Dynamic Config (`config acs acs_id`) while StorageTek ACSLS is running. This updates the StorageTek ACSLS configuration to match the new library configuration. To do this:
  - a. Vary the port(s) online.
  - b. Update the ACS(s) configuration with `config acs acs_id`.
- Bring down StorageTek ACSLS and run `acsss_config` (option 8) to update the partition configuration in StorageTek ACSLS. To do this:
  - a. Bring down StorageTek ACSLS: `kill.acsss`.
  - b. Update the configuration using `acsss_config`.
  - c. Restart StorageTek ACSLS: `rc.acsss`.
  - d. Vary the port(s) online.

5. Vary the ACS(s) to diagnostic mode.
6. Audit the ACS(s).
7. Vary the ACS(s) online.

## ■ Changing a Partitioned ACS to an Un-partitioned ACS

1. Optionally, eject cartridges from the partition(s) managed by StorageTek ACSLS.

If StorageTek ACSLS will not be managing the non-partitioned library, you may want to eject cartridges from the partition(s) managed by StorageTek ACSLS. This allows you to enter them into other ACS(s) that StorageTek ACSLS manages.

You can use the `ejecting.sh` utility for ejecting multiple cartridges.

2. Quiesce the library before re-partitioning it and vary the ACS(s) and port(s) offline.
3. Re-partition the library using the SLConsole.

The following then occurs after you press **<Apply>**. The library:

- Rejects any new requests from StorageTek ACSLS.
- Drops all host connections.
- Applies partitioning changes.
- Accepts new host connections.

4. Reconfigure StorageTek ACSLS to change the ACS to an un-partitioned library or to remove this ACS (partition) from its configuration.

Because the library was changed from partitioned to un-partitioned, StorageTek ACSLS cannot reconnect to the library. In order to reconnect, you must:

- a. Bring down StorageTek ACSLS: `kill.acsss`.
- b. Run `acsss_config` to configure the new partition.

Refer to “[Configuring or Updating your Library Hardware](#)” on page 38 for more information.

5. Start StorageTek ACSLS with the new configuration: `rc.acsss`.
6. Vary the port(s) and ACSs online.

## ■ Viewing an ACS Partition ID

To view the partition ID(s) for one or more ACSs use one of the following commands:

- `query lmu all` for all ACSs
- `query lmu acs_id` for a single ACS

### Output Example:

```
ACSSA> q lmu 0
2008-02-27 06:08:02

ACS: 0      Mode: Single LMU      Master Status: Not
Comm
Not Partitioned      Standby Status: -
             

ACS State      Desired State
offline      online

Port      Port State  Desired State      Role  CL  Port Name
0, 0      offline      online      -      13  172.27.2.6
```

## ■ CAP Behavior

### Partitioned Library

**WARNING:** All ACSs must have one CAP that is **dedicated** or is shared. Because all of the CAPs in an StorageTek SL3000 can be dedicated to other partitions, this is a crucial restriction when configuring StorageTek SL3000 partitions.

## Dedicating a CAP in a Partitioned Library

With the StorageTek SL3000 library, a CAP can be dedicated to a partition. When CAPs are dedicated to a partition, StorageTek ACSLS can set these CAPs to automatic mode.

## Sharing CAPs in a Partitioned Library

In a partitioned StorageTek SL8500 library, CAPs are always shared among all partitions.

In a partitioned StorageTek SL3000 library, CAPs can be shared between partitions. The process is as follows:

1. When a host uses a CAP to enter or eject cartridges, it reserves the CAP for its exclusive use.
2. The host must complete the enter or eject and leave the CAP empty and closed.

Should you need to terminate an enter on:

- StorageTek ACSLS - the cancelled `enter` command must be issued
- HSC - the `drain` command must be issued

3. The CAP is now available for use by any partition in the library.

## When Another Host Needs the CAP

If a host does not complete the enter or eject, the CAP may still contain cartridges for the affected partition. The CAP is still in a reserved status. This causes problems when other partitions need to use the CAP. To resolve this, the library must identify the host holding the reserve and terminate the enter or eject from that host.

In rare cases, you may not be able to access the host holding the reservation, either because the host crashed and cannot be restarted or you lack physical access or the security authority to issue the commands needed. In these cases, the CAP reservation can be overridden using the SLConsole.

**CAUTION:** Overriding a CAP reservation using the SLConsole should be done only as a last resort.

## Assigning CAP Priorities for Shared CAPs

StorageTek ACSLS can manage multiple partitions in the same library, and these partitions can share the same CAP(s). Audit ejects all cartridges with duplicate and unreadable `vol_ids`. When you audit multiple partitions (ACSSs) at the same time, the audits may try to use the same shared CAP to eject the cartridges. The first audit reserves the CAP and the other audits are unable to reserve the CAP. The later audits are then unable to eject the cartridges.

To prevent this from happening, set the CAP priorities so different shared CAPs are the highest priority CAP in the different partitions. For example, if partitions 2 and 3 in an StorageTek SL3000 are sharing CAPs 5 and 6, set CAP 5 as the highest priority CAP in partition 2 and CAP 6 as the highest priority CAP in partition 3.

## Reserving the CAP

Consider the following when reserving the CAP:

- When a CAP is in use for an enter or eject operation, all 39 slots (StorageTek SL8500) and 26 slots (StorageTek SL3000) are reserved for that operation. The CAP cannot be subdivided.
- For addressing purposes, the CAP needs a location (ACS,LSM,CAP#). The LSM number is associated with the second rail in each library. For example: ACS#,1,0 for CAP A and ACS#,1,1 for CAP B
- Reserving the CAP

The CAP is a common component among partitions. Each host will:

- reserve the CAP to use it for an enter or eject
- release the CAP when the enter or eject is terminated. Another host can then use it.

## Terminating a CAP Reservation

1. When StorageTek ACSLS finds that a CAP is reserved by another partition, it reports the partition ID and host ID holding the reservation.  
You then need to contact the host owning the reserved CAP and request them to complete the enter or eject.  
Once this is done, the empty CAP is then unreserved and available.
2. If the CAP reservation cannot be released by the host holding it, the SLConsole command is used to override the CAP reservation.
  - a. The SLC command displays a warning to the host informing it that the reservation from the specific partition owner will be removed.
  - b. The SLConsole queries the CAP to find the partition owner/requester/reserver.
  - c. The SLC displays the partition name (HLI1, HLI2, HLI3, HLI4, or Default) in the warning.
3. The library sends a CAP Overridden Message to the host that held the reservation.

This host should terminate the enter or eject task that was in progress.

4. The library now owns the CAP.

The CAP must be empty and closed before it is available to be used by another host. If the:

- CAP has cartridges in it, you must empty the CAP before a partition can use it. Use the SLConsole to do this.
- CAP is open, you must empty and close it. Then the library can audit it and ensure that it is empty. Until the CAP is closed, it cannot be made available to any partitions.
- CAP is empty, it will be locked, and it is available to be reserved by any partition.

5. The CAP is now unreserved and is available for use by any partition.

## ■ Moving Cartridges to a Specific Cell in the StorageTek SL3000

StorageTek SL3000 can partition down to the drive and cell level. If cells are reassigned from one partition to another, the cartridges in these cells are orphaned, and are no longer accessible by the partition that they were in before. The host managing the other partition could then write over the data on these cartridges.

To prevent cartridges from being orphaned when partition boundaries change, and before you re-partition the library, you need to move the cartridges to cells that will remain in the partition.

Since StorageTek SL3000 is a single LSM, the existing StorageTek ACSLS move command does not work, because the cartridges would just be moved somewhere else in the library, and they might be moved to another cell that will also be removed from the partition. To handle this, the StorageTek SL3000 provides the ability to move cartridges to a specific cell.

The syntax for moving cartridges to a cell is like moving them to an LSM. However, instead of specifying an LSM ID, you specify a cell ID.

a=acs, l=lsm, p=panel, r=row, and c=column

```
move AAAAAA a,1,p,r,c      (for a cell move)
move AAAAAA a,1             (for a standard LSM move)
```

Example for a cell move:

```
move EDU010 0,1,0,5,1
```

**Note:** You can use the display command to display a list of available (empty) cells in a specified panel:

```
display cell a,1,p,*,* -status empty -f statu
```

# Troubleshooting

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This chapter summarizes tools, tips, and techniques for troubleshooting problems in StorageTek ACSLS. The range of troubleshooting resources includes logs, key observation points, and diagnostic probes.

## ■ StorageTek ACSLS Event Log

The StorageTek ACSLS event log is the first stop for useful information in the event of problems with your library operation. This log contains information about library events, status changes, and errors. All sub-components within StorageTek ACSLS will report events to the `acsss_event.log` by sending messages to a process called the event logger. The standard event log, which is automatically created when StorageTek ACSLS is installed, is contained in the file

`$ACS_HOME/log/acsss_event.log` and where `$ACS_HOME` is usually `/export/home/ACSSS/`.

Logged events include:

- Significant Events

These are normal events that can help you manage the library. For example, events are logged when an audit is initiated or terminated, a device changes state, or a CAP is opened or closed.

- Library Errors

These are events where both fatal and nonfatal hardware and software errors are logged. Examples include: LSM failures; problems with cartridges; database errors; process failures; and library communications failures.

Each message in the event log includes a time stamp, the name of the component reporting the message, and a description of the event. For a complete explanation of each message, consult the *StorageTek ACSLS Messages* manual.

A window on the StorageTek ACSLS console displays a running tail of the event log. You can generate a similar display from any shell window. To do this:

1. As user `acsss`, run the command

```
acs_tail $ACS_HOME/log/acsss_event.log
```

2. To view the entire event log, use a text editor, such as vi, that enables you to navigate through the log, search for specific errors, or follow specific sequences of events.

## Managing the Event log

StorageTek ACSLS continues sending messages to the acsss\_event.log.

- When this file reaches a threshold size (500KB by default), the file is renamed to event0.log and saved in the log directory. The acsss\_event.log then continues as a new file.
- When acsss\_event.log again reaches the threshold size, the event0.log is renamed to event1.log and the acsss\_event.log is renamed event0.log.
- This process continues for as many log files that are configured for retention.

By default, nine event log files are retained in the log directory. With each subsequent threshold, the oldest file is removed and all remaining files are sequentially renamed.

You can configure the maximum size of the acsss\_event.log and the number of log files to retain using `acsss_config`, Option 2. Refer to [“Setting Event Logging Variables” on page 28](#).

## Using *greplog* to Search Event Logs

The diagnostic tool, *greplog*, allows you to perform keyword searches through any and all event log files. Used very much like the Unix *grep* utility, *greplog* will return the complete log message associated with a given keyword expression. This allows you see the message's date and time stamp, message number and the function text related to every message containing that expression.

### Format

```
greplog [-iv] pattern file_1 file_2 ... file_n
```

### Options

- `-i` instructs *greplog* to ignore the case of the search pattern expression.
- `-v` instructs *greplog* to filter out all messages containing the expression and to display all of the entries in the log file. The exception are those entries which match the pattern expression.

pattern: the pattern is the search criteria to be used.

```
file_1 file_2 ... file_n
```

*greelog* accepts multiple file parameters and wild card expressions in the file list.

## Examples

- To display all occurrences within an event sequence, use the sequence number.

```
greelog 1392 acsss_event.log
```

- To search the Event Log for all messages about volume CART89:

```
greelog CART89 acsss_event.log
```

- To search all archived copies of the Event Log for messages about tape mounts:

```
greelog -i mount event*.log
```

## Additional Logs

The *acsss\_event.log* contains all of the messages pertaining to any aspect of the StorageTek ACSLS running processes. But there are additional files in the log directory that contain status information about external utilities, such as backup and restore and installation utilities.

- *S87ACSL.log* - Contains messages pertaining to the startup of StorageTek ACSLS at boot time.
- *acsss.pid* - Stores the process id of the currently running *acsss\_daemon*.
- *acsss\_config.log* - Contains a summary of each library configuration.
- *acsss\_config\_event.log* - Contains event messages that were posted by the *acsss\_config* routine.
- *bdb\_event.log* - Contains event messages that were posted by the database backup utility, *bdb.acsss*.
- *cron\_event.log* - Contains messages that were posted by cron utilities. (To see the cron schedule, run the command *crontab -l*.)
- *di\_trace.log* - Contains trace information related to the database interface.
- *install.log* - Contains event messages posted while running the installation script, *install.sh*.
- *ipc\_trace.log* - Contains trace information pertaining to StorageTek ACSLS inter-process communications.
- *rdb\_event.log* - Contains event messages that were posted by the database restore utility, *rdb.acsss*.

- `timed_bkup.sh.log` - Contains event messages related to the automatic database backup utility.

Additional trace logs may be found in the log directory depending upon the specific tracing that you have enabled on your system. These include the following:

- `acsss_stats.log` - Volume statistics tracing is enabled by `acsss_config`.
- `acsss_trace.log` - Client-server tracing is enabled at the request of Software Support personnel.
- `acslh.log` - Host-LMU tracing is enabled at the request of Software Support personnel.
- `scsilh.log`, `mchangerX.log`, `scsipkt.log` - All of these contain traces of SCSI communications to a SCSI-attached library and they are enabled at the request of Software Support.

## Trace Log Management

Trace logs that are enabled at the request of Software Support can grow quite rapidly. These logs need to be monitored and managed in order to mitigate problems of a full disk.

The utility `monitor.sh` is provided to perform automatic log management and archiving services. The syntax is

```
monitor.sh <name of log>
```

When this utility is enabled to monitor a specific log, it will allow the log to grow to a size of 1MB (default) and then will compress the log using `gzip`, placing the compressed logfile with a time stamped name in the `ACSSS/log/log_archives` subdirectory. This operation will continue as long as tracing stays enabled.

## ■ Key Observation Points

There are numerous utilities that enable you to verify the status of various aspects of StorageTek ACSLS.

- `psacs` - shows a summary of all of the StorageTek ACSLS running processes. It is the best indication whether StorageTek ACSLS is running or not. A typical output should display no fewer than twelve different processes, all children of a common parent process.
- `acsss status` - checks if the `acsdb` database service is running
- `get_license_info` - checks to confirm that the product is not inhibited due to a license issue.
- To display your StorageTek ACSLS release and maintenance level:

- On Solaris:

`pkginfo -l STKacs1s` - shows the version of StorageTek ACSLS you are running.

## ■ Testing Library Connections

StorageTek ACSLS provides utilities for verifying a good physical connection to the library. The tool you select is best determined by the context of your activity.

### **testports**

This utility tests the connection to each library that has been configured to StorageTek ACSLS. It is also the easiest to use and is the most comprehensive. The test is un-obtrusive and does not impact normal library operations. Since `testports` utilizes the StorageTek ACSLS database to determine the library port name and library type, the library must already have been configured to StorageTek ACSLS in order for `testports` to function.

- For TCP/IP libraries, `testports` verifies the connection and whether or not the library is online and in use by StorageTek ACSLS.
- For SCSI and serial-attached libraries, the 'acs' and 'port' must be offline in order for `testports` to open the test connection.

To run this utility, the command syntax is:

`testports`

The library compat level or microcode level appears.

### **testlmutcp**

This utility submits a TCP/IP packet to a network-attached library.

To test the library connection, you must include the library hostname or ip address in the command line:

`testlmutcp <ip_address> or`  
`testlmutcp <hostname>`

If you wish to test the connection while the library is online to StorageTek ACSLS, you need to specify an unused socket number between 50002 and 50016. For example:

`testlmutcp <ip_address>:50002`

A successful response will include the compatibility level of the attached library.

## **testlmu**

This utility can be used to test connectivity between StorageTek ACSLS and legacy StorageTek serial-attached libraries. To run this utility, you must submit the devlink path to the serial port device node:

```
testlmu /dev/term/0
```

The library must be offline to StorageTek ACSLS in order for `testlmu` to open the serial connection.

## **pinglmu.sh**

This utility allows you to verify communication between StorageTek ACSLS and a serial-attached library while the library is online to StorageTek ACSLS. A successful response includes the library compatibility level.

## **probescsi.sh**

This utility exercises the connection between the StorageTek ACSLS server and a SCSI or fibre-attached library. To run this utility, you must specify the devlink path to the mchanger device. The syntax is:

```
probescsi.sh /dev/mchangerX
```

where *X* is the specific mchanger instance of the library being tested.

The library must be offline to StorageTek ACSLS in order for `probescsi` to open the SCSI connection. A successful response includes the microcode level of the attached library.

## **probeFibre.sh**

This utility discovers all fibre-attached libraries that are reachable from the StorageTek ACSLS server. The syntax is:

```
probeFibre.sh
```

A successful response displays the model number of each fibre-attached library along with its target and LUN IDs, and the World Wide Port Name (WWPN).

Using the "-v" option, you can also display the model number of the host bus adapter.

```
probeFibre.sh -v
```

## **showDevs.sh**

This utility reveals details about every mchanger device that has been configured to StorageTek ACSLS.

- No argument displays the model, target, LUN, and revision level of each attached mchanger library.

```
showDevs.sh
```

- A "-w" argument displays the WWNN and WWPN of each library.

```
showDevs.sh -w
```

- An "-s" option displays the serial number of each library:

```
showDevs.sh -s
```

## ■ Testing a Client Connection

Client applications communicate with StorageTek ACSLS over TCP/IP using the RPC (remote procedure call) protocol. If a client system is unable to communicate with StorageTek ACSLS, you can use *rpcinfo* to test whether StorageTek ACSLS is reachable from the client machine. To do this:

1. From the StorageTek ACSLS server, verify that StorageTek ACSLS is running.

```
psacs
```

2. From the StorageTek ACSLS server, verify that the RPC daemon is running.

```
ps -ef | grep rpc
```

3. From the StorageTek ACSLS server, verify that program number 300031 is registered for TCP and IDP.

```
rpcinfo | grep 300031
```

This program number confirms that StorageTek ACSLS is running and that StorageTek ACSLS has registered with RPC.

4. From the client machine, or any Unix machine on the network, use *rpcinfo* to exchange a packet with program number 300031 on the StorageTek ACSLS server.

You must specify the IP address of the StorageTek ACSLS server along with the program number.

```
rpcinfo -t <ip address> 300031
```

If the communication exchange was successful, the *rpcinfo* utility will display the message

```
program 300031 version 1 ready and waiting
program 300031 version 2 ready and waiting
```

This confirms that StorageTek ACSLS is available for client connections across the network.

## ■ Gathering Diagnostic Information for Software Support

As part of the service call, your software support representative may ask you to send the entire set of diagnostic logs and other diagnostic information for analysis by StorageTek. All of this data can be collected with a single command:

```
get_diags
```

When this utility has collected all of the information, it prompts you to either email the data or to make it available for manual transfer.

If you elect to email the data directly from the StorageTek ACSLS machine, make sure that email communication is possible between your StorageTek ACSLS machine and the Internet. Your enterprise may have a firewall to prevent email going directly from the target machine. In this case, you can email the information to yourself within the enterprise and then forward the diagnostic data to StorageTek.

Alternatively, you can elect to transfer the information manually. The *get\_diags* utility advises you where to find the waiting tar packages for transfer. Typically, the staging area for diagnostic data is /export/backup/diag/acsss.

# Improving Library Performance

## ■ Overview

This chapter discusses how to maximize your library performance during pass-thru activity between Library Storage Modules (LSMs). StorageTek ACSLS works to minimize pass-thru activity in several ways. You can enhance performance by using these StorageTek ACSLS facilities to minimize pass-thru activity. They are:

- Minimizing pass-thru activity between LSMs
- Floating cartridges during a dismount
- Entering cartridges into a library
- Ejecting cartridges from a library
- Maintaining empty storage cells in a library
- Minimizing pass-thru activity with ACSAPI requests and StorageTek ACSLS commands
- Using these ACSAPI requests and StorageTek ACSLS commands

## ■ Minimizing Pass-thru Activity Between LSMs

To improve tape library performance, it is important to minimize pass-thru activity from one library to another. When cartridges and drives are in connected libraries, it is always desirable if tape mounts occur when both the drive and the cartridge are in the same LSM (library). Mounts that require fewer pass-thrus result in better performance.

## ■ Floating Cartridges During a Dismount

When cartridges are dismounted, StorageTek ACSLS tries to avoid pass-thru activity among LSMs by assigning a new home cell whenever the cartridge's old home cell is in a different LSM than the drive. This is StorageTek ACSLS's default behavior. To disable this feature, use the "Extended Store" feature for an LSM. Cartridges being dismounted are "floated" to a new home cell to avoid movement between LSMs.

## ■ Entering Cartridges into a Library

When cartridges are entered into a library, each cartridge is assigned a home cell in the closest LSM to the CAP. If the LSM with the CAP has empty cells, home cells are assigned in this LSM. If the LSM with the CAP is full, home cells are assigned in the closest LSM with empty cells.

To optimize performance, enter cartridges into an LSM with tape drives that are compatible with the cartridge(s). For example, enter 9940 cartridges into an LSM with T9940B tape drives, not into an LSM with only T9840B tape drives. Otherwise, the 9940 cartridges must be passed-thru to an LSM with T9940B tape drives.

## ■ Ejecting Cartridges from a Library

When cartridges are ejected from a library, the cartridges must be moved to the specified CAP(s).

To optimize performance, eject cartridges to a CAP in the LSM where the cartridges are located. If the cartridges are located in several LSMs, choose a CAP that is close to most of the cartridges.

## ■ Maintaining Empty Storage Cells in an LSM

StorageTek ACSLS cannot “float” cartridges to an LSM on a dismount if all the storage cells are full. Similarly, when cartridges are entered into a full LSM, the cartridges must be passed-thru to an LSM with empty cells.

To optimize performance, you should identify cartridges that do not need to be kept in the library for StreamLine access and eject those cartridges from the library. You may also want to move cartridges from full LSMs to other LSMs with enough empty cells so that all LSMs have empty storage cells.

**Notes:** Managing the cartridges in a library should be done when the library is not busy with mount requests.

## ■ Minimizing Pass-Thru Activity Using ACSAPI Requests and StorageTek ACSLS Commands

These ACSAPI requests and StorageTek ACSLS cmd\_proc commands help you to avoid unnecessary pass-thru activity between LSMs.

The following applies to both ACSAPI requests from a client to StorageTek ACSLS, and to StorageTek ACSLS commands entered using cmd\_proc. The term “request” is used for both ACSAPI requests and cmd\_proc commands.

## mount scratch and mount \*

For a specified drive, select a scratch cartridge and mount it. Optionally, select the cartridge from a specified scratch pool and/or with a specified media type. StorageTek ACSLS selects a compatible scratch cartridge in the closest LSM to the drive. In order to rotate use among all cartridges, the compatible cartridge with the least recent access date is selected within the selected LSM.

**Command:**

---

ACSAPI	mount scratch
cmd_proc	mount * <i>drive_id</i> [ <i>pool_id</i> ] [ <i>media media_type</i> ]

---

- For an ACSAPI request, *drive\_id*, *pool\_id* and *media\_type* must be specified. (Either a specific media type, ALL\_MEDIA\_TYPE, or ANY\_MEDIA\_TYPE can be specified for *media\_type*.)
- With a cmd\_proc mount \* command, if *pool\_id* is not specified, it defaults to the common pool (pool 0).

A specific media type can be identified. If media \* is specified, ANY\_MEDIA\_TYPE is chosen. If media is not specified, ALL\_MEDIA\_TYPE is chosen.

The special *media\_type* values of ANY\_MEDIA\_TYPE and ALL\_MEDIA\_TYPE are processed as follows:

- When ALL\_MEDIA\_TYPE is specified, a cartridge with a media type compatible with the drive is selected. (This is based on the media\_compatibility file.)
- When ANY\_MEDIA\_TYPE is specified, the scratch\_preferences file identifies the preferred list of media to mount on a drive.

## query mount

- For a specified cartridge (*vol\_id*), return a list of drives that are compatible with the cartridge's media type, ordered by proximity to the cartridge. (The compatible drives in the closest LSM are listed first, etc.)
- With StorageTek ACSLS 7.3.1 and later releases, drives that are the same pass-thru distance from the cartridge are in least-recently-used order.

Example: The compatible drive with the longest time since a cartridge was dismounted, is first; the drive with the next longest time, is second, etc.

**Command:** query mount *vol\_id*

## query mount scratch and query mount \*

For a specified scratch pool, a list of all drives compatible with the media type(s) of the cartridges in a specified scratch pool is returned. A specific media type can be specified to restrict the drives to only those compatible with the specified media type.

The list of drives returned is ordered so the drives closest to the densest scratch pools are listed first.

### Command:

ACSAPI	query mount scratch
cmd_proc	query mount * <i>pool_id</i> [media <i>media_type</i> ]

Either a specific media type or ALL\_MEDIA\_TYPE (media \* in a cmd\_proc command) can be specified. ANY\_MEDIA\_TYPE is **not** supported.

**Note:** When ALL\_MEDIA\_TYPE is specified, cartridges with media compatible with the drive are selected to determine the densest scratch pool.

## ■ Using these ACSAPI Requests & StorageTek ACSLS Commands

This section describes how to use the ACSAPI requests and commands for improving tape library performance.

In the following discussion the term “request” is used for both ACSAPI requests and cmd\_proc commands.

When mounting a specific cartridge (where the vol\_id is known):

- Precede the mount request with a query mount request.
- Pick the first “available” drive, and specify this drive in the mount request.

When mounting a scratch cartridge on a specific drive, there are two options:

- To select the closest scratch cartridge to a specific drive:

Use a mount scratch request specifying a drive and, optionally, a scratch pool.

For ACSAPI requests, specify one of the following:

- ALL\_MEDIA\_TYPE (compatible media is selected)
- ANY\_MEDIA\_TYPE (uses the scratch preference list).

For cmd\_proc commands, select one of the following:

- Do not specify a media type (compatible media is selected)
- Specify `media *` (uses the scratch preference list).
- To select a specific drive from a list of drives and then select the closest scratch cartridge:

Pick the drive, then pick the scratch tape: This ensures the drive is close to the scratch cartridge.

- a. Enter a `query mount scratch` request to identify the closest available drive to the most scratch media in the desired scratch pool.
- b. Enter a `mount scratch` request to mount a scratch cartridge on the selected drive. Optionally, specify the scratch pool.

For ACSAPI requests, either specify:

- `ALL_MEDIA_TYPE` (and compatible media will be selected), or
- `ANY_MEDIA_TYPE` (to use the scratch preference list).

For `cmd_proc` commands, either:

- Do not specify a media type (and compatible media will be selected), or
- Specify `media *` (to use the scratch preference list).



# Firewall Security Option

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## ■ Overview

The firewall-secure option allows you to run StorageTek ACSLS behind a firewall while the client software makes requests across that firewall.

Firewall security is also offered to StorageTek ACSLS clients, which also allows them to operate behind their own respective firewalls. This is made available by StorageTek to its ISVs (Independent Software Vendor partners). Please contact the ISV for your client software component to find out the latest status for each specific client.

## ■ Running StorageTek ACSLS behind a Firewall

This Firewall-secure solution provides the following capabilities:

- Allow StorageTek ACSLS to run behind a firewall (i.e. StorageTek ACSLS on the secure side of firewall, client on opposite side)
- Allow StorageTek ACSLS client(s) to run behind their own firewall(s) (i.e. client(s) on secure side, StorageTek ACSLS on the opposite side of firewall).

**Important:** To do this, the ISV must have implemented the supplied changes within their client side software component.

- Preserve compatibility with current StorageTek ACSLS client implementations, allowing those clients to continue to run with StorageTek ACSLS in the firewall solution.
- Preserve current ACSAPI/Client functionality and performance. This includes all functionality that is available in a non-firewall environment.

A complete solution would include combining the first two capabilities above. This would allow StorageTek ACSLS and the StorageTek ACSLS client(s) to each run behind their own respective firewalls (i.e. two firewalls between StorageTek ACSLS and the client(s)), and still have the same communications performance as within a non-firewall environment.

## ■ Addressing security areas

StorageTek ACSLS has addressed the following security concerns as follows:

### RPC

The use of RPC within StorageTek ACSLS is a concern for some sites in trying to run within a firewall environment. Preserving compatibility with the current installed client base precludes the ability to remove RPC completely from the StorageTek ACSLS.

However, the StorageTek ACSLS firewall-secure feature has addressed the concerns inherent in RPC, which are:

- The need to allow outside (untrusted) parties to initiate connections to the trusted host across an unrestricted range of ports (1024-65535).
- The exposure of the mapping of available services on a platform via the portmap (or rpcbind) daemon running on well-known port 111.

### Security

In a firewall solution, the fundamental security comes from restricting access from the untrusted (non-secure) side into the trusted (secure) side. In all cases, some limited and controlled access must be allowed in order to perform communications and allow data exchange. The goal is to allow that data exchange within a well-defined and restricted set of entry points, allowing you to control those access points and their corresponding communications. This goal is met by this solution.

## Communications Components

StorageTek ACSLS/Client communications rely on two network interface components to handle network communications between client platforms and the StorageTek ACSLS platform. Software which acts as a client or proxy-server for StorageTek ACSLS implements one of these two components, in order to be compatible with StorageTek ACSLS platforms and existing clients. The component residing on the client platform is known as the SSI; the component residing on the StorageTek ACSLS platform is known as the CSI. While it would be desirable to implement all changes within one side (e.g. the StorageTek ACSLS platform), in order to maintain client compatibility and to provide all the firewall-secure features it is necessary that corresponding changes be made to each side where the benefits are to be realized. The positive side of this is that each side can independently implement the features and realize the firewall-secure benefits on its side (e.g. changes to the StorageTek ACSLS allow the StorageTek ACSLS platform to run behind a secured firewall).

## ■ Benefits of the Firewall-Secure Option

### Server Side

With changes to just the server side component, as provided within this Firewall-secure solution, the benefits are:

- Restricts incoming connections for StorageTek ACSLS communications to a single TCP port for all registered program numbers (there are two registered program numbers for the StorageTek ACSLS CSI, both of which will be serviced by one single port).
- Allows users to specify the identity of that port, and configure their firewall in a corresponding fashion.
- Allows users to turn off StorageTek ACSLS communications to UDP ports.
- Allows users to disable any communication by the StorageTek ACSLS server to the **client-side** portmapper(s)\* (UDP/TCP port 111). The portmapper must still remain running on client platforms to preserve compatibility with client side code. However, it will not be used for network communications initiated by the server, and therefore the clients' firewall(s) can be configured to disallow access to it.
- Outgoing connections from the StorageTek ACSLS server side to the client(s) are unrestricted with respect to the server-side ports used to preserve current performance. This follows the widely accepted practice by the security community.

### Server Port Restriction

This solution potentially restricts the number of incoming ports to which any outside party can communicate with the server platform (i.e. initiate network connection) to either one or three ports - the single customer-specified port for StorageTek ACSLS incoming requests, plus possibly the two portmapper ports (TCP & UDP port 111).

**Note:** To disallow client access to the **StorageTek ACSLS server** portmapper, and thus disallow access to UDP and TCP ports 111, the changes must be made to the **client** software component. See the client side discussion below.

The server side of the solution, above, is implemented completely within this firewall-secure StorageTek ACSLS solution.

## Client Side

An identical set of restrictions can be realized on the client side. This would give the client an identical capability of residing behind its own secure firewall, as described in the server side discussion above. These restrictions allows the user to:

- Restrict incoming connections for communications (response) to the client to a single TCP port for each registered program number. There is one registered program number for the StorageTek ACSLS SSI.
- Specify the identity of this port, and configure the firewall in a corresponding fashion.
- Turn off client-side communications to UDP ports.
- Disable any communication by the client to the **StorageTek ACSLS server** portmapper (UDP/TCP port 111). The portmapper must still remain running on the StorageTek ACSLS platform to preserve compatibility with StorageTek ACSLS code. However, it will not be used for network communications initiated by the clients, and the StorageTek ACSLS server firewall can be configured to disallow access to it.
- Outgoing connections from the client side to the server are unrestricted with respect to the client-side ports used to preserve current performance. This follows widely accepted practices by the security community.

## Client Port Restriction

This solution restricts the number of incoming ports to which any outside party can communicate with the client platform (i.e. initiate network connection) to between one and three ports - one specified port for client incoming responses, and possibly the two portmapper ports (TCP & UDP port 111).

**Note:** To disallow StorageTek ACSLS server access to the **client's** portmapper (and thus disallow access to UDP and TCP ports 111), the changes must be made to the **StorageTek ACSLS server** software component (see server side discussion above).

This solution has a two-step implementation:

- StorageTek has made the needed code changes to the StorageTek ACSLS CDK source code (CSC Developer's Toolkit)
- Clients of StorageTek ACSLS who wish to provide this security for their client platform must integrate these changes into their client-side SSI code, rebuild that product, and again certify their CSC (Client System Component) with StorageTek's StorageTek ACSLS.

## Advantages

Each of the client-side and server-side parts of the solution is independent. This means that if only one of the two sides is behind a firewall with respect to the other side, the solution (software changes) need only be implemented on that side. In addition, that partial solution maintains compatibility with all current client and server implementations which already exist, as well as compatibility with other software components which use the CSI / SSI interface. This includes compatibility with current StorageTek products. This solution does not impact current performance, with respect to client / server communications.

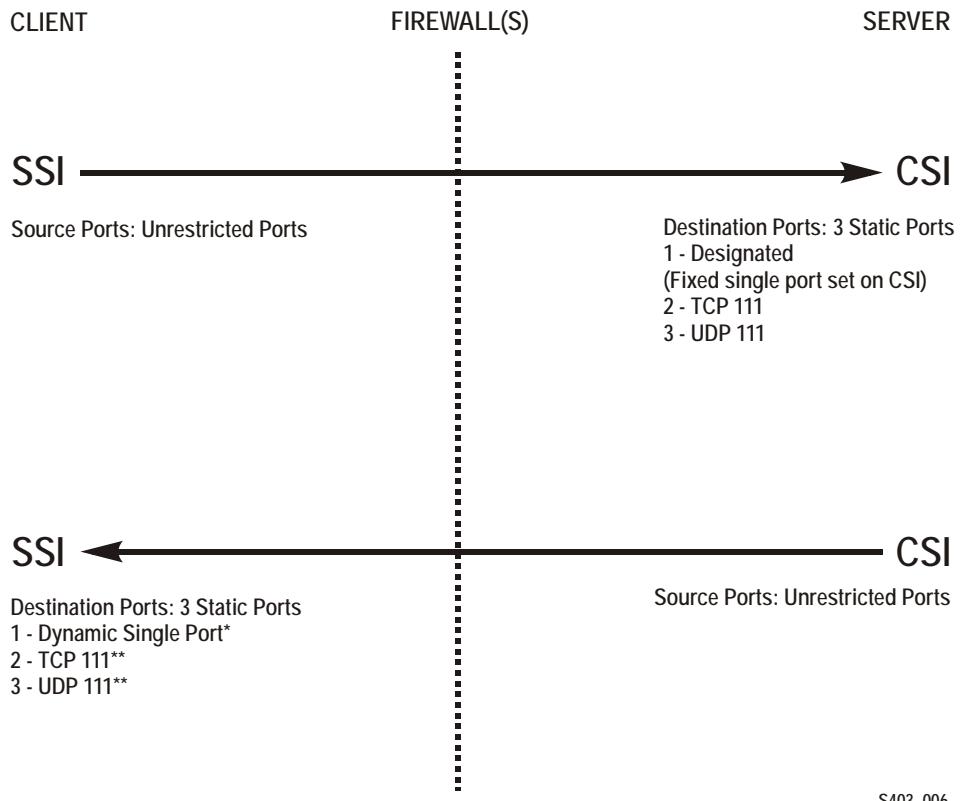
## ■ Firewall-Secure Solution Scenarios

The following diagrams show possible scenarios of the operation, port usage, and relationship of the StorageTek ACSLS components when used across a firewall. They are intended to be understood in conjunction with the text just presented (above). The “SSI” in the following diagrams is the network interface component of StorageTek ACSLS that runs on the client side of the communications. The CSI is the network interface component of StorageTek ACSLS that runs on the StorageTek ACSLS platform.

## Example 1

In [Figure 31](#), firewall security is implemented on the StorageTek ACSLS server side (CSI) only.

**Figure 31. Firewall security on StorageTek ACSLS server side (CSI) only**



### Notes:

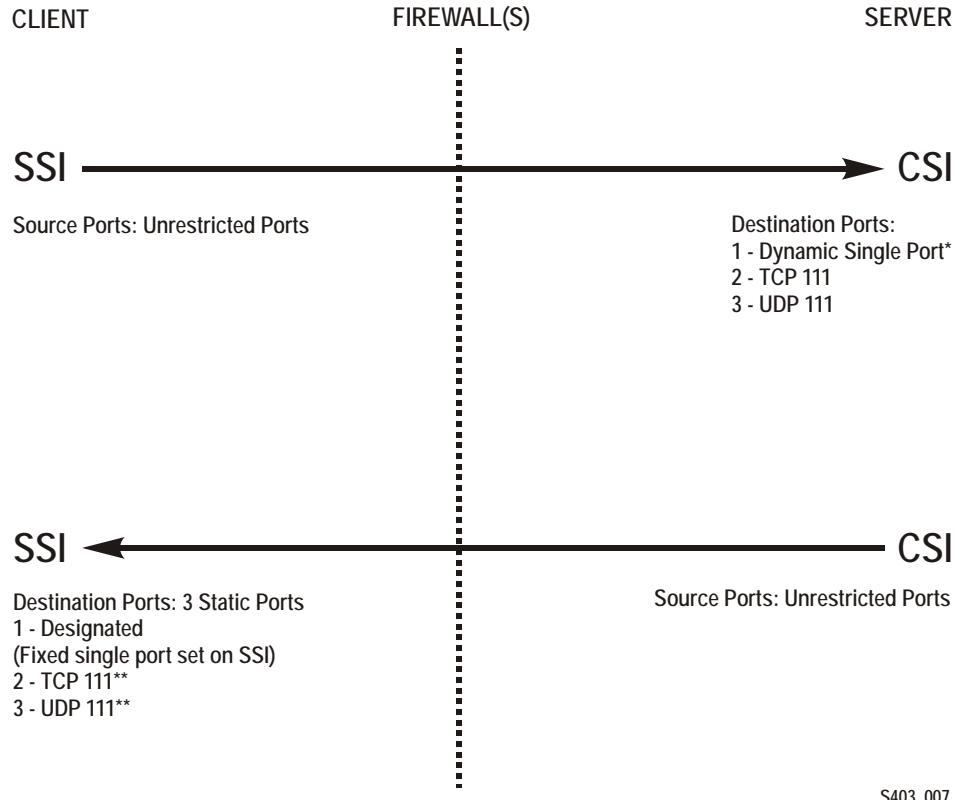
\* Dynamic in this example means that the port is selected by the SSI at startup from the range 1024-65535. The port is not designated by the user, nor is it typically the same port across new executions of the SSI (i.e. from one instance of an SSI running process to the next).

\*\* The portmapper 111 port(s) on the SSI side is **only rarely** queried by the CSI. It is only accessed by the CSI in the case where the return port number provided by the SSI in its request packet does not function (i.e. results in a network interface failure) for sending the response packets back to the SSI. In this case, as a retry mechanism, the CSI queries the SSI-side portmapper for the port to use, which is registered with the portmapper under the SIE's program number.

## Example 2

In [Figure 32](#), firewall security is implemented on the client side (SSI) only.

**Figure 32. Firewall Security on Client Server Side (SSI) Only**



### Notes:-

\* Dynamic in this example means that the port is selected by the CSI at startup from the range 1024-65535 and the port is not designated by the user, nor is it typically the same port across new executions of the CSI (i.e. from one instance of an CSI running process to the next).

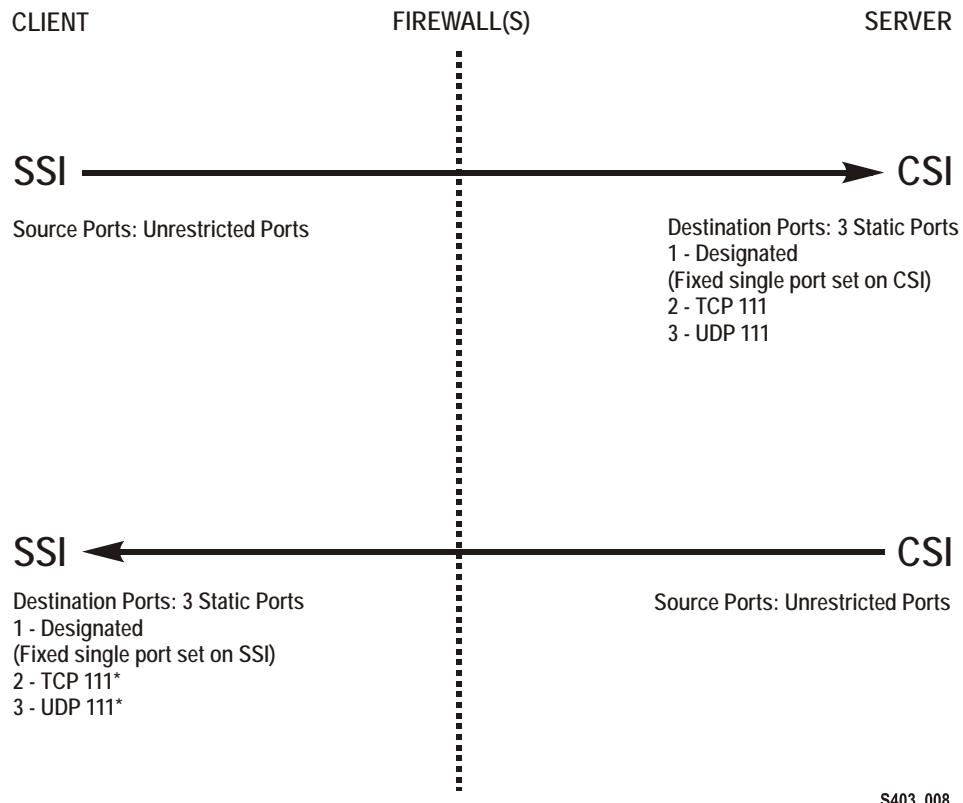
\*\* The portmapper 111 port(s) on the SSI side is only rarely queried by the CSI. It is only accessed by the CSI in the case where the return port number provided by the SSI in its request packet does not function (i.e. results in a network interface failure) for sending the response packets back to the SSI. In this case, as a retry mechanism, the CSI queries the SSI-side portmapper for the port to use, which is registered with the portmapper under the SSI's program number.

### Example 3

In [Figure 33](#), both client (SSI with CDK 2.2 and Firewall-secure Supplement) and the StorageTek ACSLS server (CSI) are implementing Firewall-Secure

API's. The client and server is still relying on the portmapper for port identification).

**Figure 33. Firewall Security on Client (SSI) and StorageTek ACSLS Server (CSI) using Portmapper**



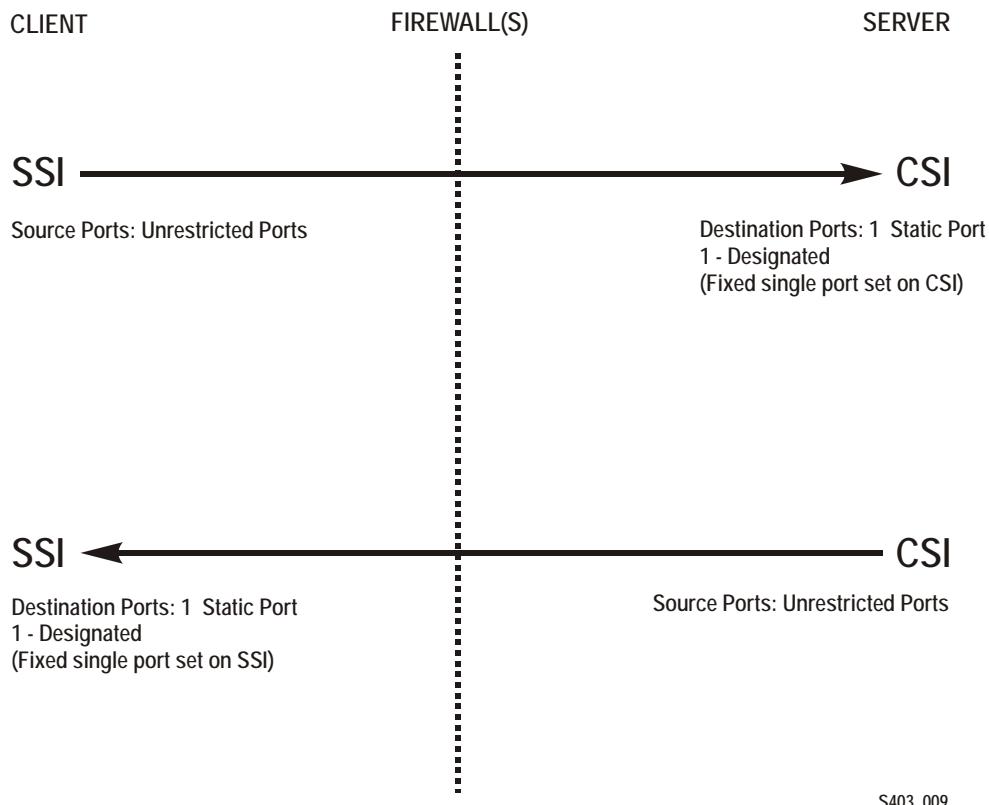
**Notes:**

\* The portmapper 111 port(s) on the SSI side is only rarely queried by the CSI. It is only accessed by the CSI in the case where the return port number provided by the SSI in its request packet does not function (i.e. results in a network interface failure) for sending the response packets back to the SSI. In this case, as a retry mechanism, the CSI queries the SSI-side portmapper for the port to use, which is registered with the portmapper under the SSI's program number.

## Example 4

In [Figure 34](#), both Client (SSI with CDK 2.2 and Firewall-secure Supplement) and StorageTek ACSLS Server (CSI) implementing Firewall-Secure API's (Client and Server have implemented the "No Portmapper" feature).

**Figure 34. Firewall Security on Client (SSI) and StorageTek ACSLS Server (CSI) Without the Portmapper Feature**



## ■ Turning On the Firewall-Secure Option

To turn on the firewall-secure option, you need to set several variables using the `access config` utility.

1. Log in as acsss.
2. At the password prompt, enter the password for user acsss.
3. Stop the StorageTek ACSLS server

**Note:** You must bring down the StorageTek ACSLS server for the new firewall-secure variables to take effect.

kill.acsss

4. To run the configuration script, enter

```
acsss_config
```

The StorageTek ACSLS feature configuration screen appears.

5. Select option 1 - Set CSI tuning variables

Accept the default for all variables except for the following.

- a. Set the value to TRUE at the following prompt:

Changes to alter use of the TCP protocol will not take effect until the product is restarted. CSI support for RPC using the TCP protocol is enabled [TRUE].

**Variable:** CSI\_TCP\_RPCSERVICE

Turning on TCP insures that the TCP protocol is available for use by clients of StorageTek ACSLS for network communications. The firewall-secure feature of StorageTek ACSLS supports TCP only, so clients should perform network communications using this protocol.

- b. Set the value to FALSE at the following prompt:

Changes to alter the use of the UDP protocol will not take effect until the product is restarted. CSI support for RPC using the UDP protocol is enabled [TRUE].

**Variable:** CSI\_UDP\_RPCSERVICE



**CAUTION:** You must ensure that no StorageTek ACSLS clients are depending on this UDP protocol. The firewall-secure StorageTek ACSLS runs on TCP only.

Turning off UDP insures that no clients will access the server using this protocol. This allows you to disallow all general UDP access to the StorageTek ACSLS platform at the firewall, allowing only those accesses which are specifically required in your environment.

You **must** allow clients access to the UDP and TCP port 111 for portmapper access, unless those clients implement the firewall-secure feature, and specifically turn off their queries to the StorageTek ACSLS portmapper.

- c. Set the value to NEVER at the following prompt:

Changes to alter use of the port mapper will not take effect until the product is restarted. Enable

```
port mapper: (ALWAYS / NEVER /  
IF_DUAL_LAN_NOT_ENABLED) [IF_DUAL_LAN_NOT_ENABLED].
```

**Variable:** CSI\_USE\_PORTMAPPER

**NEVER** allows clients of StorageTek ACSLS to disallow external access to the portmapper on those client platforms.

**IMPORTANT:** This does **not** allow you to turn off external access to the portmapper on the StorageTek ACSLS platform; to do that, the client(s) of StorageTek ACSLS must have adopted the firewall-secure changes in the client software component(s), and this feature must be turned on in the client software component.

This feature ensures that the StorageTek ACSLS server will not make any queries of the portmapper on the client platform. This allows any firewall **which is protecting the client** to disallow access to the portmapper.

- d. Set the value to TRUE at the following prompt:

Enable CSI to be used behind a firewall (user-defined inbound port) (TRUE/FALSE) [FALSE]:

**Variable:** CSI\_FIREWALL\_SECURE

**TRUE** allows you to specify the single port that StorageTek ACSLS will use for accepting inbound client communications (i.e. TCP connections). This variable simply enables this feature. The specific port will be specified in the next variable.

- e. Set the value to an available fixed port on the StorageTek ACSLS server at the following prompt:

Port number used by the CSI to receive incoming StorageTek ACSLS requests.

**Variable:** CSI\_INET\_PORT

This is the port which will be used by the StorageTek ACSLS CSI component for accepting incoming network connections.

**IMPORTANT:** You must configure your firewall to allow incoming connections on this port. This ensures that only that port is exposed for use by those outside clients wanting to initiate communications with StorageTek ACSLS. You may disallow connections on all other incoming ports except this one, and UDP/TCP port 111 (unless clients have implemented the feature to eliminate their queries to the StorageTek ACSLS portmapper; in that case, port 111 may also be disallowed at the firewall). The recommended default value for this port is 30031. It is unlikely (but not impossible) that this port will be used by other processes on most systems. See the [Appendix H, "Troubleshooting"](#) for steps to take if there is a port conflict.

6. Select E to exit acsss\_config.  
Your changes are saved.
7. Restart StorageTek ACSLS by entering:  
`rc.acsss`  
Your changes are saved.

## ■ Turning Off the Firewall-Secure Option

Some of the variables used above for turning on the firewall-secure feature are also related to turning off that feature. To turn off the firewall-secure behavior, it is only necessary to perform the steps below, but a specific site may wish to make modifications to other variables as well.

1. Log in as acsss.
2. At the password prompt, press enter the password for user acsss.
3. Stop the StorageTek ACSLS server

**Note:** You must bring down the StorageTek ACSLS server for the new firewall-secure variables to take effect.

`kill.acsss`

4. To run the configuration script, enter  
`acsss_config`
5. Select option 1 - Set CSI tuning variables

Change the following values that were set when you configured the firewall-secure feature. You must change the following variables:

- a. Set the value to ALWAYS at the following prompt:  
Changes to alter use of the port mapper will not take effect until the product is restarted. Enable port mapper: (ALWAYS / NEVER / IF\_DUAL\_LAN\_NOT\_ENABLED) [IF\_DUAL\_LAN\_NOT\_ENABLED].

**Variable:** CSI\_USE\_PORTMAPPER

- b. Set the value to FALSE at the following prompt:  
Enable CSI to be used behind a firewall (user-defined inbound port) (TRUE/FALSE) [FALSE]:

**Variable:** CSI\_FIREWALL\_SECURE

6. Select E to exit acsss\_config.
7. Restart StorageTek ACSLS by entering:

rc.acsss

## ■ Firewall-Secure Configuration

The following requires that you are knowledgeable with regard to configuring the network firewall behind which StorageTek ACSLS resides. ALL firewalls are “third-party” software, and will have varying details with regard to setting them up correctly for protecting your network environment. The following is not meant to be a recommendation of firewall security policy, but rather a set of helpful instructions for what the firewall must / can do with regard to the StorageTek ACSLS product only. See your System Administrator for other security details.

Here is a list of details for setting up your firewall with respect to the StorageTek ACSLS platform:

- Put in place an overall rule to disallow UDP incoming and outgoing connections.
- Put in place an overall rule to disallow TCP incoming connections (TCP outgoing connections must remain open).
- Put in place a specific rule to allow incoming TCP connections on the port which you specified for the StorageTek ACSLS usage. **IMPORTANT:** This port **must** match the one you configured under acsss\_config, or you will receive no client communications at the StorageTek ACSLS server.

If all of your clients have implemented the firewall-secure feature and make no queries to the StorageTek ACSLS platform's portmapper, you are done. If the clients still make use of that portmapper on the StorageTek ACSLS platform, you must add the following:

- Put in place a specific rule to allow incoming and outgoing connections on the well-known portmapper TCP and UDP port 111.

## Example

The following is an example of the rules which were put in place for an iptables-based firewall in order to put all of the above rules in place.

**Note:** These are in addition to other rules configured for the specific firewall.

```
echo " - FWD: Allow all connections OUT and only existing/
related IN"
$IPTABLES -A FORWARD -i $EXTIF -o $INTIF -m state --state \
ESTABLISHED,RELATED -j ACCEPT
# These rules allow client access to the portmapper
$IPTABLES -A FORWARD -p tcp -i $EXTIF --dport 111 -j ACCEPT
$IPTABLES -A FORWARD -p udp -i $EXTIF --dport 111 -j ACCEPT
```

```
# These rules allow client access to the StorageTek ACSLS CSI
# for network communication

# Note: This assumes that the CSI firewall-secure port was
# specified as 30031

$ IPTABLES -A FORWARD -p tcp -i $EXTIF --dport 30031 -j ACCEPT

# Catch all rule, all other forwarding is denied and logged.

$ IPTABLES -A FORWARD -j drop-and-log-it
```

## ■ Troubleshooting Firewall-Secure Communications

Troubleshooting a network communications interface which includes the StorageTek ACSLS platform and clients, and now includes intervening firewall(s), may involve multiple steps. By introducing the firewall(s) into the path between StorageTek ACSLS and its clients, there are more potential causes for network communications failures. Additionally, there are more components that must be configured in a way that corresponds with the settings in other components, and if these settings do not match, the network communications will be impacted. Here is a list of things to check and try if you've done all the configuration work on StorageTek ACSLS, its client(s), and the firewall(s), and network communications are not working.

1. Checking the StorageTek ACSLS platform:
  - Is the StorageTek ACSLS up and running? If not, check the `acsss_event.log` for possible reasons, or for pointers to a possible culprit.
  - Is the CSI being brought up successfully by StorageTek ACSLS? If not, there should be informative messages in the `acsss_event.log` which point towards the cause. Bad values for some of the configuration parameters or a port conflict are likely possible causes.
  - Is there a port conflict being reported in the `acsss_event.log` which causes the CSI to fail? If so, you should use the "netstat" or similar system utility to tell you which ports are in use on the system, and configure the StorageTek ACSLS to use an available port. Remember to reconfigure the firewall to match.
  - Is the CSI registering for the port you expect? Use the command `'rpcinfo -p'` to look at the portmap table. The CSI is registered under program number 300031. Check to make sure that the port registered under that program number is the one you expect (the default port is 30031, with one less zero than the program number).
2. If StorageTek ACSLS and the CSI are up and running and correctly registered, the next step would be to check access to the StorageTek ACSLS platform across the firewall:

- Is the StorageTek ACSLS reachable via basic RPC? Use the "rpcinfo -t <hostname> <program-number> <version-number>" command to send a simple RPC request to the CSI. (Use "man rpcinfo" on your system to get more information on the rpcinfo command and its use.) Do this from a machine on the inside of the firewall with StorageTek ACSLS (e.g. from the StorageTek ACSLS platform itself), and from outside the firewall. If it works from inside but not from outside, then the firewall is intercepting your StorageTek ACSLS requests. You need to double check the configuration of the firewall and the StorageTek ACSLS port. Also check to be sure that the portmapper is accessible through the firewall (this test cannot be used from outside the firewall if access to the portmapper is disallowed).
- Do the ports configured for StorageTek ACSLS and for the firewall match? Double-check these parameters. This is a likely cause of failure in network communications. Aside from the configured values, perform the 'rpcinfo -p' command mentioned above to insure that the CSI is indeed registering with the expected portnumber. If it is not, look in the acsss\_event.log for information about the cause.
- Is the StorageTek ACSLS receiving requests, but unable to send back responses? If you check the acsss\_event.log and find that the CSI reports many dropped network packets or failures to communicate with network clients, then the client requests are getting in, but the responses are not getting out. Again, this is an indication that they are being blocked by a firewall.

### 3. If your problems are still not resolved.

The above addresses several levels of things to look for. If these yield no specific answer, it's time to do some lower-level checking to find out where communications are being broken down. The best way to do this is through the use of a network packet sniffer facility, such as 'snoop' under Solaris. Use "man snoop" on your Solaris-based system to get more information on the snoop command and its use.

Similar packet tracing facilities are available on other network-connected systems.

- To utilize this, you will have to do your packet sniffing from locations that show you where the packets are getting to and where they are being lost. This may be from both inside and outside the firewall.
- Additionally, looking at the packet data will be informative. If either side is allowing use of the portmapper, it is likely you will see some PORTMAP packets.
- Also, you should see RPC packets passing between the StorageTek ACSLS and its clients.
- Finally, looking at the transport-level TCP connection will inform you of the specific ports being used on each side for the connection. This is

often critical information to find out where the communications are being stopped.

- More detail on performing these operations is beyond the scope of this manual, but your System Administrator should be able to provide some help in this area.

## ■ Frequently Asked Questions

### **Why do I need the firewall-secure solution for StorageTek ACSLS?**

The firewall-secure solution allows you to effectively run the StorageTek ACSLS behind a firewall, and allows you to restrict ports on that firewall so that security is significantly enhanced.

### **What releases of StorageTek ACSLS will support the firewall-secure feature?**

Only StorageTek ACSLS 7.0.0 and above support this feature.

### **What is the maximum number of ports I will have to leave open if I use this firewall-secure feature?**

The maximum number of ports on which you might have to allow incoming network connections is three: one for the StorageTek ACSLS network interface, and two for the portmapper (UDP and TCP 111). Outgoing ports are unrestricted, in accord with accepted industry security practices.

### **What is the minimum number of ports I can leave open?**

The minimum number is one. This is possible if your clients (ISV software) have also implemented the firewall-secure features in their client, and make no queries to the portmapper which resides on the StorageTek ACSLS platform. When that is the case, the only port that need be open for incoming connections is the one user-specified TCP port used by the StorageTek ACSLS network interface.

### **Why doesn't the feature use a range of ports?**

There is no architectural advantage to using a range of ports, and there are some security disadvantages. The non-firewall-secure StorageTek ACSLS uses a range of ports which consists of the full range of dynamic ports available on any given platform. This is correctly perceived as a potential compromise to the security of a site. Restricting this as much as possible, without adversely affecting StorageTek ACSLS performance, is the goal in order to eliminate that compromise. Since the StorageTek ACSLS network interface uses only one incoming port at any given time, there is no reason to extend the range beyond one port, provided that port is dedicated to StorageTek ACSLS use for the StorageTek ACSLS platform.

**What if the port I choose conflicts with another usage of that port on my system?**

This is one of the reasons that the port is made user-specifiable. The specific ports available will vary from one customer site to another. The user is not allowed to use one of the well-known reserved ports from 0-1023. The default port of 30031 falls within the range of registered ports, which makes it less likely (though not impossible) that another application which uses dynamic ports will utilize it. Although it is in the range of registered ports, there is no application registered to use it, which makes it a reasonable default selection.

**Does this feature allow me to protect my StorageTek ACSLS server with a firewall?**

Yes, with this feature in place, your StorageTek ACSLS server can be put on the trusted side of a firewall, with clients accessing it from the opposite (untrusted) side or from the same side.

**Does this feature allow me to protect my StorageTek ACSLS clients (ISV components) with a firewall?**

Potentially, yes, but not by itself. In order to realize this scenario, your client software components (clients of the StorageTek ACSLS) must have adopted the firewall-secure feature, which has been made available via the StorageTek CDK (CSC Developer's Toolkit). Contact your client software provider for a current update on their status.

**If I want to be able to protect my clients with a firewall, what should I do?**

You should contact your client software provider. They can tell you whether they have adopted any firewall-secure changes in their CSC (client software component).

**What about the portmapper? Can I completely disallow access to the portmapper?**

If your clients have adopted the firewall-secure changes, they may allow you to shut off the client's queries to the StorageTek ACSLS platform's portmapper. In that case, you may disallow access to the portmapper on the firewall which protects the StorageTek ACSLS platform. In any other case, the clients will depend on the StorageTek ACSLS server side portmapper to help them make a connection with the StorageTek ACSLS network interface, and it must be available for their use.

**Why must the client implement some changes in order for my StorageTek ACSLS server firewall to shut down access to the StorageTek ACSLS platform portmapper?**

Because it is the client that is making these queries of the StorageTek ACSLS platform. If the client continues to make these queries, the

StorageTek ACSLS platform must continue to provide the portmapper's services in order for those queries to succeed.

**I think the portmapper is bad. Why didn't you remove it completely?**

The portmapper provides an important service to legacy clients. Removing it completely would invalidate the interface on which those clients depend. In short, no legacy clients would work without recoding, retesting, and again certifying with the new non-portmapper interface. In this firewall-secure solution, we have provided the capability to remove the queries to the portmapper from both the StorageTek ACSLS to the client, and from the client to the StorageTek ACSLS, but we cannot force client software to conform to this. Thus, the portmapper must remain available at least as an optional service until a site's clients have adopted the firewall-secure features and no longer make use of the portmapper service.

**Some of my clients have adopted the firewall-secure features and some have not. How can I take advantage of this?**

Those clients which have adopted these features may be protected behind their own respective firewalls. In addition, access to the portmapper's well-known ports may be restricted at the firewall, and then configured to allow access to the portmapper only by those clients who require it. The details and ability to do this will vary based on the specific firewall in use at the site.

**I think RPC is bad. Why didn't you remove it completely?**

The StorageTek ACSLS network interface has been RPC-based since the first release of StorageTek ACSLS. It has proven to be an effective, stable, and reliable mechanism, offering various advantages at the network communications layer. However, it can also be more difficult to secure a platform which uses RPC, due to its common dynamic allocation of ports and use of the portmapper. In this firewall-secure solution, both of these areas are addressed, which allows the customer to effectively configure a firewall in a restricted fashion, yielding the security benefits for which they have the firewall in place.

Additionally, complete removal of RPC from the StorageTek ACSLS network interface would invalidate all current (legacy) StorageTek ACSLS clients, making it impossible for any of them to communicate with StorageTek ACSLS without recoding, retesting, and again certifying their CSCs (client software components).

**How will the firewall-secure feature affect network communications performance and timing between my StorageTek ACSLS clients and the StorageTek ACSLS server?**

There is no effect on performance due to the new firewall-secure features. The usage of a firewall may have performance implications, but this will be based on the operational characteristics of each specific customer's firewall implementation. With a firewall which has negligible impact on

performance, the StorageTek ACSLS and its clients will continue to perform as they did prior to installing the firewall-secure feature. Also, the StorageTek ACSLS network interface tolerances can be configured, so that delays imposed by the firewall could be handled gracefully.

**How does the firewall-secure feature affect the rest of my StorageTek ACSLS operations?**

There is no effect or impact on other parts of the StorageTek ACSLS operations due to the installation of the firewall-secure solution.

**How does the firewall-secure feature affect the StorageTek ACSLS functionality that my clients use (via the ACSAPI)?**

The full set of functionality that is provided through the ACSAPI (and which our StorageTek ACSLS clients use today to interface with StorageTek ACSLS) will operate the same under the firewall-secure feature as it does without the feature installed. In particular, this firewall-secure feature supports access control, and also all of the newer features that have been added to the StorageTek ACSLS product. The full functionality of the ACSAPI will continue to be supported by this feature.

**Does the firewall-secure feature work with the StorageTek ACSLS HA (High Availability) solution?**

The firewall-secure feature does not adversely affect HA operation. However, the HA solution is not designed to be run across a firewall (i.e. with each HA server on opposite sides of a firewall). The HA solution requires remote access to the portmapper, so the firewall could not disallow that access if an attempt were made to run each server on opposing sides of a firewall. There are other details of running across a firewall that could adversely affect an HA setup; it is highly recommended that this not be done.

If the HA servers are set up on the same secured side of the firewall, that set of HA servers could be set up with the firewall-secure feature, and clients on the opposite side of the firewall would be able to interact across the firewall with those servers with the same performance and behavior as they would against a non-firewall-secure HA solution.

**Does this firewall-secure feature work with other StorageTek software products?**

Interoperability with other StorageTek products, as well as partner products (such as client software components which communicate with StorageTek ACSLS) has been completely preserved. Those products can continue to operate without modification, communicating with the StorageTek ACSLS server, with the StorageTek ACSLS server running behind a secured firewall, or in the same environment with those products (as it does today).

**Do other StorageTek software products have the same firewall-secure features?**

Other StorageTek products do not gain the firewall-secure benefit simply by being used in the same environment with the firewall-secure StorageTek ACSLS. Each product can work with a firewall secured StorageTek ACSLS (see previous question), but putting each of those products behind its own respective firewall is a question that the specific product itself must address. Some StorageTek products already have built-in policies which allow some restriction at a firewall used to protect the platforms where those products run. Additionally, any product which acts as a client to StorageTek ACSLS has the option of adopting the firewall-secure changes which were made to StorageTek ACSLS, and which are provided as part of the StorageTek CDK (CSC Developer's Toolkit).

# Media Management

K

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This chapter discusses how to manage the same type of media recorded in different densities, as well as how to separate cartridges written in the old density from cartridges written in the new density.

## ■ Overview

In this overview, you gain an understanding of:

- Restrictions and the possible problems you may encounter
- Examples of tape drives that record on the same media in different densities
- Recommended solutions

## Restrictions

Often, new tape drives are introduced that use existing tape media, but record at a higher density. These new drives can often read tapes recorded in the old density, but they cannot write in the old density. The older tape drives can neither read nor write in the higher density.

Because of these restrictions, you can encounter these problems:

- When a tape written in the new density is mounted on an older drive, the older drive cannot read the tape.
- When storage management applications try to fill up partially used tapes by appending additional files at a later time it fails if the tape was written using a different density than one to which a new tape drive can read but cannot write.

If you have a mix of both older and newer tape drives in your libraries, you need to manage your tape cartridges that are of the same media type.

## Examples

The following examples show tape drives that record on the same media in different densities:

- **T1000 Media used by T1000A and T1000B Tape Drives**

The T10000B tape drive uses the same media as the T10000A, but writes data at double the T10000A's density. The T10000B can read T10000A

media and can “reclaim” (write from beginning of tape) it for writing T10000B density data, but it cannot append data to a previously written T10000A.

The T10000A drive can reclaim a T10000B cartridge for writing T10000A density data, but can neither read from nor append data to a T10000B cartridge.

- **9840 Media used by T9840A, T9840B, T9840C and T9840D Tape Drives**

You must manage 9840 media when a combination of T9840A, T9840B, T9840C, and/or T9840D drives are present because:

- T9840A and T9840B

The T9840A and T9840B tape drives use the same media and record in the same density.

- T9840C

The T9840C uses the same media as the T9840A and T9840B, but records at double the density.

- T9840D

The T9840D writes at almost double the T9840C drive's density.

You must manage 9840 media when a combination of T9840A, T9840B, T9840C, and/or T9840D drives are present.

- **9940 Media used by T9940A and T9940B Tape Drives**

- **T9940A**

The T9940A drive can reclaim a T9940B cartridge for writing single density data, but can neither read from nor append data to a T9940B cartridge.

- **T9940B**

The T9940B tape drive uses the same media as the T9940A, but writes data at double the T9940A's density. The T9940B can read T9940A media and can reclaim it for writing double density data. However, it cannot append data to a previously written T9940A cartridge.

## Solution

StorageTek ACSLS has tools you can use to manage common media on which two or more types of drives can write, but are in incompatible recording densities. The client application must use these tools to manage the read/append data incompatibilities.

You can manage drives that record on common media in different densities within an ACS by either:

- Replacing all of the older drives in an ACS with the new drives at the same time.

This is the simplest and safest strategy. Using this strategy, you avoid the problems caused by managing a combination of drives using different densities. If you are unable to do this, you can gradually replace the older drives with the new drives as discussed in the second bullet.

**Note:** Do not append files to any tapes written in the old recording density after replacing the old drives with the new drives. With Veritas NetBackup, this is done by *suspending* the tapes.

- Gradually replacing the older drives with the new drives.

This requires you to manage the common media recorded in different densities. You can do this by:

- Using the recording format information returned when the cartridge is dismounted in StorageTek SL8500 and StorageTek SL3000 libraries to manage media. This is discussed in the next section.
- Creating separate StorageTek ACSLS pools for each format.
- Using the facilities of a backup application (for example, Veritas NetBackup, Legato NetWorker, IBM Tivoli, or CA BrightStor) to manage media pools.

## ■ Managing Common Media with Recording Densities Reported by StorageTek ACSLS

When a cartridge is dismounted from a modern tape drive in a modern library, the recording format of the cartridge is reported to StorageTek ACSLS.

StorageTek ACSLS saves the recording format in its database. You can use the `display volume` command to display this information.

Recording format is reported by:

- Libraries:
  - StorageTek SL3000
  - StorageTek SL8500 (with 4.10 or later firmware)

- Tape Drives:
  - All T10000 tape drives (with 1.38 or later firmware)
  - T9840A, T9840C, and T9840D (All T9840 tape drives except the T9840B.) (with 1.4.2 or later firmware)
  - T9940A and T9940B tape drives (1.4.2 and later firmware)

The example below describes how to manage T10000 media recorded in both T10000A and T10000B formats. Use the following table to apply the procedure to your specific case:

Old Format Drive(s)	New Format Drive(s)
T10000A	T100000B
T9940A	T9940B
T9840A/T9840B	T9840C or T9840D
T9840C	T9840D

**Note:** The discussion below uses the following syntax conventions for commands and utilities:

- Commands and Utilities entered as is are in **bold**.
- Variables (you must enter the exact value) are in *italics*.

## Procedure

After the T10000B drives are installed, use the recording format information to mount cartridges on compatible tape drives. Again, cartridges written at T100000A density can be read by either T10000A drives or T10000B drives, but only T10000A drives can append data written in a T10000A format. Only T10000B drives can read or append to cartridges written in a T10000B format.

No special processing is necessary when mounting scratch cartridges. When you write the cartridge from beginning-of-tape, the previous recording format does not matter.

To select a drive to read or append to a cartridge with data already recorded on it, follow this procedure. The following commands identify drives that can read and write a cartridge's recording format.

### Mounting Non-scratch Cartridges

1. Display the recording format of the cartridge.

```
display volume vol_id -f recording_format_family
recording_format_model
```

The recording format for this volume is displayed.

2. Use the following query command to identify a compatible drive.

```
query mount vol_id
```

Drives compatible with a cartridge are displayed.

- You must select the correct drive type before mounting the cartridge.

This query command returns both T10000A and T10000B drives (because both drive types are compatible with T10000 media).

- Use drive type to separate T10000As from T10000Bs.

Selecting the first compatible drive in the list minimizes pass-thru and improves library performance.

3. Mount the cartridge on a drive compatible with the recording format.

```
mount vol_id drive_id
```

#### **Migrating to the New Recording Format**

- When all the data on the cartridge has expired, you can re-write the cartridge from beginning-of-tape in a new recording format. For more information on expired cartridges, refer to ["Identifying Expired Cartridges" on page 97](#).
- After all T10000A drives are converted to or replaced by T10000B drives, all T10000 media can be used by T10000B drives as long as data is not appended to cartridges written in T10000A format

## **■ Managing Common Media Recorded in Different Densities with StorageTek ACSLS Pools**

The example below describes how to manage 9940 media recorded in both T9940A and T9940B densities. The following procedure applies to all cases where different tape drives record on a common media in different densities. Use the following table to apply the procedure to your specific case:

<b>Old Format Drive(s)</b>	<b>New Format Drive(s)</b>
T10000A	T100000B
T9940A	T9940B
T9840A/T9840B	T9840C or T9840D
T9840C	T9840D
SDLT 220	SDLT 320

## Procedure

1. Identify all 9940 data (non-scratch) cartridges in the ACS and assign them to a T9940A pool.

Do this before installing T9940B drives in an ACS that has T9940A drives.

Now you can assign 9940 scratch cartridges to either the T9940A or T9940B pool.

- a. Define T9940A and T9940B media pools:

```
define pool pool_id
```

- b. Report all 9940 media.

You can do this by using either the `display volume` command (option 1) or a custom `volrpt` (option 2) as shown below:

Results are written to a file.

- Option 1

Use the `display volume` command to write the results to a file.

```
display volume * -media STK2P > filename
```

where:

All 9940 tape cartridges (media STK2P) are reported.

*filename* is the filename to which the output is written. The **ACS ID** in which the cartridge is located is also listed.

Read the output, selecting cartridges from specific ACS(s), if desired.

If you want cartridges from one ACS, use the `-home` operand to only select cartridges from this ACS.

```
display volume * -home acs_id.*,*,* -media STK2P> filename
```

- Option 2

Use the custom `volrpt` for all volumes in the ACS. The results are written to a file:

```
volrpt -d -f custom_volrpt_file -a acs_id > filename
```

where:

*custom\_volrpt\_file* is the filename specifying the fields reported in a custom `volrpt`. The following fields are reported:

VOLUME_ID	6	2
MEDIA_TYPE	7	2
VOLUME_TYPE	4	2

*acs\_id* is the ID of the ACS that you are managing.

*filename* is the filename to which the output is written.

Read the output, selecting only the volumes with a media type of STK2P.

- c. Assign the selected volumes to the appropriate pools.

Assign all non-scratch (**VOLUME\_TYPE** = “D”) cartridges to the T9940A pool.

**set scratch off pool\_id vol\_id**

Assign the scratch cartridges (**VOLUME\_TYPE** = “S”) to either the T9940A or T9940B pools.

**set scratch pool\_id vol\_id**

2. After the T9940B drives are installed, use the pools to mount cartridges on compatible tape drives.

Again, cartridges written at T9940A recording density can be read by either T9940A drives or T9940B drives, but only T9940A drives can append data on 9940A media. Only T9940B drives can read or append to cartridges written at 9940B recording density.

The following commands can be used to identify, select and mount cartridges from the pool appropriate for a T9940A or T9940B drive. Use the pools to ensure you are mounting cartridges on the correct drive.

**Note:** If you want to mount a scratch cartridge on the correct drive type, follow procedure A. If you want to mount a non-scratch cartridge with data already recorded on it, follow procedure B.

#### **Procedure A - Mounting Scratch Cartridges**

- a. Query drive(s) to identify drive types.

**query drive drive\_id | all**

- b. Identify the correct pool (media type) for the cartridges to be mounted on the desired drive
- c. Mount scratch cartridges to a drive from the specified pool.

**mount \* drive\_id pool\_id**

#### **Procedure B - Mounting Non-scratch Cartridges**

- a. Display the status of drives compatible with a cartridge.

**display volume vol\_id -f pool**

The pool for this volume is displayed.

- b. Identify a compatible drive using the query command.

**query mount** *vol\_id*

Drives compatible with a cartridge are displayed.

You must select the correct drive type before mounting the cartridge. This query command returns both T9940A and T9940B drives (because both drive types are compatible with 9940 media).

Use drive type to separate T9940As from T9940Bs.

- c. Mount the cartridge on the selected drive.

**mount** *vol\_id* *drive\_id*

3. When all the data on the cartridge has expired, you can migrate the scratch cartridges to the pool for the new recording density. Because T9940A and T9940B drives can re-initialize cartridges in their density, scratch cartridges can be reassigned to a different pool.

**set scratch** *pool\_id* *vol\_id*

4. After all T9940A drives are converted to or replaced by T9940B drives, all 9940 media can be used by T9940B drives as long as data is not appended to cartridges written in T9940A recording density.

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This chapter describes the Client Server Communications Interface (CSCI) component.

This chapter covers the following topics:

- Overview of CSCI
- Error messages
- Environmental variables

Installation of CSCI should follow installation of the operating system and installation and configuration of StorageTek ACSLS.

**Note:** For StorageTek ACSLS to function properly, the START\_CSCI\_Process configuration variable must be set to TRUE. You do this in Option 1 of acsss\_config. See [“Setting Variables that Control StorageTek ACSLS Behavior” on page 23](#).

## ■ Overview of CSCI

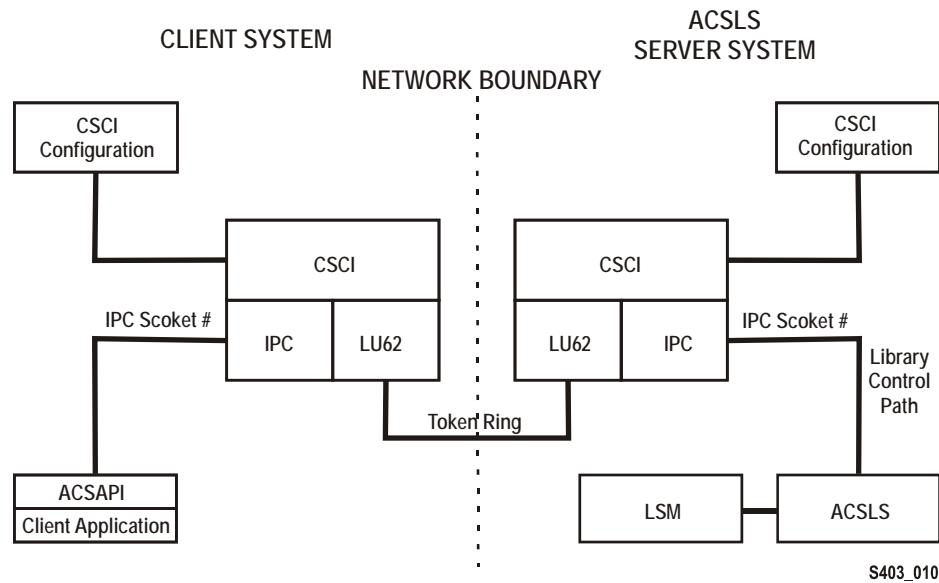
The Client Server Communications Interface (CSCI) is a stand-alone component responsible for the passing of request and response packets between a client system and a server system. CSCI is an optional component that lets MVS or RMLS/CSC clients communicate with StorageTek ACSLS. If you do not use CSCI, you use CSI by default to communicate with StorageTek ACSLS.

## CSCI Connectivity

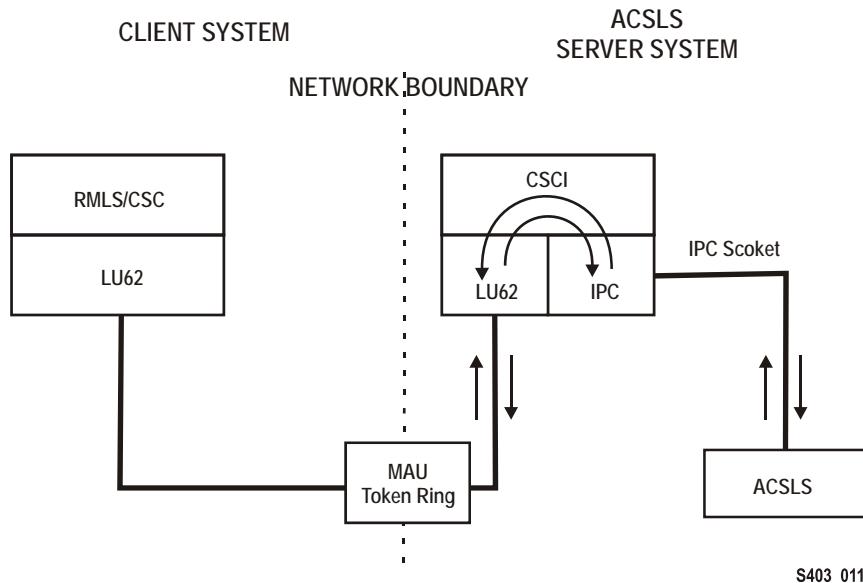
CSCI provides IPC and TCP/IP connectivity to link the StorageTek ACSLS server with MVS clients or RMLS/CSC clients

## Architecture and Subsystems

[Figure 35 on page 440](#) shows an overall CSCI architecture and subsystems.

**Figure 35. CSCI Architecture and Subsystems**

[Figure 36](#) shows how the CSCI system connects with the network interface. On the server side, the data flows from the network hub through the TCP/IP interface to the CSCI interface. From here the data flows through an IPC interface to the StorageTek ACSLS software in both directions but in a half duplex mode, i.e., one direction at a time.

**Figure 36. CSCI System with Token Ring Interface**

## ■ Error Messages

CSCI installation and configuration error messages relate to the following conditions:

- Improper ownership
- Improper access permission
- Undefined environment variables
- A variety of miscellaneous conditions
- Improper CSCI and TCP/IP configuration

### Common Error Messages

Communication failure, verb = *cmroutine*, rc = *xx*, errno = *yyy* IPC failure on Socket CSCI*zzzzz*

**Explanation:** The read failed on the named connection.

**Variable:**

- *xx* is IBM CPI return code
- *yyy* is the UNIX errno value in /usr/include/sys/errno.h
- CSCI*zzzzz* is the socket number that was in use
- *cmroutine* is the IBM CPI routine name that failed

Read failed for connection: *connection\_name*

**Explanation:** The read failed on the named connection.

**Variable:** *connection\_name* is the name of the connection on which the read failed.

Write failed for connection: *connection\_name*

**Explanation:** The write failed on the named connection.

**Variable:** *connection\_name* is the name of the connection on which the write failed.

## ■ Environmental Variables

CSCI is invoked by `csciServer.sh`, a Transaction Program Name (TPN) in the directory where StorageTek ACSLS executables reside. This shell script defines CSCI environment variables.

[Table 28](#) shows descriptions of CSCI environment variables for the server subsystem. Following this table is a shell script like the one provided in the distribution of StorageTek ACSLS/CSCI software. This shell script is started by TCP/IP on the server.

**Table 28. CSCI Server Subsystem Environment Variables**

Name	Description
CSCI_TRACE	This variable is used to indicate whether CSCI tracing is <b>ON</b> or <b>OFF</b> .
CSCI_SLEEP_TIME	This variable is used to indicate the PER sleep time at the end of each round-robin loop through the connection table (polling timeout). Default is <b>100 msec</b> .
CSCI_INITIAL_CONNECTION	This variable is used to indicate the CSCI's initial connect name to open first. This is the connection service name requiring i/o on initial startup of the CSCI. Clients usually open IPC first; Servers open TCP/IP first.
CSCI_SERVER_NAME	This variable is used to indicate the name of the CSCI Server. It must be set the same for all CSCI's Clients defined to a single CSCI server. <b>The server name must match its CSCI Clients</b> <b>CSCI_SERVER_NAME</b> . The matching of the Server and Client CSCI_SERVER_NAME provides an end-to-end logical link between machines. Finally, this name is used later for the “connectionname” in other environment variables. The value assigned to the CSCI_SERVER_NAME must be replicated in the connectionname part of the subsequent variables.
CSCI_connectionname_NET_TYPE	This variable is used to indicate what Network type this CSCI is configured for from the CIF subsystem. The NETTYPE defines the transport layer used by this CSCI. Valid assignments are <b>LU62</b> or <b>IPC</b> .
CSCI_connectionname_INPUT_SOCKET	This variable is used to indicate the input socket number to use as input to this CSCI. This number would match the Server or Client application output socket number.

**Table 28. CSCI Server Subsystem Environment Variables**

Name	Description
CSCI_connectionname_CON_TYPE	This variable is used to indicate this CSCI type. This CON_TYPE defines the CSCI to be either a <b>SERVER</b> or a <b>CLIENT</b> .
CSCI_connectionname_TRANSLATE_TYPE	This variable is used to indicate this CSCI XDR type to be employed during execution. This can be assigned to either <b>XDR</b> or <b>NONE</b> .
CSCI_connectionname_DESTINATION_SOCKET	This variable is used to indicate destination or output socket number to be used by the CSCI Server. This socket number would be the matching input socket number to the CSCI Server Application.



# Glossary

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## A

**absent cartridge** A cartridge that is in the database, but that couldn't be found when all recorded locations for the cartridge were catalogued. If a nonzero retention period is set, the volume status is changed to STATUS\_VOLUME\_ABSENT.

**ACS** See Automated Cartridge System.

**ACSEL** See ACS Event Logger.

**ACS Event Logger (ACSEL)** The software component that receives messages from other StorageTek ACSLS components and writes them to an Event Log.

**ACS ID** A unique identifier for an ACS.

**ACSLH** See ACS Library Handler.

**ACS library** A library is composed of one or more ACSs, attached tape drives, and cartridges residing in the ACSs.

**ACS Library Handler (ACSLH)** The part of the ACSLM that communicates directly with the LMU.

**ACSLM** See ACS Library Manager.

**ACS Library Manager (ACSLM)** The software component that validates and routes library requests and responses.

**StorageTek ACSLS** See ACS Library Software.

**StorageTek ACSLS database** StorageTek ACSLS database containing information about the location and status of the data or cleaning cartridges. The information includes cell location, scratch status, etc.)

**StorageTek ACSLS platform** The server hardware and software that provide the proper environment for StorageTek ACSLS.

**ACS Library Software (StorageTek ACSLS)** Manages ACS library contents and controls ACS library hardware to mount and dismount cartridges on ACS cartridge drives.

**StorageTek ACSLS database** A database used by StorageTek ACSLS to track the library configuration and the locations and IDs of all data or cleaning cartridges in the library.

**ACSSA** See ACS System Administrator.

**ACS System Administrator (ACSSA)** The interface between the Command Processor and the rest of the system.

**ADI** Application Data Interchange.

**audit** A physical inventory of the contents of all or part of a library.

**Automated Cartridge System (ACS)** The library subsystem consisting of one or more libraries connected through pass-thru-ports.

**automated library** See library.

## B

**backing library** Identifies the physical library from which the logical library is created.

**beginning of tape (BOT)** The location on a tape where written data begins.

**BOT** See Beginning of Tape.

## C

**CAP** See Cartridge Access Port.

**CAP ID** A unique identifier for the location of a CAP. A CAP ID consists of the ACS ID, the LSM number, and the CAP number.

**cartridge** A plastic housing containing a length of data recording tape. The tape is threaded automatically when loaded in a transport. A plastic leader block is attached to the tape for automatic threading. The spine of the cartridge can contain an OCR/Bar Code label listing the volume ID.

**Cartridge Access Port (CAP)** A bidirectional port built into the door panel of an LSM, which provides for the manual entry or automatic ejection of data or cleaning cartridges.

**cartridge drive (CD)** A device containing two or four cartridge drives and their associated power and pneumatic supplies.

**cartridge tape I/O driver** Operating system software which issues commands (e.g., read, write, and rewind) to cartridge subsystems.

**cartridge transport** An electromechanical device that moves tape from a cartridge over a head that writes and reads data from the tape. A transport is distinct from the power and pneumatic sources that supply the electricity and air it needs to function. See cartridge drive.

**CCI** See client computing system.

**CD** See cartridge drive.

**cell** A receptacle in the LSM in which a cartridge is stored.

**channel** A device that connects the host and main storage with the input and output control units.

**client applications** Software applications that manage tape cartridge contents. They access tape cartridges by interacting with StorageTek ACSLS. Any number of client applications can be resident on a client system.

**client computing system** A computer and an executable image of the operating system.

**client software** This software manages tape cartridge contents, generates requests for cartridges, and drives data to and from cartridges. The client software is not part of StorageTek ACSLS.

**Client System Component** Software which provides an interface between the client computing system's operating system and StorageTek ACSLS.

**Client System Interface (CSI)** The software component that translates and routes messages between the ACS Library Manager and the Client System Component.

**command access control** Limits access to commands.

**command area** The bottom area of the cmd\_proc interface where you enter requests and receive responses.

**command processor (cmd\_proc)** The screen interface of the ACSSA. cmd\_proc lets you enter the commands described in Chapter 7.

**control path adapter** A hardware device which converts a Client Computing System's control protocol to the control protocol of the StorageTek Library Control System.

**control unit (CU)** A microprocessor-based unit logically situated between a channel and up to fifteen cartridge transports. The CU translates channel commands into transport commands and sends transport status to the channel.

**CSE** Customer Services Engineer.

**CSC** Client System Component.

**CSI** See Client System Interface.

**CSI variables** Used to define various options to fine-tune communications between a CSC and the CSI. You change these variables in the acsss\_config program.

**CU** See control unit.

**current state** The current state for an ACS, port, LSM, drive, or CAP is the current availability of the component limited by desired state.

**cycle error messages** Messages that indicate a library or StorageTek ACSLS failure.

## D

**database** A collection of interrelated data records. See also StorageTek ACSLS Database.

**data path** The network path that allows client applications read/write access to tape cartridges.

**data path adapter** A hardware device which translates a Client Computing System's data protocol to the data protocol of the StorageTek Control Unit.

**desired state** The desired state for an ACS, port, LSM, drive, or CAP is the availability that you want for the component. ACSLS sets desired state when an explicit vary operation is performed.

**display area** The top area of the cmd\_proc interface that collects messages regarding the status of the library.

**dynamic configuration** Allows you to implement configuration changes to StorageTek ACSLS libraries (and

components) while StorageTek ACSLS remains online and running.

## E

**ejected cartridge** A cartridge that has been ejected from the library. If a nonzero retention period is set, the cartridge status is changed to STATUS\_VOLUME\_EJECTED.

**end of tape (EOT)** The location on a tape where written data ends.

**EOT** See end of tape.

**EPO** Emergency Power Off.

**EPROM** See erasable programmable read only memory.

**erasable programmable read-only memory (EPROM)** A special memory chip that can be erased and reprogrammed.

**Event Log** A file, maintained by the ACSEL, that contains messages describing library and StorageTek ACSLS events.

**Event Logger** See ACS Event Logger.

**external label identifiers** A six-character alphanumeric label on the outside edge of a cartridge used to identify a physical tape cartridge. It may consist of uppercase letters A through Z, numerals 0 through 9, \$, #, and blanks.

## F

**full installation** A complete software installation required for new customer sites or for existing sites where a new library has been installed.

## H

**HLI** Host/Library Interface. One way that the StorageTek ACSLS communicates with a library.

**HLI-attached** Libraries that are connected to the StorageTek ACSLS through the HLI. These libraries can be connected through a serial interface (serial-attached) or through a TCP/IP interface (TCP/IP-attached).

**home location** The cell associated with a given cartridge.

## I

**ID** Identifier or identification.

**Initial Program Load (IPL)** A process that activates a machine reset, initiates wake up diagnostics (from EPROMs) and loads functional code.

**inline diagnostics** Routines that test components of a subsystem while operating on a time-sharing basis with the functional microcode in the subsystem component.

**in-transit cartridges** Cartridges between their source and destination locations. Cartridges are considered in-transit if they are in pass-thru ports, robot hands, or playground.

**I/O** Input/Output.

**IPC** Interprocess Communication.

**IPL** See Initial Program Load.

## J

**journal** A sequential log of changes made to the database since the last checkpoint.

## L

**LAD** Lock Access Door.

**LAN** See local area network.

**large CAP (LCAP)** A 40-cartridge CAP with the storage cells arranged in four removable magazines of ten cells each. The magazines

appear as a single column of 40 cells to the host software.

**LCAP** See large CAP.

**LCU** See Library Control Unit.

**LED** See Light Emitting Diode.

**library** A library is composed of one or more ACSs, attached tape drives, volumes in the ACSs, and the StorageTek ACSLS software that controls and manages the ACSs.

**library configuration options** Allows the customer to specify the number of ACSs in the library and the connections between each ACS and the server system.

**library control component** Software which controls the mounting and dismounting of cartridges in the ACS.

**library control processor** Properly configured computer hardware that, with the addition of appropriate software, supports the operation of the Library Control Software.

**library control system** The library control platform loaded with library control software (StorageTek ACSLS).

**library control software** The software components of StorageTek ACSLS including the library control component, the Client System Interface and Library Utilities.

**Library Control Unit** The portion of the LSM that controls the picking, mounting, dismounting, and replacing of data and cleaning cartridges.

**library drive** A cartridge transport attached to an LSM that is connected to, and controlled by, a client system. Library drives interact with the LCU during automated tape cartridge mount and dismount operations. Library drives interact with a client application during tape data transfer

operations. Library drives are individually addressable by the ACSLM and are individually accessible by client applications. See Cartridge Transport.

**library errors** Errors that occur because the library is offline, has suffered hardware failure, is unavailable, etc.

**Library Management Unit (LMU)** The portion of an ACS that manages LSM's, allocates their resources, and communicates with StorageTek ACSLS.

**Library Storage Module (LSM)** An ACS structure that provides the storage area for cartridges, cartridge drives, CAPs, and the robot necessary for moving them.

**light emitting diode (LED)** A light emitting device that uses little energy and is used mainly to indicate on/off conditions.

**LMU** See Library Management Unit.

**local area network (LAN)** A computer network in which any component in the network can access any other component. This is the type of interface between an LMU and attached LSM's.

**LSM** See Library Storage Module.

**LSM ID** A unique identifier for an LSM. The LSM ID consists of the ACS ID and the LSM number.

## M

**missing cartridge** A cartridge that is in the database, but couldn't be found. If a recorded possible location for the cartridge could not be examined due to an offline LSM or a drive not communicating, the cartridge is marked MISSING instead of ABSENT. The cartridge status is changed to STATUS\_VOLUME\_MISSING.

## N

**network adapter** Equipment that provides an electrical and logical interface between a network and specific attached equipment.

**Network Interface (NI)** An interface between the server system and the client systems that maintains network connections and controls the exchange of messages. The NI is resident on the server system and each client system.

**NI** See Network Interface.

## O

**OCR** Optical character recognition.

**ONC** Open network computing.

**Open Systems Interconnection (OSI)** A software architecture model of the International Organization for Standardization. The OSI model provides standards for the interconnection of data processing systems.

**OSI** See Open Systems Interconnection.

**OSLAN** Open Systems Local Area Network.

## P

**Partition** Partition of a library cell's, cartridges, drives, and CAPs assigned to a physical partition that is managed by StorageTek ACSLS as a separate ACS.

**Pass-Thru Port (PTP)** Mechanism that allows a cartridge to be passed from one LSM to another in a multiple LSM ACS.

**PCAP** See priority CAP.

**playground** A reserved area of special cells (within an LSM) used for storing diagnostic cartridges and cartridges found

in-transit upon power-on and before initialization of the LSM is completed.

**pool** A collection of tape cartridges having one or more similar features or attributes, such as a pool of scratch tapes.

**POST** Power-on self-test.

**priority CAP (PCAP)** A single-cartridge CAP used for priority entry and ejection of cartridges.

**processing errors** Errors that result from processing or network communication failures.

**PROM** Programmable read-only memory.

**PTP** See Pass-Thru Port.

## R

**RDBMS** Relational database management system.

**redo log files** Backup files used to restore the StorageTek ACSLS database.

**relational database** A database that is organized and accessed according to relationships between the data items; relationships are represented by tables.

**Redundant Electronics** The optional SL8500 Redundant Electronics feature provides failover protection in enterprise libraries.

**ROM** Read-only memory.

**RPC** Remote Procedure Call.

## S

**SCAP** See standard CAP.

**scratch** An attribute of a tape cartridges, indicating that it is blank or contains no useful data.

**SCSI** Small computer serial interface.

**Serial-attached** See HLI-attached.

**server system** The part of the library that is the residence for StorageTek ACSLS, now referred to as the Library Control System. The Library Control System acts as an interface between a library and client systems.

**server system user** A person who invokes StorageTek ACSLS commands, utilities, or procedures on the server system. Server system users are generally site and maintenance personnel (for example, library operators, tape librarians, system administrators, CSEs, and systems personnel).

**servo** A system that uses feedback to control a process.

**silo** A commonly used term for an LSM. See Library Storage Module.

**SIMM** Single inline memory module.

**SLOT** see cell.

**SQL** See structured query language.

**SRN** See service request number.

**SSI** See Storage Server Interface.

**SSR** Software Support Representative.

**Standard CAP (SCAP)** A 21-cartridge CAP with the storage cells arranged in three rows of seven fixed cells.

**Storage Server Interface (SSI)** A software component, resident on a client system, that translates and routes messages between client applications and the CSI.

**structured query language (SQL)** A language used to define, access, and update data in a database.

**StorageTek Library Console** the operator panel software application used for the StreamLine libraries.

**system resource variable** Used to control the amount of system resources used by StorageTek ACSLS.

**system unit** The Library Control Platform.

## T

**tape library management system (TLMS)** A type of client application.

**TCP** Transmission Control Protocol.

**TLMS** See tape library management system.

**TOD** Time of day.

## U

**UDP** User Datagram Protocol.

**UNIX** An operating system originally developed by Bell Laboratories (now UNIX Systems Laboratories, Inc.) and used by a variety of computer systems.

**unsolicited messages** Messages that indicate an error or notify you when a particular routine action can be taken.

**UOC** Usable on codes.

**upgrade installation** Performed when installing a new version of StorageTek ACSLS at an existing customer site.

**user** selectable features and options variables-Used to define various user-selectable features and options.

## V

**validation errors** Errors that result from format and syntax validation performed by cmd\_proc.

**venter** Virtual enter. Entering an unlabeled cartridge with a virtual label.

**virtual label** A logical volume ID (volser) that can be assigned to a cartridge when its physical label is missing or unreadable.

**volser** Volume Serial Number.

**volume** A data or cleaning cartridge.

**volume access control** Limits access to volumes, usually by the client.

**volume identifier** A six-character string that uniquely identifies a data or cleaning cartridge to the database.

**volume serial number (volser)** A synonym for external label identifier.

## W

**WTM** write tape mark.

## X

**XDR** External data representation.

**XML** Extensible Markup Language. A universal format for structured documents and/or data on the Web.



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