

**StorageTek Automated Cartridge System Library
Software**

Product Information

Release 8.3

E48580-03

July 2014

E48580-03

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Preface

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

Audience

This guide is for the individual responsible for administering StorageTek ACSL. 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 perform typical UNIX system administrator tasks, such as logging on as root and setting up user accesses to a UNIX application.

Documentation Accessibility

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What's New

ACSLS 8.3 provides support for the following:

- New OS Support - Solaris 11

ACSLS 8.3 is supported on Solaris 11 Update 1, as well as on Solaris 10 Update 10 and Update 11. The port to Solaris 11 includes all of the features that are available on Solaris 10. Support for ACSLS HA on Solaris 11 is not available at the time of this release.

- New OS Support - Oracle Linux

ACSLS 8.3 is supported on Oracle Linux 6.3 and 6.4. The Linux port includes complete support of ACSAPI client operations. It includes all of the user interfaces, including `cmd_proc`, the ACSLS GUI and `lib_cmd`. The Linux port does not include support for logical libraries since the ability to present logical libraries to fibre-channel clients relies on the Solaris COMSTAR infrastructure. ACSLS HA is not supported on Linux.

Oracle Linux testing was done in environments using Oracle's Unbreakable Enterprise Kernel and the Red Hat Compatible Kernel. Oracle provides full system support on these systems.

Oracle also provides ACSLS 8.3 application support for customers running Red Hat Enterprise Linux 6.3 or 6.4.

- Customer-Defined Install Directory

The ACSLS package can be installed in any user-defined file system. The default base installation remains `/export/home`, but the installer can relocate the base installation to any file system that contains sufficient space. See the *ACSLS 8.3 Installation Guide*.

- Product Configuration Flexibility

The `install.sh` routine has been redesigned with greater flexibility, allowing users to install, remove, or reinstall any portion of the product without impacting other components of the product. See the *ACSLS 8.3 Installation Guide* for details.

- Java 7 Support

The Java functions in ACSLS are compatible with both Java 1.6 and Java 1.7.

- Enhancements to the `probeFibre.sh` utility

The `probeFibre.sh` utility now provides more detailed information about FC-attached tape libraries. When using the `-v` option, the output reflects initiator ports, along with their associated libraries, for each FC HBA (available for both Solaris and Linux).

- Enhancements to the auto-clean function
 - When an attempt to automatically clean a tape drive fails, ACSLS will try to select another cleaner and re-try.
 - Extend the usable life of cleaning cartridges. Relies on the tape drive to identify a spent cleaner rather than a pre-defined `max_usage` value.
 - Retry a failed dismount of a cleaning cartridge.
- Mount retry behavior is more adjustable

The `MOUNT_RETRY_TIME_LIMIT` is adjustable upwards from five minutes. Users can manipulate this variable by running the `dv_config` utility. See the chapter, “Setting Variables that Control ACSLS Behavior” in the *ACSL 8.3 Administration Guide*.
- New status responses to `acsss` status

Status messages show granularity with regard to WebLogic and `acsls` start/stop status. (*online/offline/stopping/starting*).
- Adjustable startup timeout (Solaris)

To accommodate unusual library configurations that may require more time for the SMF service to startup and recover, ACSLS 8.3 provides for a customized startup policy. See the *ACSL 8.3 Administration Guide* for details.
- Supporting partitioning across an SL8500 complex.

Support for up to 16 partitions in a library complex.
- Support for FCoE Tape Drives

Support for T10000D FCoE (Fibre Channel over Ethernet) drive types: T10000D FCoE and T10000DE FCoE.
- GUI diagnostic utility

The ACSLS GUI installation has multiple dependencies, including WebLogic status, ACSLS deployment, and possible firewall settings. A new utility, `checkGui.sh` tests these various dependencies and provides a summary report showing the status of each one. For more information, refer to the “Troubleshooting” appendix in the *ACSL 8.3 Administrator’s Guide*.
- Fixes to ACSLS 8.3

Refer to the *ACSL 8.3 Release Notes* for details.

ACSL 8.3 introduces greater flexibility for customers with varied platform and file-system preferences. The ACSL package will install in any file system on any contemporary Solaris 10, Solaris 11, or Oracle Linux 6 platform.

Requirements

This section describes the platform, operating system, system, browser, and co-hosting requirements.

Platform Requirements

ACSL 8.3 will run successfully on any contemporary SPARC or X86 server platform.

Memory

A minimum of 2 GB memory is required for ACSL 8.3. Additional memory may be desirable in high-volume library environments where multiple requests for mount and dismount operations are to be processed simultaneously or where the GUI is heavily used.

Disk Capacity

A minimum of 40 GB should be available to the file system in which ACSL 8.3 will be installed. This will accommodate ACSL and WebLogic binaries, and will allow ample storage for on-going logging and database backup activity.

Network I/O

At least one 10/100/1000-base-T network port is required for client and library communication. Dedicated redundant network adapters are recommended when connecting to SL8500 and SL3000 libraries. Redundant networks are also recommended when connecting to an SL8500 or SL3000 library with the Dual TCP/IP feature.

Fibre-channel

Fibre-channel initiator port is required to support fibre-attached libraries such as the StorageTek SL500 or SL150.

Fibre-channel target port is required if ACSL is to present logical libraries to fibre-channel client applications. A 4 Gb/s (or higher) QLogic HBA will be necessary for target-mode operation.

Operating System Requirements

- Solaris 10 Update 10 and Update 11 for SPARC and X86
- Solaris 11 Update 1 for SPARC and X86
- Oracle Linux 6.3 and 6.4
Oracle Linux testing was done in environments using Oracle's Unbreakable Enterprise Kernel and the Red Hat Compatible Kernel. Oracle provides full system support on these systems.
- Red Hat Enterprise Linux 6.3 or 6.4
Oracle provides ACSLS 8.3 application support for customers running Red Hat Enterprise Linux 6.3 or 6.4.

Software Requirements

- ACSLS uses PostgreSQL to manage database services for library control.
 - PostgreSQL 8.3 is a standard inclusion with Solaris 10.
 - For Solaris 11, the PostgreSQL 8.3 packages are provided along with the ACSLS 8.3 package from the Oracle e-delivery site. Installation instructions are provided in the ACSLS 8.3 Installation Guide.
 - For Linux, PostgreSQL 8.4 is provided for easy installation from the Oracle yum repository. Instructions are included in the ACSLS 8.3 Installation Guide.
- WebLogic 10.3.5 is bundled with ACSLS 8.3.
- The ACSLS GUI, logical library services, and `lib_cmd` require Java 1.6 or Java 1.7. The necessary Java runtime environment is a standard package included with Solaris 10, Solaris 11, and Linux 6.
- ACSLS 8.3 includes (optional) device drivers:
 - The *mchanger* driver is used to control fibre-attached libraries such as the SL500 and SL150.
 - The *qlt* and *stmf* drivers are used to present logical libraries to fibre-channel client applications.
 - If any of these drivers are used, then ACSLS 8.3 must have immediate access to kernel-level functions. In such cases, ACSLS cannot be installed in a Solaris Zoned environment.

Browser Requirements

The ACSLS 8.3 graphical user interface has been tested using the following browsers:

- FireFox 22.0
- Chrome 28.0

For Internet Explorer versions 8, 9, and 10, it will be necessary to create an SSL certificate with public/private key pair that is unique to the specific ACSLS server installation. Refer to the ACSLS 8.3 Installation Guide for details on creating such an SSL certificate.

Co-Hosting

To ensure uninterrupted library service and to avoid unanticipated problems due to resource contention, it is generally recommended that ACSLS run in a stand-alone environment on a dedicated server. However, some systems are specifically designed to allow multiple applications to run in co-hosted fashion as though they are completely isolated from one another. Specifically, Solaris Containers and Oracle Solaris VM Server for SPARC enable conditional co-hosting possibilities for use with ACSLS.

The following details the conditions and limitations associated with the various co-hosting options for an ACSLS application:

- Solaris Containers (zones)

Solaris Containers (or zones) enable a system administrator to partition a standard, low cost server into four independent Solaris systems, each with its own isolated file system, and its own instance of Solaris. You can assign network resources to each container and you can reboot any local (non-global) zone without affecting applications in other zones on the same platform.

However, the ability to share kernel resources (such as device drivers) across multiple zones is tenuous at best. Ideally, an application that requires kernel drivers would reside in the global zone. However, it is generally not good practice to install an application in the global zone since any fatal condition with the application could impact all other applications running in the other zones.

ACSL 8.x can reside in a Solaris container only if it does not require drivers beyond the network interface. If you intend to use the target-mode fibre-channel driver (*qlt*) which is required for logical libraries, then your application should not be installed in a Solaris container. Or, if you intend to make use of a fibre-attached library which requires the *mchanger* driver, the application should not be installed in a Solaris container.

Note: There are no versions of ACSLS-HA that are supported for use in Solaris Containers.

- Oracle VM Server for SPARC

Oracle VM Server for SPARC (formerly Logical Domains or LDOMs) is technology available on SPARC T-series servers with Chip Multithreading (CMT) technology. This technology offers significant advantages over Solaris Containers to the extent that each domain is in control of its own Solaris kernel.

A Solaris administrator can partition hardware resources across the system, assigning a specific resource to a specific domain. Network resources on this virtual machine can easily be shared across any of up to 128 'guest domains' on the server. But applications that require access to I/O devices through the PCIe bus must be installed in special 'I/O domains'. The number of I/O domains that you can create on the VM Server depends on the number of discrete PCIe busses on the SPARC platform. On a system with a single PCIe bus, you can have two I/O domains, and one of these must be the control domain.

Any ACSLS application that relies solely on network connectivity to the library and for client applications can be installed in a guest domain on this server. The virtual network set-up procedure is described in the document, *Oracle VM Server for SPARC 2.1 Administration Guide* in the section, entitled "Using Virtual Networks".

If your ACSLS 8.x application is intended for use with logical libraries, or if you intend to connect to a fibre-channel library such as the SL500 or L700, then ACSLS must be installed in an I/O domain. Refer to the section “Setting up I/O Domains” in the *Oracle VM Server for SPARC 2.1 Administration Guide*.

Solaris Cluster Software is supported on the Oracle VM Server for SPARC and this platform can be employed in an ACSLS-HA application. Refer to the *Oracle Solaris Cluster Data Service for Oracle VM Server for SPARC Guide*.

Overview of ACSLS

This section provides an overview of ACSLS 8.3.

Library Management

ACSLS is automated library management software. It facilitates automated tape operations for multiple clients, providing services and support to enhance library ease-of-use, performance, and availability. One ACSLS server can control libraries connected into a library complex, individual libraries, or a mix of both.

ACSLS includes all library management capabilities available in the legacy ACSLS 7.3.1 product. Support is provided for ACSAPI clients, `cmd_proc` and ACSLS utilities (startup and shutdown have changed).

Graphical User Interface

The GUI is a browser-based web application which runs within WebLogic. This interface provides an alternative to the traditional `cmd_proc` interface from ACSLS.

- Runs as an application with the Oracle's WebLogic.
- Provides an alternative to the `cmd_proc` for library administration and operation. It provides the ability to perform most legacy `cmd_proc` operations, along with new operations related to logical library management.
- Provides real-time monitoring of tape library components.
- Provides a tree browser to navigate physical and logical configuration.
- Real time alerts are visible from each screen.
- Allows the customizing of filtering capabilities and the ability to download query results to a flat file.

Features

- Create, edit and delete logical library resources
- View physical and logical resources
- Audit physical and logical libraries
- Perform enters and ejects
- Perform mounts and dismounts
- Set clean and set owner for one or more volumes
- User-customized displays and custom filtering for volume and drive listings.
- Set the CAP mode and priority
- Vary operations for physical and logical components

- System Operations, including ability to cancel selected operations
- Log viewer for event logs

Logical Libraries

The ACSLS GUI or `lib_cmd` lets you create logical libraries which include a sub-set of the volumes and drives in a specific physical library. This allows you to define logical subsets of your physical libraries, which can be managed and utilized by client applications as if they were separate logical libraries. You can dedicate a portion (or all) of the volumes and drives in a given physical library to a logical library for use by a specific client application.

- A logical library can not span more than one physical ACS (or physical partition).
- Logical libraries are accessible to clients using the ACSLS 8.x SCSI Interface. They **are not** available to clients that use the legacy ACSAPI.
- Physical drives and cartridges that are allocated to logical libraries become inaccessible to ACSAPI clients. The physical libraries, along with any drives and volumes that are not allocated to logical libraries, remain accessible to ACSAPI clients.
- Drives and volumes that are allocated to logical libraries are allocated exclusively. There is no support for sharing of either drives or volumes across logical libraries.

Open Format (Volser)

Before ACSLS 8.x, support for longer volume labels in physical libraries relied on library firmware and configuration.

Now, the ACSLS SCSI Media Changer Interface allows ACSLS to support longer volume labels. You have visibility to the longer volume labels through the GUI, the CLI (`cmd_proc`), and utilities.

Longer volume labels are viewed by clients using the SCSI Medium Changer interface to access logical libraries. They are not accessible to ACSAPI clients.

SCSI Media Changer over Fibre Client Interface

ACSLS 8.x provides a SCSI Media Changer over Fibre Channel Interface for allowing access to logical libraries. ACSLS can service multiple SCSI clients simultaneously. Each client has exclusive access to its assigned logical library.

This allows client software, such as NetBackup, to utilize the logical libraries as if they were separate physical libraries. Each logical library can be assigned to only one client, but a given client can access multiple logical libraries if desired. ACSLS 8.x does not allow direct SCSI client access to the backing physical libraries - only the volumes and drives assigned to the logical libraries are accessible.

SCSI client access can be established when creating or modifying logical libraries.

ACSAPI Client Interface

ACSLS 8.x provides an ACSAPI client interface which is compatible with existing client applications. The ACSAPI interface is identical to that provided in the legacy ACSLS 7.3 product.

Access and Visibility

ACSAPI clients have neither visibility nor access to logical libraries.

Physical Drives and Cartridges

Physical drives and cartridges that are allocated to logical libraries become inaccessible to ACSAPI clients. The physical libraries, along with any drives and volumes that are NOT allocated to logical libraries, remain accessible to ACSAPI clients.

Command Line Interface

ACSLS 8.x provides a command-line interface in the form of the legacy `cmd_proc` from ACSLS. This interface provides the same functionality as ACSLS 7.3 for managing physical library resources.

The `cmd_proc` interface does not provide access to logical libraries. But the physical resources which have been allocated to logical libraries do remain fully accessible through the `cmd_proc` administrative CLI (although they are not accessible to ACSAPI clients).

Utilities

ACSLS provides a set of utilities which can be executed from a shell running on the ACSLS server. This includes most of the traditional utilities provided in the legacy ACSLS 7.3.1 product.

These utilities include the following:

- backup and restore operations for database tables
- import and export operations for database tables
- startup and shutdown operations
- dynamic configuration for physical libraries
- `volrpt`, `moving.sh`, and `ejecting.sh`

Differences and exceptions

- A new utility (`checkGui.sh`). The ACSLS GUI installation has multiple dependencies, including WebLogic status, `acsls` deployment, and possible firewall settings. The utility, `checkGui.sh` tests these various dependencies and provides a summary report showing the status of each one. For more information, refer to the “Troubleshooting” appendix in the *ACSLS 8.3 Administrator’s Guide*.
- A new utility (`getHba.sh`) manages Fibre Channel (FC) ports. Ports can be configured to operate in target mode (supporting FC clients) or in initiator mode (managing FC-attached physical libraries).
- ACSLS provides a new command (`acsss`) for starting and stopping the library management application. This command is available from the shell prompt only, and is not accessible from the GUI.

The `acsss` command replaces the `db_command`, `rc.acsss`, `kill.acsss`, and `fix_rc.sh` commands used in ACSLS. The `acsss` command also provides the ability to monitor application status. For example, you use:

- `acsss enable` to start ACSLS
- `acsss disable` to stop ACSLS

- `acsss` to see the list of options

No Longer Requires Software Licenses

Beginning with StorageTek ACSLS versions 7.3.1 and 8.x, the right-to-use license is no longer enforced 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 appear 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 use the `free_cells.sh` utility.

testports Utility

Beginning with StorageTek ACSLS versions 7.3.1 and 8.x, a new `testports` utility tests the connection to TCP/IP libraries and whether the ACS and port connection is online or offline.

Library, Tape Drive and Media Support

This chapter provides you with a list of:

- ["Current Libraries Supported"](#) on page 2-1
- ["Legacy Libraries Supported"](#) on page 2-2
- ["Tape Drives Supported"](#) on page 2-2
- ["Tape Media Supported"](#) on page 2-5
- ["Tape Drive and Media Compatibility Supported"](#) on page 2-7

Current Libraries Supported

The following table provides the list of libraries supported by ACSLS. The second column in this table shows support for a library, and its features added, after ACSLS 7.0.

Table 2–1 Current Libraries Supported

Library and Library Feature	Support and Maintenance Level after 7.0
StorageTek SL8500	ACSLS 7.1
StorageTek SL8500, Dual TCP/IP Connections	ACSLS 7.1 with PUT0602
StorageTek SL8500, Connections to Multiple Libraries	ACSLS 7.1 with PUT0701
StorageTek SL8500 Partitioning	ACSLS 7.1 with PUT0701
StorageTek SL500	ACSLS 7.1 with PUT0402
StorageTek SL500 Cartridge Expansion Module (CEM)	ACSLS 7.1 with PUT0502
StorageTek SL3000	ACSLS 7.3
StorageTek SL3000 AEM	ACSLS 7.3 with PUT0801 (ejecting only 42 cartridges at a time) ACSLS 8.0 (eject full AEM using the GUI)
StorageTek Virtual Tape Library (VTL)	ACSLS 7.3.1 and 8.0.2
Drive & Media Statistics from Library	ACSLS 7.3. An improved display is provided with PUT0801
SL3000 and SL8500 Redundant Electronics	ACSLS 7.3.1 and 8.0.2
SL150	ACSLS 8.2
SL8500 Partitioning across library complex	ACSLS 8.0.2 - 8 partitions ACSLS 8.3 - 16 partitions

Legacy Libraries Supported

The following legacy libraries are supported by ACSLS.

- StorageTek 9310
- StorageTek 9360
- StorageTek L180
- StorageTek L700
- StorageTek L700e PTP
- StorageTek L5500

ACSLs is still coded to support several earlier StorageTek libraries, like the 4410s, 97xx, L20, L40, and L80 libraries. However, we have not been able to test our support for these libraries for several years.

Tape Drives Supported

The following table is used to translate drive types between applications. The Drive Type Name represents the drive type in `cmd_proc` and event log messages. The ACSAPI Drive Type Number is used in ACSLS software operations and ACSAPI client communications.

The last column in the Tape Drives table describes when support for a tape drive and associated media was added after ACSLS 7.0.

Notes:

- The library drive type for DLT and SDLT drives is in a different drive domain than Oracle StorageTek drives, and it overlays with the drive types of StorageTek drives. To avoid conflicts, it is incremented by 40 hexadecimal or 64 decimal when these drives are reported by Host/Library Interface libraries. The incremented or “offset” drive type is reported in parentheses.
- The SL8500 supports LTO-5 drives starting with the 6.0.2 firmware. ACSLS must be at the 7.3.1 or 8.0.2+ update level to support the SL8500 6.0.2+ firmware.
- To determine if a new tape drive is supported in your release and maintenance level, go to an ACSLS Product Information manual for a later ACSLS release and look at the “ACSLs Support after 7.0” column in the Tape Drives Supported table.

We add support to new tape drives to ACSLS before the tape drives are released so we can test with prototype versions of the drives, and so you can install and use the drives without installing patches to ACSLS.

We cannot announce support for new tape drives in the release notes for an ACSLS release or update because at the time ACSLS is released, the new tape drive has not yet been released. We also cannot update the Readme files after an ACSLS package or patch is released.

Table 2–2 Tape Drives Supported

ACSAPI Drive Type Number	Drive Domain -hex and character, if applicable	Drive Type Reported by Library (decimal)	Drive Type Name	Tape Drive Description	ACSLs Support after 7.0
0	00h	64	4480	StorageTek 18-track	
1	00h	08	4490	StorageTek Silverton 36-track	
2	00h	32	9490	StorageTek TimberLine 36-track high performance	
3	00h	16	SD3	StorageTek Redwood Helical	
4	00h	04	4890	StorageTek Twin Peaks 36-track	
5	01h	01 (65)*	DLT2000	Quantum DLT2000	
6	01h	02 (66)*	DLT2000XT	Quantum DLT2000XT	
7	01h	03 (67)*	DLT4000	Quantum DLT4000	
8	01h	04 (68)*	DLT7000	Quantum DLT7000	
9	00h	02	9840	StorageTek T9840A	
10	00h	33	9491	StorageTek TimberLine EE 36-track	
11	01h	07 (71)*	DLT8000	Quantum DLT8000	
12	00h	03	9840-3590	T9840A with IBM 3590 emulation	
13	00h	05	T9940A	T9940A with SCSI/Fibre or VSM3490	
14	00h	06	9940--3590	T9940A with 3590 emulation	
15	01h	20 (84)*	SDLT	Super DLT 220	
16	00h	01	T9840B	High Performance 9840 with SCSI/Fibre or VSM3490	
17	00h	07	T9840B35	T9840B with 3590 emulation	
18	4Ch ("L")	48	HP-LTO	HP LTO Generation 1	
19	4Ch ("L")	49	IBM-LTO	IBM LTO Generation 1	
20	4Ch ("L")	50	CER-LTO	Certance LTO Generation 1	
21	00h	09	T9940B	T9940B with SCSI/Fibre or VSM3490	
22	00h	10	T9940B35	T9940B with 3590 emulation	
23				reserved	
24	01h	21 (85)*	SDLT-320	Super DLT 320	
25	00h	11	T9840C	T9840C with Fibre or VSM3490	
26	00h	12	T9840C35	T9840C with 3590 emulation	
27	4Ch ("L")	51	HP-LTO-2	HP LTO Generation 2	
28	4Ch ("L")	52	IBM-LTO-2	IBM LTO Generation 2	
29	4Ch ("L")	53	CER-LTO-2	Certance LTO Generation 2	
30	01h	23 (87)*	SDLT-600	Super DLT-600	ACSLs 7.1
31	54h ("T")	13	T1A	T10000A with Fibre or VSM3490	ACSLs 7.1 with PUT0501
32	54h ("T")	14	T1A35	T10000A with IBM 3592 emulation	ACSLs 7.1 with PUT0501

Table 2–2 (Cont.) Tape Drives Supported

ACSAPI Drive Type Number	Drive Domain -hex and character, if applicable	Drive Type Reported by Library (decimal)	Drive Type Name	Tape Drive Description	ACSLs Support after 7.0
33	4Ch ("L")	54	HP-LTO-3	HP LTO Generation 3	ACSLs 7.1 with PUT0501
34	4Ch ("L")	55	IBM-LTO-3	IBM LTO Generation 3	ACSLs 7.1 with PUT0501
35	4Ch ("L")	56	CER-LTO-3	Certance LTO Generation 3	ACSLs 7.1 with PUT0501
36				reserved	
37	54h ("T")	24	T1AE	T10000A, fibre or VSM3490, with encryption enabled	ACSLs 7.1 with PUT0602
38	54h ("T")	25	T1AE35	T10000A - IBM 3592 emulation with encryption enabled	ACSLs 7.1 with PUT0602
39				reserved	
40				reserved	
41	00h	18	T9840D	T9840D, fibre or VSM3490	ACSLs 7.1 with PUT0602
42	00h	19	T9840D35	T9840D - IBM 3592 emulation (MVS attach)	ACSLs 7.1 with PUT0602
43	00h	20	T9840DE	T9840D, fibre or VSM3490, with encryption enabled	ACSLs 7.1 with PUT0602
44	00h	21	T9840DE5	T9840D- IBM 3592 emulation (MVS attach) with encryption enabled	ACSLs 7.1 with PUT0602
45	01h	24 (88)*	DLT-S4	Quantum DLT-S4	ACSLs 7.1 with PUT0602
46	4Ch ("L")	57	HP-LTO4	HP LTO Generation 4	ACSLs 7.1 with PUT0701
47	4Ch ("L")	58	IBM-LTO4	IBM LTO Generation 4	ACSLs 7.1 with PUT0701
48				reserved	
49	54h ("T")	26	T1B	T10000B with Fibre or VSM3490	ACSLs 7.1 with PUT0701 and PTF or ACSLS 7.2 with PUT0702
50	54h ("T")	27	T1B35	T10000B with IBM 3592 emulation	ACSLs 7.1 with PUT0701 and PTF or 7.2 with PUT0702

Table 2–2 (Cont.) Tape Drives Supported

ACSAPI Drive Type Number	Drive Domain -hex and character, if applicable	Drive Type Reported by Library (decimal)	Drive Type Name	Tape Drive Description	ACSL Support after 7.0
51	54h ("T")	28	T1BE	T10000B with Fibre or VSM3490 and encryption	ACSL 7.1 with PUT0701 and PTF or ACSL 7.2 with PUT0702
52	54h ("T")	29	T1BE35	T10000B with encryption and IBM 3592 emulation	ACSL 7.1 with PUT0701 and PTF or ACSL 7.2 with PUT0702
53	54h ("T")	34	T1C	T10000C with Fibre or VSM3480	ACSL 7.3.1 or ACSL 8.0.2
54	54h ("T")	35	T1C35	T10000C with IBM 3592 emulation	ACSL 7.3.1 or ACSL 8.0.2
55	54h ("T")	36	T1CE	T10000C with Fibre or VSM3480 and encryption	ACSL 7.3.1 or ACSL 8.0.2
56	54h ("T")	37	T1CE35	T10000C IBM 3592 emulation with encryption enabled	ACSL 7.3.1 or ACSL 8.0.2
57	4Ch ("L")	59	HP-LTO5	HP-LTO Generation 5	ACSL 7.3.1
58	4Ch ("L")	60	IBM-LTO5	IBM LTO Generation 5	ACSL 7.3.1
59	4Ch ("L")	61	HP-LTO6	HP LTO Generation 6	ACSL 8.2
60	4Ch ("L")	62	IBM-LTO6	IBM LTO Generation 6	ACSL 8.2
61	54 ("T")	38	T1D	T10000D with Fibre or VSM3480	ACSL 8.2
62	54 ("T")	39	T1D35	T10000D with IBM 3592 emulation	ACSL 8.2
63	54 ("T")	40	T1DE	T10000D with Fibre or VSM3480 and encryption	ACSL 8.2
64	54 ("T")	41	T1DE35	T10000D IBM 3592 emulation with encryption enabled	ACSL 8.2
65	54 ("T")	42	T1D-FCoE	T10000D with Fibre Channel over Ethernet (FCoE)	ACSL 8.3
66	54 ("T")	43	T1DE-FCoE	T10000D with FCoE and encryption	ACSL 8.3

Tape Media Supported

The following table lists the compatible tape media supported for each drive type.

Notes:

- * Legacy StorageTek media do not have a media domain on the label. They are reported as media domain 0 (zero).
- * 3480 cartridges do not have a media type label. They are reported as media type1.

- *** DLT cartridges do not have a media domain on the label. They are reported as media domain 1. SDLT cartridges with 7 character barcodes are also reported as media domain 1.
- **** When a media type is reported as cleaning cartridge *maybe*, both data or cleaning cartridges can have this media type.
- ***** LTO-6 media types are reported as LTO-3.2T and LTO-3.2W in ACSLS 8.1. In ACSLS 8.2 and later releases, LTO-6 media types are reported as LTO-2.5T and LTO-2.5W. This was because the capacity of LTO-6 media changed before LTO-6 was announced.

Table 2–3 Tape Media Supported

ACSAPI Media Type Number	Media Type Name	Media Description	Media Domain (on label)	Media Type (on label)	Cleaning Cartridge*** *
0	3480	3480 18 or 6-track	0*	1**	maybe
1	3490E	3490E 36-track	0*	E	no
2	DD3A	StorageTek Redwood (Helical) 10GB	0*	A	no
3	DD3B	StorageTek Redwood (Helical) 25GB	0*	B	no
4	DD3C	StorageTek Redwood (Helical) 40GB	0*	C	no
5	DD3D	StorageTek Redwood Cleaning Cartridge	0*	D	yes
6	DLTIII	Quantum DLT III -10GB	1***	C	maybe
7	DLTIV	Quantum DLT IV - 20GB or 35GB	1***	D	no
8	DLTIIIXT	Quantum DLT IIIxt - 15GB	1***	E	no
9	STK1R	T9840A, T9840B, T9840C or T9840D data cartridge	0*	R	no
10	STK1U	T9840A, T9840B, 9840C cleaning cartridge	0*	U	yes
11	EECART	9490EE 36-track	0*	Z	no
12		reserved			
13	STK2P	9940 data cartridge	0*	P	no
14	STK2W	9940 cleaning cartridge	0*	W	yes
15		reserved			
16	LTO-100G	LTO Generation 1 data cartridge	L	1	no
17	LTO-50GB	LTO Generation 1 data cartridge	L	A	no
18	LTO-35GB	LTO Generation 1 data cartridge	L	B	no
19	LTO-10GB	LTO Generation 1 data cartridge	L	C	no
20	LTO-CLN2	IBM cleaning cartridge	C	2	yes
21	LTO-CLN3	Certance cleaning cartridge	C	3	yes
22	LTO-CLN1	HP cleaning cartridge	C	1	yes
23	SDLT	Super DLT Generation I cartridge	1***	S	maybe
24		reserved			
25	LTO-CLNU	LTO universal cleaning cartridge	C	U	yes

Table 2–3 (Cont.) Tape Media Supported

ACSAPI Media Type Number	Media Type Name	Media Description	Media Domain (on label)	Media Type (on label)	Cleaning Cartridge*** *
26	LTO-200G	LTO Generation 2 data cartridge	L	2	no
27	SDLT-2	Super DLT Generation II data cartridge	1***	2	no
28	T10000T1	T10000 data cartridge	T	1	no
29	T10000TS	T10000 sport data cartridge	T	S	no
30	T10000CT	T10000 cleaning cartridge	C	T	yes
31	LTO-400G	LTO Generation 3 data cartridge	L	3	no
32	LTO-400W	LTO Generation 3 WORM data cartridge	L	T	no
33		reserved			
34	SDLT-S1	Super DLT Generation I data cartridge in SDLT-220 format	S	1	maybe
35	SDLT-S2	Super DLT Generation I data cartridge in SDLT-320 format	S	2	no
36	SDLT-S3	Super DLT Generation II data cartridge	S	3	no
37	SDLT-S4	Super DLT Generation 4 data cartridge	S	4	no
38	SDLT-4	Super DLT Generation 4 data cartridge	1***	4	no
39	STK1Y	T9840D cleaning cartridge	0*	Y	yes
40	LTO-800G	LTO Generation 4 data cartridge	L	4	no
41	LTO-800W	LTO Generation 4 WORM data cartridge	L	U	no
42	T10000T2	T10000 Version 2 data cartridge	T	2	no
43	T10000TT	T10000 Version 2 sport data cartridge	T	T	no
44	T10000CC	T10000 Version 2 cleaning cartridge	C	C	yes
45	LTO-1.5T	LTO Generation 5 data cartridge	L	5	no
46	LTO-1.5W	LTO Generation 5 WORM data cartridge	L	V	no
47	T10000CL	T10000 Backwards compatible cleaning cartridge	C	L	yes
48	LTO-2.5T	LTO Generation 6 data cartridge	L*****	6	no
49	LTO-2.5W	LTO Generation 6 WORM data cartridge	L*****	W	no

Tape Drive and Media Compatibility Supported

The following table lists the compatible media for each drive type. Use these values as input to the `media media_type` and `drive drive_type` parameters on ACSLS commands.

An R/O identifies media types that are read-only by the specified drive type.

Table 2–4 Drive and Media Compatibility

Drive Type (drive_type)	Compatible Media for Data Cartridge	Compatible Media for Cleaning Cartridge
4480	3480,	3480
4490	3480, 3490E	3480
4890	3480, 3490E	3480
9490	3480, 3490E	3480
9490EE	3480 (read only), 3490E, EECART	3480
SD3	DD3A, DD3B, DD3C	DD3D
9840	STK1R	STK1U
9840-3590	STK1R	STK1U
T9840B	STK1R	STK1U
T9840B35	STK1R	STK1U
T9840C	STK1R	STK1U
T9840C35	STK1R	STK1U
T9840D	STK1R	STK1Y
T9840D35	STK1R	STK1Y
T9840DE	STK1R	STK1Y
T9840DE5	STK1R	STK1Y
T9940A	STK2P	STK2W
9940A-3590	STK2P	STK2W
T9940B	STK2P	STK2W
T9940B35	STK2P	STK2W
DLT2000	DLTIII	DLTIII
DLT2000XT	DLTIII, DLTIIIXT	DLTIII
DLT4000	DLTIII, DLTIIIXT, DLTIV	DLTIII
DLT7000	DLTIII, DLTIIIXT, DLTIV	DLTIII
DLT8000	DLTIII, DLTIIIXT, DLTIV	DLTIII
SDLT	SDLT, SDLT-S1, DLTIV	SDLT, SDLT-S1
SDLT-320	SDLT, SDLT-S1, SDLT-S2, DLTIV	SDLT, SDLT-S1
SDLT-600	SDLT (R/O), SDLT-2, SDLT-S1 (R/O), SDLT-S2 (R/O), SDLT-S3	SDLT, SDLT-S1
DLT-S4	SDLT-2, SDLT-4, SDLT-S2 (R/O), SDLT-S3, SDLT-S4	SDLT
HP-LTO	LTO-100G, LTO-50GB, LTO-35GB, LTO-10GB	LTO-CLN1, LTO-CLNU
IBM-LTO	LTO-100G, LTO-50GB, LTO-35GB, LTO-10GB	LTO-CLN2, LTO-CLNU
CER-LTO	LTO-100G, LTO-50GB, LTO-35GB, LTO-10GB	LTO-CLN3, LTO-CLNU
HP-LTO-2	LTO-200G, LTO-100G, LTO-50GB, LTO-35GB, LTO-10GB	LTO-CLN1, LTO-CLNU

Table 2–4 (Cont.) Drive and Media Compatibility

Drive Type (drive_type)	Compatible Media for Data Cartridge	Compatible Media for Cleaning Cartridge
IBM-LTO-2	LTO-200G, LTO-100G, LTO-50GB, LTO-35GB, LTO-10GB	LTO-CLN2, LTO-CLNU
CER-LTO-2	LTO-200G, LTO-100G, LTO-50GB, LTO-35GB, LTO-10GB	LTO-CLN3, LTO-CLNU
HP-LTO-3	LTO-400G, LTO-400W, LTO-200G, LTO-100G (R/O), LTO-50GB (R/O), LTO-35GB (R/O), LTO-10GB (R/O)	LTO-CLN1, LTO-CLNU
IBM-LTO-3	LTO-400G, LTO-400W, LTO-200G, LTO-100G (R/O), LTO-50GB (R/O), LTO-35GB (R/O), LTO-10GB (R/O)	LTO-CLN2, LTO-CLNU
CER-LTO-3	LTO-400G, LTO-400W, LTO-200G, LTO-100G (R/O), LTO-50G (R/O), LTO-35GB (R/O), LTO-10G (R/O)	LTO-CLN3, LTO-CLNU
HP-LTO4	LTO-800G, LTO-800W, LTO-400G, LTO-400W, LTO-200G (R/O)	LTO-CLNU
IBM-LTO4	LTO-800G, LTO-800W, LTO-400G, LTO-400W (R/O), LTO-200G (R/O)	LTO-CLNU
HP-LTO5	LTO-1.5T, LTO-1.5W, LTO-800G, LTO-800W, LTO-400G (R/O), LTO-400W (R/O)	LTO-CLNU
IBM-LTO5	LTO-1.5T, LTO-1.5W, LTO-800G, LTO-800W, LTO-400G (R/O), LTO-400W (R/O)	LTO-CLNU
HP-LTO6	LTO-2.5T, LTO-2.5W, LTO-1.5T, LTO-1.5W, LTO-800G (R/O), LTO-800W (R/O)	LTO-CLNU
IBM-LTO6	LTO-2.5T, LTO-2.5W, LTO-1.5T, LTO-1.5W, LTO-800G (R/O), LTO-800W (R/O)	LTO-CLNU
T1A	T10000T1, T10000TS	T10000CT, T10000CL
T1A35	T10000T1, T10000TS	T10000CT, T10000CL
T1AE	T10000T1, T10000TS	T10000CT, T10000CL
T1AE35	T10000T1, T10000TS	T10000CT, T10000CL
T1B	T10000T1, T10000TS	T10000CT, T10000CL
T1B35	T10000T1, T10000TS	T10000CT, T10000CL
T1BE	T10000T1, T10000TS	T10000CT, T10000CL
T1BE35	T10000T1, T10000TS	T10000CT, T10000CL
T1C	T10000T1 (R/O), T10000TS (R/O), T10000T2, T10000TT	T10000CC, T10000CL
T1C35	T10000T1 (R/O), T10000TS (R/O), T10000T2, T10000TT	T10000CC, T10000CL
T1CE	T10000T1 (R/O), T10000TS (R/O), T10000T2, T10000TT	T10000CC, T10000CL
T1CE35	T10000T1 (R/O), T10000TS (R/O), T10000T2, T10000TT	T10000CC, T10000CL
T1D	T10000T1 (R/O), T10000TS (R/O), T10000T2, T10000TT	T10000CL
T1D35	T10000T1 (R/O), T10000TS (R/O), T10000T2, T10000TT	T10000CL

Table 2–4 (Cont.) Drive and Media Compatibility

Drive Type (drive_type)	Compatible Media for Data Cartridge	Compatible Media for Cleaning Cartridge
T1DE	T10000T1 (R/O), T10000TS (R/O), T10000T2, T10000TT	T10000CL
T1DE35	T10000T1 (R/O), T10000TS (R/O), T10000T2, T10000TT	T10000CL
T1D-FCoE	T10000T1 (R/O), T10000TS (R/O), T10000T2, T10000TT	T10000CL
T1DE-FCoE	T10000T1 (R/O), T10000TS (R/O), T10000T2, T10000TT	T10000CL

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