

SSC-3: Vendor Feedback

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1 Overview

This document tracks the feedback received from vendors for the SSC-3 and related standards. The intent is to focus on the SSC-3 standard in this document and provide appropriate feedback to the related standards from the SSC-3 perspective. Note, there is a similar effort via the SMC-3 working group.

1.1 EMC

My name is Charles Chun and I work for EMC Dantz as a software engineer on our Retrospect SMB backup application. I was informed by Kevin Butt from IBM that the T10 organization is requesting input for SMC and SSC standards documents. I would like to ask the T10 organization to clarify the Sense data that is returned for unloaded media for the Load/Unload command in SSC.

For most tape drives if we poll the tape drive using Test Unit Ready when media is loaded into the tape drive, the typical progression of Sense data is as follows:

- Not Ready with ASC,ASCQ 0x3a,0x00 Medium Not Present
- Not Ready with ASC,ASCQ 0x04,0x01 Logical Unit Is In Process Of Becoming Ready
- Unit Attention with ASC,ASCQ 0x28,0x00 Not Ready to Ready Change, Medium May Have Changed
- Good Check Condition Status

And for the Unload process, the typical progression of Sense data is as follows:

- Good Check Condition Status
- Not Ready with ASC,ASCQ 0x04,0x00 Logical Unit Not Ready, Cause Not Reported
- Not Ready with ASC,ASCQ 0x3a,0x00 Medium Not Present

Once the tape drive reports a Not Ready Sense key with ASC,ASCQ 0x3a,0x00 Medium Not Present, a Changer Move Medium command should have access to the unloaded media in the tape drive.

Unfortunately some tape drives do not report Medium Not Present Sense data upon completion of the Unload command. Instead, I have seen tape drives return Not Ready with ASC,ASCQ 0x04,0x02 Initializing Cmd. Required or Not Ready with ASC,ASCQ 0x04,0x00 Logical Unit Not Ready, Cause Not Reported. This makes it difficult to determine if the device is still in the process of unloading media or if the media is accessible for a Changer Move Medium command.

I would like to propose the modification of the Load/Unload command in SSC-3 to state that following the successful completion of an Unload command (Hold bit zero), the device return a Not Ready Sense key with Medium Not Present. In SSC-2 it states that the device return a Not Ready Sense key for all medium access commands, which I find too ambiguous. Thank you for your time and cooperation.

1.2 Computer Associates

T10 Suggestions

This is a list of suggestions that we have compiled highlighting features that, if available, we believe would make using these devices that much better and would make our lives as device clients, easier.

Note: I'm not sure if there are any considerations of VTL's in the T10 standard, but we have added a few suggestion of expanding the Library standards and drive standards to better utilize these devices.

All Devices

- 1) Standardize all SenseKey/ASQ/ASCQ across all different vendors. For example, different vendors may have different SenseKey/ASQ/ASCQ for door open condition and I/E door open condition.
- 2) A standardized command such as ModeSense to give us the error history (count, error codes, and time stamps) of the drive, robotic and/or media.
- 3) Application level Reserve/Release Command. This would be a Reserve/Release command that allows the setting of a key, which would be used to allow other commands to be sent to the device. This would be a way to protect a device that we are trying to exclusively use, from interference by another application on the same initiator.

Library Devices

- 1) Read Element enhancements:
 - a. We would like to see if the spec could be expanded to include if possible, the Medium type (SDLT, LTO-2, LTO-3) of the media in the slot, as well as special case media (Cleaning, WORM), without having to load the media first.
 - b. Can the standard also include Write Protected to the spec, so if the vendor is able to detect this via the barcode scanner or some other method, it could be part of the Storage Element page, and we could find this out before loading it into the drive.
 - c. For the Data Transfer Element page, can it be expanded to show us what type of Medias this drive can write to and Read from?
- 2) Can a Test Unit Ready Not Ready ASC/ASCQ be added to tell of a Door/Open, something has changed, only if a tape was accessed (removed or added from a slot). This way we could only try to re-inventory the library when something truly has changed, not when the user just opened and closed the door.
- 3) Can a Test Unit Ready Not Ready ASC/ASCQ be added to tell of a possible hardware change? This would be a condition that we could search for to detect if a drive was swapped out, removed or inserted

Tape Devices

- 1) Can a SCSI command be added that could accept a 128 bit (or a variable length key), and a bit mask for standard encryption algorithm so when writing or reading from the drive, this key could be used to Encrypt/Decrypt data. This would help in offloading the costly CPU cycles of encryption/decryption to the tape drive.
- 2) Can a command be added to have a "uniform" way of finding out "consistently" if an error is caused by a media or by the drive hardware.
- 3) Some device support allowing the Early Warning size to be set, but can this be made a standard. This would allow us to calculate how much space we will need at the end of a tape and make sure that there will be sufficient space for dumping our data to the tape before running out of space.
- 4) The addition of a Mode Sense call that would have information about a drive that is part of a Library. The Mode Page could let us know the Library Serial Number that this drive is a part of, as well as it's element address. This could be something that a Library could set on it's drives by sending a Mode Select for the same page.

VTL's

- 1) A standardized command to differentiate a SCSI Library from a VTL.
- 2) A standardized command to differentiate a SCSI Tape Drive from a VTL Tape Drive.

3) A special set of commands (e.g. the host ID is included in Read/Write command) for VTL that allows multiple concurrent streams to write to a VTL Tape drive.

1.3 Michael's (paraphrased) summary of comments

- Mandate that commands return CHECK CONDITION status with the sense key set to NOT READY and the additional sense code set to MEDIUM NOT PRESENT after returning GOOD status to a LOAD/UNLOAD command with LOAD set to zero and HOLD set to zero (SSC-3; EMC);
- Standardize all of the conditions/events that set sense key and additional sense code values (SMC-3, SSC-3, SPC-4?; CA);
- Provide a standard command to return the error history (e.g. count, error codes, and time stamps) for the device, device server, and removable medium (SMC-3, SSC-3, SPC-4?; CA);
- Provide an application client-level reservation capability (SPC-4; CA);
- Enhance READ ELEMENT STATUS data to include medium type (i.e. technology, generation, and special cartridge type; not sure if CA wants it to apply to storage elements only or all element types; SMC-3; CA);
- Enhance READ ELEMENT STATUS data to include WRITE PROTECT bit in storage element pages (SMC-3; CA);
- Enhance READ ELEMENT STATUS data to include medium type support (i.e. technology, generation, and special cartridge type) for Data Transfer elements (SMC-3; CA);
- Add an additional sense code and text to the TEST UNIT READY command so that an application client can detect when the opening and closing of an Import/Export element door has resulted in a change in the medium inventory (SMC-3, SPC-4; CA);
- Add an additional sense code and text to the TEST UNIT READY command so that an application client can detect when a SCSI device associated with a Data Transfer element has been removed or replaced (SMC-3, SPC-4; CA);
- Add an interface [i.e. parameters for a key and bit mask for standardized algorithm(s)] for encryption/decryption in a stream device server (SSC-3?, SPC-4?; CA);
- Add a uniform method (e.g. command) to determine if the medium or the device caused an error (SSC-3, SPC-4?; CA);
- Add a mode parameter to allow an application client to set the Early Warning size (SSC-3; CA);
- Add a parameter to a stream device server that contains the serial number of the media changer containing the removable medium device, and add a method for an application client within the media changer to set this parameter (ADC-2, SSC-3; CA);
- Add a method to differentiate between a medium changer device server acting on a virtual library and one acting on a physical library (SMC-3; CA);
- Add a method to differentiate between a stream device server acting on a virtual removable medium device and one acting on a physical removable medium device (SSC-3; CA); and
- Enhance the explicit command set (e.g. by adding the host id to the medium access CDBs) to support concurrent data streams to a stream device server acting on a virtual removable medium device (SSC-3; CA).

1.4 Kevin's summary via email

SSC-3

- Mandate that commands return CHECK CONDITION status with the sense key set to NOT READY and the additional sense code set to MEDIUM NOT PRESENT after returning GOOD status to a LOAD/UNLOAD command with LOAD set to

zero and HOLD set to zero (SSC-3; EMC);

<< Priority ??, Difficulty B >>

- Standardize all of the conditions/events that set sense key and additional sense code values (SMC-3, SSC-3, SPC-4?; CA);

<< Priority ??, Difficulty A >>

- Provide a standard command to return the error history (e.g. count, error codes, and time stamps) for the device, device server, and removable medium (SMC-3, SSC-3, SPC-4?; CA);

<< Priority ??, Difficulty C >>

- Add an interface [i.e. parameters for a key and bit mask for standardized algorithm(s)] for encryption/decryption in a stream device server (SSC-3?, SPC-4?; CA);

<< Priority A+, Difficulty A+ >>

- Add a uniform method (e.g. command) to determine if the medium or the device caused an error (SSC-3, SPC-4?; CA);

<< Priority C, Difficulty A >>

- Add a mode parameter to allow an application client to set the Early Warning size (SSC-3; CA);

<< Priority ??, Difficulty C >>

- Add a parameter to a stream device server that contains the serial number of the media changer containing the removable medium device, and add a method for an application client within the media changer to set this parameter (ADC-2, SSC-3; CA);

<< Priority ??, Difficulty C >>

- Add a method to differentiate between a stream device server acting on a virtual removable medium device and one acting on a physical removable medium device (SSC-3; CA); and

<< Priority ??, Difficulty A >>

- Enhance the explicit command set (e.g. by adding the host id to the medium access CDBs) to support concurrent data streams to a stream device server acting on a virtual removable medium device (SSC-3; CA).

<< Priority ??, Difficulty A >>

2 SSC-3 working group response