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T10/08-215r1

To INCITS T10 Committee
From Curtis Ballard, HP
Subject Report Volume Information

Date
 8 July, 2008

Revision History

Revision 0 – Initial document
 Revision 1 – Changes from May 2008 Face to Face

Related Documents

smc3r04 – SCSI Media Changer Commands - 3 revision 11
 spc3r23 – SCSI Primary Commands -3 revision 23

Background

This command is a companion to 08-066, Report Element Information. Full background is available in that proposal. This document proposes the second half of a change to SMC-3 that creates two new media changer commands, "REPORT ELEMENT INFORMATION" and "REPORT VOLUME INFORMATION" which will provide an alternate method to retrieve all of the information currently returned by "READ ELEMENT STATUS". These new commands will provide a mechanism that allows for easier extension in the future and allows selective or all inclusive retrieval of the data. Following the standardization of these commands "READ ELEMENT STATUS" may be deprecated.

The "REPORT VOLUME INFORMATION" command specified in this proposal reports data pages containing information about a volume in a medium changer element. Using the page code mechanism to select information pages about an element allows an application client to select only the information it needs at the time and to get back only that information rather than the monolithic data block used by Read Element Status. By using this command an application client can determine information about a volume in a medium changer element.

The Read Element Status mechanism for specifying a starting element address and number of elements is leveraged for this command as well as the element type filter to allow requesting information on a single element or range of elements of a specific type or all elements of all types.

In the May 2008 meeting the working group suggested that a new command or page should be defined that will report static information about a volume type capability so this version removes characteristics that would be common for all volumes of a given type.

In the proposed changes that follow, new text appears in blue or purple, deleted text appears in red-strikeout, and editorial comments appear in green.

Proposed Changes to SMC-3

Changes to 6.1:

Table 5 has the following addition (the entire table is not reproduced here):

Command	Operation Code	Type	Reference
REPORT VOLUME INFORMATION	9Eh/11h ^a	O	6.x

Changes to 6.2:

Table 6 has the following addition (the entire table is not reproduced here):

REPORT VOLUME INFORMATION	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed
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New sub-clause 6.x:

(Note: existing sub-clauses 6.x and above shift to become 6.x+1 and above with the addition of this new sub-clause)

6.x REPORT VOLUME INFORMATION COMMAND

6.x.1 REPORT VOLUME INFORMATION command introduction

The REPORT VOLUME INFORMATION command (see table y) requests information pages that describe a volume or a set of volumes.

Table y – REPORT VOLUME INFORMATION command

Bit Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (9Eh)							
1	Reserved			SERVICE ACTION (11h)				
2	PAGE CODE							
3	CDATA	Reserved	VOLUME ADDRESS TYPE		Reserved	MEDIUM TYPE		
4	(MSB)							
5	VOLUME TYPE							
6	(MSB)							
7	FIRST VOLUME ADDRESS							
8	(MSB)							
9	NUMBER OF VOLUMES							
10	(MSB)							
11								
12	ALLOCATION LENGTH							
13								
14	Reserved							
15	CONTROL							

See SPC-3 for the definition of the OPERATION CODE field and the SERVICE ACTION field. The OPERATION CODE and SERVICE ACTION fields shall be set to the values shown in table y.

The PAGE CODE field specifies the volume information page requested (see table y+2) by the application client. If the device server detects a PAGE CODE field set to an unsupported value, then it shall terminate the command with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN CDB.

If the cached data (CDATA) bit is set to one, then the device server shall return the requested volume information page using cached discovery and inventory information without causing device motion. If the CDATA bit is set to zero, then the device server may cause device motion to validate the volume information (e.g., perform an inventory scan or other actions). If the CDATA bit is set to zero and discovery (see 3.1.X) or an inventory scan (see 3.1.X) is required to update a volume information page requested but the device is not capable of performing the discovery or inventory scan, then the device server shall terminate the command with CHECK CONDITION status, with the sense key set to NOT READY and the additional sense code shall specify the reason for NOT READY. If the CDATA bit is set to one and discovery (see 3.1.X) is required to update a requested volume information page, then the device server shall terminate the command with CHECK CONDITION status, with the sense key set to NOT READY and the additional sense code shall specify the reason for NOT READY. Support for the CDATA bit set to one is mandatory.

The VOLUME ADDRESS TYPE field specifies the format of the value in the FIRST VOLUME ADDRESS FIELD. See table y+1 for the VOLUME ADDRESS TYPE field values.

Table y + 1: VOLUME ADDRESS TYPE field values

Address type	Description
00b	Element Address
01b	Volume Index (see 6.x.x)
10b – 11b	Reserved

The MEDIUM TYPE field specifies the type(s) of medium selected for reporting by this command. The medium type codes are defined in table 26.

The VOLUME TYPE field specifies the volume type (see 5.4) selected for reporting by this command.

The FIRST VOLUME ADDRESS field specifies the address of the first volume to report using the address type specified in the VOLUME ADDRESS TYPE field. Only volumes with a medium type code selected by the MEDIUM TYPE CODE field, a volume type selected by the VOLUME TYPE field, and a volume address numerically greater than or equal to the value specified in the FIRST VOLUME ADDRESS field shall be reported. If the PAGE CODE field is set to 00h (i.e., Supported Element Information Pages), then the STARTING ELEMENT ADDRESS field shall be ignored.

The NUMBER OF VOLUMES field specifies the maximum number of volumes to be reported. Pages shall only be reported for defined volume addresses. Undefined volume addresses shall be skipped and shall not be counted in the number of volumes reported. If the PAGE CODE field is set to 00h (i.e., Supported Element Information Pages), then the NUMBER OF VOLUMES field shall be ignored.

Elements selected by the STARTING VOLUME field and the NUMBER OF VOLUMES field shall be reported once per volume in ascending order by volume address.

See SPC-3 for the definition of the ALLOCATION LENGTH field. If the descriptors are truncated because of the allocation length this shall not be considered an error.

See SAM-3 for a description of the CONTROL byte.

Table y + 2: Volume Information Page Codes

PAGE CODE	Definition	Reference	Support
00h	Supported Volume Information Pages	6.x.2	Mandatory
01h	Volume Static Information	6.x.3	Mandatory
02h	Volume State	6.x.4	Mandatory
03h	Volume Bus Address	6.x.5	Optional
04h-7Eh	Reserved		
7Fh	Return All Supported Pages	6.x.6	Optional
80h-FFh	Vendor Specific		

6.x.2 Supported Volume Information Pages

The Supported Volume Information Pages information page (see table y + 2) returns the list of volume information pages supported by the device server for the volume specified by the volume index or the element address in the REPORT VOLUME INFORMATION command. If all volume types are specified, then the device server shall return one supported pages descriptor for each volume type.

Table y + 3: Supported Volume Information Pages

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (00h)							
1	Reserved							
:								
5								
6	(MSB)	PAGE LENGTH (n-7)						(LSB)
7								
Supported pages descriptors								
8	First supported pages descriptor (see table y + 4)							
	:							
	:							
n	Last supported pages descriptor (see table y + 4)							

The PAGE CODE field shall be set to the value shown in table y+3.

The value in the PAGE LENGTH field indicates the length in bytes of the supported pages descriptors that follow. If the descriptors are truncated because of the allocation length, the PAGE LENGTH field shall not be affected.

One supported pages descriptor shall be returned for each selected volume type. Supported pages descriptors shall be returned in ascending order by element type code.

Comment: It may not make sense to return a list of supported pages by volume type since this command doesn't have a lot of optional pages that may vary by volume type but it will depend on what we decide to do with the volume type concept and if we want to future proof to allow the possibility of mixed media libraries with very different volume types (maybe mixed optical and tape media) and some potential new pages defined in the future that may describe characteristics unique to a particular volume type.

Table y + 4: Supported Pages descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved				VOLUME TYPE CODE			
1	Reserved							
2	(MSB)	PAGE CODE LIST LENGTH (n-3)						(LSB)
3								
4	Supported element information page code list							
n								

The VOLUME TYPE CODE field shall contain the volume type code for the volume type that supports the following list of pages.

The value in the PAGE CODE LIST LENGTH field is the length in bytes of the supported volume information page code list. If the descriptor is truncated because of the allocation length, the PAGE CODE LIST LENGTH field shall not be affected.

The supported volume information page code list contains a list of volume information page codes (see table y + 2) implemented by the logical unit for the specified volume type code in ascending order beginning with page code 00h.

6.x.3 Volume Static Information

Table y + 5 shows the format of the Volume Static Information page.

Table y + 5: Volume Static Information page

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (01h)							
1	Reserved							
:								
5								
6	(MSB)	PAGE LENGTH (n-7)						(LSB)
7								
Volume static information descriptors								
8	First volume static information descriptor (see table y + 6)							
⋮								
n	Last volume static information descriptor (see table y + 6)							

The PAGE CODE field shall be set to the value shown in table y + 5.

The value in the PAGE LENGTH field is the length in bytes of the volume static information descriptors that follow. If the descriptors are truncated because of the allocation length, the PAGE LENGTH field shall not be affected.

Comment: This page should report the following information

- **Medium type**
- **Volume type code**
- **Volume qualifier code**
- **Barcode**
- **Volume GUID**

6.x.4 Volume State

Table y + 8 shows the format of the Volume State page.

Table y + 8: Volume State page

Bit Byte	7	6	5	4	3	2	1	0	
0	PAGE CODE (02h)								
1									
:	Reserved								
5									
6	(MSB)	PAGE LENGTH (n-7)							
7								(LSB)	
Volume state descriptors									
8	First volume state descriptor (see table y + 9)								
⋮									
n	Last volume state descriptor (see table y + 9)								

The PAGE CODE field shall be set to the value shown in table y + 8.

The value in the PAGE LENGTH field is the length in bytes of the volume state descriptors that follow. If the descriptors are truncated because of the allocation length, the PAGE LENGTH field shall not be affected.

Comment: This page should report the following information

- **Primary volume tag**
- **Alternate volume tag**
- **Source Valid**
- **Source element address**
- **Invert**
- **May be exported**
- **Write protect**
- **Contains encrypted data**
- **Mounted**
- **Volume use (backup, archive, backup duplicate)?**
- **Expired**
- **Full**
- **Configured to allow encryption**
- **Others**

6.x.5 Volume Bus Address

Table y + 14 shows the format of the Volume Bus Address page.

Table y +14: Volume Bus Address page

Bit Byte	7	6	5	4	3	2	1	0	
0	PAGE CODE (02h)								
1									
:	Reserved								
5									
6	(MSB)	PAGE LENGTH (n-7)							
7									
	Volume bus address descriptors								
8	First volume bus address descriptor (see table y + 9)								
	:								
	:								
	Last volume bus address descriptor (see table y + 9)								
n									

The PAGE CODE field shall be set to the value shown in table y + 14.

The value in the PAGE LENGTH field is the length in bytes of the volume bus address descriptors that follow. If the descriptors are truncated because of the allocation length, the PAGE LENGTH field shall not be affected.

Comment: This page can include information to help the application find where the volume is mounted. It would probably include information like the WWID of the DTD where the volume is mounted and may contain information about whether that DTD device believe it is connected to a transport and maybe information on the transport type if that is useful. It may make more sense to have this page with the element information for the element that contains this volume if this page is useful at all.

6.x.6 Return All Supported Pages

If the Return All Supported Pages information page code is requested, then the device server shall return all of the pages supported by the elements selected by the STARTING VOLUME field in the CDB and the VOLUME TYPE CODE field in the CDB in ascending order by page code (i.e. all page code 01h pages shall be returned before any page code 02h pages).