T10/08-215r5~~3~~

To	From	Subject	Date
INCITS T10 Committee	Curtis Ballard, HP	Report Volume Information	~~6 January, 2008~~ 3 May, 2009

Revision History

Revision 0 – Initial document

Revision 1 – Changes from May 2008 Face to Face

Revision 2 – Filled in all of the return data pages to return values as decided at the face to face meetings.

Revision 3 – Changes from September 2008 face to face

Revision 4 – Changes from January 2009 teleconference

Revision 5 – Modified to have optional XCDB for transferring volume descriptor
        Changed to use 4 byte element addresses to match REPORT ELEMENT INFORMATION

Related Documents

smc3r11 – 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 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.

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Proposed Changes to SPC-4

Changes to 4.3.4.2, The XCDB format, table 20:

Table 20 – EXTENSION TYPE field

Code	Descriptor Order [a]	Description	Extension size (bytes)	Reference
40h	first	CbCS extension descriptor	140	5.14.6.8.16
41h	second	Volume identifier descriptor	64	SMC-3

[a] The order in which XCDB descriptors appear in an XCDB is arranged so that all the XCDB descriptors that follow an XCDB descriptors that follow an XCDB descriptor defined in a future version of this standard are also XCDB descriptros defined in a future version of this standard (i.e., after encountering one unrecognized XCDB descriptor, all subsequent XCDB descriptors are also going to be unrecognized).

Proposed Changes to SMC-3

Changes to 3.1:

3.1.x Mounted: mounted is a state of a volume where the volume is in a data transfer device element and the data transfer device is physically capable of processing commands that cause the media in the volume to be moved.

3.1.x volume code: A combination of the volume type code and the volume qualifier code (see 5.4).

Changes to 6.1:

Table 6 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 7 has the following addition (the entire table is not reproduced here):

Command	Address LU is reserved by another initiator [A]	Addressed LU has this type of persistent reservation held by another initiator [B]				
		From any initiator		From registered initiator (RR all types)	From any initiator not registered	
		Write Excl	Excl Access		Write Excl –RR	Excl Access –RR
:	:	:	:	:	:	:
REPORT VOLUME INFORMATION (CDATA = 0)	Conflict	Conflict	Conflict	Allowed	Conflict	Conflict
REPORT VOLUME INFORMATION (CDATA = 1)	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed
:	:	:	:	:	:	:

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. The REPORT VOLUME INFORMATION command may be encapsulated in an XCDB (see SPC-4) to include a volume identifier descriptor.

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	SEAV	NEV	CDATA	~~VAT~~ RESERVED		MEDIUM TYPE		
4	(MSB)			REQUESTED VOLUME TYPE				
5								(LSB)
6	(MSB)			~~FIRST VOLUME~~STARTING ELEMENT ADDRESS				
~~9~~7								(LSB)
~~8~~	~~(MSB)~~			~~NUMBER OF VOLUMES~~				
~~9~~								~~(LSB)~~
10	(MSB)							
11				ALLOCATION LENGTH				
12								
13								(LSB)
14	~~Reserved~~NUMBER OF VOLUMES							
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+1) 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.

Table y + 1: 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 tag information	6.x.5	Optional
04h	Volume bus identifier	6.x.6	Optional
05h-7Eh	Reserved		
7Fh	Return all supported pages	6.x.6	Mandatory
80h-FFh	Vendor specific		

A starting element address valid (SEAV) bit set to one indicates that the STARTING ELEMENT ADDRESS field is valid. A SEAV bit set to zero indicates that the STARTING ELEMENT ADDRESS field is not valid. If the REPORT VOLUME INFORMATION command is not sent in an XCDB with a volume identifier extension (see x.x.x), then the SEAV bit shall be set to one. If the REPORT VOLUME INFORMATION command is sent in an XCDB with a volume identifier extension, then the SEAV bit shall be set to zero.

A number of elements valid (NEV) bit set to one indicates that the NUMBER OF ELEMENTS field is valid and the specified number of elements are selected for reporting. A NEV bit set to zero indicates that the NUMBER OF ELEMENTS field is not valid and all elements may be selected for reporting. If the PAGE CODE field is set to 00h (i.e., Supported element information pages), then the NEV bit shall be set to zero.

If the cached data (CDATA) bit is set to one, then the device server shall return the requested volume information page using cached volume information and shall not cause device motion. The device server shall support the cdata bit set to one. 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). The device server shall support the CDATA bit set to zero. If the CDATA bit is set to zero and device motion is required to report a requested volume information page, but the media changer is not capable of performing the device motion, 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 the device server does not have the cached volume information required to report 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.

~~If the volume address type (VAT) bit is set to one, then the FIRST VOLUME ADDRESS field contains a volume index (see 6.x.x). If the VAT bit is set to zero, then the FIRST VOLUME ADDRESS field contains an element address.~~

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. If the medium type selected is type 0h, (i.e., Unspecified), then all medium types ~~are~~ may be selected for reporting by this command.

Comment: Do we need to modify the definition of medium type code 0h in table 26 which currently states: "Unspecified. The media changer does not support this field, cannot determine the medium type, or the element is empty"?

The REQUESTED VOLUME TYPE field specifies the volume code (see 3.1.X) 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 VAT field. Only volumes with a medium type code selected by the MEDIUM TYPE CODE field, a volume code selected by the REQUESTED 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 STARTING ELEMENT ADDRESS field specifies the lowest element address to report. Only volumes with an element type code selected by the ELEMENT TYPE CODE field and an element address greater than or equal to the value specified in the STARTING ELEMENT ADDRESS field shall be selected for reporting. The device server shall not report element information descriptors for undefined element addresses. If the PAGE CODE field is set to 00h (i.e., Supported volume information pages), then the STARTING ELEMENT ADDRESS field shall be ignored.

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

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 not be reported 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.~~

~~Volumes 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 any of 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.

If the REPORT VOLUME INFORMATION command is encapsulated in an XCDB containing a volume identifier extension, then the volume identified in the volume identifier extension shall be selected for reporting if:

    a)   the volume is selected by the MEDIUM TYPE field; and
    b)   the volume is selected by the VOLUME TYPE field.

Volumes selected for reporting shall be reported once per volume in ascending order by volume address.

Comment: It seems useful to define a couple of new ASC/ASCQ combinations for this command if an XCDB is used. One to report that the specified volume did not match the type codes and another to report that the volume was not found.

6.x.2 Supported volume information pages

The Supported volume information pages volume information page (see table y + 2) returns the list of volume information pages supported by the device server for the volumes with the volume type code specified by the REQUESTED VOLUME TYPE field 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 + 2: 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)				
7								(LSB)
				Supported pages descriptors				
8				First supported pages descriptor (see table y + 3)				
				: :				
n				Last supported pages descriptor (see table y + 3)				

The PAGE CODE field shall be set to the value shown in table y + 2.

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, then 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 VOLUME TYPE CODE. If all volume types support the same set of pages, a single descriptor with the volume code set to 00h (all types) may be returned.

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 + 3: Supported pages descriptor

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

The VOLUME TYPE CODE field shall contain the volume type code (see 5.4) for the volume type that supports the following list of pages. All volumes with the same volume type code shall support the same set of volume information 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, then 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 + 1) 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

The volume static information volume information page (see table y + 4) returns a set of volume characteristics that are defined as static and were established:

a) when the media was manufactured;
b) when the media was formatted; or
c) by vendor specific means.

Table y + 4: Volume static information page

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (01h)							
1	Reserved							
2~~4~~	Reserved							
5								
6	(MSB)		PAGE LENGTH (n-9)					
9								(LSB)
	Volume static information descriptors							
10	First volume static information descriptor (see table y + 5)							
	:							
	:							
n	Last volume static information descriptor (see table y + 5)							

The PAGE CODE field shall be set to the value shown in table y + 4.

~~The DESCRIPTOR LENGTH field shall contain the length of each volume static information descriptor. The DESCRIPTOR LENGTH shall be a multiple of 4. The volume static information descriptors shall be zero padded.~~

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, then the PAGE LENGTH field shall not be affected.

One volume static information descriptor shall be returned for each selected volume. Volume static information descriptors shall be returned in ascending order by element address.

Table y + 5: volume static information descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1			DESCRIPTOR LENGTH (n-2)					(LSB)
2~~0~~	(MSB)							
5~~1~~			VOLUME ~~IDENTIFIER~~ ELEMENT ADDRESS					(LSB)
6~~2~~	Reserved	SIGU	VSLBE		VSMAMA		MEDIUM TYPE	
7~~3~~	Reserved				CAE		VSNV	BCV
8~~4~~								
9~~5~~	REPORTED VOLUME TYPE							
10~~6~~								
15	Reserved							
16								
47	BARCODE							
48								
79	VOLUME SERIAL NUMBER							
80								
m	VOLUME ID							
m+1								
n	Reserved							

The DESCRIPTOR LENGTH field shall contain the length of the data to follow. The DESCRIPTOR LENGTH shall be a multiple of 4. The volume static information descriptors shall be zero padded.

~~If the volume address type (VAT) bit in the CDB is set to one, then t~~The VOLUME ~~IDENTIFIER~~ ELEMENT ADDRESS field contains the element address for the volume~~a volume index (see 6.x.x). If the VAT bit is set to zero, then the VOLUME IDENTIFIER field contains an element address.~~

A serial number is globally unique (SIGU) bit set to one indicates that the value reported in the VOLUME SERIAL NUMBER field is globally unique. A SIGU bit set to zero indicates that the value reported in the VOLUME SERIAL NUMBER field is not known to be globally unique.

The volume supports logical block encryption (VSLBE) field reports the logical block encryption support for the volume being reported. See table y + 6 for the VSLBE field values

Table y + 6: VSLBE field values

MOUNTED	Description
00b	Unknown
01b	The volume supports encrypting and decrypting the data within logical blocks (see SSC-3)
10b	The volume does not support encrypting and decrypting the data within logical blocks (see SSC-3)
11b	Reserved

Comment: can we reference SSC-3 for logical blocks or do we need to pull that definition into here since the DTD may not be a tape device?

A volume supports medium auxiliary memory attributes (VSMAMA) bit set to one indicates that the volume supports medium auxiliary memory attributes (see SPC-3). A VSMAMA bit set to zero indicates that the volume does not support medium auxiliary memory attributes. If a volume supports medium auxiliary attributes, then an application client may access the medium auxiliary attributes when the volume is in a data transfer device that supports the READ ATTRIBUTE command (see SPC-3) and the WRITE ATTRIBUTE command (see SPC-3).

See 6.x.1 for the definition of the MEDIUM TYPE field.

The configured to allow encryption (CAE) field indicates whether the volume is configured to allow encrypting and decrypting of the data within logical blocks. See table y+12 for the CAE field values.

A volume serial number valid (VSNV) bit set to one indicates that the value in the VOLUME SERIAL NUMBER field is valid. A VSNV bit set to zero indicates that the value in the VOLUME SERIAL NUMBER field is not valid.

A barcode valid (BCV) bit set to one indicates that the value in the BARCODE field is valid. A BCV bit set to zero indicates that the value in the BARCODE field is not valid.

The REPORTED VOLUME TYPE field indicates the volume code (see 3.1.X) of the volume being reported.

The BARCODE field contains 32 bytes of left-aligned ASCII data (see SPC-3) identifying the value from the barcode on the volume. If the barcode value is not known, then the device server shall return ASCII spaces (20h) in this field. This field is valid only if the BCV bit is set to one.

The VOLUME SERIAL NUMBER field contains 32 bytes of left-aligned ASCII data (see SPC-3) identifying the serial number of the volume. If the volume serial number value is not known, then the device server shall return ACII spaced (20h) in this field. This field is valid only if the MSNV bit is set to one.

Comment: Do we want to drop the BARCODE and VOLUME SERIAL NUMBER fields if those aren't valid so that we conserve the space when information on everything is requested? Not really a problem when requesting a single volume and fixed sizes is easier but the additional length is significant if requesting everything.

The VOLUME ID field contains a volume identifier (see x.x.x). If no volume identifier is available for the selected volume, then the VOLUME IDENTIFICATION LENGTH field in the volume identifier descriptor shall be set to zero.

One volume static information descriptor shall be returned for each selected volume. Volume static information descriptors shall be returned in ascending order by:

    1)   volume identifier; or
    2)   element address.

6.x.4 Volume state

The volume state information page (see table y + 7) returns the current state of a set of volume characteristics that are not defined as static and may change.

Table y + 7: Volume state page

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

The PAGE CODE field shall be set to the value shown in table y + 7.

The DESCRIPTOR LENGTH field shall contain the length of each volume state information descriptor. The DESCRIPTOR LENGTH shall be a multiple of 4. The volume state information descriptors shall be zero padded.

Comment: Need to consider whether Symantec proposal for extension to this command would cause the descriptors to be variable length and if so the length field needs moved.

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

One volume state information descriptor shall be returned for each selected volume. Volume state information descriptors shall be returned in ascending order by: ~~element address.~~

1) volume identifier; or
2) element address.

Table y + 8: volume state information descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)			ELEMENT ADDRESS				
3~~1~~								(LSB)
4~~2~~	WRITE PROTECT		MOUNTED		CED		CUED~~CAE~~	
5~~3~~	CAE		Reserved	INVERT	SEAV	ECV	NCR	MBE
6				Reserved				
7								
8~~4~~	(MSB)			SOURCE STORAGE ELEMENT ADDRESS				
11~~5~~								(LSB)
12~~6~~				Reserved				
n~~7~~								

The ELEMENT ADDRESS field indicates the element address of the media changer element that contains the volume being reported.

The WRITE PROTECT field indicates whether the volume is write protected. See table y+9 for the WRITE PROTECT field values.

Table y + 9: WRITE PROTECT field values

WRITE PROTECT	Description
00b	Unknown
01b	The device server has detected that the last data transfer device reported that the volume was write protected. If the write protection was temporary, then the volume may not be write protected when it is loaded into another data transfer device.
10b	The device server has detected that the last data transfer device reported that the volume was not write protected.
11b	Reserved

The MOUNTED field indicates whether the volume is mounted (see 3.1.X). See table y+10 for the MOUNTED field values.

Table y + 10: MOUNTED field values

MOUNTED	Description
00b	Unknown
01b	The volume is mounted.
10b	The volume is not mounted
11b	Reserved

The contains encrypted data (CED) field indicates whether the volume contains at least one encrypted logical block (see SSC-3). See table y+11 for the CED field values.

Table y + 11: CED field values

CED	Description
00b	Unknown
01b	The volume contains at least one encrypted logical block.
10b	The volume does not contain any encrypted logical blocks.
11b	Reserved

The contains unencrypted data (CUED) field indicates whether the volume contains at least one unencrypted logical block (see SSC-3). See table y+11 for the CUED field values.

Table y + 12: CUED field values

CED	Description
00b	Unknown
01b	The volume contains at least one unencrypted logical block.
10b	The volume does not contain any unencrypted logical blocks.
11b	Reserved

The configured to allow encryption (CAE) field indicates whether the volume is configured to allow encrypting and decrypting of the data within logical blocks. See table y+12 for the CAE field values.

Table y + 12: CAE field values

CAE	Description
00b	Unknown
01b	The volume does not support encrypting and decrypting of the data within logical blocks.
10b	The volume is configured to allow encrypting and decrypting of the data within logical blocks.
11b	The volume is configured to prohibit encrypting and decrypting of the data within logical blocks.

An INVERT bit set to one indicates that the volume is a two sided volume and the side identified by the device server as the bottom is on top.~~has been inverted by MOVE MEDIUM or EXCHANGE MEDIUM operations since it was last in the SOURCE STORAGE ELEMENT ADDRESS.~~ An INVERT bit set to zero indicates that the volume is a two sided volume and the side identified by the device server as the bottom is on the bottom.~~has not been inverted by MOVE MEDIUM or EXCHANGE MEDIUM operations since it was last in the SOURCE STORAGE ELEMENT ADDRESS~~ If the top and bottom of the volume can not be identified by the device server, then the side that was on top when the last inventory scan was performed shall be the top.

A source element address valid (SEAV) bit set to one indicates that the SOURCE STORAGE ELEMENT ADDRESS field is valid. A SEAV bit set to zero indicates that the SOURCE STORAGE ELEMENT ADDRESS field is not valid.

An expired cleaning volume (ECV) bit set to one indicates that the device server has detected that the volume is an expired cleaning volume. An ECV bit set to zero indicates that the device server has not detected that the volume is an expired cleaning volume or that the device server does not support detection of expired cleaning volumes. How the device server detects that the volume is an expired cleaning volume is beyond the scope of this standard.

A no capacity remaining (NCR) bit set to one indicates that the device server has detected that the volume has passed a device server determined capacity threshold (e.g., the data transfer device includes an SSC-3 compliant device server and the logical position has passed the early warning position). A no capacity remaining (NCR) bit set to zero indicates that the device server has not detected that the volume has passed a device server determined capacity threshold or that the device server does not support capacity detection.

A may be exported (MBE) bit set to one indicates that the volume may be exported (i.e., moved to an import/export element). A MBE bit set to zero indicates that the volume may not be exported.

The SOURCE STORAGE ELEMENT ADDRESS field provides the address of the last storage element this unit of media occupied. This field is valid only if the SEAV bit is set to one.

6.x.5 Volume tag information page

Table y + 13 shows the format of the Volume tag information page.

Table y +13: Volume tag information page

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (03h)							
1	Reserved							
~~2~~	~~(MSB)~~			~~DESCRIPTOR LENGTH~~				
~~3~~								~~(LSB)~~
<u>2</u>~~4~~	Reserved							
5								
6	(MSB)			PAGE LENGTH (n-9)				
9								(LSB)
	Volume tag information descriptors							
10								
	First volume tag information descriptor (see table y + 15)							
	.							
	.							
	Last volume tag information descriptor (see table y + 15)							
n								

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

~~The DESCRIPTOR LENGTH field shall contain the length of each volume tag information descriptor. The DESCRIPTOR LENGTH shall be a multiple of 4. The volume tag information descriptors shall be zero padded.~~

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

One volume tag information descriptor shall be returned for each selected volume. Volume tag information descriptors shall be returned in ascending order by element address.

Table y + 15: volume tag information descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				DESCRIPTOR LENGTH (n-1)				(LSB)
20				Reserved				
31				Reserved				EAVIVALID
45	(MSB)							
76				ELEMENT ADDRESS				(LSB)
87				Reserved				
158								
16				PRIMARY VOLUME TAG INFORMATION				
51								
52				ALTERNATE VOLUME TAG INFORMATION				
87								
88	(MSB)							
m				VOLUME ID				(LSB)
m+1				Reserved				
n								

The DESCRIPTOR LENGTH field shall contain the length of the data to follow. The DESCRIPTOR LENGTH shall be a multiple of 4. The volume tag information descriptors shall be zero padded.

An element address valid (EAV) bit set to one indicates that the value reported in the ELEMENT ADDRESS field is valid. An EAV bit set to zero indicates that the value reported in the ELEMENT ADDRESS field is not valid.

See 6.x.5 for the definition of the IVALID bit and the VOLUME INDEX field.

The ELEMENT ADDRESS field indicates the address of the element that contains the volume being reported. The ELEMENT ADDRESS field is not part of the static information and is used to provide a way to identify the volume being reported in libraries that do not support the VOLUME INDEX field. This field is only valid if the EAV bit is set to one.

Comment: We could have the field at the end be either a volume ID or an element address with the volume ID as the preferred value.

The PRIMARY VOLUME TAG INFORMATION field and the ALTERNATE VOLUME TAG INFORMATION field provide identifying information for this volume (see 5.3).

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 volumes selected by the MEDIUM TYPE field in the CDB, the STARTING VOLUME field in the CDB and the REQUESTED VOLUME TYPE field in the CDB in ascending order by page code (i.e. return all page code 01h pages followed by all page code 02h pages, etc).