memorandum

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T10/08-066r7~~6~~

To	From	Subject	Date
INCITS T10 Committee	Curtis Ballard, HP	Report Element Information	~~6~~8 April~~January~~, 20098

Revision History

Revision History for original document number 06-272

Revision 0 – Initial document, split off from 06-046r1

Revision 1 – Changes from September 2006 T10
Changed to 16 Byte CDB to reuse number of elements concept from RES and removed "SINGLE" bit
Updated to SMC3r04
Completed element characteristics page
Added element state page

Revision 2 – Moved Page Code field in CDB
Corrected Opcode in CDB table and command table
Removed complete descriptors requirement and added note about difference from RES
Added requirement that element address be ignored if the supported pages list is requested
Renamed Element Characteristics page to Element Static Information page
Added requirement for supported pages order in return data
Added length fields to pages with fixed length descriptors
Removed "Offline" concept and all bits – disabled with UA's will be used instead
Added Import and Operator Intervention bits to element state
Change Exception Cause field to ASC/ASCQ as in RES
Added support column to page code list

Revision 3 – Changes requested in Feb. 2007 T10 meeting
Moved "see SPC-3" for allocation and control field to the correct location.
Changed ELEMENT TYPE CODE field to reference 6.10.1 directly
Moved truncated descriptors not an error statement to normative text in allocation length description
Wording corrections on supported element information pages description
Moved location of single supported pages descriptor for each element type requirement
Changed return data to allow grouping of elements by starting address and number of elements
Changed location length descriptor to 4 bytes and location parameter length to 4 bytes
Removed list of proposed location types
Corrected location of PARAMETERS LENGTH in element location descriptor.
Changed supported volume types list to supported volume types parameters
Added ability to report a supported volume type as read only when in the described data transfer element
Added a volume index to the state information.

Revision 4 – Changed background to better describe this as part of a two command replacement for RES
Simplified the header to conform to working group standards of no company logo on pages 2+
Added text to clarify element can be disabled bit
Added text to clarify removed bit
Added CURDATA bit to CDB

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Revision 5 – Several wording changes from June 2007 conference call
    Rewrote paragraph on setting volume types and qualifiers in supported volume types list
    Changed read only setting on volumes in drives to reference write OK bit in drive report density codes page
    Added text to each descriptor that may contain variable information to specify behavior when CURDATA=1
Revision 6 – Changes from July 2007 T10 meeting
    Revised definitions for Discovery and Inventory Scan
    Added UPG bit to CDB to allow optional selection of elements available with an upgrade
    Changed definition of write capable to not tie directly to tape WRTOK bit
    Split expansion concept in static descriptor to add-on and COD types of expansion
    Replaced virtual bit with can not be exported bit in static descriptor

Revision 7 – Changes from September 2007 T10 meeting
    Changed CONTROL byte reference
    Changed element state descriptor to only be able to return a single element instead of a range
    Changed all pages to be able to wait or return OPERATION IN PROGRESS when CURTDATA = 0
    Removed "can not be exported" bit – use volume type/qualifier to create type incompatible with I/O instead
    Several minor clarifications and corrections

Revision History for new document number 08-066

Revision 0 – Identical to 06-272r7 new number automatically assigned

Revision 1 – Changes from January, 2008 working group meeting Santa Ana, CA

Revision 2 – Changes from January, 2008 phone conference
    Changed CURDATA to CDATA and renamed to cached data to avoid SMC-3 CURDATA confusion
    Reformatted and slightly reworded requirements around CDATA in each section.
    Added LOCATION DESCRIPTION and CODE SET QUALIFIER to location descriptor

Revision 3 – Changes from March 2008 working group meeting and comments received via markup
    Added requirement that NOT READY be returned if CDATA set and discovery not complete
    Added requirement that elements be returned once in order
    Changed all headers to 8 bytes
    Added requirement to ignore WRITE CAPABLE in supported volumes page if element is not a DTD device

Revision 4 – Changed to 4 byte page lengths for all pages
    Made bit name and wording changes suggested at May 2008 meeting to element state descriptor fields
    Removed element location page so it can be brought back later as an individual piece

Revision 5 – Corrected reservations conflict table to show conflict for CDATA = 1 cases
    Clarifications to some bit definitions for the element state page
    Removed "inventory scan" definition as it was pulled into a proposal by Noud Snelder and approved
    Updated "discovery" definition to match approved inventory scan definition format
    Clarified Note in section 6.x.5
    Editorial changes as recommened

Revision 6 – Changes to keep proposal synchronized with 08-215r3

Revision 7 – Changed to accept greater than 64K elements
    Changed VOLUME INDEX to a more generic VOLUME IDENTIFIER

Related Documents

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

Background

The Read Element Status command is used by applications to describe which elements of a media changer device are full and empty. Some information about the element compatibility has been added to the Read Element Status command in SMC and other information is provided using various vendor unique methods. Some of the characteristics that are currently reported in vendor unique methods are medium type, and element location which are frequently returned in a vendor specific section at the end of the Read Element Status data. Much of the information currently returned in Read Element Status is static information that does not change and does not need read every time the full/empty status needs refreshed. There are also several element characteristics that are not currently returned in Read Element Status. Further expansion of Read Element Status to include more static information would add complexity to an already complex command and increase the already large return data.

This document proposes the first 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 ELEMENT INFORMATION" command specified in this proposal reports data pages containing information about a medium changer element. One page describes the dynamic information about the elements and all describe semi-static information that will not change without a device configuration change. 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 the type and capabilities of an element including volume types that are compatible with this element and the location of this 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.

The proposed command is intended to be the first of a set of commands to fully describe the elements and the media in the elements. A companion to this command for reporting information about the volume in the element will return the volume tag and other volume characteristics currently reported with the element information in Read Element Status.

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 3.1:

3.1.x Discovery: An action performed by a media changer where the elements and values describing the elements in the media changer are determined.

Changes to table 3 – Volume Type Codes:

Table 3 has the following changes:

Table 3 – Volume type codes

Code	Description
00h	~~Reserved~~ All Types
01h – 7Fh	Vendor-specific
80h – ~~FFh~~FEh	Reserved
FFh	Unknown

If the volume type is set to All Types or Unknown, then the volume qualifier shall be set to All Qualifiers.

Changes to 6.1:

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

Command	Operation Code	Type	Reference
REPORT ELEMENT INFORMATION	9Eh/10h [a]	O	6.x

Changes to 6.2:

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

REPORT ELEMENT INFORMATION (CDATA = 0)	Conflict	Conflict	Conflict	Allowed	Conflict	Conflict
REPORT ELEMENT 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 ELEMENT INFORMATION command

6.x.1 REPORT ELEMENT INFORMATION command introduction

The REPORT ELEMENT INFORMATION command (see table y) requests information pages that describe an element or a set of elements.

Table y – REPORT ELEMENT INFORMATION command

Bit / Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (9Eh)							
1	Reserved			SERVICE ACTION (10h)				
2	PAGE CODE							
3	R~~svd~~ ~~eserved~~	NETS	UPG	CDATA	ELEMENT TYPE CODE			
4	(MSB)							
5				~~STARTING ELEMENT ADDRESS~~				~~(LSB)~~
4				STARTING ELEMENT ADDRESS				
5								(LSB)
6	(MSB)							
7				NUMBER OF ELEMENTS				(LSB)
8	~~Reserved~~							
9	~~Reserved~~							
10	(MSB)							
11				ALLOCATION LENGTH				
12								
13								(LSB)
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 element 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: Element Information Page Codes

Page code	Definition	Reference	Support
00h	Supported element information pages	6.x.2	Mandatory
01h	Supported volume types	6.x.3	Optional
02h	Element static information	6.x.4	Optional
03h	Element state	6.x.5	Mandatory
04h-7Eh	Reserved		
7Fh	Return all supported pages	6.x.7	Optional
80h-FFh	Vendor specific		

A number of elements times 64K (NETS) bit set to one indicates that the value in the NUMBER OF ELEMENTS shall be multiplied by FFFFh. A NETS bit set to zero indicates that the value in the NUMBER OF ELEMENTS field shall not be multiped by FFFFh.

If theAn upgrade (UPG) bit is set to one indicates that, then the device server may use the EXP bit and the COD bit in the element static information page to return information for elements that are not currently accessibleavailable but may be purchased or licensed. An UPG bit set to zero indicates that the device server shall only return information for elements that are available.

If theA cached data (CDATA) bit is set to one indicates that, then the device server shall return the requested element information page using cached discovery and inventory information and shall not cause device motion. The device server shall support the CDATA bit set to one. If theA CDATA bit is set to zero, then indicates that the device server may cause device motion to validate the element 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 discovery (see 3.1.X) or an inventory scan (see 3.1.X) is required to update an element 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 an element information page requested, 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.

See 6.10.1 for the definition of the ELEMENT TYPE CODE field

The STARTING ELEMENT ADDRESS field specifies the lowest element address to report. Only elements 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 reported. 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 element information pages), then the STARTING ELEMENT ADDRESS field shall be ignoredset to zero.

The NUMBER OF ELEMENTS field specifies the maximum number of elements 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 elements reported. If the PAGE CODE field is set to 00h (i.e., Supported element information pages), then the NUMBER OF ELEMENTS field shall be ignoredset to zero.

Elements selected by the STARTING ELEMENT ADDRESS field and the NUMBER OF ELEMENTS field shall be reported once per element in ascending order by element 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.

6.x.2 Supported element information pages

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

Table y + 2: Supported element information pages

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (00h)							
1 : 5	Reserved							
6 9	(MSB) PAGE LENGTH (n-9) (LSB)							
	Supported pages descriptors							
10	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 element type. Supported pages descriptors shall be returned in ascending order by element type code.

Table y + 3: Supported pages descriptor

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

The ELEMENT TYPE CODE field shall contain the element type code for the element 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 element 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 element information page code list contains a list of element information page codes (see table y + 1) implemented by the logical unit for the specified element type code in ascending order beginning with page code 00h.

6.x.3 Supported volume types

Table y + 4 shows the format of the Supported volumes type volume information page.

Table y + 4: Supported volume types page

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

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

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

Table y + 5: Supported volume types descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1	~~FIRST ELEMENT ADDRESS REPORTED~~							~~(LSB)~~
2	FIRST ELEMENT ADDRESS REPORTED							
3								(LSB)
4~~2~~	(MSB)							
5~~3~~	~~NUMBER OF ELEMENTS~~							~~(LSB)~~
6~~2~~	NUMBER OF ELEMENTS							
7~~3~~								(LSB)
8~~4~~	Reserved				ELEMENT TYPE CODE			
9~~5~~	Reserved							
10~~6~~	(MSB) PARAMETERS LIST LENGTH (n -11~~7~~)							
11~~7~~								(LSB)
	Supported volume types parameters							
8 11	First supported volume type parameter (See table y + 6)							
	. . .							
n-1 n	Last supported volume type parameter (See table y + 6)							

The FIRST ELEMENT ADDRESS REPORTED field indicates the lowest element address reported in the supported volume types parameters.

The NUMBER OF ELEMENTS field indicates the number of contiguous elements with element addresses greater than or equal to the value specified in the FIRST ELEMENT ADDRESS REPORTED field and with the same set of supported volume type parameters and ELEMENT TYPE CODE.

The ELEMENT TYPE CODE field shall contain the element type code for the element being described.

The PARAMETERS LIST LENGTH field is the length in bytes of the parameter data to follow. If the data is truncated because of the allocation length, the PARAMETERS LIST LENGTH field shall not be affected.

The supported volume types parameters indicate the volume types that may be moved to or from the specified element. Table y + 6 shows the supported volume type parameter format.

Table y + 6: Supported Volume Type parameter

Bit Byte	7	6	5	4	3	2	1	0
0	VOLUME TYPE							
1	VOLUME QUALIFIER							
2	Reserved					WRITE CAPABLE		
3	Reserved							

See 5.4 for the definition of the VOLUME TYPE field and the VOLUME QUALIFIER field.

If the device server is unable to determine the volume types supported by the specified element, then the VOLUME TYPE field shall be set to FFh (i.e., Unknown) and the VOLUME QUALIFIER field shall be set to 00h (i.e., All Qualifiers). If all volume types supported by the device may be moved to or from the element described, then the device server may set the VOLUME TYPE field to 00h (i.e., All Types) and the VOLUME QUALIFIER field to 00h (i.e., All Qualifiers). If all volume qualifiers for a volume type supported by the device may be moved to or from the element described, then the device server shall set the VOLUME TYPE field to the value for the specified volume type and may set the VOLUME QUALIFIER field to 00h (i.e., All Qualifiers).

If the ELEMENT TYPE CODE field in the supported volume types descriptor is set to 4h (i.e., data transfer element), then the WRITE CAPABLE field specifies whether the selected data transfer element is capable of writing to a volume with the specified volume type and volume qualifier. (e.g., for SSC devices the data transfer device server reports a WRTOK bit set to one in a density support data block descriptor for a volume with this volume type and volume qualifier in response to a REPORT DENSITY SUPPORT command, see SSC-3). If the ELEMENT TYPE CODE field is set to a value other than 4h, then the WRITE CAPABLE field shall be ignored. The WRITE CAPABLE field values are defined in table y + 7.

Table y + 7: WRITE CAPABLE field values

WRITE CAPABLE	Description
00b	Unknown or element is not a data transfer device
01b	The data transfer device is capable of writing to this volume type
10b	The data transfer device is not capable of writing to this volume type
11b	Reserved

If the CDATA bit in the REPORT VOLUME INFORMATION command is set to zero and the device server is not ready or a discovery (see 3.1.X) is in progress, then the device server shall

    a) complete discovery before returning any descriptors; or
    b) 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 in the REPORT VOLUME INFORMATION CDB is set to one, then the device server shall use cached values for the VOLUME TYPE field, VOLUME QUALIFIER field, and WRITE CAPABLE field or shall

    a) set the VOLUME TYPE field to FFh (i.e., Unknown);
    b) set the VOLUME QUALIFIER field to 00h (i.e., All Qualifiers); and
    c) set the WRITE CAPABLE field to 00h (i.e., Unknown).

6.x.4 Element static information

Table y + 8 shows the format of the Element static information page.

Table y + 8: Element static information 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)
	Element static data descriptors							
10	First element static information descriptor (see table y + 9)							
	. . .							
n	Last element static information 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 element static data descriptors that follow. If the descriptors are truncated because of the allocation length, then the PAGE LENGTH field shall not be affected.

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

Table y + 9: Element static information descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1			~~FIRST ELEMENT ADDRESS REPORTED~~					~~(LSB)~~
2̶0̶			FIRST ELEMENT ADDRESS REPORTED					
3̶1̶								(LSB)
4̶2̶	(MSB)							
5̶3̶			~~NUMBER OF ELEMENTS~~					
6̶2̶	~~(MSB)~~		NUMBER OF ELEMENTS					
7̶3̶								(LSB)
8̶4̶	Reserved				ELEMENT TYPE CODE			
9̶5̶	Reserved		EXP	COD	CNXP	MDO	IESTOR	EDC
1̶0̶6̶	Reserved							
n								

The FIRST ELEMENT ADDRESS REPORTED field indicates the lowest element address being reported.

The NUMBER OF ELEMENTS field indicates the number of contiguous elements with element addresses greater than or equal to the value specified in the FIRST ELEMENT ADDRESS REPORTED field and with the same ELEMENT TYPE CODE field, EXP bit, COD bit, CNXP bit, MDO bit, IESTOR bit, and EDC bit values.

The ELEMENT TYPE CODE field shall contain the element type code for the element being described.

An expansion (EXP) bit set to one indicates that the specified element is in an expansion module that is not present. An EXP bit set to zero indicates that the specified element is not in an expansion module that is not present. If the UPG bit in the CDB is set to zero, then the EXP bit shall be set to zero.

A capacity on demand (COD) bit set to one indicates that the specified element is an unlicensed capacity on demand element and may be made accessible by licensing. A COD bit set to zero indicates that the specified element is not an unlicensed capacity on demand element. If the UPG bit in the CDB is set to zero, then the COD bit shall be set to zero.

A moves during operation (MDO) bit set to one indicates that the physical position of the specified element is not fixed and the element moves during normal operation. A MDO bit set to zero indicates that the physical position of the specified element is fixed and the element does not move during normal operation. (e.g. the media changer moves a magazine as part of the process of opening an import/export element and all elements in that magazine have the MDO bit set to one).

An import/export or storage (IESTOR) bit set to one indicates that the specified element is configurable as either an import/export element or as a storage element. An IESTOR bit set to zero indicates that the specified element is not configurable as an import/export element or as a storage element. If the IESTOR bit is set to one, then the EDC bit shall be set to one.

An element disabled capable (EDC) bit set to one indicates that the specified element is capable of being disabled. An EDC bit set to zero indicates that the specified element is not capable of being disabled.

If the CDATA bit in the REPORT VOLUME INFORMATION CDB is set to zero and the device server is not ready or a discovery (see 3.1.X) is in progress, then the device server shall

   a) complete the discovery before returning any descriptors; or
   b) 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 in the REPORT VOLUME INFORMATION CDB is set to one, then the device server shall return element static descriptors using cached values.

6.x.5 Element state

Table y + 10 shows the format of the Element state page.

Table y + 10: Element state page

Bit / Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (03h)							
1	Reserved							
2	(MSB)		DESCRIPTOR LENGTH					
3								(LSB)
4			Reserved					
5								
6	(MSB)		PAGE LENGTH (n-9)					
9								(LSB)
	Element state descriptors							
10	First element state descriptor (see table y + 11)							
	: :							
n	Last element state descriptor (see table y + 11)							

The PAGE CODE field shall be set to the value shown in table y + 10.

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

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

Table y + 11: Element state descriptor

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1			ELEMENT ADDRESS					(LSB)
2			ELEMENT ADDRESS					
3								(LSB)
4	Reserved				ELEMENT TYPE CODE			
5	Reserved	IVALID	OPVD	OIR	VP	ED	MTAA	SDV
6	ELEMENT STATE ADDITIONAL SENSE CODE							
7	ELEMENT STATE ADDITIONAL SENSE CODE QUALIFIER							
8	(MSB)							
9 n			VOLUME INDEX IDENTIFIER					(LSB)
n								

The ELEMENT ADDRESS field indicates the element address being reported.

The ELEMENT TYPE CODE field shall contain the element type code for the element being described.

An index identifier valid (IVALID) bit set to one indicates that the volume index identifier field is valid. An IVALID bit set to zero indicates that the volume index identifier field is not valid.

An operator placed volume detected (OPVD) bit set to one indicates that the volume in this element may have been placed in this element by an operator. An OPVD bit set to zero indicates that the volume in this element was

    a)   in this element when the element state descriptor for this element was last reported; or
    b)   was placed in this element by a medium transport element.

NOTE: Support for detecting operator placed volumes may require unique barcodes. A medium changer may not be able to tell if a volume has been changed or manually moved if a barcode value is used on more than one volume.

An operator intervention required (OIR) bit set to one indicates that operator intervention is required to make the element accessible (e.g. a mailslot or access panel must be closed). An OIR bit set to zero indicates that operator intervention is not required. If the OIR bit is set to one, then the ED bit shall be set to one and the MTAA bit shall be set to zero.

A volume present (VP) bit set to one indicates that the specified element contains a volume. A VP bit set to zero indicates that the specified element does not contain a volume.

An element disabled (ED) bit set to one indicates that the specified element is disabled. An ED bit set to zero indicates that the specified element is not disabled. Support of the ED bit set to one is required. If the ED bit is set to one, then the MTAA bit shall be set to zero. If the ED bit is set to one, then the ECBD bit in the static data descriptor for this element shall be set to one.

A medium transport element access allowed (MTAA) bit set to one indicates that access to the specified element by a medium transport element is allowed. An MTAA bit set to zero indicates that access to the specified element by a medium transport element is not allowed. Support for the MTAA bit set to one is mandatory.

A sense data valid (SDV) bit set to one indicates that the ELEMENT STATE ADDITIONAL SENSE CODE and ELEMENT STATE ADDITIONAL SENSE CODE QUALIFIER fields are valid and additional element information is available with an additional sense code indicated by the ELEMENT STATE ADDITIONAL SENSE CODE field and the ELEMENT STATE ADDITIONAL SENSE CODE QUALIFIER field. A SDV bit set to zero indicates that the contents of the ELEMENT STATE ADDITIONAL SENSE CODE and the ELEMENT STATE ADDITIONAL SENSE CODE QUALIFIER fields are not valid.

An ~~index~~ identifier valid (IVALID) bit set to one indicates that the VOLUME ~~INDEX~~ IDENTIFIER field contains a ~~device server assigned index value~~ volume identifier ~~which may be used with the REPORT VOLUME INFORMATION command to retrieve information about the volume in the specified element~~. The device server shall report the same volume ~~index~~ identifier value for the volume in the specified element when that volume is in any element. An IVALID bit set to zero indicates that the VOLUME ~~INDEX~~ IDENTIFIER field ~~shall be ignored~~ does not contain a volume identifier. If an event occurs which causes the volume ~~index~~ identifier values to change (e.g. the device is reset and volume identifier~~index~~ values are not retained across a reset), then the device server shall establish a unit attention (see SAM-4) condition for every I_T nexus with the additional sense code set to VOLUME ~~IN~~IDENTIFIER~~X~~ VALUES CHANGED.

Editors Note: When REPORT VOLUME INFORMATION command is complete insert a cross reference to the VOLUME IDENTIFIER field in the REPORT VOLUME INFORMATION CDB.

Comment: VOLUME ~~INDEX~~ IDENTIFIER VALUES CHANGED is a new additional sense code

If the CDATA bit in the REPORT ELEMENT INFORMATION command is set to zero, and

   a)   the device server is not ready;
   b)   a discovery (see 3.1.X) is in progress; or
   c)   an inventory scan is in progress;

   then the device server shall

   a)   complete the discovery before returning any descriptors; or
   b)   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 in the REPORT ELEMENT INFORMATION command is set to one and the device server is not ready or an inventory scan is in progress, then the device server shall

   a)   set the SDV bit to one;
   b)   set the ELEMENT STATE ADDITIONAL SENSE CODE field and the ELEMENT STATE ADDITIONAL SENSE CODE QUALIFIER field to LOGICAL UNIT IS IN PROCESS OF BECOMING READY; and
   c)   set the IVALID bit, OPVD bit, OIR bit, VP bit, ED bit, ED bit, and MTAA bit to the last cached values or to zero.

Note: The application client may use the SDV bit to determine if the element data is from cache.

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 ELEMENT ADDRESS field in the CDB and the ELEMENT TYPE CODE 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).