

TO: T10 Membership, SMC-3 Working Group
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 DATE: January 14th, 2008
 SUBJECT: SMC-3 New Additional Sense Codes Usage (document T10/07-018r2)

1 Revision History

Rev0 – Initial draft (based on text introduced in T10/06-110r0).

Rev1 – Updated based on comments from May 2007 SMC-3 working group meeting: added new common model clause section describing use of sense data to indicate affected elements, editorial cleanup.

Rev2 – Reordered the data transfer insertion/removal sequences to their original form based on discussion at the January 2008 working group meeting; made some minor editorial changes.

2 Related Documents

SMC-3 Revision 4
 T10/06-110r0

3 Introduction

This document proposes several new additional sense code and additional sense code qualifiers defined for use within SMC-3. Both the sense code description and usage within SMC-3 are presented. This proposal only covers new ASC/ASCQs that have been defined or requested to date, and new ASC/ASCQs beyond those in this proposal will be described as additional proposals.

4 Discussion

Various proposals for SMC-3 (e.g., T10/05-243) have necessitated creation of ASC/ASCQs that do not currently exist within SPC-4. This proposal consolidates these new ASC/ASCQs and specifies their usage if one was not previously provided.

5 New ASC/ASCQ Summary

Table 1 summarizes the new ASC/ASCQs addressed by this proposal.

Table 1 Proposed ASC/ASCQs

ASC	ASCQ	Description	Reference
28h	03h	IMPORT/EXPORT ELEMENT ACCESSED, MEDIUM CHANGED	T10/05-315r3, item 3.2.6
3Bh	18h	ELEMENT DISABLED	T10/05-243r4
3Bh	19h	ELEMENT ENABLED	<this proposal>
3Bh	1Ah	DATA TRANSFER DEVICE REMOVED	T10/05-315r3, item 3.2.7
3Bh	1Bh	DATA TRANSFER DEVICE INSERTED	T10/05-315r3, item 3.2.7
55h	09h	DATA CURRENTLY UNAVAILABLE	T10/05-243r4

Notes

The proposed ASC/ASCQ values were based on similarities to existing ASC/ASCQs where possible (the ASCQ values may change to the next available if other ASCQs appear in SPC-4 before this is submitted).

In considering T10/05-315 item 3.2.6, it should be noted that there already is 28h/01h IMPORT OR EXPORT ELEMENT ACCESSED. Since the request was for an application client to detect when opening and closing an I/E element door has resulted in a change in the medium inventory, presumably the existing 28h/01h was deemed inadequate to cover this case (i.e., the request appears to be for an explicit indication that accessing an I/E element has changed the inventory). Do we want to consider a more generic ASC/ASCQ that only indicates medium inventory changed? (I opted not to).

ELEMENT ENABLED ASC/ASCQ was created to balance the ELEMENT DISABLED ASC/ASCQ, even though the referenced proposal did not include it originally.

6 Proposed Changes to SMC-3

These are proposed changes to SMC-3 for new ASC/ASCQs whose usage (i.e., under what conditions the ASC/ASCQ is to be returned) is not already defined in other proposals. Proposed changes are in [blue text](#).

6.1 Changes to 5.2.4 Import/export element

Add the following paragraph as the last paragraph to this sub-clause:

If the device server detects that one or more volumes have been inserted into or withdrawn from an import/export element by an operator, then the device server shall establish a unit attention condition for the initiator port associated with every I_T nexus and the additional sense code shall be set to IMPORT/EXPORT ELEMENT ACCESSED, MEDIUM CHANGED. The INFORMATION field in the sense data shall report the import/export elements associated with the unit attention condition (see 5.2.8). The device server may establish a single unit attention condition for the initiator port associated with every I_T nexus when more than one volume has been inserted or withdrawn at the same time (e.g., upon closure of a structure containing multiple import/export elements).

6.2 New sub-clause 5.2.7 Disabling/enabling elements

Add the following new sub-clause:

5.2.7 Disabling/enabling elements

Elements within a media changer may be disabled at various times and later enabled. The element disabled (ED) bit (see 6.10.4) indicates that an element is either disabled (e.g., when a magazine has been removed or an element has been logically disabled for servicing) or enabled (e.g., when a magazine has been inserted or servicing of an element completes).

On transition from enabled to disabled, the device server shall establish a unit attention condition for the initiator port associated with every I_T nexus and the additional sense code shall be set to ELEMENT DISABLED. On transition from disabled to enabled, the device server shall establish a unit attention condition for the initiator port associated with every I_T nexus and the additional sense code shall be set to ELEMENT ENABLED. The INFORMATION field in the sense data shall report the disabled or enabled elements associated with the unit attention condition (see 5.2.8). The device server may establish a single unit attention condition for the initiator port associated with every I_T nexus when more than one element has been disabled or enabled at the same time.

6.3 Changes to 5.2.5 Data transfer element

Add the following paragraphs at the end of this sub-clause:

Data transfer devices may be removed from, replaced within, or added to the media changer at various times (e.g., when servicing a drive). These actions may affect the status of the data transfer element that interfaces with the data transfer device. Various unit attention conditions are established by the device server to notify application clients of these actions.

If replacement of a data transfer device does not change the values returned in the Element Address Assignment mode page (see 7.3.4) and the additional sense codes of DATA TRANSFER DEVICE REMOVED or DATA TRANSFER DEVICE INSERTED are used, then the device server shall:

- 1) disable the data transfer element (see 5.2.7) that interfaces with the data transfer device prior to removal of the data transfer device;

- 2) establish a unit attention condition for the initiator port associated with every I_T nexus with the additional sense code set to DATA TRANSFER DEVICE REMOVED upon removal of the data transfer device;
- 3) establish a unit attention condition for the initiator port associated with every I_T nexus with the additional sense code set to DATA TRANSFER DEVICE INSERTED upon insertion of the replacement data transfer device; and
- 4) enable the data transfer element (see 5.2.7) that interfaces with the data transfer device when the data transfer device is able to be returned to operation.

If removal of a data transfer device changes the values returned in the Element Address Assignment mode page (e.g., reduces the total number of data transfer elements) and the additional sense code of DATA TRANSFER DEVICE REMOVED is used, then the device server shall:

- 1) disable the data transfer element that interfaces with the data transfer device prior to removal of the data transfer device;
- 2) establish a unit attention condition for the initiator port associated with every I_T nexus with the additional sense code set to DATA TRANSFER DEVICE REMOVED upon removal of the data transfer device; and
- 3) establish a unit attention condition for the initiator port associated with every I_T nexus with the additional sense code set to MODE PARAMETERS CHANGED after updating the Element Address Assignment mode page.

If insertion of a data transfer device changes the values returned in the Element Address Assignment mode page (e.g., increases the total number of data transfer elements) and the additional sense code of DATA TRANSFER DEVICE INSERTED is used, then upon insertion of the data transfer device the device server shall:

- 1) establish a unit attention condition for the initiator port associated with every I_T nexus with the additional sense code set to DATA TRANSFER DEVICE INSERTED;
- 2) enable the data transfer element (see 5.2.7) that interfaces with the data transfer device when the data transfer device is able to be returned to operation; and
- 3) establish a unit attention condition for the initiator port associated with every I_T nexus with the additional sense code set to MODE PARAMETERS CHANGED after updating the Element Address Assignment mode page.

If the additional sense codes of DATA TRANSFER DEVICE REMOVED or DATA TRANSFER DEVICE INSERTED are used, then the INFORMATION field in the sense data shall contain the associated data transfer element address followed by a value of 0001h (see 5.2.8).

6.4 New sub-clause 5.2.8 Reporting elements in sense data

Add the following new sub-clause.

[Note: A comment was raised as to whether descriptor format sense data or fixed format sense data should be used. I decided to stay with fixed format sense data, since sense data is not large enough to accommodate reporting all elements individually or as mixed ranges (i.e., inclusive ranges or multiple unit attentions would still be needed), and fixed format sense data required fewer bytes to send.]

5.2.8 Reporting elements in sense data

If the additional sense data reported requires one or more elements to be reported in the sense data (e.g., ELEMENT DISABLED), then the elements shall be reported as described in this subclause.

The INFORMATION field in the sense data (see SPC-4) shall contain the information specified in table X.

Table X – INFORMATION field format

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)	FIRST ELEMENT ADDRESS						(LSB)
1								
2	(MSB)	NUMBER OF ELEMENTS						(LSB)
3								

The FIRST ELEMENT ADDRESS field contains the address of the first element associated with the reported sense data. The NUMBER OF ELEMENTS field contains the number of elements in the range inclusive of the first and last elements associated with the reported sense data (e.g., if there are five elements, and the second and fourth elements are associated with the reported sense data, then the FIRST ELEMENT ADDRESS field would contain the element address of the second element and the NUMBER OF ELEMENTS field would contain the value 0003h; the unassociated third element is included in the count of elements). If only a single element is being reported, then the FIRST ELEMENT ADDRESS field contains the address of the element associated with the reported sense data and the NUMBER OF ELEMENTS field contains the value 0001h.