

T10/07-244r0 SMC-3 READ ATTRIBUTE and WRITE ATTRIBUTE command clarification

To: T10 Technical Committee

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Subject: T10/07-244r0 READ ATTRIBUTE and WRITE ATTRIBUTE command clarification

### Revision History

Revision 0 (9 May 2007): initial revision

### Related Documents

SMC3r06 - SCSI Media Changer Commands - 3 revision 6

T10/99-148r7 – Proposed addition of Read and Write Attribute commands to SPC-2

### Overview

The in SMC-3 the READ ATTRIBUTE command uses the undocumented service action 4. Service action 4 is defined as restricted by SPC-3. Neither SMC-2 nor SPC-3 specifies a format for the returned parameter data. This proposal defines this action code and returned parameter data based on the original read/write attribute proposal (99-148r7). It also has some editorial changes to the READ ATTRIBUTE and WRITE ATTRIBUTE commands. And it includes a reference to the Device Capabilities mode page.

### Suggested changes to SMC-3

## 6.9 READ ATTRIBUTE command

The READ ATTRIBUTE command (see table 14) allows an application client to read attribute values from **m**Medium **a**Auxiliary **m**Memory (MAM) of the volume specified by the **ELEMENT ADDRESS** field and also to discover **what** which elements contain a volume with MAM **exists** at the device server.

**Table 14 — READ ATTRIBUTE command**

Bit Byte	7	6	5	4	3	2	1	0	
0	OPERATION CODE (8Ch)								
1	Reserved			SERVICE ACTION ( <del>04h</del> )					
2	(MSB)	ELEMENT ADDRESS							(LSB)
3									
4	Reserved			<del>Obsolete</del> ELEMENT TYPE CODE					
5	VOLUME NUMBER								
6	Reserved								
7	PARTITION NUMBER								
8	(MSB)	FIRST ATTRIBUTE ID							(LSB)
9									
10	(MSB)	ALLOCATION LENGTH							(LSB)
11									
12									
13									
14	Reserved								
15	CONTROL								

*[EDITOR NOTE: The element type code field was made obsolete in SMC-3r2, with the discovery of proposal 99-148r7 this field is again applicable and therefore the editor proposes to cancel the obsolete state]*

The service action codes defined for the READ ATTRIBUTE command are described in table 15. If the value in the SERVICE ACTION field is not supported, then the device server shall return CHECK CONDITION status. The sense key shall be ILLEGAL REQUEST and the additional sense code INVALID FIELD IN CDB.

**Table 15 — READ ATTRIBUTE service action codes**

Code	Name	Description	Reference
00h	ATTRIBUTE VALUES	Return attribute values	SPC-3
01h	ATTRIBUTE LIST	Return list of available attribute identifiers, identifiers that are not in the nonexistent state or unsupported state (see SPC-3)	SPC-3
02h	VOLUME LIST	Return list of known volume numbers	SPC-3
03h	PARTITION LIST	Return list of known partition numbers	SPC-3
04h	ELEMENT LIST	Return a list of elements containing MAM	This document
05h-1Fh	reserved		

#### 6.9.1 ATTRIBUTE VALUES service action

The ELEMENT ADDRESS field specifies the element where reading of the MAM is requested. ~~currently resides as part of a medium. This might mean, for example, a MAM inside a medium residing in a storage element or a MAM inside a medium residing in a data transfer element.~~ The ELEMENT ADDRESS field may represent an element from any element type (see table 16).

If the element specified by the ELEMENT ADDRESS field is empty, then the device server shall return CHECK CONDITION status. The sense key shall be ILLEGAL REQUEST and the additional sense code MEDIUM SOURCE ELEMENT EMPTY.

If the device server does not support ~~READ ATTRIBUTE~~ reading attribute values at the specified ELEMENT ADDRESS, then CHECK CONDITION status shall be returned. The sense key shall be ILLEGAL REQUEST and the additional sense code INVALID ~~FIELD IN CDB~~ ELEMENT ADDRESS. The supported element types and required resources for each element type may be determined from the Device Capabilities mode page (see 7.3.2).

~~Note that this~~ The ELEMENT ADDRESS field forms an additional location qualifier hierarchically superior to VOLUME NUMBER field (see SPC-3) and PARTITION NUMBER field (see SPC-3).

The content of the ELEMENT TYPE CODE field in the CDB is ignored for this service action.

~~For the definition of all other fields in this command see SPC-3.~~

For a description of the VOLUME NUMBER field, PARTITION NUMBER field, FIRST ATTRIBUTE ID field, and ALLOCATION LENGTH field in the CDB see SPC-3. See SAM-3 for a description of the CONTROL byte. For a definition of the returned parameter data of the READ ATTRIBUTES command with the ATTRIBUTE VALUES service action see SPC-3.

#### 6.9.2 ATTRIBUTE LIST service action

For a description of the ELEMENT ADDRESS field in the CDB see 6.9.1. The content of the ELEMENT TYPE CODE field in the CDB is ignored for this service action. For a description of the VOLUME NUMBER field, PARTITION NUMBER field, FIRST ATTRIBUTE ID field, and ALLOCATION LENGTH field in the CDB see SPC-3. See SAM-3 for a description of the CONTROL byte. For a definition of the returned parameter data of the READ ATTRIBUTES command with the ATTRIBUTE LISTS service action see SPC-3.

#### 6.9.3 VOLUME LIST service action

For a description of the ELEMENT ADDRESS field in the CDB see 6.9.1. The content of the ELEMENT TYPE CODE field in the CDB is ignored for this service action. For a description of the VOLUME NUMBER field, PARTITION NUMBER field, FIRST ATTRIBUTE ID field, and ALLOCATION LENGTH field in the CDB see SPC-3. See SAM-3 for a description of the CONTROL byte. For a definition of the returned parameter data of the READ ATTRIBUTES command with the VOLUME LIST service action see SPC-3.

#### 6.9.4 PARTITON LIST service action

For a description of the ELEMENT ADDRESS field in the CDB see 6.9.1. The content of the ELEMENT TYPE CODE field in the CDB is ignored for this service action. For a description of the VOLUME NUMBER field, PARTITION NUMBER field, FIRST ATTRIBUTE ID field, and ALLOCATION LENGTH field in the CDB see SPC-3. See SAM-3 for a description of the CONTROL byte. For a definition of the returned parameter data of the READ ATTRIBUTES command with the PARTITION LIST service action see SPC-3.

#### 6.9.5 ELEMENT LIST service action

The READ ATTRIBUTE command with the ELEMENT LIST service action returns parameter data containing a list of element address ranges that contain volumes with MAM.

The ELEMENT TYPE CODE field specifies the particular element type(s) selected for reporting by this command. A value of zero specifies that status for all element types shall be reported. The element type codes are defined in table x.

The ELEMENT ADDRESS field specifies the lowest element address to report. Only elements with an element type code permitted by the ELEMENT TYPE CODE field, and an element address greater than or equal to the value specified in the ELEMENT ADDRESS field shall be reported.

Table 16 shows the format of the information returned by the device server.

Bit	7	6	5	4	3	2	1	0	
Byte									
0	MSB							AVAILABLE DATA (N-3)	LSB
3									LSB
4	MSB							ELEMENT ADDRESS	LSB
5									LSB
6	MSB							NUMBER OF ELEMENTS	LSB
7									LSB
...									
n-3	MSB							ELEMENT ADDRESS	LSB
n-2									LSB
n-1	MSB							NUMBER OF ELEMENTS	LSB
N									LSB

*[EDITOR NOTE: above format is diferent than the original specified in the 99-148r7 proposal. The ELEMENT TYPE CODE field is removed because the editor believes this field is irrilevant]*

The ELEMENT ADDRESS field indicates the first element address of a range of elements with element type specified by the ELEMENT TYPE CODE field in the command that contains a volume with MAM.

The NUMBER OF ELEMENTS field indicates the number of consecutive elements withing this range that contain a volume with MAM.

## 6.15 WRITE ATTRIBUTE command

The WRITE ATTRIBUTE command (see table 35) allows an application client to write attribute values to ~~m~~Medium ~~a~~Auxiliary ~~m~~Memory (MAM) of the volume specified by the ELEMENT ADDRESS field.

Table 35 — WRITE ATTRIBUTE command

Bit Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (8Dh)							
1	Reserved							
2	(MSB)		ELEMENT ADDRESS				(LSB)	
3								
4	Obsolete							
5	VOLUME NUMBER							
6	Reserved							
7	PARTITION NUMBER							
8	Reserved							
9	Reserved							
10	(MSB)		PARAMETER LIST LENGTH				(LSB)	
11								
12								
13								
14	Reserved							
15	CONTROL							

The ELEMENT ADDRESS field specifies the element where ~~writing of the MAM is requested. currently resides as part of a medium. This might mean, for example, a MAM inside a medium residing in a storage element or a MAM inside a medium residing in a data transfer element.~~ The ELEMENT ADDRESS field may represent an element from any element type (see table 16).

If the element specified by the ELEMENT ADDRESS field is empty, then the device server shall return CHECK CONDITION status. The sense key shall be ILLEGAL REQUEST and the additional sense code MEDIUM SOURCE ELEMENT EMPTY.

If the device server does not support ~~WRITE ATTRIBUTE writing attributes~~ at the specified ELEMENT ADDRESS, then CHECK CONDITION status shall be returned. The sense key shall be ILLEGAL REQUEST and the additional sense code ~~INVALID FIELD IN CDB ELEMENT ADDRESS~~. The supported element types and required resources for each element type may be determined from the Device Capabilities mode page (see 7.3.2).

~~Note that this-~~The ELEMENT ADDRESS field forms an additional location qualifier hierarchically superior to VOLUME NUMBER field (see SPC-3) and PARTITION NUMBER field (see SPC-3).

~~For the definitions of all other fields, and parameter data format, see SPC-3.~~

For a description of the parameter data format and description of the PARAMETER LIST LENGTH field see SPC-3. See SAM-3 for a description of the CONTROL byte.