

T10/07-244r3 SMC-3 READ ATTRIBUTE and WRITE ATTRIBUTE command clarification

To: T10 Technical Committee

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Subject: T10/07-244r3 READ ATTRIBUTE and WRITE ATTRIBUTE command clarification

Revision History

Revision 0 (9 May 2007): initial revision

Revision 1 (13 September 2007): incorporated comments from July SMC-3 WG meeting

Revision 2 (17 September 2007): incorporated comments from Rod Wideman

Revision 3 (6 November 2007): incorporated comments from November SMC-3 WG meeting

Related Documents

SMC3r09 - SCSI Media Changer Commands - 3 revision 9

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

6.9.1 READ ATTRIBUTE command introduction

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

Table z — READ ATTRIBUTE command

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

[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 shown in table z+1. 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 sense data shall be set to INVALID FIELD IN CDB.

Table z+1 — READ ATTRIBUTE service action codes

Code	Name	Description	Reference
00h	ATTRIBUTE VALUES	Return attribute values	SPC-3
01h	ATTRIBUTE LIST	Return a 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 a list of known volume numbers	SPC-3
03h	PARTITION LIST	Return a list of known partition numbers	SPC-3
04h	ELEMENT LIST	Return a list of elements containing volumes with MAM	6.9.2
05h-1Fh	reserved		

If the SERVICE ACTION field is set to ELEMENT LIST, then the ELEMENT ADDRESS field specifies the lowest element address to report. Only elements with a volume that contains MAM, and with an element type code specified 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 (see 6.9.2).

If the SERVICE ACTION field is set to a value other than ELEMENT LIST, then the ELEMENT ADDRESS field specifies the element containing a volume 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 forms an additional location qualifier hierarchically superior to the VOLUME NUMBER field (see SPC-3) and the PARTITION NUMBER field (see SPC-3). If the element specified by the ELEMENT ADDRESS field is empty, then the device server shall terminate the command with ~~return~~ CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST, and the additional sense code set to MEDIUM SOURCE ELEMENT EMPTY. If the device server does not support ~~READ ATTRIBUTE~~ reading attribute values from the volume's MAM at the specified ~~ELEMENT ADDRESS~~ element address, then the device server shall terminate the command with CHECK CONDITION status ~~shall be returned~~. The sense key shall be set to ILLEGAL REQUEST, and the additional sense code set to ~~INVALID FIELD IN CDB~~ MEDIUM AUXILIARY MEMORY NOT ACCESSIBLE. The Device Capabilities mode page (see 7.3.2), provides a matrix of element types with the required resources where reading of attribute values are supported.

The ELEMENT TYPE CODE field specifies the element type(s) to report when the SERVICE ACTION field is set to ELEMENT LIST. For all other settings of the SERVICE ACTION field the content of the ELEMENT TYPE CODE field is ignored.

See SPC-3 for a description of the VOLUME NUMBER field, PARTITION NUMBER field, and ALLOCATION LENGTH field. See SPC-4 for a description of the FIRST ATTRIBUTE IDENTIFIER field.

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

[EDITOR NOTE: MEDIUM AUXILIARY MEMORY NOT ACCESSIBLE needs to be defined in SPC]

6.9.2 ELEMENT LIST service action

The parameter data returned in response to an ELEMENT LIST service action reports elements containing volumes with MAM. Only elements with an element type specified by the ELEMENT TYPE field, and an element address greater than or equal to the value specified in the ELEMENT ADDRESS field shall be reported. The format of the returned parameter data is shown in table z+2.

Table z+2 — READ ATTRIBUTE with ELEMENT LIST service action parameter data format

Bit Byte	7	6	5	4	3	2	1	0	
0	MSB							DESCRIPTORS LENGTH (n-3)	
3								LSB	
4								ELEMENT ADDRESS RANGE (first)	
7									
...									
n-3								ELEMENT ADDRESS RANGE (last)	
n									

The DESCRIPTORS LENGTH field contains the total length in bytes of descriptors that follow. If the descriptors are truncated because of the allocation length then the DESCRIPTORS LENGTH field shall not be affected.

The ELEMENT ADDRESS RANGE descriptor describes a contiguous range of elements of the specified element type containing volumes with MAM. Element address range descriptors shall be returned in ascending order by STARTING ELEMENT ADDRESS field for each element type. The format of an element address range descriptor is shown in table z+3.

Table z+3 —ELEMENT ADDRESS RANGE descriptor

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

The STARTING ELEMENT ADDRESS field indicates the first element address of a contiguous range of elements with an element type selected by the ELEMENT TYPE CODE field containing volumes with MAM.

The NUMBER OF ELEMENTS field indicates the number of contiguous elements containing volumes with MAM that follow the element indicated by the STARTING ELEMENT ADDRESS field.

6.15 WRITE ATTRIBUTE command

The WRITE ATTRIBUTE command (see table z+3) allows an application client to write attribute values to the ~~m~~Medium ~~a~~Auxiliary ~~m~~Memory (MAM) of the volume selected by the value in the ELEMENT ADDRESS field.

Table z+3 — WRITE ATTRIBUTE command

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

The ELEMENT ADDRESS field specifies the element ~~containing a volume~~ 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 forms an additional location qualifier hierarchically superior to the VOLUME NUMBER field (see SPC-3) and the PARTITION NUMBER field (see SPC-3). If the element specified by the ELEMENT ADDRESS field is empty, then the device server shall ~~terminate the command with~~ ~~return~~ CHECK CONDITION status. The sense key shall be ~~set to~~ ILLEGAL REQUEST, and the additional sense code ~~set to~~ MEDIUM SOURCE ELEMENT EMPTY. If the device server does not support ~~WRITE ATTRIBUTE writing attribute values~~ at the specified element address, then ~~the device server shall terminate the command with~~ CHECK CONDITION status ~~shall be returned~~. The sense key shall be ~~set to~~ ILLEGAL REQUEST, and the additional sense code ~~set to~~ ~~INVALID FIELD IN CDB~~ MEDIUM AUXILIARY MEMORY NOT ACCESSIBLE. The Device Capabilities mode page (see 7.3.2), provides a matrix of element types with the required resources where writing of attribute values are supported.

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

See SPC-3 for a description of the VOLUME NUMBER field and the PARTITION NUMBER field.

See SPC-3 for a description of the parameter list format and description of the PARAMETER LIST LENGTH field.

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

[EDITOR NOTE: Check SMC-3 for data out and parameter data sb parameter list]