T10/07-244r1 SMC-3 READ ATTRIBUTE and WRITE ATTRIBUTE command clarification

To: T10 Technical Committee
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Subject: T10/07-244r1 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

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 Introduction

The READ ATTRIBUTE command (see table z) allows an application client to read attribute values from mMedium aAuxiliary mMemory (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 Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (8Ch)							
1	Reserved			SERVICE ACTION (04h)				
2	(MSB)			ELEMENT ADDRESS				
3								(LSB)
4	Reserved			Obsolete ELEMENT TYPE CODE				
5	VOLUME NUMBER							
6	Reserved							
7	PARTITION NUMBER							
8	(MSB)			FIRST ATTRIBUTE ID				
9								(LSB)
10	(MSB)							
11				ALLOCATION LENGTH				
12								
13								(LSB)
14	Reserved							
15	CONTROL							

The service action codes defined for the READ ATTRIBUTE command are described in table z+1.

Table z+1 — READ ATTRIBUTE service action codes

Code	Name	Description	Reference
00h	ATTRIBUTE VALUES	Return attribute values	6.9.2
01h	ATTRIBUTE LIST	Return a list of available attribute identifiers, identifiers that are not in the nonexistent state or unsupported state (see SPC-3)	6.9.3
02h	VOLUME LIST	Return a list of known volume numbers	6.9.4
03h	PARTITION LIST	Return a list of known partition numbers	6.9.5
04h	ELEMENT LIST	Return a list of elements containing volumes with MAM	6.9.6
05h-1Fh	reserved		

6.9.2 ATTRIBUTE VALUES, ATTRIBUTE LIST, VOLUME LIST, and PARTITON LIST service action

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 may represent an element from any element type (see table 18). 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).

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 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~~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).

The content of the ELEMENT TYPE CODE field in the CDB is ignored.

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

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

See SPC-3 for a definition of the parameter data returned.

6.9.3 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 ADDRESS field specifies the lowest element address to report. Only elements with a volume that contains MAM, and 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.

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 18.

The returned parameter data shall contain the requested element address ranges in acending numerical order by element address in the format 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							
3				AVAILABLE DATA (N-3)				LSB
4	MSB							
5				ELEMENT ADDRESS				LSB
6	MSB							
7				NUMBER OF ELEMENTS				LSB
				…				
n-3	MSB							
n-2				ELEMENT ADDRESS				LSB
n-1	MSB							
N				NUMBER OF ELEMENTS				LSB

[EDITOR NOTE: above format is diferent than the original specified in the 99-148r7 proposal. The ELEMENT TYPE CODE field is removed from the returned parameter format because the editor believes this field is irrilevant and causes a none 4 byte multiple structure]

The AVAILABLE DATA field indicates the number of bytes of element list ranges in the parameter data.

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 contain a volume with MAM.

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

6.15 WRITE ATTRIBUTE command

The WRITE ATTRIBUTE command (see table z+3) allows an application client to write attribute values to mMedium aAuxiliary mMemory (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				PARAMETER LIST LENGTH				
12								
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 may represent an element from any element type (see table 18). 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).

If the element specified by the ELEMENT ADDRESS field is empty, then the device server shall terminate the command withreturn 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 the command shall be terminiated with CHECK CONDITION status shall be returned. The sense key shall be ILLEGAL REQUEST and the additional sense code INVALID FIELD IN CDBELEMENT 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).

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 PARTITION NUMBER field.

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

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