To: INCITS Technical Committee T10
From: Ellen Stacey & Kevin Butt
Date: Monday, April 06, 2009 11:11 am
Document: T10/08-406r2 — SSC-3: Clarifying when Sense Data bits are set

Revisions

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>08-406r0</td>
<td>(16 October 2008)</td>
<td>Initial revision</td>
</tr>
<tr>
<td>08-406r1</td>
<td>(19 February 2009)</td>
<td>Incorporate changes stemming from January T10 meeting review.</td>
</tr>
<tr>
<td>08-406r2</td>
<td>(03 April 2009)</td>
<td>Incorporate changes from last meetings. I accepted all changes in the Annex in the middle of this effort so I lost markings of what changes were made in the March meeting.</td>
</tr>
</tbody>
</table>

Introduction

It can be difficult and confusing to figure out the basic media events that are communicated and when they may be communicated. This includes when one might see EOM, ILI, Filemark bits in sense data.

I recommend changes be made to read (6), read (16), write (6), write (16), write filemark,

In addition, I recommend that a basic table be implemented for easier reference.

Proposal

5.6 Write(16) Command

If the device server enables a WRITE(16) command while positioned between EW and EOP, or encounters EW during the processing of a WRITE(16) command, an attempt to finish writing any data may be made as determined by the current settings of the REW and SEW bits in the Device Configuration mode page (see 8.3.3). The command shall terminate with CHECK CONDITION status and the additional sense code shall be set to END-OF-PARTITION/MEDIUM DETECTED. If all data that is to be written is successfully transferred to the medium, the sense key shall be set to NO SENSE or RECOVERED ERROR, as appropriate. If the device server is unable to transfer all the data to the medium any data, buffered or unbuffered, before end-of-partition when early warning is encountered, the sense key shall be set to VOLUME OVERFLOW. If the SEW bit is set to zero, the EOM bit shall be set to one in the sense data. If the SEW bit is set to one, the EOM and VALID bits shall be set to one in the sense data. The EOM bit shall be set to one. If the SEW bit is set to one then the VALID bit shall be set to one.

...
5.7 WRITE FILEMARKS(16) command

If the device server enables a WRITE FILEMARKS(16) command while positioned between EW and EOP, or encounters EW during the processing of a WRITE FILEMARKS(16) command, an attempt to finish writing any buffered logical objects may be made, as determined by the current settings of the REW and SEW bits in the Device Configuration mode page (see 8.3.3). The command shall terminate with CHECK CONDITION status and the additional sense code shall be set to END-OF-PARTITION/MEDIUM DETECTED. If all buffered logical objects to be written are successfully transferred to the medium, the sense key shall be set to NO SENSE or RECOVERED ERROR, as appropriate. If the device server is unable to transfer all the buffered logical objects to the medium any buffered logical objects before end-of-partition when early-warning is encountered, the sense key shall be set to VOLUME OVERFLOW. If the SEW bit is set to zero, the EOM bit shall be set to one in the sense data. If the SEW bit is set to one, the EOM and VALID bits shall be set to one in the sense data. The EOM bit shall be set to one. If the SEW bit is set to one then the VALID bit shall be set to one.

6.8 Write(6) Command

If the device server enables a WRITE(16) command while positioned between EW and EOP, or encounters EW during the processing of a WRITE(16) command, an attempt to finish writing any data may be made as determined by the current settings of the REW and SEW bits in the Device Configuration mode page (see 8.3.3). The command shall terminate with CHECK CONDITION status and the additional sense code shall be set to END-OF-PARTITION/MEDIUM DETECTED. If all data that is to be written is successfully transferred to the medium, the sense key shall be set to NO SENSE or RECOVERED ERROR, as appropriate. If the device server is unable to transfer all the data to the medium any data, buffered or unbuffered, before end-of-partition when early-warning is encountered, the sense key shall be set to VOLUME OVERFLOW. If the SEW bit is set to zero, the EOM bit shall be set to one in the sense data. If the SEW bit is set to one, the EOM and VALID bits shall be set to one in the sense data. The EOM bit shall be set to one. If the SEW bit is set to one then the VALID bit shall be set to one.
6.9 WRITE FILEMARKS(6) command

If the device server enables a WRITE FILEMARKS(6) command while positioned between EW and EOP, or encounters EW during the processing of a WRITE FILEMARKS(6) command, an attempt to finish writing any buffered logical objects may be made, as determined by the current settings of the REW and SEW bits in the Device Configuration mode page (see 8.3.3). The command shall terminate with CHECK CONDITION status and the additional sense code shall be set to END-OF-PARTITION/MEDIUM DETECTED. If all buffered logical objects to be written are successfully transferred to the medium, the sense key shall be set to NO SENSE or RECOVERED ERROR, as appropriate. If the device server is unable to transfer all the buffered logical objects to the medium any buffered logical objects before end-of-partition when early-warning is encountered, the sense key shall be set to VOLUME OVERFLOW. If the SEW bit is set to zero, the EOM bit shall be set to one in the sense data. If the SEW bit is set to one, the EOM and VALID bits shall be set to one in the sense data. The EOM bit shall be set to one. If the SEW bit is set to one then the VALID bit shall be set to one.

Editors Note 1 - KDB: The entire Annex D is new
Annex D
(informative)

D.1 Sense data error indications for read and write operations

Table D.1 — Sense data error indications for read and write operations (part 1 of 2)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Operation</th>
<th>Sense Key</th>
<th>Additional Sense Code</th>
<th>EOM</th>
<th>FM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filemark encountered a</td>
<td>Read(16),</td>
<td>NO SENSE or RECOVERED ERROR</td>
<td>FILEMARK DETECTED</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Read Reserve(16), Read Reserve(6), Read Reverse(6), Space(6) a, Space(6) a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End-of-data encountered before EW d</td>
<td>Read(16),</td>
<td>BLANK CHECK</td>
<td>END OF DATA ENCOUNTERED</td>
<td>0</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Read(6),</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Space(6),</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Space(16)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End-of-data encountered between EW and end-of-partition/medium d</td>
<td>Read(16),</td>
<td>BLANK CHECK</td>
<td>END OF DATA ENCOUNTERED</td>
<td>REW b</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Read(6),</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Space(6),</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Space(16)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EW encountered and REW h is set to one in the Device Configuration mode page (see 8.3.3)</td>
<td>Read(16),</td>
<td>NO SENSE or RECOVERED ERROR</td>
<td>END OF PARTITION/MEDIUM ENCOUNTERED</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Read Reserve(16),</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Read Reserve(6), Read Reverse(6), Space(6), Space(6), Space(16)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key:
- X = not specified.
- a The application client is only notified of filemarks on space commands when processing a Space(6) or Space(16) command with the CODE field set to logical blocks (i.e., 0000b).
- b These values represent the current settings of the corresponding fields in the Device Configuration mode page (see 8.3.3).
- c The information field is only valid if the VALID bit is set to one in the sense data.
- d End-of-data is not returned after end-of-partition.
- e At least one logical block was unable to be written. A Read Position command may be used to determine which blocks were successfully written. A Recover Buffered Data command, if supported by the device server, may be used to read the unwritten data from the logical object buffer.
- f The Read Position command should be used to determine the amount of data transferred.
- g It is only possible to encounter BOP on a Space command when the COUNT field is a negative value.
- h This condition occurs one or more times.
- i This row is only valid when the SEW bit is set to one in the Device Configuration mode page (see 8.3.3).
Table D.1 — Sense data error indications for read and write operations *(part 1 of 2)*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Operation</th>
<th>Sense Key</th>
<th>Additional Sense Code</th>
<th>EOM</th>
<th>FM</th>
</tr>
</thead>
<tbody>
<tr>
<td>EW encountered and (REW^h) is set to zero in the Device Configuration mode page (see 8.3.3)</td>
<td>Read(16), Read Reserve(16), Read(6), Read Reverse(6), Space(6), Space(16)</td>
<td>N/A</td>
<td>N/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>End-of-partition/medium encountered before end-of-data</td>
<td>Read(16), Read(6), Space(6), Space(16)</td>
<td>MEDIA ERROR</td>
<td>Dependent on the operation</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td>Beginning-of-partition/medium encountered</td>
<td>Read Reverse(16), Read(6), Space(6) (^g), Space(16) (^g)</td>
<td>NO SENSE or RECOVERED ERROR</td>
<td>BEGINNING-OF-PARTITION/MEDIUM DETECTED</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td>EW encountered and data successfully written. (^h)</td>
<td>Write(6), Write(16), Write Filemarks(6), Write Filemarks(16)</td>
<td>NO SENSE or RECOVERED ERROR</td>
<td>END OF PARTITION/MEDIUM ENCOUNTERED</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td>End-of-partition/medium encountered without successfully writing data. (^e)</td>
<td>Write(6), Write(16), Write Filemarks(6), Write Filemarks(16)</td>
<td>VOLUME OVERFLOW</td>
<td>END OF PARTITION/MEDIUM ENCOUNTERED</td>
<td>1</td>
<td>X</td>
</tr>
</tbody>
</table>

Key:
- \(X\) = not specified.
- \(^a\) The application client is only notified of filemarks on space commands when processing a Space(6) or Space(16) command with the CODE field set to logical blocks (i.e., 0000b).
- \(^b\) These values represent the current settings of the corresponding fields in the Device Configuration mode page (see 8.3.3).
- \(^c\) The information field is only valid if the VALID bit is set to one in the sense data.
- \(^d\) End-of-data is not returned after end-of-partition.
- \(^e\) At least one logical block was unable to be written. A Read Position command may be used to determine which blocks were successfully written. A Recover Buffered Data command, if supported by the device server, may be used to read the unwritten data from the logical object buffer.
- \(^f\) The Read Position command should be used to determine the amount of data transferred.
- \(^g\) It is only possible to encounter BOP on a Space command when the COUNT field is a negative value.
- \(^h\) This condition occurs one or more times.
- \(^i\) This row is only valid when the SEW bit is set to one in the Device Configuration mode page (see 8.3.3).
Table D.2 — INFORMATION field and position for read and write operations (part 2 of 2)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Operation</th>
<th>VALID</th>
<th>INFORMATION c</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>FIXED = 1 f</td>
<td>FIXED = 0</td>
<td></td>
</tr>
<tr>
<td>Filemark encountered a</td>
<td>Read(16), Read(6)</td>
<td>1</td>
<td>Transfer length minus length actually read</td>
<td>Transfer length</td>
</tr>
<tr>
<td></td>
<td>Read Reserve(16), Read Reverse(6)</td>
<td>1</td>
<td>Transfer length minus length actually read</td>
<td>Transfer length</td>
</tr>
<tr>
<td></td>
<td>Space(6)a, Space(16)b</td>
<td>1</td>
<td>Count of blocks traversed</td>
<td>After file-mark</td>
</tr>
<tr>
<td>End-of-data encountered before EW d</td>
<td>Read(16), Read(6), Space(6), Space(16)</td>
<td>1</td>
<td>Transfer length minus length actually read</td>
<td>Transfer length</td>
</tr>
<tr>
<td>End-of-data encountered between EW and end-of-partition/medium d</td>
<td>Read(16), Read(6), Space(6), Space(16)</td>
<td>1</td>
<td>Transfer length minus length actually read</td>
<td>Transfer length</td>
</tr>
<tr>
<td>EW encountered and REW h is set to one in the Device Configuration mode page (see 8.3.3)</td>
<td>Read(16), Read Reserve(16), Read(6), Read Reverse(6), Space(6), Space(16)</td>
<td>1</td>
<td>Transfer length minus length actually transferred</td>
<td>Transfer length minus actual block length</td>
</tr>
</tbody>
</table>

Key:
- **X = not specified.**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Operation</th>
<th>VALID</th>
<th>INFORMATION c</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>FIXED = 1 f</td>
<td>FIXED = 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- a The application client is only notified of filemarks on space commands when processing a Space(6) or Space(16) command with the CODE field set to logical blocks (i.e., 0000b).
- b These values represent the current settings of the corresponding fields in the Device Configuration mode page (see 8.3.3).
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- e At least one logical block was unable to be written. A Read Position command may be used to determine which blocks were successfully written. A Recover Buffered Data command, if supported by the device server, may be used to read the unwritten data from the logical object buffer.
- f The Read Position command should be used to determine the amount of data transferred.
- g It is only possible to encounter BOP on a Space command when the COUNT field is a negative value.
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Table D.2 — INFORMATION field and position for read and write operations (part 2 of 2)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Operation</th>
<th>VALID</th>
<th>INFORMATION c</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>EW encountered and REW(^h) is set to zero in the Device Configuration mode page (see 8.3.3)</td>
<td>Read(16), Read Reserve(16), Read(6), Read Reverse(6), Space(6), Space(16)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>After last requested logical object</td>
</tr>
<tr>
<td>End-of-partition/medium encountered before end-of-data</td>
<td>Read(16), Read(6), Space(6), Space(16)</td>
<td>1</td>
<td>Transfer length minus length actually transferred</td>
<td>Transfer length</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At end-of-partition/medium</td>
</tr>
<tr>
<td>Beginning-of-partition/medium encountered</td>
<td>Read Reverse(16) Read Reverse(6) Space(6) (^g), Space(16) (^g)</td>
<td>1</td>
<td>Transfer length minus length actually transferred</td>
<td>Transfer length</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At beginning-of-partition/medium</td>
</tr>
<tr>
<td>EW encountered and data successfully written. (^h), (^i)</td>
<td>Write(6), Write(16), Write Filemarks(6), Write Filemarks(16)</td>
<td>1</td>
<td>Transfer length minus length actually transferred to medium</td>
<td>Transfer length</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>After block(s) written</td>
</tr>
<tr>
<td>End-of-partition/medium encountered without successfully writing data. (^e), (^i)</td>
<td>Write(6), Write(16), Write Filemarks(6), Write Filemarks(16)</td>
<td>1</td>
<td>Transfer length minus length actually written</td>
<td>Transfer length</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At end-of-partition/medium</td>
</tr>
</tbody>
</table>

Key:
- X = not specified.
- \(\text{a}\) The application client is only notified of filemarks on space commands when processing a Space(6) or Space(16) command with the CODE field set to logical blocks (i.e., 0000b).
- \(\text{b}\) These values represent the current settings of the corresponding fields in the Device Configuration mode page (see 8.3.3)
- \(\text{c}\) The information field is only valid if the VALID bit is set to one in the sense data
- \(\text{d}\) End-of-data is not returned after end-of-partition.
- \(\text{e}\) At least one logical block was unable to be written. A Read Position command may be used to determine which blocks were successfully written. A Recover Buffered Data command, if supported by the device server, may be used to read the unwritten data from the logical object buffer.
- \(\text{f}\) The Read Position command should be used to determine the amount of data transferred.
- \(\text{g}\) It is only possible to encounter BOP on a Space command when the COUNT field is a negative value.
- \(\text{h}\) This condition occurs one or more times.
- \(\text{i}\) This row is only valid when the SEW bit is set to one in the Device Configuration mode page (see 8.3.3).
# D.2 Summary of Length Errors on Read Type Commands

<table>
<thead>
<tr>
<th>Error Condition</th>
<th>Fixed</th>
<th>SILI</th>
<th>BLOCK LENGTH field in mode parameter header</th>
<th>Sense Error</th>
<th>ILI</th>
<th>Information</th>
<th>Position (^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Underlength</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>NO SENSE / NO ADDITIONAL SENSE</td>
<td>1</td>
<td>Requested length minus block size</td>
<td>After logical block</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>X</td>
<td>None</td>
<td>0</td>
<td>N/A</td>
<td>After logical block</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>Non-zero</td>
<td>NO SENSE / NO ADDITIONAL SENSE</td>
<td>1</td>
<td>Requested length minus blocks read not including incorrect block</td>
<td>After incorrect logical block</td>
</tr>
<tr>
<td><strong>Overlength</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>NO SENSE / NO ADDITIONAL SENSE</td>
<td>1</td>
<td>Requested length minus block size</td>
<td>After logical block</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>None</td>
<td>0</td>
<td>N/A</td>
<td>After logical block</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>Non-zero</td>
<td>NO SENSE / NO ADDITIONAL SENSE</td>
<td>-</td>
<td>Requested length minus block size</td>
<td>After logical block</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>Non-zero</td>
<td>NO SENSE / NO ADDITIONAL SENSE</td>
<td>1</td>
<td>Requested length minus blocks read not including incorrect block</td>
<td>After incorrect logical block</td>
</tr>
</tbody>
</table>

Key:
- \(X\) = don’t care
- \(^a\) After block means on the EOP side of the block for a Read (6) or Read (16) command and on the BOP side of the block for a Read Reverse (6) or Read Reverse (16) command.