

To: INCITS T10 Committee

From: Kevin Butt, IBM

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Subject: SSC-2: ILI Resolution

1. Problem Description

In SSC when an error occurred, the INFORMATION field reported was the total number of bytes or blocks in the buffer that were not successfully written to media. If there were a series of commands where FIXED length transfers and variable length transfers were changed, there is no way to determine how many "units" are in the buffer or if those "units" were bytes or blocks. Also, there is no way to know how many are actually in the buffer because it is not known if all blocks made it to the drive (in the case of fixed length transfers of multiple blocks). It is not known by the application client if the drive takes all blocks in before reporting an error or if the blocks are processed as they are sent and when an error occurs the transfers are stopped.

Additionally, on non-WRITE commands, it is not known what to report for deferred errors.

In short, the ILI condition had overloaded the INFORMATION field to be information of the current command and information of the buffer state. This overloading of information has made it impossible in many scenarios to give deterministic information. In fact, the definition of this field is "3.1.30 INFORMATION field: A command-specific field in the sense data (see SPC-3)." This states it is a command-specific field.

The SSC-2 WG has had an action for each of us to report on what our various drives report in these scenarios.

2. IBM Tape drive behavior

IBM tape drives will only report the ILI information on non-deferred errors. If there is a deferred error we do not set the ILI bit nor fill in the information field. We force the application client to use Read Position and other means to determine the location of the media and the number of bytes/blocks in the buffer.

3. Proposed Solution

There is a solution to all of these problems and it has the added benefit of making the INFORMATION field valid and useful in all cases. The solution is to make the INFORMATION field command-specific, that is, the INFORMATION field reports information only for the current command that is processed and does not report buffer state. This buffer state only clouds the information such that the values returned are not deterministic and are unreliable. If the INFORMATION field relates only to the current command, then the application client knows how many blocks/bytes of its data were transferred to the buffer. It also has the history of previous commands, so it knows what data was received into the buffer. In order to know what data was actually transferred to media, the application client must issue a Read Position command that was designed specifically for this purpose. Indeed today, the application client must use a Read Position to accurately know what made it onto media. This brings clarification without requiring extra effort.

4. Proposed Changes in SSC-2

4.2.11 Error reporting

In the case of an unrecovered write error, if ~~unbuffered mode is selected and~~ the FIXED bit is set to one, the sense data VALID bit shall be set to one and the INFORMATION field shall be set to the requested transfer length minus the actual number of logical blocks written if unbuffered mode is selected or transferred to the buffer if buffered mode is selected.

If ~~unbuffered mode is selected and~~ the FIXED bit is set to zero, the INFORMATION field shall be set to the requested transfer length.

~~In the case of an unrecovered write error or a deferred write error, if buffered mode is selected and the FIXED bit is one, the sense data VALID bit shall be set to one and the INFORMATION field shall be set to the total number of logical objects not written (i.e., the number of logical blocks not transferred from the initiator for this command plus the number of logical objects remaining in the logical unit's object buffer). If buffered mode is selected and the FIXED bit is zero, the INFORMATION field shall be set to the total number of bytes, filemarks, and setmarks not written (the number of bytes not transferred from the initiator for this command plus the number of bytes, filemarks, and setmarks remaining in the logical unit's object buffer). In both cases, the value in the INFORMATION field may exceed the transfer length.~~

5.6 WRITE(16) command

The INFORMATION field shall be set as follows:

- a if ~~the device is operating in unbuffered mode (see 3.1.63) and~~ the FIXED bit is set to one, the INFORMATION field shall be set to the requested transfer length minus the actual number of logical blocks written;
- b if ~~the device is operating in unbuffered mode and~~ the FIXED bit is set to zero, the INFORMATION field shall be set to the requested transfer length;

- ~~e if the device is operating in buffered mode (see 3.1.8) and the FIXED bit is set to one, the INFORMATION field shall be set to the total number of logical objects not written (i.e., the number of logical blocks not transferred from the application client plus the number of logical objects remaining in the logical unit's object buffer). The value in the INFORMATION field may exceed the transfer length; and~~
- ~~d if the device is operating in buffered mode and the FIXED bit is set to zero, the INFORMATION field shall be set to the total number of bytes, filemarks, and setmarks not written (the number of bytes not transferred from the application client plus the number of bytes, filemarks, and setmarks remaining in the logical unit's object buffer).~~

5.7 WRITE FILEMARKS(16) command

The INFORMATION field shall be set ~~as follows:~~to the requested transfer length minus the actual number of filemarks or setmarks written

- ~~a if the device is operating in unbuffered mode (see 3.1.63), the INFORMATION field shall be set to the requested transfer length minus the actual number of filemarks or setmarks written;~~
- ~~b if the device is operating in buffered mode (see 3.1.8) and the last buffered logical block was written using a variable block transfer (see 6.8 or 5.6), the INFORMATION field shall be set to the total number of bytes, filemarks, and setmarks not written (i.e., the number of filemarks or setmarks not transferred from the application client plus the number of bytes, filemarks, and setmarks remaining in the logical unit's object buffer). It is possible for the value in the INFORMATION field to exceed the transfer length; or~~
- ~~e if the device is operating in buffered mode and the last buffered logical block was written using a fixed block transfer (see 6.8 or 5.6), the INFORMATION field shall be set to the total number of logical objects not written (i.e., the number of filemarks or setmarks not transferred from the application client plus the number of logical objects remaining in the logical unit's object buffer). It is possible for the value in the INFORMATION field to exceed the transfer length.~~

6.8 WRITE(6) command

The INFORMATION field shall be set as follows:

- ~~a if the device is operating in unbuffered mode (see 3.1.63) and~~ the FIXED bit is set to one, the INFORMATION field shall be set to the requested transfer length minus the actual number of logical blocks written;
- ~~b if the device is operating in unbuffered mode and~~ the FIXED bit is set to zero, the INFORMATION field shall be set to the requested transfer length;
- ~~e if the device is operating in buffered mode (see 3.1.8) and the FIXED bit is set to one, the INFORMATION field shall be set to the total number of logical objects not written (i.e., the number of logical blocks not transferred from the application client plus the number of logical objects remaining in the logical unit's object buffer). The value in the INFORMATION field may exceed the transfer length; and~~

- ~~d if the device is operating in buffered mode and the FIXED bit is set to zero, the INFORMATION field shall be set to the total number of bytes, filemarks, and setmarks not written (i.e., the number of bytes not transferred from the application client plus the number of bytes, filemarks, and setmarks remaining in the logical unit's object buffer).~~

6.9 WRITE FILEMARKS(6) command

The INFORMATION field shall be set ~~as follows:~~ to the requested transfer length minus the actual number of filemarks or setmarks written

- ~~a if the device is operating in unbuffered mode (see 3.1.63), the INFORMATION field shall be set to the requested transfer length minus the actual number of filemarks or setmarks written;~~
- ~~b if the device is operating in buffered mode (see 3.1.8) and the last buffered logical block was written using a variable-block transfer (see 6.8 or 5.6), the INFORMATION field shall be set to the total number of bytes, filemarks, and setmarks not written (i.e., the number of filemarks or setmarks not transferred from the application client plus the number of bytes, filemarks and setmarks remaining in the logical unit's object buffer). It is possible for the value in the INFORMATION field to exceed the transfer length; or~~
- ~~e if the device is operating in buffered mode and the last buffered logical block was written using a fixed-block transfer (see 6.8 or 5.6), the INFORMATION field shall be set to the total number of logical objects not written (i.e., the number filemarks or setmarks not transferred from the application client plus the number of logical objects remaining in the logical unit's object buffer). It is possible for the value in the INFORMATION field to exceed the transfer length.~~