

To: T10 Technical Committee
 From: Rob Elliott, Compaq Computer Corporation (Robert.Elliott@compaq.com)
 Date: 17 July 2001
 Subject: SPC-3 sense data INFORMATION field for long LBAs/bidirectional commands

Revision History

Revision 0 (17 July 2001) first revision

Related Documents

spc2r19 - SCSI Primary Commands - 2 revision 19
 ssc2r05 – SCSI Stream Commands – 2 revision 4
 sbc2r03 – SCSI Block Commands – 2 revision 3

Overview

Sense data includes a 4 byte INFORMATION field that can contain values like an LBA or a residual based on the device types and/or command. This field is not big enough for commands using 8 byte LBAs, commands with 8 byte residuals, or bidirectional commands with multiple residuals.

SBC-2 includes that access > 2 TB like READ(16) and WRITE(16). The LBAs for these commands are 8 bytes long and don't fit in the INFORMATION field. A temporary workaround was added to SPC-2 declaring that if the LBA does not fit in 4 bytes, the VALID bit for the INFORMATION field is set to 0. A complete solution needs to be provided.

SBC-2 includes a bidirectional command that can result in two residuals, one for each direction. Future command sets may define more bidirectional commands with similar properties. The residual size is limited by the size of the transfer length field, which is currently 4 bytes in SBC-2. A pair of these residuals does not fit in the INFORMATION field.

SSC-2 includes a set of commands for an explicit model that use 8 byte LBAs like SBC-2. The definition of INFORMATION is yet to be defined for these commands, but it might be needed to carry the LBA like in SBC-2.

SSC-2 include a SPACE(16) command, used in both explicit and implicit models, that uses an 8 byte COUNT field. This means an 8 byte residual must be stored in the sense data.

Options:

1. For each command requiring more than 4 bytes of INFORMATION data, use the 4-byte COMMAND-SPECIFIC INFORMATION field to hold the additional data. Each new command definition would define its use of the field.

Today only EXTENDED COPY (SPC-2) and REASSIGN BLOCKS (SBC-2) use the COMMAND SPECIFIC INFORMATION field. EXTENDED COPY stores either a 2 byte segment number or a pointer into the sense data in this field. It stores a residual in the INFORMATION field. When EXTENDED COPY is expanded to support SBC-2 and SSC-2, none of these fields should grow so no additional work looks necessary.

This solution leaves the sense data format unchanged.

2. For each command set describing long LBA or bidirectional commands, use the first bytes of the "Additional sense bytes" to hold the additional information. This causes a change in the sense data structure. There is a limit to the size of the structure in most protocols, but a few more bytes should not be a problem.

Suggested Changes [none yet]

7.20.2 Sense data format

A VALID bit of zero indicates that the INFORMATION field is not as defined in this standard. A VALID bit of one indicates the INFORMATION field contains valid information as defined in this standard. Device servers shall implement the VALID bit.

Response code value 70h (current errors) is described in 7.20.4. Device servers shall implement response code 70h. Response code value 71h (deferred errors) is described in 7.20.5. Implementation of response code 71h is optional. Response code 7Fh is for a vendor specific sense data formats. Response code values of 72h to 7Eh and 00h to 6Fh are reserved.

...

The contents of the INFORMATION field is device-type or command specific and is defined within the appropriate standard for the device type or command of interest. Device servers shall implement the INFORMATION field.

Unless specified otherwise, this field contains:

- a) the unsigned logical block address associated with the sense key, for direct-access devices (device type 0), write-once devices (device type 4), CD-ROM devices (device type 5), and optical memory devices (device type 7). If the logical block address value cannot be represented in four bytes, the VALID bit shall be set to zero;
- b) the difference (residue) of the requested length minus the actual length in either bytes or blocks, as determined by the command, for sequential-access devices (device type 1), printer devices (device type 2), processor devices (device type 3) and some direct access device commands, except as defined for d) below. Negative values are indicated by two's complement notation;
- c) the difference (residue) of the requested number of blocks minus the actual number of blocks copied or compared for the current segment descriptor of an EXTENDED COPY command; or
- d) for sequential-access devices operating in buffered modes 1h or 2h that detect an unrecoverable write error when unwritten data blocks, filemarks, or setmarks remain in the buffer, the value of the INFORMATION field for all commands shall be:
 - a) the total number of data blocks, filemarks, and setmarks in the buffer if the device is in fixed block mode (i.e., BLOCK LENGTH field of the MODE SENSE block descriptor is non-zero and the FIXED bit of the WRITE command is one); or
 - b) the number of bytes in the buffer, including filemarks and setmarks, if the device is in variable mode (i.e., the FIXED bit of the WRITE command is zero).

For additional information on the use of the INFORMATION field by sequential-access devices see SSC.

The ADDITIONAL SENSE LENGTH field indicates the number of additional sense bytes to follow. If the allocation length of the CDB is too small to transfer all of the additional sense bytes, the additional sense length is not adjusted to reflect the truncation.

The COMMAND-SPECIFIC INFORMATION field contains information that depends on the command that encountered the exception condition. Further meaning for this field is defined within the command description. The COMMAND-SPECIFIC INFORMATION field is mandatory if the device server supports any of the following commands: EXTENDED COPY and REASSIGN BLOCKS.

...

The additional sense bytes may contain command specific data, peripheral device specific data, or vendor specific data that further defines the nature of the CHECK CONDITION status.