To: T10 Technical Committee
From: Wayne Bellamy (wayne.bellamy@hp.com), Hewlett Packard
Date: September 2, 2005
Subject: T10/05-142r3 SAT - LOG SENSE command and SMART

Revision History

Revision 0 (April 15, 2005) first revision
Revision 1 (May 23, 2005) second revision
 Change Details:

1) per 4-18-05 SAT T10 WG: add MODE SENSE/MODE SELECT relevant data for Information Exceptions Control mode page for enabling/disabling this page (SMART).
2) per 4-18-05 SAT T10 WG: (editing note - SMART can be supported but mat not be enabled.)
3) per 4-18-05 SAT T10 WG: (editing note – Log pages "list" should not change dynamically based on enable/disabled of SMART on ATA side.)
4) per 5-19-05 SAT T10 WG teleconference call: Ralph Weber provided ASC/ASCQ of (67/0B) for ATA DEVICE FEATURE SET NOT ENABLED (input from Mark Overby). This information is added in Table 3.
5) per 5-19-05 SAT T10 WG teleconference call: Add the Self-Test Results Results log page to this proposal.
6) per 5-19-05 SAT T10 WG teleconference call: early posting requested regardless of completion.

Revision 2 (July 30, 2005) third revision
 Change details:

1) Added the Self-Test Results log page to the PAGE CODE field only (Table 3). (The Self-Test Results log page is in proposal 05-245.)
2) Added the Informational Exceptions log page to this proposal since it is the "SCSI" SMART log page.
3) Removed "strikeouts" for clarity (original proposal & SAT contains original data if needed).
4) Added the Supported Log Pages log page.

Revision 3 (August 23, 2005) fourth revision
 Change details:

1) Add SPC-4 to the Related Documents heading.
2) Change "SPC-3" to "SPC-4" in "Suggested changes to SPC-3."
3) Delete the word "SET" from "ATA DEVICE FEATURE SET NOT ENABLED."
4) Add the word "client" after the word "application" in the first statement of the paragraph of section 8.2.1.
5) Remove SATType column and Changeable column from all tables.
6) Remove all instances of the "Bit or field values that are not supported" statement mentioned below the tables.
7) Change Table 1 – PPC, SP and PARAMETER POINTER fields to "Unspecified".
8) Change the text to "Unspecified" for all prior "U" SATType fields in all Tables.
9) Delete "ATA SMART self-test enabled/disabled" verbiage in Table 3 for log page 10h. Only supported/non-supported verbiage is correct per T13 attendees (J. H., M.O., & C.S.).
10) Delete "(B0h) with Features register set to DAh, LBA Mid register set to 4Fh, and LBA High register set to C2h" from the PAGE CODE field description of Table 54.
11) Table 54 – separate out the parameter code (in or away from the table?) and put parameter code 0000h data into this (per Ralph W).
12) Issue with Table 4 - ASC & ASCQ hexadecimal values instead of verbiage. No resolution.
13) Table 56 – add "As part of conforming to the requirements of SPC-3" to the beginning of the sentence in the description field for the SUPPORTED PAGE LIST field. Remove the word "which" from the sentence, also.
14) Swap the order of items 1) and 2) in the description field for the SUPPORTED PAGE LIST field. If (current) item 2 is not supported there is no need to perform (current) item 1, also. (edit this).

Related Documents

(T10) sat-r04 – SCSI to ATA Translation (SAT), Revision 4
(T10) spc-3r23 – SCSI Primary Commands - 3, Revision 23
(T10) spc-4r0 – SCSI Primary Commands - 4, Revision 0
(T13) ata7v1r4b – AT Attachment with Packet Interface - 7 Volume1, Revision 4b

Overview

1. The LOG SENSE command is used by SCSI application clients to retrieve SMART data (Informational Exceptions log page). The SATL must be able to provide the occurrence of an impending failure (SMART event) to the SCSI application client. This proposal details a method to accomplish this task.
2. The LOG SENSE command is used by SCSI application clients to retrieve the Self-Test Results log page. This proposal details a method to accomplish this task. (The Self-Test Results log page translation is addressed by another proposal (05-245)).
3. Complexity of the emulation of the LOG SENSE command is estimated to be minimal.

Suggested changes to SPC-4

Requesting a new ASC and ASCQ assignment as follows:

ASC   ASCQ
 67   0B   ATA DEVICE FEATURE NOT ENABLED

Suggested changes to SAT

8.2 LOG SENSE command (4Dh)

8.2.1 Command summary

The LOG SENSE command provides a mechanism an application client may use to retrieve statistical or diagnostic results, or other operating information about a target or a logical unit. Table 1 shows the translation for fields specified in the LOG SENSE CDB (see SPC-3).

Table 1 – LOG SENSE command CDB fields

Field	Description or reference
OPERATION CODE	The SATL shall implement support for this field by returning the log page data for the particular page requested.
PPC	Unspecified.
SP	Unspecified.
PC	(see 8.2.2)
PAGE CODE	(see 8.2.3)
PARAMETER POINTER	Unspecified.
ALLOCATION LENGTH	The SATL shall implement support for this field as defined in SPC-3.
CONTROL	(see 6.4)

8.2.2 PC (page control) field

The SATL shall implement this field as defined in SPC-3. The SATL interpretation and support of the page control values is shown in Table 2.

Table 2 - Page control values

PC	Description or reference
00b	Threshold values: Unspecified.
01b	Cumulative values: Supported.
10b	Default threshold values: Unspecified.
11b	Default cumulative values: Unspecified.

8.2.3 PAGE CODE field

The SATL shall support this field as defined in SPC-3. The SATL emulation for support of the PAGE CODE field is provided in Table 3.

Table 3 - PAGE CODE field values

PAGE CODE	Description or reference
00h	Supported Log Pages log page:The SATL shall implement this page by returning a list of supported log pages (see 10.2.3).
10h	Self-Test Results log page: The SATL shall determine if the ATA SMART self-test is supported from the ATA IDENTIFY DEVICE data word 84, bit 1. If the ATA SMART self-test is not supported the SATL shall return a CHECK CONDITION status with SENSE KEY set to ILLEGAL REQUEST and ADDITIONAL SENSE CODE set to INVALID FIELD IN CDB. If the ATA SMART self-test is supported the SATL shall return the translated Self-Test Results log page to the application client (see 10.2.2).
2Fh	Informational Exceptions log page: The SATL shall determine if the ATA SMART feature set is supported from the ATA IDENTIFY DEVICE data word 82, bit 0. If the ATA SMART feature set is not supported the SATL shall return a CHECK CONDITION status with SENSE KEY set to ILLEGAL REQUEST and ADDITIONAL SENSE CODE set to INVALID FIELD IN CDB. If the ATA SMART feature set is supported the SATL shall determine if the ATA SMART feature set is enabled or disabled from the ATA IDENTIFY DEVICE data word 85, bit 0. If the ATA SMART feature set is disabled the SATL shall return a CHECK CONDITION status with SENSE KEY set to ABORTED COMMAND and ADDITIONAL SENSE CODE set to ATA DEVICE FEATURE NOT ENABLED. If the ATA SMART feature set is enabled the SATL shall return the translated Informational Exceptions log page to the application client (see 10.2.1).
All others	Not supported.

[Note to Editor: The following is the Informational Exceptions log page translation to be added to section 10.2. (The subclause and table numbering will probably be incorrect due to document changes.)]

10.2 Log Pages

10.2.1 Informational Exceptions log page

The Informational Exceptions log page (see Table 54) provides detail about informational exceptions (see SPC-3).

Table 54- Informational Exceptions log page fields

Field	Description or reference
PAGE CODE	Set to a value of 2Fh. This field value is specific to the Informational Exceptions log page. The SATL shall issue the ATA SMART RETURN STATUS command to the non-packet device. Data returned from the non-packet device shall be translated into the appropriate log sense parameter data (see 10.2.1.1) to be returned to the application client.
PAGE LENGTH	Unspecified.
Informational exceptions log parameters (see SPC-3)	
First informational exceptions log parameter	
...	
Last informational exceptions log parameter	

The first log parameter is the informational exceptions general parameter which is shown in table 55.

Table 55 – Informational exceptions general parameter data

Field	Description or reference
PARAMETER CODE	Shall be set to a value of 0000h.
DU	Shall be set to a value of 0b (see SPC-3).
DS	Shall be set to a value of 0b (see SPC-3).
TSD	Shall be set to a value of 0b (see SPC-3).
ETC	Shall be set to a value of 0b (see SPC-3).
TMC	Shall be set to a value of 0h (see SPC-3).
LBIN	Shall be set to a value of 1b (see SPC-3).
LP	Shall be set to a value of 1b (see SPC-3).
PARAMETER LENGTH	Unspecified.
INFORMATIONAL EXCEPTION ADDITIONAL SENSE CODE	(see 10.2.1.1).
INFORMATIONAL EXCEPTION ADDITIONAL SENSE CODE QUALIFIER	(see 10.2.1.1).
MOST RECENT TEMPERATURE READING	Unspecified.
Vendor specific	Unspecified.

10.2.1.1 Informational exceptions general parameter data SATL translations

Data received from a non-packet device in response to an ATA SMART RETURN STATUS command shall be translated by the SATL into parameter data for the informational exceptions general parameter data to be returned to the application client. Table 4 provides the parameter data translations for data returned from the non-packet device in response to an ATA SMART RETURN STATUS command.

Table 4 - ATA SMART RETURN STATUS translations

Data returned to SATL from non-packet device for ATA SMART RETURN STATUS command	SMART condition	Informational Exceptions log page parameter code (0000h) fields	
LBA Mid = 4Fh LBA High = C2h	threshold not exceeded	INFORMATIONAL EXCEPTION ADDITIONAL SENSE CODE	00h
		INFORMATIONAL EXCEPTION ADDITIONAL SENSE CODE QUALIFIER	00h
LBA Mid = F4h LBA High = 2Ch	threshold exceeded	INFORMATIONAL EXCEPTION ADDITIONAL SENSE CODE	5Dh
		INFORMATIONAL EXCEPTION ADDITIONAL SENSE CODE QUALIFIER	10h

[Editor's & W.G. note: another attempt at correcting the asc/ascq issue per R.W. concern....choose one....]

Table 4 - ATA SMART RETURN STATUS translations

Data returned to SATL from non-packet device for ATA SMART RETURN STATUS command	SMART condition	Informational Exceptions log page parameter code (0000h) fields	
LBA Mid = 4Fh LBA High = C2h	threshold not exceeded	INFORMATIONAL EXCEPTION ADDITIONAL SENSE CODE	INFORMATIONAL EXCEPTION ADDITIONAL SENSE CODE QUALIFIER
		00h	00h
		NO ADDITIONAL SENSE INFORMATION	
LBA Mid = F4h LBA High = 2Ch	threshold exceeded	INFORMATIONAL EXCEPTION ADDITIONAL SENSE CODE	INFORMATIONAL EXCEPTION ADDITIONAL SENSE CODE QUALIFIER
		5Dh	10h
		HARDWARE IMPENDING FAILURE GENERAL HARD DRIVE FAILURE	

10.2.3 Supported Log Pages log page

The Supported Log Pages log page (see Table 56) returns the list of log pages supported by the SATL (see SPC-3).

Table 56 - Supported Log Pages log page fields

Field	Description or reference
PAGE CODE	Set to a value of 00h. This field value is specific to the Supported Log Pages log page.
PAGE LENGTH	(see SPC-3).
SUPPORTED PAGE LIST	As part of conforming to the requirements of SPC-3 the SATL shall identify log pages to add to the list of supported log pages by performing the following steps: 1) The SATL shall determine if the non-packet device supports the ATA SMART feature set from the ATA IDENTIFY DEVICE data word 82, bit 0. If the device supports the ATA SMART feature set the SATL shall add the Informational Exceptions log page to its list of supported log pages. If the device does not support the ATA SMART feature set the SATL shall not add either the Informational Exceptions log page or the Self-Test Results log page to its list of supported pages. 2) If the non-packet device supports the ATA SMART feature set, the SATL shall determine if the device supports the ATA SMART self-test from the ATA IDENTIFY DEVICE data word 84, bit 1. If the device supports the ATA SMART self-test the SATL shall add the Self-Test Results log page to its list of supported log pages.