To: T10 Technical Committee
From: Wayne Bellamy (wayne.bellamy@hp.com), Hewlett Packard
Date: July 30, 2005
Subject: T10/05-142r2 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.

Related Documents

(T10) sat-r04 – SCSI to ATA Translation (SAT), Revision 4
(T10) spc-3r23 – SCSI Primary Commands - 3, Revision 23
(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-3

Requesting a new ASC and ASCQ assignment as follows:

ASC	ASCQ	
67	0B	ATA DEVICE FEATURE SET 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 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	SATType	Description or reference
OPERATION CODE	I	The SATL shall implement support for this field by returning the log page data for the particular page requested.
PPC	U	The SATL shall not support this bit.
SP	U	The SATL shall not support this bit.
PC	E	(see 8.2.2)
PAGE CODE	E	See 8.2.3 for page codes supported by the SATL.
PARAMETER POINTER	U	The SATL shall not support this field.
ALLOCATION LENGTH	I	The SATL shall implement support for this field as defined in SPC-3.
CONTROL	I	(see 6.4)

Bit or field values that are not supported (values other than 0h) shall cause the SATL to return a CHECK CONDITION status with SENSE KEY set to ILLEGAL REQUEST and ADDITIONAL SENSE CODE set to INVALID FIELD IN CDB.

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	SATType	Description or reference
00b	U	Threshold values: Not supported.
01b	I	Cumulative values: Supported.
10b	U	Default threshold values: Not supported.
11b	U	Default cumulative values: Not supported.

Page control (PC) field values that are not supported shall cause the SATL to return a CHECK CONDITION status with SENSE KEY set to ILLEGAL REQUEST and ADDITIONAL SENSE CODE set to INVALID FIELD IN CDB.

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	SATType	Description or reference
00h	E	Supported Log Pages log page:The SATL shall implement this page by returning a list of supported log pages (see 10.2.3).
10h	E	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 determine if the ATA SMART self-test is enabled or disabled from the ATA IDENTIFY DEVICE data word 85, bit 0. If the ATA SMART self-test 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 SET NOT ENABLED. If the ATA SMART self-test is enabled the SATL shall return the translated Self-Test Results log page to the application client (see 10.2.2).
2Fh	E	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 SET 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	U	Not supported.

PAGE CODE field values that are not supported shall cause the SATL to return a CHECK CONDITION status with SENSE KEY set to ILLEGAL REQUEST and ADDITIONAL SENSE CODE set to INVALID FIELD IN CDB.

[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	Changeable	SATType	Description or reference
PAGE CODE	NO	E	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 (B0h) with Features register set to DAh, LBA Mid register set to 4Fh, and LBA High register set to C2h 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	N/A	U	
PARAMETER CODE	N/A	U	
DU	NO	E	Shall be set to a value of 0b (see SPC-3).
DS	NO	E	Shall be set to a value of 0b (see SPC-3).
TSD	NO	E	Shall be set to a value of 0b (see SPC-3).
ETC	NO	E	Shall be set to a value of 0b (see SPC-3).
TMC	NO	E	Shall be set to a value of 0h (see SPC-3).
LBIN	NO	E	Shall be set to a value of 1b (see SPC-3).
LP	NO	E	Shall be set to a value of 1b (see SPC-3).
PARAMETER LENGTH	N/A	U	
INFORMATIONAL EXCEPTION ADDITIONAL SENSE CODE	YES	E	(see 10.2.1.1).
INFORMATIONAL EXCEPTION ADDITIONAL SENSE CODE QUALIFIER	YES	E	(see 10.2.1.1).
MOST RECENT TEMPERATURE READING	N/A	U	
Vendor specific	N/A	U	

Bits or fields that are set to values other than those required by the table shall cause the SATL to return a CHECK CONDITION status with SENSE KEY set to ILLEGAL REQUEST and ADDITIONAL SENSE CODE set to INVALID FIELD IN PARAMETER LIST.

10.2.1.1 Informational Exceptions log page (2Fh) parameter data

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 log page as defined in SPC-3 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

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	Changeable	SATType	Description or reference
PAGE CODE	NO	E	Set to a value of 00h. This field value is specific to the Supported Log Pages log page.
PAGE LENGTH	YES	E	(see SPC-3).
SUPPORTED PAGE LIST	YES	E	The SATL shall identify which 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 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. 2) 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.