To: T10 Technical Committee
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Subject: T10/08-018r0 SAT-2: NV Cache Translation

Revision History
Revision 0 - Initial draft of document

Related Documents
SAT-2 (T10/1699-D) Revision 1a

1 Overview

This proposal creates a translation from the ATA non-volatile cache feature set into a combination of the SBC non-volatile cache and SAT-specific mode pages to control the behavior of the cache.

Note - this draft is incomplete and is submitted for the purposes of discussion and early feedback.

2 Document Changes

2.1 Changes to SAT-2

2.1.1 Changes to parameters for SAT implementations

2.1.2 Non-Volatile Cache Log Page

The non-volatile cache mode page reports that a non-volatile cache is present and how long the data remains volatile for. If the attached ATA device reports support for the non-volatile cache feature set (see [Extended Inquiry VPD Page Translation]), the SATL shall implement the translation for this log page. As ATA non-volatile caches are required to remain non-volatile under all circumstances, the SATL shall report that the caches are indefinitely non-volatile as described in the following translation.

Table xx shows the translation of the fields for the returned parameter data. This translation shall be used for all defined non-volatile cache log parameters.

Table 1 — Non-volatile Cache Parameter Fields

Field	Cangeable	Description or reference
PARAMETER LENGTH	n/a	Shall be set to 3h
REMAINING NON-VOLATILE TIME or MAXIMUM NON-VOLATILE TIME	n/a	Shall be set to FFFFFFh

2.1.3 Changes to Vital product data parameters

2.1.4 Extended INQUIRY VPD Page

The SATL shall implement the Extended INQURY VPD Page if the ATA device reports support for the non-volatile cache feature set (i.e., IDENTIFY DATA word 214, bit 0 is set to 1) or the NCQ priority feature.

Table xx defines the translation of the Extended INQUIRY VPD Page.

Table 2 — Extended INQUIRY VPD Page

Field	Description or Reference
PERIPHERAL QUALIFIER	Shall be set to 000b
PERIPHERAL DEVICE TYPE	Shall be set to 00h
PAGE CODE	Shall be set to 86h
PAGE LENGTH	Shall be set to 3Ch
SPT	Unspecified (see 3.4.2)
GRD_CHK	Unspecified (see 3.4.2)
APP_CHK	Unspecified (see 3.4.2)
REF_CHK	Unspecified (see 3.4.2)
GROUP_SUP	Shall be set to zero
PRIOR_SUP	If the ATA device reports support for the NCQ priority feature (need reference), shall be set to one. Otherwise, shall be set to zero. See [NCQ Priority Translation].
HEADSUP	Unspecified (see 3.4.2)
ORDSUP	Unspecified (see 3.4.2)
SIMPSUP	Shall be set to one
COR_D_SUP	Shall be set to zero
NV_SUP	If the ATA device supports the non-volatile cache feature set (i.e. IDENTIFY DATA word 214, bit 0 is set to one), this field shall be set to one. Otherwise, this field shall be set to zero.
V_SUP	If the ATA device write or read caches are enabled (i.e. IDENTIFY DATA word 85, bits 5 or 6 are set to one), this field shall be set to one. Otherwise, this field shall be set to zero.
LUICLR	Unspecified (see 3.4.2)

2.1.5 New SAT-specific SCSI extensions

2.1.6 ATA Non-Volatile Cache Control Mode Page

The ATA non-volatile cache control mode page provides ATA specific controls that allows an application client to control the range of logical block addresses that are resident in the non-volatile cache as well as query current characteristics of the non-volatile cache. This mode page shall be implemented by the SATL when the ATA device supports the non-volatile cache feature set, see [extended inquiry VPD page].

Table 3 — ATA Non-Volatile Cache Control Mode Page

Byte/Bit	7	6	5	4	3	2	1	0
0	PS	SPF (1B)	PAGE CODE (0AH)					
1	SUBPAGE CODE (F2H)							
2	(MSB)	PAGE LENGTH						
3								(LSB)
4	(MSB)	RANGE ALLOCATION LENGTH						
5								(LSB)
6	Reserved			ACTION			PWRMODE	ENABLE
7	Reserved							
8	COMMAND PARAMETER DATA							
n								

If the parameters savable (PS) bit is not set to one, the SATL shall terminate the command with CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and the additional sense code set to INVALID FIELD IN PARAMETER LIST.

The SPF bit (see SPC-4) shall be set to one to access this mode page.

The PAGE CODE field shall be set to 0Ah.

The SUBPAGE CODE field shall be set to F2h.

The PAGE LENGTH field shall be set to 8h plus the contents of the RANGE ALLOCATION LENGTH field.

The RANGE ALLOCATION LENGTH field shall be set to the length, in bytes, of additional data transmitted with the mode page beginning at offset 8h.

When processing a MODE SENSE command for this page, ENABLE shall be set to one if the ATA device IDENTIFY DEVICE data word 214, bit 1 is set to one.

When processing a MODE SELECT command for this page, if ENABLE is set to zero, the SATL shall issue an NV CACHE DISABLE command to the device and all other fields in the mode page are ignored. If enable is set to one,

and IDENTIFY DEVICE data word 214, bit 1 is set to zero, the SATL shall issue an NV CACHE ENABLE command to the device.

When processing a MODE SENSE command for this page, pwrmode shall be set to one if the ATA device IDENTIFY DEVICE data word 214, bit 1 is set to one.

When processing a MODE SELECT command for this page, if pwrmode is set to zero, the SATL shall issue a RETURN FROM NV CACHE POWER MODE command to the device. If pwr mode is set to one, the application client shall pass a command parameter data block as described in table xx in command parameter data. The SATL shall issue a SET NV CACHE POWER MODE command to the device with the minimum high-power time parameter set to the value as described in table xx.

Table 4 —

Byte\Bit	7	6	5	4	3	2	1	0
0	(LSB)	maximum high-power time						
1								(MSB)

MAXIMUM HIGH-POWER TIME specifies the time, in seconds, that the device shall remain fully powered after accessing the media to satisfy a request.