Vendor Specific And Optional ("Zero Budgeting") Proposal

To: X3T13 Technical committee
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Subj: Proposal for changing some Vendor Specific and Optional items in ATA-4

Introduction:

Much concern has been expressed about the number of items that are designated "vendor specific" or "optional" in ATA-3. Users can not depend on these items to be consistent from vendor to vendor, from product to product from a particular vendor, or even to be implemented at all. Therefore, in many cases, "vendor specific" or "optional" designate items that are virtually meaningless to anyone using this standard. The following document reviews many of the occurrences of "vendor specific" and "optional" in ATA-3 and proposes changes for several of those items for inclusion in the ATA-4 draft standard. The goal of this proposal is that, where possible, items that are currently designated as vendor specific or optional should be redefined to be something non-vendor specific and non-optional upon which all can agree, or the items should be made to be obsolete or deleted from the standard.

Several changes have been made in this revision of the document. Numbers previously used for identification of the items have been deleted. Clause numbers for these items have been updated to those used in ATA/ATAPI-4 Revision 2. These items are now ordered by their order in ATA/ATAPI-4 and are referenced by their respective clause or table number in that standard. In addition, this document has been rearranged such that there are now two sections. The first section contains the issues that are not yet resolved and some of the discussion that has taken place regarding those issues. The second section contains those items that have been resolved during working committee meetings. Editorial comments are in brackets.

The following is the list of unresolved issues and corresponding comments that have risen during the "Zero Budgeting" discussions (in order of their location in ATA/ATAPI-4 Revision 2):

8.6 EXECUTE DEVICE DIAGNOSTIC: 255 possible values are given for diagnostic codes (see Table 7). All but 01h and 81h are listed as vendor specific in the text that follows the table. It was recommended that the table and following text be changed to:

01 - device 0 passed, device 1 failed or not present
81 - device 0 passed, device 1 passed
All other values are retired

A second recommendation was made that the table and text be changed to

01 - device 0 passed, device 1 passed
81 - device 0 passed, device 1 failed or not present
All other values are retired

8.8 IDENTIFY DEVICE: It was recommended that a bits should be defined in the IDENTIFY DEVICE data that could inform the host if any of the following commands were implemented on a given device: DOWNLOAD MICROCODE, READ BUFFER, WRITE BUFFER and WRITE VERIFY.

8.32.8 SET FEATURES, DESCRIPTION, Paragraph 2: "At power on, or after a hardware reset, the default setting of the functions specified by the subcommands are vendor specific." It was recommended that a place to report the default settings should be allocated in the IDENTIFY DEVICE information for any commands that we decide to keep in ATA-4.

8.32.9 SET FEATURES, Enable/disable write cache: It was recommended that these subcommands should be made mandatory and work so that they completely enable and disable write cache, and that when the subcommand to disable write cache is issued, the device should flush cache to non-volatile memory before posting command complete.

There was discussion that this should be redefined to include that when a device receives this subcommand it should: 1) set BSY and clear DRDY, 2) disable write cache, 3) flush cache, and, 4) set DRDY and clear BSY. Bit 4 of Word 82 in IDENTIFY DEVICE data would indicate that this subcommand and above sequence is supported by the device.

In addition, a note could be added to state that "Issuing this subcommand to the device may cause the device to remain busy for an extended period while it services the subcommand. This period could be more than 30 s."

8.32.18 Enable/disable reverting to defaults (optional): "Subcommand codes CCh and 66h allow the host to enable or disable the device from reverting to power on default values. A setting of 66h allows settings of greater than 80h which may have been modified since power on to remain at the same setting after a software reset." It was recommended that this subcommand should be made obsolete.

The following is the list of recommended changes that have been accepted by the working group (in order of their location in ATA/ATAPI-4 Revision 2):

3.2.1 Keywords, obsolete [this definition shall replace the definition in the standard] - a keyword used to describe bits, bytes, fields and code values which no longer have consistent meaning or functionality from one implementation to another. However, some degree of functionality may be required for items designated as "obsolete" to provide for backward compatibility. An obsolete bit, byte, field or command shall never be reclaimed for any other use in any future standard. Obsolete commands should not be used by the host. Commands defined as obsolete in previous standards may be aborted by devices conforming to this standard. Bits, bytes, fields and code values that had been designated as "obsolete" in previous standards may have been reclassified as "retired" based on the definitions for "obsolete" and "retired".

3.2.1 Keywords, retired [this is a new keyword and definition] - a keyword indicating that the designated bits, bytes, fields and code values may be reclaimed for other uses in future standards. If retired bits, bytes, fields or code values are utilized before they are reclaimed, they shall have the meaning or functionality as described in previous standards.

Table 4, Driver types and required pull-ups, Note:**1**"VS=vendor specific" shall be deleted.

5.2.11 IOCS16: This clause shall be deleted.

5.2.12 IORDY, Paragraph 3 shall be changed to: "If the device requires extending the host transfer cycle time at PIO modes 3 and above, the device shall utilize IORDY. Hosts that use PIO transfer modes 3 and above shall support IORDY."

6.2 Sector Addressing, Paragraph 1, sentence 2 shall be changed to: "There is no implied relationship between logical and physical sector addresses."

6.5 Power management feature set, Paragraph 2: The following sentence shall be deleted: "Additional vendor specific commands and functions are allowed."

6.5.2 Power management commands, Paragraph 3, sentence 4 shall be changed to: "It is recommended that a device shall return to the mode it was in before receiving the reset, unless the device was in the sleep mode, and if the device was in the sleep mode when receiving a reset, it should return to the standby mode. This may be made a mandatory requirement in a future standard."

6.5.4 Idle mode transition: The text of this clause shall be changed to: "If a device accepts the IDLE IMMEDIATE command, the device shall transition to the Idle mode after receipt of the command. If the device accepts the IDLE command it shall transition to the idle mode as described in Clause 8.11.7. Some devices may perform internal power management and transition to the idle mode without host intervention."

6.6 Removable media feature set: A new command set shall be defined here. The commands included in this set are DOOR LOCK, DOOR UNLOCK and MEDIA EJECT. If this feature set is implemented then the DOOR LOCK and DOOR UNLOCK commands shall be implemented. If this
feature set is implemented then the MEDIA EJECT command is optional and may be implemented.

6.7 Security mode feature set: A line shall be included here as in the Power Management Feature Set: "A device that implements the Security Mode Feature Set shall implement the

following minimum set of functions: [The required commands shall be listed.]"

7.2.13 Status Register, Field/Bit Description, Bit 6 [DRDY], item b) shall be changed to: "EXECUTE DEVICE DIAGNOSTICS, [et al.], may be issued by the host and shall be accepted by the device when DRDY is equal to zero."

7.2.13 Status Register, Field/Bit Description, Bit 2 [CORR]: This bit shall be designated "retired".

8.1.1 CHECK POWER MODE, COMMAND CODE shall be changed to "E5h."

8.3.1 [Shouldn't his clause number be 8.3.2?] **DOOR LOCK, Type**: This shall be changed to "Optional - Removable media feature set. If the Removable media feature set is implemented this command shall be implemented."

8.4.1 [Shouldn't his clause number be 8.4.2?] **DOOR UNLOCK, Type**: This shall be changed to "Optional - Removable media feature set. If the Removable media feature set is implemented this command shall be implemented."

8.7 FORMAT TRACK: This command shall be designated "obsolete". The name shall be changed to Command 58h. The definition shall be updated to include the statement that "...the minimum that is required by the device in response to this command is good status." **[The clause for RECALIBRATE was removed from the standard. Should this clause be deleted as well? Also, isn't the last sentence about returning good status true for any "obsolete" command, and, if so, shouldn't this phrase be added to the definition for obsolete?]**

Table 8, **IDENTIFY DEVICE information:**

Word 0, bits 14-8 shall be changed to "retired".
Word 0, bits 5-1 shall be changed to "retired".
Word 4 shall be changed to "retired".
Word 5 shall be changed to "retired".
Words 7-8 shall be changed to "retired".
Word 20 shall be changed to "retired".
Word 21 shall be changed to "retired".
Word 2 shall be changed to "obsolete".
Word 47, bits 15-8 shall be changed to 80h.
Word 49, bit 13 shall be changed to "0=Standby timer values shall be managed by the device."
Word 49, bit 9 shall be changed to have a fixed value of 1.
Word 49, bit 8 shall be changed to have a fixed value of 1.
Word 49, bits 7-0 shall be changed to "retired".
Word 51, bits 7-0 shall be changed to "retired".
Word 52, bits 15-8 shall be changed to "retired".
Word 52, bits 7-0 shall be changed to "retired".
Word 62 shall be changed to "retired".

8.8.12 Word 47: This text shall be changed to "Retired".

8.8.13 Word 51: This text shall be changed to "Retired".

8.8.17 Word 20: This text shall be changed to "Retired".

8.8.18 Word 21: This text shall be changed to "Retired".

8.8.19 Word 22 This text shall be changed to “Obsolete”.

8.8.20 Word 23-26: Firmware revision: This text of this clause shall be changed to “This field contains the firmware revision number of the device. The contents of this field is an ASCII character string of eight bytes. The device shall pad the character string with spaces (20h), if necessary, to ensure that the string is the proper length.”

8.8.24.1 Standby timer support: Sentence 3 shall be changed to “If bit 13 [of Word 49] is cleared to zero, the timer values shall be managed by the device.”

8.8.24.4: The text of this clause shall be changed to “Bits 8 and 9 of Word 49 shall be set to one for backward compatibility.

8.8.27 Word 52 This text shall be changed to “Retired”.

8.8.29 Word 54 Note 18 shall be deleted.

8.8.30 Word 55 Note 19 shall be deleted.

8.8.31 Word 56 Note 20 shall be deleted.

8.8.35 Word 62 This text shall be changed to “Retired”.

8.11.1 IDLE, COMMAND CODE shall be changed to “E3h.”

8.11.3 IDLE, INPUTS: The first sentence shall be changed to “Values other than zero in the Sector Count register when the IDLE command is issued shall determine the time period programmed into the Standby Timer.”

8.12.1 IDLE IMMEDIATE, COMMAND CODE shall be changed to “E1h.”

8.14.1 [Shouldn’t his clause number be 8.14.2?] **MEDIA EJECT, Type**: This shall be changed to “Optional - Removable media feature set. If the Removable media feature set is implemented this command is optional and may be implemented.”

8.18 READ DMA The phrase “(with retries and without retries)” shall be deleted.

8.18.1 READ DMA, COMMAND CODE: The text shall be changed to “C8h or C9h”

8.18.7. READ DMA, DESCRIPTION: Paragraph 3 (“Error recovery performed by the device either with or without retries is vendor specific.”) shall be deleted.

8.19 READ LONG This clause shall be deleted.

8.21 READ SECTOR(S) The phrase “(with retries and without retries)” shall be deleted.

8.21.1 READ SECTOR(S), COMMAND CODE: The text shall be changed to “20h or 21h”

8.21.7. READ SECTOR(S), DESCRIPTION: Paragraph 3 (“Error recovery performed by the device either with or without retries is vendor specific.”) shall be deleted.

8.22 READ VERIFY SECTOR(S) The phrase “(with retries and without retries)” shall be deleted.

8.22.1 READ VERIFY SECTOR(S), COMMAND CODE: The text shall be changed to “40h or 41h”

8.22.7. READ VERIFY SECTOR(S), **DESCRIPTION**: Paragraph 3 (“Error recovery performed by the device either with or without retries is vendor specific.”) shall be deleted.

8.23 RECALIBRATE: This clause shall be deleted.

8.30 SEEK: The following changes shall be made:

8.30.4 SEEK, INPUTS: The text shall be changed to “The Cylinder High register, the Cylinder Low register, the head portion of Drive/head register and the Sector Number register contain the address of a sector that the host may request in a subsequent command.”

8.30.6 SEEK, ERROR OUTPUTS: The sentence “Error reporting is vendor specific.” shall be replaced by: “Some devices may not report IDNF because they do not range check the address values requested by the host.”

8.30.8 SEEK, DESCRIPTION: The text shall be changed to: “This command allows the host to provide advanced notification that particular data may be requested by the host in a subsequent command. DSC shall be set to one concurrent with or after the setting of DRDY to one when updating the Status register for this command.”

Table 15 - SET FEATURES register definition

Values 01h and 81h shall be changed to “retired”.
Values 04h and 84h shall be changed to “obsolete”.
Values 33h and 99h shall be changed to “obsolete”.
Values 44h and BBh shall be changed to “obsolete”.
Value 54h shall be changed to “obsolete”.
Values 77h and 88h shall be changed to “obsolete”.
Value 9Ah shall be changed to “obsolete”.
Value ABh shall be changed to “obsolete”.

Table 16 - Transfer/mode values: The transfer mode value of 00010nnn shall be changed to “retired”.

8.32.11 This clause shall be deleted.

8.32.12 This clause shall be deleted.

8.32.13 This clause shall be deleted.

8.32.14 This clause shall be deleted.

8.32.19 This clause shall be deleted.

8.32.20 This clause shall be deleted.

8.32.21 This clause shall be deleted.

8.34.1 SLEEP, COMMAND CODE The text shall be changed to “E6h.”

8.34.7 SLEEP, DESCRIPTION, Paragraph 2 shall be changed to “Because some host systems may not read the Status register and clear the interrupt, a device may automatically deassert INTRQ and enter Sleep mode after a time period of not less than 2 s.”

8.36.1 STANDBY, COMMAND CODE: The text shall be changed to “E2h.”

8.37.1 STANDBY IMMEDIATE, COMMAND CODE: The text shall be changed to “E0h.”

8.39 WRITE DMA: The phrase “(with retries and without retries)” shall be deleted.

8.39.1 WRITE DMA, COMMAND CODE: The text shall be changed to “CAh or CBh”

8.39.7 WRITE DMA, DESCRIPTION: Paragraph 3 (“Error recovery performed by the device either with or without retries is vendor specific.”) shall be deleted.

8.40 WRITE LONG shall be deleted as it is now obsolete.

8.42 WRITE SECTOR(S): The phrase “(with retries and without retries)” shall be deleted.

8.42.1 WRITE SECTOR(S), COMMAND CODE: The text shall be changed to “30h or 31h”

8.42.7 WRITE SECTOR(S), DESCRIPTION: Paragraph 3 (“Error recovery performed by the device either with or without retries is vendor specific.”) shall be deleted.

9.1.2 Power-on and hardware resets - device 1, item j): The beginning of sentence three shall be changed to “Device 1 shall clear BSY and assert PDIAG- if device 1 has passed its diagnostics no later than...”

9.2.2 Software resets - device 1, item i): The beginning of sentence three shall be changed to “Device 1 shall clear BSY and assert PDIAG- if device 1 has passed its diagnostics no later than...”

Table E.1 - Command matrix

Command code 08h shall be designated “O”
Command codes 11h-1Fh shall be designated “E”
Command codes 22h-23h shall be designated “O”
Command codes 32h-33h shall be designated “O”
Command code 50h shall be designated “O”
Command codes 71h-7Fh shall be designated “E”
Command codes 94h-99h shall be designated “E”
Command codes DBh-DDh shall be designated “E”
Command code E9h shall be designated “E”

An additional code shall be added in the key: “E = a retired command code”.

Table E.2 - Commands sorted by command value

RECALIBRATE shall be deleted from this table.

There shall be only one entry for READ SECTOR(S), WRITE SECTOR(S), READ VERIFY SECTOR(S), READ DMA and WRITE DMA. The items “(w/ retry)” and “(w/o retry)” shall be deleted from the table. The command codes previously used for the commands with and without retries shall be placed in the same box next to the single remaining command.

READ LONG and WRITE LONG with and without retries shall be deleted from this table.

The command codes 94h through 99h shall be deleted for the commands STANDBY IMMEDIATE through SLEEP.

Table E.3 - Commands and parameters

RECALIBRATE shall be deleted from this table.

There shall be only one entry for READ SECTOR(S), WRITE SECTOR(S), READ VERIFY SECTOR(S), READ DMA and WRITE DMA. The items “(w/ retry)” and “(w/o retry)” shall be deleted from the table. The command codes previously used for the commands with and without retries shall be placed in the same box next to the single command.

READ LONG and WRITE LONG with and without retries shall be deleted from this table.

The command codes 94h through 99h shall be deleted for the power management commands where they are used.

Table E.4 - Status and error usage

RECALIBRATE shall be deleted from this table.

There shall be only one entry for READ SECTOR(S), WRITE SECTOR(S), READ VERIFY SECTOR(S), READ DMA and WRITE DMA. The items “(w/ retry)” and “(w/o retry)” shall be deleted from the table. The command codes previously used for the commands with and without retries shall be placed in the same box next to the single command.

READ LONG and WRITE LONG with and without retries shall be deleted from this table.

ACKNOWLEDGE MEDIA CHANGE, BOOT-POST-BOOT, and BOOT-PRE-BOOT entries shall be deleted from this table.

Is it supported?
What is the default?
Can it be set?

FEATURE	Where?
Enable/disable write cache	SF
Transfer mode	SF
Enable/disable auto defect reassign	Was SF now obsolete
Enable/disable retries	Was SF now obsolete
Set number of cache segments	Was SF now obsolete
Enable/disable read look ahead	SF
Enable/disable release interrupt	SF
Enable/disable SERVICE interrupt	SF
Enable/disable reverting to power-on defaults	SF
Enable/disable ECC	Was SF now obsolete
Set device current	Was SF now obsolete
Set max prefetch	Was SF now obsolete
Standby timer setting	ID

OPTIONAL COMMANDS and COMMAND SETS

Packet command feature set	ID
Power management feature set	ID
Removable media feature set	ID
MEDIA EJECT	not
Security mode feature set	ID
SMART command feature set	ID
SMART EXECUTE OFF-LINE IMMEDIATE	not
SMART READ DATA	not
DOWNLOAD MICROCODE	not
READ BUFFER	not
WRITE BUFFER	not
WRITE VERIFY	not