

X3T13/D96125R2

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.

Definitions for two new keywords have been proposed:

Obsolete: This term is 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.

Retired: Retired 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.

It is recommended that there should be an additional comment like: Bits, bytes, fields and code values that had been designated as “obsolete” in previous standards may have been reclassified as “retired” in this standard based on the new definitions for “obsolete” and “retired”.

The following is the list of recommended changes that have been accepted by the working group:

- 1) Table 4, Note 1: “VS=vendor specific” shall be deleted.
- 2) 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.”
- 3) 6.2.13 Status Register, Field/Bit Description, 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.”
- 4) 6.2.13 Status Register, Field/Bit Description, DF: This bit shall be designated “retired”.
- 5) 6.2.13 Status Register, Field/Bit Description, CORR: This bit shall be designated “retired”.
- 6) 6.2.13 Status Register, Field/Bit Description, IDX: This bit shall be designated “retired”.
- 7) 7.2 Sector Addressing, Paragraph 1, sentence 2: “The mapping of logical sector addresses to the actual physical location of the data sector on the media is vendor specific.” shall be changed to: “There is no implied relationship between logical and physical sector addresses.”
- 8) 7.3 Power management feature set, Paragraph 2: The following sentence shall be deleted: “Additional vendor specific commands and functions are allowed.”
- 9) 7.3.2 Power management commands, Paragraph 3, sentence 4: “The [power management] mode selected by the device [after receiving a reset] is based on the type of reset received and on [a] vendor specific implementation.” 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.”
- 11) 7.5 Security mode feature set: A line shall be included here like the Power Management Feature Set: “A device that implements the Security Mode Feature Set shall implement the following minimum set of functions:”

12), 13), 14), 15), 16), 17), 47), 48) and 49) 7.6.1 Attributes, 7.6.2 Attribute Thresholds, 7.6.3 Attribute Values, 7.6.4 Threshold Exceeded Condition, 7.6.5 SMART commands, 7.6.6 SMART operation with power management modes, 8.31.4 SMART READ ATTRIBUTE THRESHOLDS, 8.31.5 SMART READ ATTRIBUTE VALUES, and 8.31.5 SMART READ ATTRIBUTE VALUES: These clauses (and all other clauses relating to SMART) shall be updated based on my proposal X3T13/D96131.

23) 8.6 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.”

24) IDENTIFY DEVICE, Table 9:

Word 47, bits 15-8 Will be changed to 80h in ATA-4. *[This word is “reserved” in IDENTIFY DEVICE PACKET data.]*

[Note: There is an action item for all to check to see if the item above breaks anything else.]

Word 49, bits 7-0 will be changed to “retired”.

Word 51, bits 7-0 will be changed to “retired”.

Word 52, bits 7-0 will be changed to “retired”. *[This word is “reserved” in ID PACKET data.]*

25) 8.7.13 Word 23-26: Firmware revision: This clause shall read like the definitions for serial and model number, i.e.: “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.”

26) 8.7.17.1 The following changes shall be made: 1) Standby timer support, Sentence 3: “If bit 13 [of Word 49] is cleared to zero, the timer values shall be managed by the device.” 2) INPUTS for the IDLE command: “Values other than zero in the Sector Count register ... shall determine the time period ...” 3) In bit 13 of Word 49 in IDENTIFY DEVICE data: “0=Standby timer values shall be managed by the device.”

27) 8.7.22, .23, and .24, Notes 9, 10 and 11 shall be deleted.

31) 8.15, 8.18, 8.19, 8.35 and 8.38, READ and WRITE commands: The phrases “with retries and without retries,” “with retries,” and “without retries” shall be deleted from the text for these commands along with the last sentence in each of these command descriptions: “Error recovery performed by the device either with or without retries is vendor specific.” The command codes previously used for commands “with retries” shall be given the same meaning as the command codes for the commands “without retries.”

32) and 51) 8.16 READ LONG and 8.36 WRITE LONG shall be designated “obsolete” along with 8.7.12 Word 22 in the IDENTIFY DEVICE data.

33) 8.20 RECALIBRATE shall be designated “obsolete”.

34) 8.27 SEEK: The following changes shall be made:

“INPUTS: 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 (or sectors) that the host may require in the near future.”

“ERROR OUTPUTS: Aborted command. Some devices may not report IDNF because they don’t range check the address values requested by the host.”

“DESCRIPTION: 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 by the device before or concurrent with clearing of BSY when updating the Status register for this command.”

37) 8.28.3 Enable/disable automatic defect reassignment subcommands shall be designated “obsolete”.

38) 8.28.4 Enable/disable retries subcommands shall be designated “obsolete”.

39) 8.28.5 Vendor specific data appended subcommand shall be designated “obsolete”.

40) 8.28.6 Set cache segments subcommand shall be designated “obsolete”.

43) 8.28.9 Enable/disable ECC subcommand shall be designated “obsolete”.

44) 8.28.10 Set device current subcommand shall be designated “obsolete”.

45) 8.28.11 Set maximum prefetch subcommand shall be designated “obsolete”.

46) 8.30 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.”

53) and 54) 9.1.2 Power-on and hardware resets - device 1, item j), sentence 3, and 9.2.2 Software resets - device 1, item i), sentence 3: The beginning shall be changed to “Device 1 shall clear BSY and assert PDIAG- if device 1 has passed its diagnostics no later than ...”

The following is the list of recommendations that were rejected by the working group:

21) 8.4 DOWNLOAD MICROCODE: A new bit shall **not** be added to the IDENTIFY DEVICE data to inform the host if the command was implemented on a given device. This should be covered by Words 23-26, Firmware revision level.

29) 8.13 NOP: This command shall **not** be designated “obsolete”.

41) 8.28.7 Enable/disable read look-ahead shall **not** be designated “obsolete”.

The following items are to be included in the discussion of Apple’s GET FEATURES/SET FEATURES/IDENTIFY DEVICE proposal:

21) 8.4 DOWNLOAD MICROCODE: It was recommended that a bit should be defined in the IDENTIFY DEVICE data that could inform the host if the command was implemented on a given device.

Upon further review, the only items that could be in IDENTIFY DEVICE are whether the device has the ability to respond to the values in the Features register that cause the downloaded code to be used temporarily or for future use. However, it is specified that if the device does not support one of these subcommands that it will respond with an Aborted Command error.

28), 30), 50) and 52) 8.8 IDENTIFY DEVICE DMA, 8.14 READ BUFFER, 8.34 WRITE BUFFER and 8.39 WRITE VERIFY: It was recommended that bits should be defined in the IDENTIFY DEVICE data that could inform the host if these commands were implemented on a given

device.

35) 8.31 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.

42) 8.28.8 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 items were moved to the issues list, deferred or need to be revisited:

10) 7.3.4 Idle mode transition: “The transition to Idle mode is vendor specific and may occur as a result of an IDLE or IDLE IMMEDIATE command, or in vendor specific way.”

With the exception of what is reported in the task file upon a CHECK POWER MODE command, the condition of a device being in the idle mode as it is defined in the standard is transparent to the host. It is recommended that this should 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 xx. Some devices may perform internal power management and transition to the idle mode without host intervention.”

There was much discussion about deleting this entire clause with the definition of what happens during power management transitions taking place in Figure 3. It was decided that Figure 3 needs additional work, as well. Review of Figure 3 shall be moved to the action item list. During this discussion the question was also raised as to whether it should be specified when cache should be flushed during power management operations. Therefore, these items were moved to the issues list to be discussed at a later time.

18), 19) and 20) 8.2 DOOR LOCK, 8.3 DOOR UNLOCK and 8.12 MEDIA EJECT: It was recommended that this command set should be described -- like the other optional feature sets -- in Clause 7.4. If all removable media devices implement all three of these commands then it should be specified that they are mandatory if the command set is implemented.

There is an optional removable feature set, which will be included as such in the document. However, this entire feature set shall be placed on the issues list for further discussion.

22) 8.5 EXECUTE DEVICE DIAGNOSTIC: 255 possible values are given for diagnostic codes (see Table 8). All but 01h and 81h are listed as vendor specific: Device 0 passed and Device 1 passed or not present, and Device 0 passed and Device 1 failed. It was recommended that other diagnostic codes could be associated with other conditions, e.g.: Device 0 failed and Device 1 passed. Any remaining “vendor specific” diagnostic codes should be made “obsolete”.

During discussion it was stated that this needs to be reworded to say something like “01 and 81 are as described, all others are Device 1 and/or Device 0 failed”.

It was also discussed that Clause 9.1.1 & 9.1.2 step h, et al., need to be clarified in regard to EXECUTE DEVICE DIAGNOSTICS.

It was discussed that this command could be changed to COMMAND 90h (obsolete). The

definition would then be updated to include the statement that “the minimum that is required by the device in response to this command is good status”. If this command is made obsolete the Error register clause must be updated, as well. However, there are ramifications to obsoleting this command that must be investigated. This will be discussed further at the next meeting.

Clause 9.7 should also be reviewed. There are two optional methods defined herein. There is an action to look at how to make this work.

1) What happens when a command is issued to Device 1 in a Device 0 only configuration? Does Device 0 do nothing? Does Device 0 report “command aborted”? Does Device 0 execute the command?

2) What happens with the registers for Device 0 when Device 1 is selected in a Device 0 only configuration? Does Device 0 drive the bus?

24) IDENTIFY DEVICE, Table 9, Word 0, bits 1-5 and 8-14, and Words 7-9. It was recommended that these bits should be made obsolete.

It was determined that additional investigation into the usage of these bits was needed, particularly in regard to possible usage by PCMCIA devices. If these are used by PCMCIA, then they shall be designated “obsolete” based on the new definition.

[Note: Pete McLean is to investigate whether these bits are used by PCMCIA.]

36) 8.28.1 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.

A note would 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.

[Note: There is an action item for all to check to see what the maximum time required by our devices to execute the item above.]

The following are additional recommendations based on the new definitions for “obsolete” and “retired”.

55) 5.2.11 IOCS16-: Since this signal originates with the device, it is recommended that its designation be changed to “retired”.

56) IDENTIFY DEVICE, Table 9:

Word 4 was obsolete in ATA-2. Its designation should be changed to “retired”.
See also Clause 8.7.5. *[This word is “reserved” in IDENTIFY DEVICE PACKET data.]*

Word 5 was obsolete in ATA-2. Its designation should be changed to “retired”.
See also Clause 8.7.6. *[This word is “reserved” in ID PACKET data.]*

Word 20 was obsolete in ATA-2. Its designation should be changed to “retired”.

See also Clause 8.7.10. *[This word is “reserved” in ID PACKET data.]*
 Word 21 was obsolete in ATA-2. Its designation should be changed to “retired”.
 See also Clause 8.7.11. *[This word is “reserved” in ID PACKET data.]*
 Word 49, bit 9 indicated LBA support. Its designation should be changed from “obsolete” to “retired”. See also Clause 8.7.17.4.
 Word 49, bit 8 indicated DMA support. Its designation should be changed from “obsolete” to “retired”. See also Clause 8.7.17.4.
 Word 52, bits 15-8 were Single-word DMA timing. Their designation should be changed to “retired” (Then the entire word would be “retired”. See **24** above). See also Clause 8.7.20. *[This word is “reserved” in ID PACKET data.]*
 Word 62 was Single-word DMA transfer mode. Its designation should be changed to “retired”. See also Clause 8.7.28. *[This word is “reserved” in ID PACKET data.]*

57) 8.28 SET FEATURES, Table 15: Values 01h and 81h had been used for enabling and disabling 8-bit transfers in ATA-2. It’s recommended that these be changed to “retired”.

58) 8.28 SET FEATURES, Table 16: The transfer mode value of 00010nnn was used for Single-word DMA modes. It’s recommended that this be changed to “retired”.

59) Several command codes were made obsolete in ATA-3:

11h-1Fh: These were the other codes for RECALIBRATE. Since 10h was designated “obsolete”, it’s recommended that the designation for these codes be changed to “retired”.

71h-7Fh: These were the other codes for SEEK. It’s recommended that the designation for these codes be changed to “retired”.

DBh-DDh: These were ACKNOWLEDGE MEDIA CHANGE, BOOT - POST-BOOT, and BOOT - PRE-BOOT in ATA-2 and were designated vendor specific there. The designation was changed to “obsolete” in ATA-3. These should be revisited in the “removable” discussion and probably changed to “retired”.

E9h: This was WRITE SAME in ATA-2. It’s recommended that the designation for this code be changed to “retired”.

94h-99h: These are the alternate codes for the power management commands. Are there hosts out there that still use these codes? These seem likely candidates to be designated “obsolete”.