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Membership of X3:

Here are Lawrence Livermore National Laboratory's comments to the public review of X3.270:199x, the SCSI-3 Architecture Model (Revision 016). We consider this to be a "yes" vote once the comments are resolved.

Comments are organized as follows:

#xxx (?) Comment on y.y.y

where

xxx is the comment number,

? is the type (E: Editorial, T: Technical), and

y.y.y is the referenced section number.

#### SPECIFIC COMMENTS

#001 (E) Comment on 4.1.101

It appears that the last command in a series of linked commands is defined to be an unlinked command. Is that the intent?

#002 (E) Comment on 4.3

Should entries for "SCSI-1" and "SCSI-3" be added, or "SCSI- 2" deleted?

#003 (E) Comment on 5.2.1, last paragraph

Most of this paragraph should be in Clause 5.3 rather than in 5.2.1.

#004 (E) Comment on 5.2.1, last paragraph, last sentence

The second word should be "ensure," not "insure". A global search for this wording throughout the SAM document may be in order.

#005 (T) Comment on 5.2.1, last paragraph

Somewhere, SAM should specify information such as the following. "An SCSI-3 protocol standard shall specify formats and encodings of addresses and identifiers (e.g., in requests, command descriptor blocks, parameter blocks, etc.)." It's not clear that this is a complete list of such items that protocol standards must specify. Perhaps this information could be added after the fourth sentence of the last paragraph of 5.2.1.

#006 (E) Comment on 5.3, Figure 8

This figure shows the box for "Service Delivery Port" having two parents. Should Clause 4.6.4 mention the possibility of multiple parents in such diagrams?

#007 (E) Comment on 5.5.1

At least four terms, "client," "initiator," "server," and "target," are used in this clause. Is it reasonable to replace all instances of "initiator" by "client" and all instances of "target" by "server"? Or other consistent replacements?

If "client" and "server" are the best terms, then "initiator" at the end of sentence 2 in paragraph 1 probably should be replaced by "target." By contrast, the use of "target" in sentence 3 seems to be reasonable. The last sentence of that paragraph uses both "target" and "initiator," possibly correctly. The last sentence of the second paragraph should say "client" rather than "initiator."

#008 (T) Comment on 5.5, last paragraph, first sentence

What is meant by "The service delivery subsystem provides error-free transmission of requests and responses ..."? It does not seem likely that SAM prohibits errors or requires protocol standards to prohibit errors. (Possibly, some text similar to the last paragraph of 5.5.2 would be appropriate, to explain that SAM assumes error-free transmission for simplicity but, say, requires protocol standards to provide a certain level of assurance of error detection and recovery. What are SAM's actual requirements?)

#009 (T) Comment on 6.1, first paragraph, last sentence

The last sentence is true, but incomplete. Consider adding a sentence such as the following: "Protocol-specific formatting of parameters is specified in the applicable SCSI-3 protocol standards."

If the last sentence is normative (i.e., a requirement for command standards), then it should be reworded, perhaps by changing "... are specified ..." to "... shall be specified ...". The new sentence proposed in the preceding paragraph should then be similarly modified.

(FCP Rev 10, clause 5.2, is an example of a protocol standard specifying protocol-specific formatting of a parameter.)

#010 (T) Comment on 6.1.2, link bit

SCSI-2 has text in clause 7.8.2 that concerns the interaction of queuing and linked commands. "A series of linked commands constitute a single I/O process. ... A command received with a HEAD OF QUEUE TAG message shall not suspend a series of linked commands for which the target has begun execution."

Is that, or a similar, requirement supposed to be in SCSI-3? If so, is SAM the appropriate standard that should state the requirement? (I have not found such text in any SCSI-3 document, though could easily have failed to see it.)

#011 (T) Comment on 6.1.2, link bit

Is it supposed to be possible in SCSI-3 to use linked commands to create complex atomic operations? Assume there may be multiple initiators. As a specific example, suppose one initiator has reserved two adjacent extents of a logical unit. Suppose that initiator links three commands. The first two commands each release a reservation. The third reserves the combined extent. For this example, assuming no errors occur, is there any assurance that no commands are accepted that access the extents while the extents are unreserved? Alternatively, are there specific sequences that permit the extents to be accessed before the third (the RESERVE) command is executed?

Text (perhaps informative) discussing such issues seems useful.

#012 (T) Comment on 6.1.2, vendor-specific

There should be some description of "vendor-specific" bits. For instance, should SAM say the value "00" means there is no vendor-specific information?

#013 (E) Comment on 6.2, first paragraph, second sentence

This sentence mentions a service response of "Command Complete," consistent with the service response "Send Command Complete" in clause 6.3 but not consistent with "Task Complete", the first of the listed "Service Response" values in clause 6. We suspect clause 6.2 should say "Task Complete."

## #014 (T) Comment on 6.2, paragraph on "BUSY"

Note: this comment sneaks in some issues related to Livermore's desire for "distributed I/O" in large configurations where initiators are not all equally trusted. The paragraph describes what status to return if a command is received from an "otherwise acceptable" initiator but says nothing about what status to return if a command is received from an unacceptable initiator.

## #015 (E) Comment on 6.2, paragraph on "RESERVATION CONFLICT"

The first sentence mentions a "RESERVE UNIT" command. Since that command is no longer in SPC, but new commands are being proposed, please reword the paragraph to refer to all reservation commands. Consider making the following changes inside the parentheses: change "see" to "such as", delete "and RESERVE UNIT", and change "commands" to "command".

## #016 (T) Comment on 6.3.1, third-from-last paragraph

The first sentence of this paragraph probably is violated by most "initiator implementations" inside peripherals that implement the COPY command, since when they behave as initiators they do not support a resolution of one byte. It is not obvious how to improve the wording while keeping the requirement as strong as seems intended. Perhaps add: "Coarser resolutions are permitted during the execution of some commands in command standards (e.g., the COPY command in SPC)."

## #017 (T) Comment on 7.1, last paragraph, last sentence

If a service delivery subsystem misorders (as is specifically allowed by the last paragraph of clause 5.5.2), the target can guarantee that no further responses are sent from the task, but the target cannot guarantee that the client will receive no responses from the task after that client receives the response to ABORT TASK. The current text appears to be correct (depending on what "further" means) but misleading, and therefore should be reworded to point out that clients can receive task responses after they receive the service response to ABORT TASK.

## #018 (T) General comment

In large SCSI configurations where all initiators are not equally trusted, peripherals should be allowed to reject in some manner unwanted commands from untrusted initiators. Such issues are presently beyond the scope of SCSI standards. However, SAM should not have words that conflict with such possible future configurations. In a quick scan of SAM Revision 016, no offending text was detected. If there are any changes to SAM, they should not introduce offending text, and if any now exists, it should be corrected.

## #019 (E) Comment on Table of Contents

Each of clauses 2.1, 4.4.1, 5.2.1, 5.6.2.1, and 8.2.1 is not followed by another clause at the same level. In "Object definition (6)", the letter "d" should be upper case. "Figure 23" should be followed by a colon. Any corrections made here apply also to the body of the document.

## #020 (E) Comment on 4.1.48

It seems desirable to append to the second sentence "if compliance is claimed", or to find some other change for the definition of "option."

## #021 (E) Comment on 4.1.51

Change the "pending task" definition by adding the text "... nor a completed task."

## #022 (E) Comment on 4.1.55

The definition of "protocol-specific" talks about a "SCSI-3 protocol standard," but the term "protocol standard" is never defined. Clauses 2 and 2.1 do talk about "implementation standards" and could easily introduce terms such as "command standard," "protocol standard," and "interconnect standard," if such terms would be helpful. Clause 6.6.4 mentions "device command standard" and "protocol standard."

#023 (E) Comment on 4.1.55

The pointer to clause 1 seems bad. Clause 2 or 2.1 seems better.

#024 (E) Comment on 4.1.55 and 4.1.57

The first of these uses "protocol standard," the second uses "protocol specification." Perhaps the latter is preferable unless "protocol standard" is defined.

#025 (E) Comment on 4.1.57

Why is "protocol option" defined but neither "interconnect option" nor "command option"?

#026 (E) Comment on 4.1.96

Spelling: Use "dependent."

Probably a spell checker should be run on the document and questionable spellings brought to the committee.

#027 (E) Comment on 4.3

For "SCSI," replace "Either" with "Any one of".

#028 (E) Comment on 4.4, second paragraph, first sentence

The word "attributes" should be singular.

#029 (E) Comment on 4.6, first paragraph, third sentence

SAM does not define an "I/O bus" object; the example is poor.

#030 (E) Comment on 4.6.1

The definition of symbol "nn" is confusing. An example that includes at least one digit greater than 1 would help. Currently the confusion is not resolved until clause 4.6.2.

#031 (E) Comment on 5.1, second normal paragraph, last sentence

It is not clear whether that sentence ("The description of internal behavior ...") applies to SAM or whether it applies to all SCSI-3 standards. It almost surely should not apply to CAM.

If it is intended to apply to any SCSI-3 standards other than SAM, that intent should be stated more clearly.

#032 (E) Comment on 5.1, last paragraph

This paragraph is helpful. However, a complete list of SAM clauses that apply to any SCSI-3 standards would be useful. Clauses 4.5, 5.2.1 (at least the last paragraph), 5.6.2.1 (on addressing the task manager), 6.1, and 6.2 should be included in such a list, in addition to 6.3 and 7.7.

#033 (E) Comment on 5.2, first paragraph, second sentence

"Dashed horizontal arrows" here conflicts with "dotted" in the paragraph following figure 18.

#034 (E) Comment on Figures 5, 6, 16(?), 18, and maybe others

The quality of figures is low enough that it is hard to tell whether lines are dashed, dotted, solid, or something else.

#035 (E) Comment on 5.3, 5.4, and maybe elsewhere

The first paragraph in 5.3 seems indented by a blank. The description for "Service Delivery Subsystem" in 5.4 seems indented by a blank. The document should be scanned for other such possibly unwanted blanks.

#036 (E) Comment on 5.4

Is "Service Delivery Interface" in Figure 9 (or any other places that it might occur in SAM) the same as "Service Delivery Port"?

#037 (E) Comment on 5.5.1, first paragraph, last sentence

Insert an apostrophe before the "s" in "initiators".

#038 (E) Comment on 5.5.2, fourth paragraph, last sentence

"or places" should be "nor places", and after "requirement on" there should be a comma.

#039 (E) Comment on 5.6, under Object Definition (3)

The text describing a Target should end with a period (or else a lot of periods should be removed from similar descriptions in SAM).

#040 (E) Comment on 5.6

For the description of "Service Delivery Port," the words "interconnect subsystem delivery" probably should be "service delivery subsystem."

#041 (E) Comment on 5.6

In the text describing "Port Identifier", the words "by the device" probably should be deleted or explained. For instance, in Fibre Channel it is quite possible that the identifier is a Fibre Channel address assigned by a Fabric and that the device has no control at all.

#042 (E) Comment on 5.6.2

In the description of "Logical Unit 0", if there should be two sentences then "see" should be "See" but if there should be one sentence then the period after "zero" should be removed. In either case, the period after "5.6.3" and before the closing parenthesis should be deleted.

#043 (E) Comment on 5.6.2.1, first paragraph, second sentence

Text should be added to explain which, if any, LUN value is or can be used when external ports communicate with the task manager. Possibly clause 7 is a better place to provide the information.

#044 (E) Comment on 5.6.2.1, last paragraph

To improve clarity, change "An" to "If an", change "wishing" to "wishes", change "insure" to "ensure", and insert "it" after the comma.

#045 (E) Comment on 5.6.3

The use of the term "Implementation-specific information" and the description of this term are not helpful. Is such information supposed to be standard, or outside the scope of standards? (Keep in mind nearly all SCSI-3 standards are "implementation standards" in clause 2.1.)

#046 (E) Comment on 5.7, first paragraph that follows figure 16

For clarity, insert ", respectively" before the period ending the second sentence. To make the result correct, either interchange "LLP" and "ULP" in the first sentence or else interchange "outgoing" and "incoming" in the second sentence.

#047 (E) Comment on Figure 18

Parts of the right side of the figure seem to be missing.

#048 (E) Comment on 6.1, third paragraph

Should "medium" be replaced by "media information," which is in the glossary?

#049 (E) Comment on 6.1, Table 1

Should there be an alteration to the table to indicate an arbitrary number of bytes between byte 1 and byte "n-1"?

#050 (E) Comment on 6.1.2

The fourth paragraph after Table 3 should be moved to immediately follow Table 3.

#051 (E) Comment on 6.2, "GOOD"

Should "the comand" be "an unlinked command"? Or, perhaps, "an unlinked command or the last of a series of linked commands"?

#052 (E) Comment on 6.2, "INTERMEDIATE"

The wording is awkward, in that it says a "successfully completed command" can end with "CHECK CONDITION" or other such status. It should be rewritten. The text in the following paragraph is a better model.

#053 (E) Comment on 6.2, "TASK SET FULL"

Should "TASK SET FULL" be prohibited for a CDB in a task other than the first one? Consider linked CDBs.

#054 (E) Comment on 6.3

Should the "Send SCSI Command" request have a Command Byte Count, in analogy with DATA IN and DATA OUT requests?

#055 (E) Comment on 6.3.1, last paragraph

Should the last word, "undefined," be "unspecified"?

#056 (E) Comment on 6.4, paragraph before list of responses (page 51)

Delete the second colon at the end of the paragraph.

#057 (E) Comment on 6.4, list of responses

Under b), a comma (not period) should follow "POWER ON".

#058 (E) Comment on 6.4, list of responses

Under f), does SAM want to discuss "OTHER PORT"?

#059 (E) Comment on 6.4

Should there be a discussion (perhaps elsewhere) of possible hazards if a CDB (not the first of a task) is sent more or less concurrently with a unit attention condition or something else indicating the task was blown away?

#060 (E) Comment on 6.5.2, paragraph numbered 2

One of the periods after the last sentence should be deleted.

#061 (E) Comment on 6.6.1.2, fourth paragraph

Delete the second comma.

#062 (E) Comment on 6.6.2, second paragraph

Why is a tagged task "with a tag value exceeding Ffh" treated differently than tagged tasks with smaller tag values? Without some explanation, this looks like a typographical error.

#063 (E) Comment on 6.6.3, a), first paragraph, third sentence

The sense data must be returned by "the target", not the nonexistent logical unit.

#064 (E) Comment on 6.6.3, d), second paragraph

Why is auto contingent allegiance mentioned in case d) but not in any of cases a), b), or c)?

#065 (E) Comment on 6.6.3, d), second paragraph

The paragraph says what happens unless an ACA exists. What happens if an ACA does exist?

#066 (T) Comment on 6.6.3

Consider adding a case "e) The target supports the logical unit under miscellaneous, perhaps transient, internal circumstances. For instance, a processor device might use LUNs to identify transactions and might make the LUN exist from the beginning to the end of the transaction and no later."

#067 (E) Comment on 6.6.4, first paragraph, last sentence

Before "SCSI-3 protocol standard", insert "applicable."

#068 (E) Comment on 6.6.5, fifth paragraph, part 1)

Delete the comma following the last word.

#069 (E) Comment on 6.6.5, fifth paragraph, part 2)

Three actions are mentioned. The first (report) is mandatory, the second (discard) is optional, and it's unclear whether the third (clear) is mandatory or optional. Assuming the third is mandatory, it seems better to reorder the three actions to make the two mandatory ones occur first. If two of them are optional, the wording should be changed to be explicit that each of them, independent of the other, is optional.

#070 (E) Comment on 8, third paragraph, second sentence

There should be commas following "TASK SET FULL" and "ACA ACTIVE".

#071 (E) Comment on 8.1

Is "task set" ever clearly explained as a concept in SAM? Clause 8.1 would probably be the right place.

#072 (E) Comment on 8.2

In the description of "task abort", should "6.6.2" be "8.2.1" or something else?

#073 (E) Comment on 8.3

Should there be an 8.3.5 to discuss "Current"?

#074 (E) Comment on 8.6.3 Figure 27

For the task set in the upper right corner, should there still be an ordered blocking boundary before ORDERED task 3?

Should all four parts of the figure show an ordered blocking boundary above ordered task 6? Only the lower right one shows it now.

#075 (E) Comment on Annex A Tables

It appears that the columns in Table 1, 3, and 4 are not always aligned.

It appears that a couple of columns in Table 2 are sometimes misaligned.

#076 (E) Comment on Annex A Tables

More explanation of what the tables are saying would be welcome. For example, in Table 1 does "I1L0H" decode to "initiator 1, LUN 0, Head of queue"? Are events that are successive in time denoted as separate rows as one reads down toward the bottom of the table?

Sincerely,

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