TO : George Penokie and the SCSI Reflector
DATE: 9/18/93

SUBJECT: SCSI-3 Task Management and 92-141 Revs 7 and 8

Based on discussions in Tarrytown, a new revision of
George Penokie's task management model is to be prepared
(Rev. 8). The model had become an historical document
and had become out of date with the emergence of SAM. The
extensive number of changes I have identified to make the
model consistent with the current SCSI committee position
are more than should be incorporated sight-unseen into
SAM. These changes mean that revision 8 is no longer an
historical document, but rather duplicates the charter for
SAM.

Even though a committee vote was taken to include a
corrected model as an informative annex of SAM in its
revision 12, I recommend that the committee chairman
authorize Charles Monia not to incorporate Revision 8 of
this document into SAM until after a critical committee
review. The document will no longer be an historical
document. A corrected current model can be incorporated
into SAM, if warranted, after the whole committee has
approved the newly revised text.

Specific comments on revision 7 follow and are based on
the text made available at Tarrytown.

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1. Page 1, Change "0. Queue" to "0. Definitions" and delete
   the definition that follows. The SCSI committee has
   agreed that SAM has no concept of queue, which is left
   over from SCSI-2 and carries too much baggage.
   Therefore, the word "queue" or any derivation is to be
   removed from the model. "Task set" is the agreed upon
   term and "task set management" is the agreed upon
   operation of the contents of a task set.

2. Page 1, 0.1, Suspended Information, para 1, line 1, change
   "device" to "logical unit".

3. Page 1, ADD a new clause after clause 0.2 and renumber
   subsequent clauses.

   "0.3. Logical Unit

   An addressable function in a target that implements a

device model and manages a task set and task management functions.   "

Note: A target does not have a task set and does not do task management. All references to target in the model must be adjusted accordingly to logical unit. It is true that many SCSI devices have only one logical unit, but that is an implementation detail and the target does not perform the functions identified in this model.

4. Page 1, 0.30, Completion, Change 0.30 to 0.4 (new clause added above)

5. Page 1, 0.30, Completion, para 1, line 2, Change "cause" to "indicates". Protocols do not cause completion only logical units. The protocol is used in some specific way to indicate that the logical unit has completed a task (e.g., the COMMAND COMPLETE message in SIP).

6. Page 1, 0.4, Task Set, Change 0.4 to 0.5 (new clause added above)

7. Page 1, 0.4, Change "One or more tasks..." to "Zero or more tasks that have not completed...".

Note: A task set exists even when there are no tasks present (i.e., it is empty). The phrase "that have not completed" conveys the SCSI idea that no memory of prior tasks is maintained in a logical unit. See completion in 0.3 (0.4).

8. Page 1, 0.4, Task set, para 1, line 1, change "a target" to "a logical unit".
"...queueing..." to "...task management...".

9. Page 1, 0.4, Task Set, para 1, move paragraph 2 of clause 2 to be paragraph 2 of this clause. This paragraph is an essential part of the definition of a task set.

10. Page 1, 1.1, Task set management, para. 1, lines 1-2, change

"A target that can accept more than one task is capable of queueing."

to

"A logical unit may be able to accept more than one task in to its task set. Task set management is required even if the logical unit permits a maximum of one task in its task set".

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11.
   Page 1, 1.1, Task set management, para. 2, line 2, change
   "by the Target" to "by a logical unit".

12. Page 1, 1.1, Task set management, Para. 2, Line 3, delete
   "(see x.x)"

13. Page 1, 1.2, Untagged queueing, title, change
   "Queueing" to "task management".

14. Page 1, 1.2, Untagged queueing, para 1, line 1, change
   "queueing" to "task management".

15. Page 1, 1.2, Untagged queueing, Para. 1, Line 1, change
   "target" to "logical unit".

16. Page 1, 1.2, Untagged queueing, Para. 1, Line 2, change
   "target" to "logical unit".

17. Page 1, 1.2, Untagged queueing, Pàra 2, lines 2-3, and
   Page 2, line 1, move this last sentence to clause 1.1 as
   new paragraph 3. It is a general requirement of task
   management and needs to be separate from the definitions
   of either task type.

18. Page 2, 1.3, Untagged tasks, Para. 1, Lines 1-3, delete
   sentence 1, the requirement is states in clause 1.1 after
   the change above.

19. Page 2, 1.4, Tagged queueing, title, change
   "Queueing" to "task management".

20. Page 2, 1.4, Tagged tasks, Para. 1, Line 2, two times
   change "the target" to "a logical unit".

21. Page 2, 1.4, Tagged tasks, Para. 1, Lines 2-5, move this
   sentence to clause 1.1 as paragraph 4. This general
   requirement applies to all tasks in the task set and not
   just to tagged tasks since an untagged task is treated
   the same way as a simple task.

22. Page 2, 1.5, Tagged tasks, Delete this clause. It repeats
   text in clause 1.2. Move the same text from clasue 1.2
   to clause 1.1, the common point for such a general
   requirement.

23. Page 2, Clause 2.

   Considerable text needs to be added to describe what this
   clause and table mean. The rationale for the concepts
   presented in clause 2 and the associated table are first

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introduced in clauses 6 - 9. The concept of task
ordering boundaries might be moved after clause 9 where
the rationale for needing such concepts is established.

24. Page 2, 2., Task Ordering boundaries, Para. 1, line 2,
add a new sentence, "See clauses 6, 7, 8, and 9 for the
means of identifying a task ordering boundary.".

25. Page 2, 2., Task Ordering boundaries, Para. 2, Line 2,
change "the target" to "a logical unit".

26. Page 2, 2., Task Ordering Boundaries, Para 2, Line 2,
delete "accepted for each logical unit"

27. Page 2, 2., Task Ordering Boundaries, Para. 2, Move this
paragraph to clause 0.4, paragraph 2, where task set is
defined and this general requirement   completes
requirements for defining a task set.

28. Page 3, Table 1, Legend, change "Ordered Blocking
Boundaries" to " Task Ordering Boundaries" -- the concept
of "blocking" has not been introduced into this model
(except in the legend of this table) although it was
introduced into SAM in Tarrytown to explain the behavior
of task ordering boundary management required in this
model.

29. Page 4, 3.1.1, Auto Contingent Allegiance Condition (ACA),
Paragraph 1, delete. ACA is always enabled, the SCSI
committee only changed the manner by which it is cleared.

30. Page 4, 3.1.1, Auto Contingent Allegiance Condition (ACA),
Para 2, Line 1, delete ", if enabled,"

31. Page 4, 3.1.1, Auto Contingent Allegiance Condition (ACA),
Para 2, line 4, delete "(see x.x)"

32. Page 4, 3.1.1, Auto Contingent Allegiance Condition (ACA),
Para 2, line 7, delete " as described in x.x.x.x"

33. Page 4, 3.1.1, Auto Contingent Allegiance Condition (ACA),
Para 3, Line 5, ADD to end of last sentence,

"...per rules in 3.1.2. A new ACA condition shall not be
reported to any initiator until the current ACA
condition is cleared".

34. Page 4, 3.1.1, Auto Contingent Allegiance Condition (ACA),
Para 5, Line 3, ADD at end of paragraph,

"when the ACA field of the control byte of the CDB is set

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to 1b. Controlled error recovery and ECA can only be emulated when the ACA field of the control byte is set to 1b."

35. Page 4, 3.1.1.1, Reporting Auto Contingent Allegiance Condition (ACA), Delete this clause, it repeats requirements in 3.1.1 on the same page, four paragraphs above. That is the definition of ACA includes the method of reporting it.

36. Page 4, 3.1.2, Response to Auto Contingent Allegiance Condition, title, change to "Logical Unit Response to..."

37. Page 4, 3.1.2, Response to Auto Contingent Allegiance Condition, complete rewrite required as two sub clauses 3.1.2.1 and 3.1.2.2 to cover the two cases now permitted by the SCSI committee - ACA field set and ACA field clear in the CDB. Proposed text follows:

"3.1.2.1 ACA field of Control Byte in CDB is set to 1b

When the ACA field of the control byte of a CDB is set to 1b and an ACA condition occurs, the behavior of the Logical unit is specified in this clause. See 3.1.2.2 for logical unit behavior when the ACA field is set to 0b.

While an ACA exists, the logical unit shall only allow only one ACA tagged task at a time, and that task only from the initiator receiving the error report, to become a Pending Task. The Logical Unit shall respond to any other attempt to create any other task with an ACA Active status.

If a Pending non-ACA task has no outstanding requests for information, the Logical Unit shall not allow that task to become a current task until the ACA condition is cleared.

If a Pending task becomes a current task because of a previous request for information, that information shall be suspended until the ACA is cleared.

3.1.2.2 ACA field of Control Byte in CDB is set to 0b

When the ACA field of the control byte of the CDB is set to 0b, the behavior of the Logical unit is specified in this clause. See 3.1.2.1 for logical unit behavior when the ACA field is set to 1b.

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While an ACA exists, the logical unit shall only allow only one task, and that task only from the initiator receiving the error report, to become a Pending Task. The Logical Unit shall respond to any other attempt to create a other task from another initiator with an ACA Active status. No pending task in the task set shall become current until the ACA condition is cleared.

If the next task from the initiator that received the error report is an untagged task, the ACA condition shall be cleared with completion of the first command and the untagged task performed to the best ability of the Logical Unit.

Note: This behavior is equivalent to the Contingent Allegiance condition response in SCSI-2, 6.6.

If the next task from the initiator that received the error report is a tagged task (but not an ACA tagged task), the results are vendor specific. If the next task is an ACA tagged task, see 3.1.2.1, above.

Note: The behavior when the logical unit receives a tagged task is not clear in SCSI-2. The SCSI-2 standard does say that execution of all tagged tasks shall be suspended (SCSI-2, 6.6, paragraph 2). This requirement could be interpreted that if a subsequent tagged task is received from the initiator receiving the error report, the tagged task is suspended until the contingent allegiance is cleared. Implementations are not consistent and therefore the vendor specific response above is to be specified in SAM."

38. Page 4, 3.1.3, Auto Contingent Allegiance Processing, Para. 1, Line 1, change "Only ACA tasks..." to " Only one ACA task at a time..." to be consistent with clause 3.1.2.

39. Page 4, 3.1.3, Auto Contingent Allegiance Processing, Para. 1, Line 1, change "pending tasks" to "a pending task".

40. Page 4, 3.1.3, Auto Contingent Allegiance Processing, Para. 2, Line 2, change "task" to "task.".

41. Page 5, 3.1.3.1, Acquiring Sense Data, Para 1, Line 1, add at the beginning, "If the ACA field in the control byte of the CDB of the command where the ACA condition is reported is set to 1b, the sense data..."

42. Page 5, 3.1.3.1, Acquiring Sense Data, Para 1, add a the

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following text:

"If the ACA field in the control byte of the CDB of the command when the ACA condition is reported is set to 0b and the next task from the initiator that receives the error report is an untagged task, the logical unit shall clear the sense data for the ACA condition after completion of the first command of the untagged task.

Note: This behavior is equivalent to the Contingent Allegiance condition response in SCSI-2, 6.6.

If the ACA field in the control byte of the CDB of the command when the ACA condition is reported is set to 0b and the next task from the initiator that receives the error report is a tagged task (but not an ACA tagged task), clearing sense data for the ACA condition is vendor specific. "

43. Page 5, 3.1.4, Clearing Auto contingent Allegiance Condition (ACA), move all present text a new clause 3.1.4.1 with the title, "3.1.4.1 ACA field of Control Byte in CDB is set to 1b".

To Paragraph 1 of the new clause, add at the beginning of the sentence the following, "If the ACA field in the control byte of the CDB of the command when an ACA condition is reported is set to 1b, the... ".

Paragraph 1, the list, change bullet 2 to

" - performing a hard reset alternative response to the RST signal being asserted,"

Note: This is SIP specific text and needs to be altered to the general case for all protocols.

Paragraph 2, after the list, delete " when enabled"

Add a new clause 3.1.4.2

"3.1.4.2 ACA field of Control Byte in CDB is set to 1b

If the ACA field in the control byte of the CDB of the command when the ACA condition is reported is set to 0b, the ACA condition shall be cleared after:

- a power on condition,
- performing a hard reset alternative response to the RST signal being asserted,
- receipt of a Clear Auto Contingent Allegiance Task

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Management request for the logical unit form the
initiator receiving the error report,
- a Target Reset Task Management request,
- receipt of an untagged task with at least one command.
- clearing the ACA condition for a tagged task is
vendor specific.

The Auto Contingent Allegiance shall not be cleared for
any reason other than those listed above."

Note: No. 2 in this list is SIP specific text and
needs to be altered to the general case for all
protocols.

44. Page 5, 3.2, Duplicate tag handling, para. 1, line 1,
delete " (see x.x)".

45. Page 5, 3.2, Duplicate tag handling, para. 1, add to the
list:

"- a power on condition in the initiator,
- performing a hard reset alternative response
to the RST signal being asserted,
- sending a TARGET RESET Task Management request
- sending an ABORT TASK Task Management request
- sending an ABORT TASK SET Task Management request
- sending a CLEAR TASK SET Task Management request
- receipt of a unit attention for "TASKS CLEARD BY
ANOTHER INITIATOR" report
- receipt of a unit attention for "POWER ON, RESET or
TARGET RESET" report"

... (this list may not be complete either, but the
current list is way too short - GRS)

46. Page 5, 3.2, Duplicate tag handling, para 2 (after the
list), line 1, change "duplicate tag" to "duplicate
task," <-- (note the comma).

Duplicate task does not apply solely to tagged tasks as
this clause is worded. Duplicate untagged tasks cause
the same behavior. Change this clause to reflect the
general case and not the specific case for tagged tasks
only. For duplicate untagged tasks, only the ASC/ASCQ
"Overlpped Tasks Attempted" applies.

47. Page 5, 3.2, Duplicate tag handling, para 2 (after the
list), line 2, change "task set" to "task".

48. Page 5, 3.2, Duplicate tag handling, para 2 (after the
list), line 2, change "Overlapped Commands" to

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"Overlapped Tasks".

49. Page 5, 3.2, Duplicate tag handling, para 2 (after the list), line 5, change "a key" to "an ASC".

50. Page 5, 3.2, Duplicate tag handling, para 2 (after the list), line 5, change "Overlapped Commands" to "Overlapped Tasks".

51. Page 5, 3.2, Duplicate tag handling, para 3, line 1, change "target" to "logical unit".

52. Page 5, 3.2, Duplicate tag handling, para 3, line 2, change "target" to "logical unit".

53. Page 5, 3.2, Duplicate tag handling, para 3, lines 3-4, change "for the task set in which the duplicate nexus error occurred" to "for that initiator".

54. Page 5, 4.1, Current Task, bullet 1, line 2, move the example inside the period.

55. Page 6, line 2, change "device" to "SCSI device".

56. Page 6, 6., Simple Task (Simple Tag), title, delete "(Simple Tag)" which is a SIP specific reference.

57. Page 6, 6., Simple Task, para 1, sentence 1, replace with

"A simple task is one that a logical unit may reorder (see clause 2). In a set of simple tasks above the current task ordering boundary, any simple task may complete at any time."

This definition is protocol independent; the current one is SIP specific.

58. Page 6, 6., Simple Task, add a new paragraph.

"Additional requirements for managing simple tasks are found in clauses 7, 8, and 9. "

59. Page 6, 7., Ordered Task (Ordered Tag), title, delete "(Ordered Tag)" which is a SIP specific reference.

This revised text is protocol independent; the current one is SIP specific.

60. Page 6, 7., Ordered Task, para 1, sentence 1, delete "tagged as an"

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This revised text is protocol independent; the current
one is SIP specific.

61. Page 6, 7., Ordered Task, add a new paragraph.

    "Additional requirements for managing ordered tasks
     are found in clauses 8 and 9. "

62. Page 6, 8., Head of Queue Task Task (Head of Queue Tag),
    title, rename "Head of Task Set".

    This revised text is protocol independent; the current
    one is SIP specific.

63. Page 6, 8., Head of Task Set Task, para 1, sentence 1,
    delete "tagged as a"

    This revised text is protocol independent; the current
    one is SIP specific.

64. Page 6, 8., Head of Task Set, para 1, line 1, change "Head
    of Queue" to "Head of Task Set".

65. Page 6, 8., Head of Task Set, para 1, line 5, change
    "Head of Queue" to "Head of Task Set".

66. Page 6, 8., Head of Task Set, para 1, line 5, the phrase
    "...the most recent Head of Task Set task completes"
    appears to conflict with the text of paragraph 2.
    "Most recent" is a temporal term and can quite easily be
    taken to mean that these new simple and ordered tasks
    must not complete as long as there is a Head of Task Set
    task in the task set (i.e., the most recent). Revise the
    wording of the last sentence to unambiguously convey the
    permission granted in paragraph 2 and the task ordering
    boundary requirement at the beginning of paragraph 1.

67. Page 6, 8., Head of Task Set, para 2, line 2, change "Head
    of Queue" to "Head of Task Set".

68. Page 6, 8., Head of Task Set, add a new paragraph.

    "Additional requirements for managing head of task set
     tasks are found in clause 9. "

69. Page 6, 9., ACA Task (ACA Queue Tag), title, delete "(ACA
    Queue Tag)"

    This revised text is protocol independent; the current
    one is SIP specific.

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70. Page 6, 9., ACA Task, para. 1, change to

"An ACA task is a task identified as being a response to an ACA condition reported to an initiator. "

This definition is protocol independent; the current one is SIP specific.

71. Page 6, 9., ACA Task, para 4, line 2, change "target" to "logical unit".

72. Pages 6-7, 9., ACA Task, para 4, the response listed in this paragraph is unique to SIP. Change the text to allow other reporting mechanisms for other protocols.
Add a new ASC/ASCQ response, such as "No ACA active" which is protocol independent.

73. Page 7, 9., ACA Task, para 2, sentence 1, delete since it duplicated behavioral requirements in clause 3.1.2.

74. Page 7, 9., ACA Task, para 2, sentence 2, move to clause 3.1.2 where other behavioral requirements already exist.

75. Page 7, 9., ACA Task, para 3, delete, duplicates requriements already stated in clause 3.2. There is no reason to single out an ACA task when the others have no such text for them. See clauses 6, 7, and 8.

76. Page 7, There is no clause 10. It has been skipped. Renumber clauses 11 through 13.

77. Page 7, 11., Clear Auto Contingent Allegiance, Title, change to "Clear Auto Contingent Allegiance Task Management Function.

78. Page 7, 11., Clear Auto Contingent Allegiance

This clause needs to be before the present clause 3.1.4 since that is the point of first use. I suggest moving it to 3.1.4 and renumbering clause 3.1.4 to 3.1.5.

79. Page 7, 11, Clear Auto Contingent Allegiance Task Management Function, Para. 1, line 2, change "to clear" to "task management function to clear..."

80. Page 7, 11, Clear Auto Contingent Allegiance Task Management Function, Para. 1, line 3, add the sentence

"This task management function may be used whether the ACA field of the control byte of the command reporting an ACA condition has a value of either 0b or 1b. "

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81.
 Page 7, 11., Clear Auto Contingent Allegiance Task
 Management Function, para 2, line 1, change "target" to
 "logical unit".

82. Page 7, 11, Clear Auto Contingent Allegiance Task
 Management Function, Para. 2, line 1, change "Allegiance"
 to "allegiance task management function"

83. Page 7, 11, Clear Auto Contingent Allegiance Task
 Management Function, Para. 2, lines 1-2, delete "and
 complete the current task". Task management functions
 are not part of any task.

84. Page 7, 11., Clear Auto Contingent Allegiance Task
 Management Function, para 3, line 1, change "target" to
 "logical unit".

85. Page 7, 11, Clear Auto Contingent Allegiance Task
 Management Function, Para. 3, line 1, change "Allegiance
 and" to "allegiance task management function and"

86. Page 7, 11, Clear Auto Contingent Allegiance Task
 Management Function, Para. 2, lines 1-2, change "then the
 target shall complete the current task." to "the logical
 unit shall indicate successful completion of the task
 management request."

87. Page 7, 11., Clear Auto Contingent Allegiance Task
 Management Function, para 4, line 1, change to
 "After the logical unit clears an ACA condition,". Move
 the entire paragraph to the present 3.1.4 where other
 parts of ACA clearing behavior is specified.

88. Page 7, 12, New ASC/ASCQ codes, ADD or change description

 XX   00   DTLPWRSOMC No ACA active
 4D   XX   DTLPWRSOMC Tagged Overlapped Tasks
                              (name change)
 4E   00   DTLPWRSOMC Overlapped Tasks Attempted
                              (name change)

89.
 Pages 7 - 11, Appendix A, Delete.

 The SCSI committee settled on one model for a task set.
 Since there is no permission to use any task set
 definition other than the one in Clause 2, these examples
 are invalid and not permitted. There can be no
 consistent interpretation of this appendix with the rules
 presented in clauses 1 through 13 (12).

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In addition, the text alludes to "task ordering boundaries" which apply only within a task set (see clause 2). The appendix and associated tables really refer to alternative task set definitions which are specifically precluded in clause 2.

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