NCR Corporation

Date: March 21, 1987

To: X3T9.2 Membership

From: John Lohmeyer, Chair X3T9.2
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Subject: SCSI-2 Ad-Hoc Minutes - 03/18/87 to 03/20/87 - Tempe, AZ

An SCSI-2 working group meeting was held March 18-20 in Tempe, AZ. I would like to thank Bill Spence of T.I. for arranging this "no host" meeting. The following people attended:

Name	Status	Organization
Mr. Robert N. Snively	P	Adaptec, Inc.
Mr. Robert R. Williamsen	A	Adaptec, Inc.
Mr. Harlan Andrews	S	Apple Computer
Mr. Louis C. Domshy	P	Archive Corp.
Mr. Kim B. Le	O	Aspen Peripherals
Mr. James J. Semenak	P	AT&T Information Systems
Mr. Gerald Houlder	A	CDC/MPI
Mr. Dan Davies	P	Cipher Data Products, Inc.
Mr. Neal Foxworthy	ST	Cipher Data Products, Inc.
Ms. Donna Pope	S	Cipher/Optimem
Mr. Duncan McDonald	P	Distributed Logic Corp.
Mr. Steve Goldman	P	DPT
Mr. Paul Nitza	P	Emulex Corp.
Ms. Kim V. Le	A	Emulex Corp.
Mr. Randy Weber	ST	Emulex Corp.
Mr. I. Dal Allan	P	ENDL
Mr. Carlos E. Vidales	S	FileNet Corp.
Mr. Robert Liu	P	Fujitsu America, Inc.
Mr. Bo Larsson	A	Fujitsu America, Inc.
Ms. Elen Hunt	A	Hewlett Packard Co.
Mr. Dave McIntyre	A	Hewlett Packard Co.
Mr. Michael A. Brown	SO	Hewlett Packard Co.
Dr. Sam Karunanithi	P	HMSI, Inc.
Mr. Greg Floryance	P	IBM Corp.
Mr. William Homans	P	LMSI-CPI
Mr. Louis G. Edwards	A	LMSI-OSI
Mr. Skip Jones	P	Maxtor Corp.
Mr. Daniel E. Moczarny	P	Mitsubishi Electronics Amer
Mr. James Schuessler	P	National Semiconductor
Mr. John Lohmeyer	P	NCR Corp.
Mr. Ron Miller	ST	NCR Corp.
Mr. John Hoy	P	Optotech, Inc.
Mr. James McGrath	P	Quantum Corp.
Mr. Dexter Anderson	P	Scientific Micro Systems
Mr. D. W. Spence	A	Texas Instruments

Mr. Ralph Schultz	P	UNISYS
Mr. Jeff Stai	A	Western Digital

Status Key: P - Principal   A - Alternate   L - Liaison   O - Observer
S - Special Interest Group   V - Visitor (no address info)

The following documents were distributed at the meeting:

Document Number	Author	Description
X3T9.2/87-21 Rvl	D. Loski	Revised SCSI Bus Phase Sequencing
X3T9.2/87-36	S. Goldman	Wide SCSI Implementation
X3T9.2/87-37	D. Pope	ERASE Command
X3T9.2/87-38	S. Jones	Changes to Automatic Medium Changer (ref 87-17)
X3T9.2/87-39	S. Jones	READ UPDATED BLOCKS command
X3T9.2/87-40	J. Semenek	REQUEST SENSE command changes
X3T9.2/87-41	J. Semenek	MODE SENSE command changes
X3T9.2/87-42	G. Floryance	INQUIRY command enhancements
X3T9.2/87-43	G. Floryance	Common READ LOG command
X3T9.2/87-44	D. Kinsell	Cabling requirements
X3T9.2/87-45	M. Brown	SCSI-2 Optical command set
X3T9.2/87-46	P. Nitza	SCSI command queueing
X3T9.2/87-47	D. Loski	Certification Pattern
X3T9.2/87-48	D. Loski	MODE SENSE options page Ah
X3T9.2/87-49	J. McGrath	Command Queueing proposal
X3T9.2/87-50	R. Snively	Compatability Philosophy between SCSI & SCSI-2
X3T9.2/87-51	R. Snively	Clarification of invalid LUN
X3T9.2/87-52	R. Snively	Asynchronous event notification
X3T9.2/87-53	R. Snively	Appendix on Power-On protocols
X3T9.2/87-54	R. Snively	Full command queueing proposal
X3T9.2/87-55	R. Snively	Clarification of BUS FREE definition

All items from the agenda were discussed (not necessarily in this order) with the following results:

1. 16/32-bit SCSI. (87-36)

Document 87-36 was reviewed by Steve Goldman. This document supersedes 87-9. The working group accepted this document as the basis of a new appendix. Steve will revise this document for inclusion in a future revision of 86-109. An issue was raised on whether wide SCSI should be restricted to synchronous data transfer only. The working group felt that both asynchronous and synchronous transfers should be supported.

There are still issues related to odd-byte transfers. Dave McIntyre accepted an action item to make a proposal on this issue.

2. Overlapped commands.

This item was discussed in conjunction with item 18, below. The group working on command queuing/stacking will also make a recommendation on this issue.

3. Error logging procedure and commands. [Deferred.]

4. Implementors note on REQUEST SENSE if there is more data than requested.
    [Deferred.]

5. Wording for LOGO & ICON appendix (compatible devices). [Deferred.]

6. Download microcode commands. (87-7)

Bill Spence and Greg Floryance will prepare a revised proposal.

7. Synchronous SCSI pulse vs edge clarification. (87-33)

Gerry Houlder's proposal was accepted with minor wording changes.

8. SCSI & SCSI-2 compatibility statement. (87-50)

Bob Snively's proposal was accepted with minor wording changes.

9. Implemented options page. (87-48)

The working group felt that this is a hopeless task (at least, at this point
in time). The item was killed.

10. Required sense data to be implemented. (87-40)

The working group felt that it is not necessary to require that optional data
always be returned. Instead, John Lohmeyer accepted an action item to draft
an implementors note explaining that the first eight bytes are required to be
available and that initiators should inspect byte 7 to determine how many
additional bytes are valid. In some cases, bytes beyond byte 7 are required
to be implemented (e.g., Additional Sense Code).

11. Divide Additional Sense Data between Reserved and Vendor Unique.

The working group did not want to invalidate current designs for some
possible future need. If a future need does arise, this could be addressed by
using a different Sense Data format (e.g., 72h).

12. Asynchronous event notification. (87-52)

Bob Snively's proposal was briefly reviewed. The key difference in this
proposal is that the asynchronous notification is accomplished by the device
using a Processor Device SEND command to tell various hosts that an
asynchronous event occurred. There is still a question of whether an
enabling mechanism is required (NV RAM?). We also need to identify which
events are to be included in this notification.

13. BUS FREE clarification (expected vs unexpected). (87-55)

Bob Snively's proposal was accepted with some wording changes.

14. Boot-up Sequence. (87-34, -53)

Bob Snively's proposal was largely accepted except for portions that assume
other proposals will be accepted and the assumption that soft reset must be
used for multiple initiator systems. Bob will revise his proposal.

15. Invalid LUN reporting. (87-27, -51)

There was a great deal of discussion on this issue with no real closure prior
to running out of time for general issues. Paul Nitza accepted an action item
to write a clarification of the 7Fh device type code in the INQUIRY data.

16. Differential Cables and Drivers. (87-26, -28, -44)

87-26 documents that non-twisted flat cable does not work well with
differential signals due to crosstalk. Gerry Houlder's recommendations in 87-
28 were accepted except for the one concerning maximum transfer rate.
Consideration of 87-44 was deferred until the next working group.

17. SCSI-2 Phase diagram. (87-21 Rev 1).

Daniel Loski's revised diagram was accepted. Paul Nitza will convert the
diagram to ASCII for inclusion in the SCSI-2 draft document. Also,
an implementors note will be added to state that some devices that support
both SCSI and SCSI-2 protocols will accept additional transitions.

18. Command Stacking/queuing. (87-46, -49, -51, -54)

We had proposals from Quantum, Emulex, and Adaptec. Dal also briefly
discussed IPI-3 command queuing. The interested parties will get together to
work on a common proposal. More work is needed on error management and
initiator control of queuing strategy (MODE SELECT page?).

19. MODE SELECT & UNIT ATTENTION condition. [Deferred.]

20. Implementor's note on MODE SELECT/SENSE rounding.

This item was re-assigned from Larry Lamers to Dal. Also, several people felt
that rounding operation should be specified more strongly than just in an
implementors note. Dal drafted the wording, but we still need to determine
where to place the wording.

21. Contingent Allegience. [Deferred.]

22. Hard RESET wording on MODE SELECT "default" parameters.

This item was reassigned from Daniel Loski to Skip Jones.

23. Proposed wording to resolve 87-15 (INQUIRY DDF). (87-15, -41, -42)

John Lohmeyer had not completed this wording change. Another issue was raised
under this agenda item concerning whether the Desired Data Format approach is
the best way to control SCSI vs SCSI-2 behavior in targets that support both
protocols. Some alternate methods were discussed. More work is needed.

24. Prioritize UNIT ATTENTION reporting.

After some discussion, this item was killed.

25. State diagram for phase changes. [Deferred.]

26. Description of what message support means.

This item was reassigned from Greg Floryance to Gerry Houlder.

27. Investigate differential driver specifications. [4/1/87 WG]

28. Investigate high-speed differential bus. [4/1/87 WG]

29. Synchronous negotiation level (Device, LUN, or sub-LUN).

The current wording of the REQUEST SYNCHRONOUS DATA TRANSFER message is not
clear on whether the result of the negotiation applies to the entire device,
the addressed LUN, or the addressed sub-LUN. By a straw vote of 16 to 3, it
was decided that the result should apply to the entire device. Steve Goldman
accepted an action item to clarify the documentation.

30. Extension of SCSI device address space. [Deferred.]

31. Coding proposal for Additional Sense Code field.

This item has been completed by Ralph Schultz for inclusion in Rev 1.

32. Cumulative error reporting in Command-Specific bytes.

This item was originally suggested by Bill Spence in a Telex to several
committee members. Lou Danshy said that he may prepare a written proposal on
the topic. No more consideration is planned until we get a written proposal.

33. RESERVE UNIT command deficiencies. (87-14)

After some discussion, the working group decided that the best way to solve
this problem, is to avoid it. Dan Davies drafted some wording to preclude the
problem for inclusion in Rev 1.

34. Retrieving updated blocks. (87-39)

Skip Jones' proposal was reviewed and several issues were identified. The
working group felt that the READ UPDATED BLOCKS command should be able
optionally to transfer multiple logical blocks at the same generation level
in addition to the proposed multiple generations of the same logical block.
Also, the generation should be able to be addressed as current -n in addition
to absolute generation as proposed. Skip will revise his proposal.

35. Review MEDIA SCAN command. (87-12)

This document was accepted for inclusion in Rev 1.

36. Optical Memory Devices Additional Sense Codes.

Ken Post has received some inputs on this item, but he has not completed the
consolidation, yet.

37. READ ID & WRITE ID commands (from May '86)

Sergio Fonseca has not yet re-submitted this item -- deferred.

38. READ LONG & WRITE LONG command concerns for optical. (87-3) [Deferred.]

39. Optical disk changers. (87-17, -38)

There was general agreement that the FileNet and Maxtor proposals operate at
too low of a level for a logical interface. The working group would prefer a
command set that works at a more logical (and generic) level. Low-level
commands could also be included for today's products.

40. Optical ERASE command. (87-37, -45)

This command and the UPDATE BLOCK command may be incompatible or may result in
data corruption issues. An implementors note will be included to warn users
of this problem. Donna Pope's proposal was accepted with several minor
changes. It will be included in Rev 1.

41. Optical Disconnect/Reconnect parameters page proposals. (87-10, -22)

Lou Edward's two alternative proposals were reviewed with the conclusion that
87-22 was withdrawn and 87-10 was accepted with some additions.

42. UNIT ATTENTION & STOP UNIT command and removable media. [Deferred.]

43. Printer Strategy. [Deferred.]

44. Vendor Identification registration. [Deferred.]

45. Explore Copyright issues. [Deferred.]

46. Pin 2 definition for flexible disk parameters page. [Deferred.]

47. INQUIRY command enhancements. (87-42)

Greg Floryance introduced his proposal and suggested that we review it in more
detail at the next meeting.

48. Common READ LOG command. (87-48)

Greg Floryance introduced his proposal and suggested that we review it in more
detail at the next meeting.

49. Additional Tape Density Codes.

These codes have been added to the Rev 1 document.

50. Misc. corrections to Section 9 (Weber).

These were reviewed and Jim Semenak will include those that were accepted by
the working group.

51. Certification Pattern. (87-47)

This item was not discussed due to time limitations -- Deferred.

52. Insufficient transfer length in optical group 1 commands. (87-45)

John Hoy will begin defining 12-byte (Group 5) commands for Optical Memory
Devices that will include 4-byte transfer length fields.

The following action items were identified:

S. Goldman	Revise 87-36 to be an Appendix.
D. McIntyre	Propose solution to odd-byte issues with wide SCSI.
J. Lohmeyer	Send attendee mailing labels to D. McIntyre.
J. Lohmeyer	Act as general editor for SCSI-2 Rev 1
Spence & Floryance	Prepare revised proposal on downloading microcode.
J. Lohmeyer	Write implementors note on required bytes to be returned by REQUEST SENSE command.
P. Nitza	Convert 87-21 rev 1 to ASCII and send to Ralph Schultz.
D. Allan	Revise Lamer's wording on rounding.
S. Jones	Draft "Hard" RESET wording on MODE SELECT "default" parameters.
S. Goldman	Clarify SYNCHRONOUS DATA TRANSFER message negotiates at the device level.
P. Nitza	Clarify meaning of INQUIRY Device Code 7Fh.
G. Houlder	Arrange/host next working group meeting in Minneapolis.
D. Davies	Write statement to preclude problem identified by 87-14.
J. Semenak	Correct wording on READ REVERSE with fixed = 1 at BOM.
J. Semenak	Make corrections identified by Randy Weber.
Semenak & Spence	Write BOM/EOM definitions for 1/4" and 1/2" tape for glossary.
Jones & Hoy	Revise 87-39 as discussed.
D. Pope	Update 87-37 and send it to John Hoy.
M. Brown	Propose 12-byte (Group 5) optical command set.

cc: Attendees who are not P, A, or L members.