

Accredited Standards Committee
X3, Information Processing Systems

Doc. No.: X3T9.2/93-129 R0
Date: July 22, 1993
Project:
Ref. Doc.:
Reply to: G. Penokie

To: Membership of X3T9.2
From: George Penokie and Ralph Weber
Subject: Minutes of RAID Study Group Meeting (7/22/93)

Agenda

1. Opening Remarks
2. Attendance and Membership
3. Approval of Agenda
4. Report on last RAID Working Group
5. Project Proposal for Array Command Set
6. RAB Host Interface Group Activities
7. RAB RAID Ready Drive Group Activities
8. SCSI Disk Array Model (93-003r7)
9. SCSI Disk Array Questions and Answers (93-108r0)
10. Proposed architecture for configuring external RAID devices
(93- r0) Bob Snively
11. Action Items
12. Meeting Schedule
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Results of Meeting

1. Opening Remarks

George Penokie the RAID Study Group Chair, called the meeting to order at 9:00 am, Thursday July 22, 1993. He thanked Ralph Weber of Digital Equipment Corporation for hosting the meeting.

As is customary, the people attending introduced themselves. A copy of the attendance list was circulated for attendance and corrections.

It was stated that the meeting had been authorized by X3T9.2 and would be conducted under the X3 rules. Ad hoc meetings take no final actions, but prepare recommendations for approval by the X3T9.2 task group. The voting rules for the meeting are those of the parent committee, X3T9.2. These rules

are: one vote per company; and any participating company member may vote.

The minutes of this meeting will be posted to the SCSI BBS and the SCSI Reflector and will be included in the next committee mailing.

George stated that this is the eighth meeting of the RAID study group. The purpose of the group is to deal with interface issues related to using RAIDs.

The study group will assess the issues and then formulate a strategy for dealing with them.

2. Attendance and Membership

Attendance at working group meetings does not count toward minimum

attendance

requirements for X3T9.2 membership. Working group meetings are open to any person or company to attend and to express their opinion on the subjects being discussed.

The following people attended the meeting:

RAID Study Group Meeting Attenders

Name	S	Organization	Electronic Mail Address
Mr. Norm Harris	P	Adaptec, Inc.	hharris@adaptec.com
Mr. David Skinner	O	Advanced Micro Devices	dave.skinner@amd.com
Mr. Charles Brill	P	AMP Inc	
Mr. Bob Whiteman	A	AMP Inc	
Mr. Chap Cory	V	Augment Systems Inc	augment!ccory@linus.mitre.org
Mr. Clifford E.	P	BusLogic	
Mr. Joe Wach	O	Conner Peripherals	
jwach@development@colorado			
Mr. Edward Haske	P	CMD Technology	
Strang Jr.			
Mr. Roger Wang	O	CMD Technology	
Mr. Bob Solomon	O	Data General Corp.	bobsolomon@dgc.ceo.dg.com
Mr. Doug Hagerman	O	Digital Equipment Corp.	hagerman@starch.enet.dec.com
Mr. Ralph Weber	A	Digital Equipment Corp.	
Mr. Dal Allen	P	ENDL	
Mr. Kenneth J. Hallam	S	ENDL	
Mr. Howard Grill	O	Formation	
Mr. Robert Llu	P	Fujitsu Computer Products	
Am			
Mr. Jeffrey Williams	P	Hewlett Packard Co.	jlw@hpdmd48.boi.hp.com
Mr. Bill Hutchison	O	Hewlett Packard Co.	hutch@boi.hp.com
Mr. Larry Chen	O	Hitachi Computer Products	
Dr. Sam Karunanithi	P	Hitachi Micro Systems, Inc	
Mr. George Penokie	P	IBM Corp.	gop@rchvmp3.vnet.ibm.com
Mr. John P. Scheible	O	IBM Corp.	
Mr. Giles Grazier	O	IBM Corp.	gfrazier@asuvvm6.vnet.ibm.com
com			
Mr. John Baudrex1	O	Intellistor, Inc	jbaudrex1@intellistor.com
Mr. Robert Bellino	P	Madison Cable Corp.	
Mr. Ron Roberts	A	Maxtor Corp.	
Mr. Stephen F. Hail	P	Panasonic Technologies, Inc.	
Mr. James McGrath	P	Quantum Corp.	
Mr. Gene Milligan	A	Seagate Technology	
Mr. Robert N. Snively	P	Sun Microsystems, Inc	
Mr. Pete Tobias	P	Tandem Computers	
Mr. Todd Sprenkle	O	Tandem Computers	sprenkle_todd@tandem.com
Mr. Paul D. Aloisi	S	Unitrode Integrated Circuits	
Mr. Peter Walford	O	VemoGraFX	walford@infoserv.com

34 people present

Status Key: P - Principal
 A - Alternate
 O - Observer
 L - Liaison
 S,V - Visitor

3. Approval of Agenda

The agenda developed at the meeting was approved.

4. Report on last RAID Working Group

Last RAID Working Group was held in Minneapolis. Several members of the RAID

Advisory Board were present. Minutes of the Minneapolis meeting were published

on the SCSI Reflector.

5. Project Proposal for Array Command Set

Doug Hagerman presented a proposal for creating a new SCSI-3 document containing RAID controller commands. The proposed title is SCSI-3 Controller

Commands (SCC). Doug presented a draft SD3 for the proposed new document. George Penokie volunteered to edit the proposed document.

The Gene Milligan noted that the SD3 should properly describe the SCC relationship to other SCSI-3 documents. Gene's particular concern is that SCC

not redefine commands already defined in other documents.

The SSWG proposed that X3T9.2 distribute the SD3 for letter ballot vote.

6. RAB Host Interface Group Activities

The RAID Advisory Board (RAB) has skipped the problem definition stage and proceeded directly to defining Mode Pages for controlling RAID configurations.

They have made lots of good progress in the areas that have been undertaking.

George explained to the RAB the SCSI RAID intentions and process.

The RAB had an original goal of completing their work in four meetings. They

have held completed four meetings and not completed the work. More meetings are being planned. RAB invited any interested SCSI committee members to attend

their meetings.

Another result of the RAB was a change in perspective on configuration mechanics. George backed away from the idea that configurations are constructed via requirements conversations between the manager and the DACL. The insight that produced this change was a belief that such conversations force the DACL to have artificial intelligence properties. This is an unreasonable expectation for DACLs in the foreseeable future.

7. RAB RAID Ready Drive Group Activities

There was no discussion on this topic

8. SCSI Disk Array Model (93-003r7) [Penokie]

George Penokie presented revision 7 of the SCSI Disk Array Model. The R7 document includes changes from the May RAID SSWG meeting and changes from the joint meeting with the RAID Advisory Board. George stated that the model is about 90% complete. George further feels that additional work on the model cannot proceed without some work on specific implementation

details.

George reported on his review of the IEEE Mass Storage Reference Model. At the May meeting, George was directed to inspect IEEE Model as a possible source of material for configuration parameter metrics to be used in the SCSI Disk Array Model. George could not find any material in the IEEE Model that aid in the SCSI Model work.

Dal Allen asked that this group identify a liaison to the IEEE group responsible for the Mass Storage Reference Model. No one was identified.

9. SCSI Disk Array Questions and Answers (93-108r0) [Penokie]

George Penokie presented his new RAID support document listing major questions

& solutions. First, he described each of the eleven questions listed in the current document draft. Then, George discussed the questions individually.

Q1: "How to get more LUNs?" The purpose of addressing more than 64 LUNs concern control and maintenance functions. The purpose is not addressing more

than 64 RAID sets generated by a single controller. George presented an admittedly unhappy solution called EXPANDED IDENTIFY. Basically, EXPANDED IDENTIFY uses LUN=64 as a flag that the real LUN number follows in additional

message phase bytes. This proposal breaks existing silicon. So, George suggested a method that puts the LUN in the CDB. This too was unpopular.

Bob Snively presented a proposal that maps 64 SIP LUNs to FCP-style 64-bit entity addresses. The pros and cons of a 64 entry mapping table were discussed. Progressively, the group recognized the alternatives as being:

- 1) Limiting the active LUN operating range for an initiator to 64 devices (controlled devices or RAID sets), or
- 2) Changing the parallel SCSI message structure in a way that fundamentally breaks hardware implementations.

The two solutions that George recognized were:

- 1) Documenting Bob's mapping scheme (which matches alternative 1), or
- 2) Revise the EXPANDED IDENTIFY proposal in ways that make the first message byte somehow unique and accommodate a 64-bit LUN field.

The subsequent discussion produced question 12 for George: "Should Qtags be expanded to match SAM?"

Q2: "How does a system find out what is physically connected to it?"

Q8: "How does a system with multiple levels of SDAs work when it comes to addressing?"

George described a parameter block for returning information about physical devices in a SCSI Disk Array (SDA). This led to a description of how information is returned when a SDA incorporates another SDA as one of its physical devices (thus question 8).

George presented an example multi-layered SDA and drive configuration. He then

described how components in that configuration would be addressed using the methodology in his document. Then, Bob Snivley described the FCP entity address structure for the same configuration. The merits of the two addressing

methodologies were discussed. No decision was made as to which method would be used.

10. Proposed architecture for configuring external RAID devices
(93- r0) [Snively]

Bob presented a configuration mode page proposal that has approximately the same characteristics as George is proposing in his questions and solutions document. George took Bob's proposal as input to the next draft of his proposal.

11. Action Items

1) George Penokie will prepare revision 1 of the SCSI Disk Array Questions and Answers which includes larger LUNs and incorporates the features of Bob's proposal.

2) George Penokie will prepare a document to incorporate a new identify message into SPI to handle 8 byte LUN addresses.

12. Meeting Schedule

The next meeting of the RAID Study Group is planned for Aug 18, 1993 at the Red Lion Inn in Colorado Springs, CO.. The meeting is expected to start at 9:00am-12:00am. This meeting will be a joint RAID Advisory Board Host Interface Group and X3T9.2 RAID Study Group meeting.

George stated that in the even numbered months the RAID Study Group will plan to meet with the RAID Advisory Board. In the odd numbered months the RAID Study Group will meet on Thursday morning with X3T9.2.

13. Adjournment

The meeting was adjourned at 12:00 a.m. on Thursday July 22, 1993.

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