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Minutes of the SBP-3 Working Group meeting, June 5-6, 2001
Omni Ambassador East Hotel, Chicago

Attendees:

Eric Anderson	Apple	ewa@apple.com
Firooz Farhoomand	Panasonic	firoozf@ix.netcom.com
Lee Farrell	Canon	lfarrell@cissc.canon.com
John Fuller	Sony	jfuller@computer.org
Andy Green	Oxford Semiconductor	andy.green@oxsemi.com
Peter Johansson	Congruent Software	PJohansson@ACM.org

The following agenda was presented by Johansson. In the minutes that follow, the start of discussion of items listed below is denoted by the index number listed within square brackets, such as [4.1]. Note that these references do not always appear in order, and may not signify the conclusion of discussion of a previous agenda item.

1. Introductions and procedures
   1.1 T10 Membership and voting
   1.2 Document naming conventions
   1.3 Two-week rule
   1.4 Meeting fees
   1.5 Approval of prior minutes
2. Call for patents
3. Informal liaison
   3.1 IEEE P1394.1 [Johansson]
   3.2 IEEE P1394.3 [Johansson]
   3.3 1394 Printer Working Group [Farrell]
4. Prior action items
   4.1 Modify draft in accordance with Project Proposal item e) [Johansson]
   4.2 P1212 Revision entry in unit directory [Johansson]
   4.3 Configuration ROM (feature control, instance directories) [Johansson]
   4.4 Request AV/C expert to review Annex H [Fuller]
   4.5 Request AV/C expert to define track metadata [Fuller]

4.6 Add configuration ROM examples for instance directories [Johansson]
4.7 Remove EUI-64 from login request [Johansson]
4.8 Modify GET NODE HANDLE to permit release [Johansson]
4.9 Operational description of login (bus reset) [Johansson]
5. Review of changes in working draft
6. Old business
6.1 Data buffer and page table in different nodes [Anderson]
6.2 Isochronous data format [Green]
7. New business
7.1 RBC commands for extent management [Johansson]
7.2 Configuration ROM rules
7.3 FAST_START in multiprocessor environment [Wooten]
7.4 Isochronous model
8. Meeting schedule
July 17 - 18 (Colorado Springs, CO)
August 22 - 23 (Cupertino, CA)
October 2 - 5 (east coast)
November 6 - 7 (Monterey, CA)
December (location not yet determined)
9. Review of action items
10. Adjournment

[1] Johansson called the meeting to order and added several items of New Business to the agenda, as reflected above.

[1.2] Johansson briefly reviewed the two-week rule, explaining that it did not prevent the discussion of documents posted less than two weeks before a meeting.

[2] Johansson reviewed general T10 policies and procedures. In general, attendance and participation at T10 ad hoc meetings (such as this one) is open to both visitors and T10 members. When formal votes are taken, either in an ad hoc meeting or in the T10 plenary, one vote is permitted each organization, to be cast by its principal representative or designated alternative. A two-week rule is in effect: No matter may be voted on unless notice was given at least two weeks prior. Documents to be voted on must have been posted two weeks prior to the vote. The two-week rule can be waived if nobody objects. Announcements of new documents and meetings must be posted to the T10 email reflector; all other business can be conducted on the working group reflector.

The following paragraph about ANSI/T10 patent policy is copied from past T10 Plenary minutes:

A document is available from ANSI, "Procedures for the Development and Coordination of American National Standards", at no charge. This document is also on the web at http://www.ncits.org/help/ansi_sdo.html. Section 1.2.11 contains the ANSI patent policy. Amy Marasco manages patent issues for ANSI and can be contacted at amarasco@ansi.org or 212-642-4954. Gene Milligan prepared a useful “Handy dandy Technical Committee's Patents Guide“, which is available at ftp://ftp.t10.org/t10/document.99/99-291r0.pdf.

[1.5] The minutes from April 26-27 (Portland) were not approved, because they had just been posted and those present had not had time to read them:

ftp://ftp.t10.org/t10/document.01/01-139r0.pdf

[3.1] Johansson noted that the P1394.1 ballot group formation is complete, and the IEEE is awaiting submission of a ballot draft from the Editor, with balloting expected in June.

[3.2] Johansson noted that IEEE P1394.3 has had no activity since the last liaison report.

[3.3] Farrell reported no relevant activity in PWG. Johansson suggested that this liaison report be deleted from future agendas until something interesting happens.

[4.1] Johansson said that bidirectional ORBs had been added to the draft, and added that SCSI does not define how to report two residual counts. Johansson also observed that SCSI status might grow larger than the 32 bytes of status allowed by SBP-2.

[4.2] Johansson reported that Brian Batchelder has not provided any feedback regarding the request for a Revision entry in the Unit Directory defined by IEEE P1212r.

[4.3] Johansson moved this item to the New Business portion of the agenda for later discussion.

[4.4] [4.5] Fuller noted that David Hunter of Sony would no longer be able to attend SBP-3 meetings, and so Fuller would inherit Hunter's action items - for which there was no progress to report yet.

[4.6] Johansson remarked that the example Configuration ROM section was updated to include an Instance Directory example.

[4.7] Johansson said he had removed the EUI-64 from the Login ORB as previously discussed.

[4.8] Johansson described how GET NODE HANDLE had been modified to support a release operation.

[4.9] Johansson said that he had not yet written an operational description of login as related to bus resets, so this action item was carried forward.

[5] Johansson lead a review of the latest draft of SBP-3, revision 1c:

ftp://ftp.t10.org/t10/drafts/sbp3/sbp3r01c.pdf

Fuller suggested that in the matrix of in/out options at the top of page 29, the 0/0 and 1/1 pairs (representing two input or two output buffers) should be disallowed. Anderson endorsed permitting such use, provided there was a clear way to tell which buffer was which. Johansson noted that such details could be specified by a command set, or by a vendor unique protocol or implementation. Fuller expressed concern that an ORB with one input and one output could be expressed in two different ways, which was needlessly complex. Johansson noted that Fast Start presently had room for page table entries for a single buffer, and that describing two different buffers in a Fast Start packet would be complicated. Johansson suggested that it might be practical when describing a dual-buffer ORB with Fast Start to include only one of the two buffers, and that consequently the proposed flexibility in the in/out buffer placement within an ORB would make it possible to send the page table for the buffer that would be accessed first in a Fast Start packet, for greatest performance. No change was made to the draft on this point.

[6.1] Anderson reviewed his previous presentation regarding allowing a page table to point to data in a node other than the one where the page table resided. Johansson explained additional details about how the indirect structure he had proposed would work, noting that the intermediate structure would need to have a node ID, PTE count, and PTE pointer, and would probably have a multiple sets of these values.

Johansson and Anderson worked out a single-level solution based on the existing 8-byte PTE structure, in which a PTE with a (presently illegal) length value of zero would act as a marker to modify subsequent normal PTEs. This marker would have a node ID and any other data needed to describe transfers to the buffer, and would occupy the same 8-byte size as a normal PTE, so that the total size of the page table structure could continue to be described as a multiple

of eight. Anderson observed that because the length value of zero was reserved by SBP-2, this new structure could always be distinguished from a conventional SBP-2 page table, so no additional flag would be needed in the base ORB.

Anderson commented that he had not followed up with the developer who originally requested the increased node ID, so he could not present a better justification for the change than he had previously offered. Green suggested that if this extended node-ID feature was adopted, that it should be optional, and the Configuration ROM should explicitly indicate support for the feature when it was present. Fuller and Green agreed that this capability, when present, would be global to the entire Unit, so it could be described in the Unit Characteristics key, perhaps with a bit named "multiNodeData".

[7.3] In earlier e-mail, David Wooten had proposed changes to Fast Start that would make it practical for use with multiprocessor-capable operating systems. Briefly, Wooten's proposal added a previous_ORB pointer to the Fast Start packet, enabling the packet to be used like a write to DOORBELL, instead of only when the target was known to be idle as in Anderson's original proposal.

Discussion of Wooten's fast start yielded this summary for a simple target implementation, that would work correctly but perhaps not optimally:

(case 1) Fast Start is received when target is active: Treat as Doorbell; ignore contents.

(case 2) Fast Start is received while suspended, and previous_ORB is null: Execute ORB.

(case 3) Fast Start is received while suspended, and previous_ORB == ORB_POINTER: Execute ORB.

(case 4) In all other cases, treat Fast Start as a write to the Doorbell register

Anderson noted that sending a previous_ORB of null in Wooten's modified Fast Start packet is only allowed if the target is known to be suspended and no other processes might send fast start packets.

Anderson suggested that for potential Fast Start implementers to accept this change, a carefully documented proposal would be needed so they could understand the impact of the change.

Fuller stated that in (case 4), ignoring the Fast Start packet is safe, and recovery from the rare lost packet could consist of sending another doorbell.

Johansson asked if SBP explicitly required that after an initiator changes a null NEXT_ORB to a non-null value, the initiator is not allowed to modify that ORB pointer again. Johansson added that a target that caches Wooten's modified Fast Start packets might be required to recheck any NEXT_ORB pointer that was null when it was first seen.

[7.4] Anderson reiterated a summary of his position from the previous meeting - that a PC and a CE device each want to do their "thing" in their own particular way for best results, and this leads to different requirements and optimizations, but an isochronous disk that can satisfy one of the two could be made to satisfy the other as well with only minor enhancements. Johansson commented that open issues include the handling of "out of band data", and a public definition of recorded data formats, because a PC can't directly access data unless it knows the data format. Johansson also repeated his suggestion to collapse the two fetch agents from the isochronous model in draft versions of SBP-2 into a single fetch agent for SBP-3. Johansson and Fuller felt that this simplification could be accomplished if the command set is isochronous-aware and has a non-blocking nature.

[6.2] Green discussed his proposal:

ftp://ftp.t10.org/t10/document.01/01-179r0.pdf

Green described how a disk drive receiving DV would strip out the "empty CIP" packets and lay down same-sized frames of DV on fixed boundaries, then recreate the stream during playback. Anderson noted that much of what Green had described is done by Mac software today - on capture, empty packets are filtered out; DV is stored in fixed-size frames, and on transmit, empty packets are synthesized as needed. Anderson added that recording the empty packets and trying to play them back verbatim would be pointless in a splice-oriented editing environment, because the stored empty packets would not end up in the correct places or frequency in the resulting transmit stream.

Johansson posited that the original SBP-2 isochronous model may have been designed as a wrapper for block-oriented commands; which may have lead to the dual fetch agent model. Johansson added that a single fetch agent model and simplified command model might resolve the format issue, possibly with little or no format knowledge needed in ORBs.

Johansson suggested that in Figure 18 (sbp3r01c), the cycle_mark_offset and stream_length values should be specified in the command set, rather than by SBP-2. Johansson said that start, stop, and pause commands could be

embedded in the playlist instead of being free-standing ORBs. Anderson noted that one could have a playback situation in which one decides to stop after sending a long playlist, and one wants to stop soon, but not immediately - the desired stop point would for example be on the next frame boundary. Anderson said that sending a discrete stop command with stop position information would solve this, but that trying to abort or amend the running playlist would be messy at best.

Johansson suggested a new plan for isochronous ORBs in which 1394-specific data goes into the ORB directly, such as the cycle time to which the command might be synchronized, and the 1394 channel number, and all other data is sent in the command bytes specified by the command set. A single ORB format could satisfy all required commands.

Johansson and Fuller discussed the relative costs and merits of recording multiple 1394 isochronous channels in a single track, with the option of selective channel playback. Anderson described playing back an AV stream in which either the audio or the video might be muted, and noted that a selective playback capability allows substantial bandwidth savings. Green pointed out that separating the audio from the video in an MPEG stream was very difficult, and Anderson acknowledged that both MPEG and DV use a single isochronous channel, so no application seemed ready to immediately benefit from the posited multi-channel services.

Johansson noted that the RBC-2 project had not yet been approved by T10 and suggested they (RBC-2) be advised to wait before starting this work, because an AV command set might be the preferred solution. Fuller endorsed this and noted that the 1394 Trade Association might own such work.

Johansson and Anderson worked out an example of a disk recording DV from a camcorder under computer control. The computer used a RECORD command ORB, followed by a CONTINUE command ORB to extend the play list, then a STOP command ORB. Notably, the STOP command is optional if the play list runs out at just the right time; but STOP can be used to stop sooner (on a frame boundary, immediately, etc.).

(CDB)	(ORB)
RECORD	ISO CHAN #
TIME = HHMMSSFF	BUSTIME = Immediate (specified by CDB TIME)
FMT = DV	PLAYLIST = (see below)

CONTINUE	ISO CHAN #
TIME = N/A ("Next")	BUSTIME = N/A (implicit)
FMT = DV	PLAYLIST = (see below)
STOP	BUSTIME = N/A (implicit)
TIME = HHMMSSFF or TIME = NEXT FRAME BOUNDARY or TIME = IMMEDIATE	

PLAYLIST is a vector of [Extent ID; byte offset; byte length].

Johansson suggested the term "Media Descriptor" be used instead of "Play list", noting that "Play" was confusing if the list described data to be recorded.

Johansson noted that the cycle mark index would be removed from chapter 11, and other edits (mostly deletions) would be made to reflect the simplified fetch agent and ORB plan discussed. Anderson, Green, and Fuller endorsed these changes.

Johansson suggested that the recording of cycle marks should be optional, with the selection being made at the time a CREATE STREAM operation is performed.

Someone noted that part of the "isochronous model" problem statement is that detailed knowledge of formats such as DV, MPEG, etc. is presently necessary for a device to play back these formats with full quality and full support for optional features such as trick play. A format-knowledge-free device could play back other isochronous data formats such as DCAM, but could not play back commercially primary protocols (DV and MPEG).

The meeting continued on Wednesday, June 6.

[7.1] Johansson led a review of his proposal for RBC commands to manage extents:

ftp://ftp.t10.org/t10/document.01/01-180r0.pdf

Johansson noted that the proposal was essentially an extension of Lance Flake's earlier proposal (01-067). Anderson observed that four bytes were provided to express Extent length, limiting extents to 2048 gigabytes if conventional 512-byte blocks are used. Green noted that parts of RBC use five bytes for lengths. Johansson agreed to increase the LBA size fields to 48 bits. Fuller suggested

increasing the extent ID from 16 to 32 bits. Anderson, Green and Johansson agreed.

Johansson described the command for retrieving a list of extents. Anderson noted that with 32 bit extent IDs, the usage bitmap would occupy 512 megabytes. Johansson said he would add a method to access the bitmap in pieces. Johansson expressed a desire that disk implementers not create vast, sparse bitmaps.

Anderson noted that the create extent service should probably create extents that are "locked" for exclusive RBC access only until/unless software unlocks them later. Anderson added that an option for immediate locking could also be added to the create extent command.

Johansson asked how an extent created and populated by RBC could be turned over to AVC. Johansson noted that in addition to unlocking the extent, the data format tag must be changed to a known AVC type. Johansson added that the disk may need to perform preparation tasks, such as indexing the data or shuffling it to ensure that real-time performance requirements can be met. Johansson suggested that one way to express requirements is to use an AVC command to create a track, then move the track to (locked) RBC access, populate it, then move it back to AVC. Anderson noted that someone at a previous SBP-3 meeting had described that track creation would use indirect means to learn performance parameters, such as examining the settings of the plug control registers (PCRs). Anderson suggested that though PCRs could be set up even if one had no intent to immediately use them, this was a very roundabout way to specify track parameters. Anderson added that PCRs might be scarce and could have side effects, so it might not be practical to set them up when one was not actually using them. Johansson asked Fuller if disk or AV vendors would volunteer some information about what parameters need to be set when creating tracks.

Anderson suggested it would be OK to use AVC commands to specify track parameters, since all-AVC systems might have the same need (to express parameters) anyway, so duplicating the mechanism in RBC would be unnecessary.

Johansson noted that the Unlock Track command could take a format value and switch the format tag at the time it was executed - which might require some time. Johansson also noted that individual formats (DV, MPEG, audio) might need to be enumerated, because the disk may need specific format information to fix up the track.

Anderson and Johansson discussed an approach where tracks are created using their "native" command set (such as AVC), then captured by RBC, then returned to their native format later. Track formats could not be changed once created, but tracks probably cannot meaningfully change format anyway - all the contents would become meaningless. New tracks could freely be created if a different format was desired. One problem remains - how to learn the extent ID of a track created using a native command set.

Fuller noted that the AV HDD specification did have a command to create a track, though details were unclear. Johansson observed that plug control register settings were mandatory when using this command, and that other commands were allowed to be rejected if active plug settings differed from what was first specified.

Action: Anderson to present an SBP-3 liaison report at the AV working group July meeting in Vancouver, to describe what SBP-3 is doing, and issues the group has found with the AVC HDD model.

Johansson drafted a letter to the AV working group with questions.

Green asked how the free space on a disk could be determined. Anderson noted that in a video editing application it was desirable to tell the user how much free space was available so that they could plan ahead. Johansson said he would investigate how to add this. Green noted that the persistence of the default RBC extent selection was not stated. Johansson said it should be non-volatile, persisting across a power reset, and said he would add it to the draft. Anderson noted that a single number expressing the total free space would not convey underlying restrictions that could prevent the creation of a particular track format of that full size, such as fragmentation.

Johansson led a review of Configuration ROM entries to determine which ones apply to Unit Directories, Logical Unit Directories, or both. The group determined the following:

7.4.1 (Specifier_ID): Unit Directory only
7.4.2 (Version): Unit Directory only
7.4.3 (Command_Set_Spec_ID): either Unit Directory or Logical Unit Directory
7.4.4 (Command_Set): either Unit Directory or Logical Unit Directory
7.4.5 (Command_Set_Revision): either Unit Directory or Logical Unit Directory
7.4.6 (Firmware_Revision): either Unit Directory or Logical Unit Directory
7.4.7 (Management_Agent): Unit Directory only
7.4.8 (Unit_Characteristics): Unit Directory only
7.4.9 (Reconnect_Timeout): Unit Directory only

7.4.10 (Fast_Start): either Unit Directory or Logical Unit Directory

Furthermore, the group determined that any of the above items specified in a Unit Directory has global effect, except in a Logical Unit Directory where the item is also specified.

Johansson said he would expand the table in section 7.5 to include Fast Start, and add clarification that that items from section 7.4 not listed in the table are prohibited in Logical Unit Directories.

Anderson explained how the Firmware_Revision key is presently being used to encode bridge vendor and firmware revision information for bug workaround purposes. Johansson suggested that a vendor ID should be added to the Unit Directory to qualify the meaning of the Firmware_Revision key.

[10] Adjourned

General information and document index

The SBP-3 email reflector SBP3@isg.apple.com can be accessed as follows:

Subscribing:
email requests@isg.apple.com w/subject "subscribe sbp3"

Help?:
email requests@isg.apple.com w/subject "help"

An automated system had been created for the allocation of T10 document numbers, and the subsequent submission of documents for posting:

http://www.t10.org/members/ad.htm

The following documents have been posted pertaining to SBP-3:

00-328 Eric Anderson
Fast Start proposal (PowerPoint slides)
ftp://ftp.t10.org/t10/document.00/00-328r0.pdf

00-371 Peter Johansson
Minutes of SBP-3 Study Group September 19, 2000

ftp://ftp.t10.org/t10/document.00/00-371r0.pdf

00-388 Peter Johansson
SBP-3 Project Proposal
ftp://ftp.t10.org/t10/document.00/00-388r0.pdf

01-057 Eric Anderson
Fast Start Proposal
ftp://ftp.t10.org/t10/document.01/01-057r0.pdf

01-060 Eric Anderson
Minutes of SBP-3 Working Group January 24-25, 2001
ftp://ftp.t10.org/t10/document.01/01-060r0.pdf

01-067 Lance Flake
RBC Access For AV/C Data Interchange
ftp://ftp.t10.org/t10/document.01/01-067r0.pdf
ftp://ftp.t10.org/t10/document.01/01-067r1.pdf

01-070 Peter Johansson
Bridge-aware targets and node handles
ftp://ftp.t10.org/t10/document.01/01-070r0.pdf

01-101 Eric Anderson
Minutes of SBP-3 Working Group March 6-7, 2001
ftp://ftp.t10.org/t10/document.01/01-101r0.pdf

01-102 Scott Smyers
Proposal for modifications to SBP3 and RBC
ftp://ftp.t10.org/t10/document.01/01-102r0.pdf

01-137 Peter Johansson
Stream command block ORB
ftp://ftp.t10.org/t10/document.01/01-137r0.pdf

01-138 Peter Johansson
Bi-directional ORBs (PowerPoint slides)
ftp://ftp.t10.org/t10/document.01/01-138r0.pdf

01-139 Eric Anderson
Minutes of SBP-3 Working Group April 26-27, 2001
ftp://ftp.t10.org/t10/document.01/01-139r0.pdf

01-179 Andy Green
Proposal to modify isochronous recording format
ftp://ftp.t10.org/t10/document.01/01-179r0.pdf

01-180 Peter Johansson
RBC-2 commands for extent management
ftp://ftp.t10.org/t10/document.01/01-180r0.pdf

01-187 Eric Anderson
Minutes of SBP-3 Working Group June 5-6, 2001
ftp://ftp.t10.org/t10/document.01/01-187r0.pdf

Latest draft SBP-3 document:

ftp://ftp.t10.org/t10/drafts/sbp3/sbp3r01c.pdf

[end]