

Draft Minutes
Automation/Drive Interface (ADI) Working Group
T10/02-084r0
March 12, 2002 – Dallas, TX
9:05 AM – 5:10 PM

For reference, the agenda is reproduced here:

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|---|--|-------------------------------|
| 1. Introductions: | | Group |
| 2. Approval of this agenda: | | Paul Suhler |
| 2.1. Approval of previous meeting minutes | 02-059r0 | Paul Suhler |
| 3. Review of action items | | Joe Breher |
| a) | Paul Suhler to find out whether T10 rules require individual patent applications to be disclosed. | |
| b) | Erich Oetting to bring a proposal for automation/drive interface from StorageTek. | |
| c) | Bob Griswold to present the three project proposals at the T10 Plenary meeting. | |
| d) | Paul Entzel to disclose Quantum's physical layer specification. | |
| e) | Joe Breher to investigate whether he is able to disclose Exabyte's physical layer specification, and to disclose it to the group if able to. | |
| f) | Erich Oetting to investigate whether he is able to disclose StorageTek's physical layer specification, and to disclose it to the group if able to. | |
| g) | Michael Banther to generate a straw man summary of the various vendors' physical layers. | |
| h) | Lee Jesionowski to discuss exceptions to SAM with George Penokie. | |
| i) | Bob Griswold to take concepts developed at the meeting as a straw man, and use them to develop an initial specification proposal for ADT. | |
| j) | Rod Wideman to develop straw man specification for minimum drive state polling frame. | |
| k) | Paul Suhler to develop initial list of SCSI commands that should be mandatory and/or optional. | |
| 4. Discussion items: | | |
| a) | Bi-Directional Control Patent Disclosure | 02-099r0 Michael Banther |
| b) | Drive Polling Frames | 02-097r0 Rod Wideman |
| c) | Electrical Layer Spec Proposals | 02-063r0 Kevin Gingerich |
| d) | Required and Optional SCSI Commands | 02-106r0 Paul Suhler |
| 5. Unscheduled business: | | |
| 6. Next meeting requirements: | | Paul Suhler |
| 7. Review new action items: | | Joe Breher |
| 8. Adjournment: | | Group |

Paul Suhler brought the meeting to order at 9:05.

1 Introductions

Paul Suhler thanked the meeting host, Texas Instruments, and led the group in introductions. The following people were in attendance:

David Peterson	Cisco Systems, Inc.	dap@cisco.com
Robert Griswold	Crossroads Systems, Inc.	rgriswold@crossroads.com
Joe Breher	Exabyte Corp.	joebre@exabyte.com
Michael Banther	Hewlett Packard Co.	michael_banther@hp.com
Kevin Butt	IBM Corp.	kdbutt@us.ibm.com
Paul Entzel	Quantum Corp.	paul.entzel@quantum.com
Paul Suhler	Seagate Technology	paul.a.suhler@seagate.com
Erich Oetting	Storage Technology Corp.	erich_oetting@stortek.com
Kevin Gingerich	Texas Instruments	k-gingerich@ti.com
Susan Gray	Quantum Corp.	susan.gray@quantum.com
Lee Jesionowski	IBM Corp.	ljesion@us.ibm.com
Steve Hellwege	Quantum Corp.	steve.hellwege@quantumatl.com
Rod Wideman	ADIC	rod.wideman@adic.com

2 Approval of agenda

Paul Suhler made a call for alterations of the agenda. The following additions were suggested:

- a) SAM & SPC Feedback

Lee Jesionowski suggested that this item be added to the discussion items. This was approved by acclamation, and added as item 4 d.

2.1 Approval of previous meeting minutes

Paul Suhler made a call for corrections of the minutes of the previous ADI meeting, as embodied in T10/02-059r0.

- a) Concurrent operations

Michael Banther indicated that part of item 8.1.1.1 (“ADI will allow multiple concurrent ‘operations’ (SAM Task – like constructs) per channel.”) seemingly conflicts with part of item 8.1.1.4 (“It was decided that a sender shall receive an ACK, NAK, or timeout event before sending a subsequent frame for any given ‘ITLQ nexus’-like construct.”). It was decided to add this item to the discussion items, as item 4 f.

3 Review of action items

Joe Breher read the action items from last meeting. The status of these is as follows:

- a) Paul Suhler to find out whether T10 rules require individual patent applications to be disclosed.

Complete. T10 policy is to request disclosure of patents and applications. The organization cannot require this disclosure.

- b) Erich Oetting to bring a proposal for automation/drive interface from StorageTek.

Cancelled. This item is subsumed by action item f).

- c) Bob Griswold to present the three project proposals at the T10 Plenary meeting.

Complete. ADC, ADT, and ADP were approved as T10 projects at the last plenary.

- d) Paul Entzel to disclose Quantum's physical layer specification.

Carryover.

- e) Joe Breher to investigate whether he is able to disclose Exabyte's physical layer specification, and to disclose it to the group if able to.

Carryover.

- f) Erich Oetting to investigate whether he is able to disclose StorageTek's tape to library interface specification, and to disclose it to the group if able to.

Carryover.

- g) Michael Banther to generate a straw man summary of the various vendors' physical layers.

Carryover.

- h) Lee Jesionowski to discuss exceptions to SAM with George Penokie.

Complete. On agenda as item 4 d.

- i) Bob Griswold to take concepts developed at the meeting as a straw man, and use them to develop an initial specification proposal for ADT.

Carryover.

- j) Rod Wideman to develop straw man specification for minimum drive state polling frame.

Complete. On agenda as item 4 b.

- k) Paul Suhler to develop initial list of SCSI commands that should be mandatory and/or optional.

Complete. On agenda as item 4 b.

4 Discussion items:

- a) Bi-Directional Control Patent Disclosure

Michael Banther presented T10/02-099r0. It is disclosed therein that Hewlett Packard has applied for a patent that may possibly affect implementations compliant with the ADI family of standards. Details on the licensing policy for this patent may be found within the presented document T10/02-099r0.

- b) Drive Polling Frames

Rod Wideman presented T10/02-097r0, entitled "ADI Drive Polling Frames". This document formed the basis of much discussion, detailed as follows:

Very High Frequency Data Frame

There was some question as to whether all but very high frequency data should be done with encapsulated SCSI (Oetting) The point was made that some things (such as tape load count) are implemented as vendor specific pages, and are therefore not defined by any SCSI document (Entzel). The question was raised that perhaps SSC-x should define these items (Jesionowski).

There exists a customer request for very simple control mechanism to be used by minimal attached autoloader. A minimal implementation would likely desire that all frames be of fixed size (Banther).

Would be nice to have a model of the states a 'typical' drive may employ in the load/unload cycle. (Jesionowski) Should it be normative? Not all drives will be able to detect all possible states – e.g. no sensor to indicate unload has completed, but cartridge still in drive. Perhaps it is feasible to create a model that accounts for a superset of states current and future implemented drives employ. Any given implementation may be able to map its physical states to this meta state model.

It was suggested that we need further definition of each of the bits in second byte.

A question was raised as to what the definition of the error codes will be. Should we spend the extra bytes to report back SenseKey/ASC/ASCQ? (Breher) We could use a reserved bit in byte 0 to change the meaning for the last two bytes to ASC/ASCQ (Oetting). Switching meanings of bytes may be problematic for minimal autochangers. Perhaps we should carve up Error Code field into bits indicating category of error [error | drive error | media error | tape alert]. The specific bits being set would indicate to the media changer what frames it must acquire to obtain the specific error code.

Would like a bit to indicate that the drive is accessible from its other ports, such as SPI, Fibre Channel, etc. (Banther) This should be per port, as it may be normal that one port may not be hooked up, and that would mask any new event that disabled the operational port. Perhaps we should add an Interface Error bit to the error code byte.

Need a persistent error bit, as opposed to an error bit that would be reset upon reading it (Entzel).

High Frequency Data Frames

The Read and Write Data Response Frame consolidates data typically obtained via Log Sense.

The Tape Alert Response Data Frame consolidates data typically obtained in the TapeAlert page.

Reading the TapeAlert log page typically clears all TapeAlert flags. As we are introducing a new client of the TapeAlert data, we need to redefine when these flags will be cleared. Will they be consumed by the media changer, rather than being available to other initiators such as the 'host'?

Tape Alert flags could be kept per initiator, so we could think of the media changer as another initiator (Breher). What if the media changer talks to the drive over both ADI and SCSI? This may be an illogical implementation, so this case probably will not occur. If it is implemented as such, the media changer would get two indications of each error, one per connection (e.g. SCSI and ADI).

Low Frequency Data Frames

Drive Information Response Data Frame

Total time of tape motion is a better indicator of head residue accumulation than is total time powered on (Entzel). Total meters of tape pulled past heads may be a better indicator (Banther). However, the longer the fan is on, more contamination would be pulled into the drive (Jesionowski).

Is there a good reason to employ these frames rather than encapsulated SCSI? Two benefits were mentioned: the consolidation of information that would otherwise be pulled from many sources; and in-band communications may possibly disturb information meant for the initiator (Wideman). It was pointed out that the second issue is manageable by creating appropriate rules for clearing of these pieces of information (Banther).

The point was raised that we should probably have a single integrated maintenance mechanism (Jesionowski).

We should probably create a profile against TapeAlert (Jesionowski).

SNIA Storage Media Library Working group may be working on the same sort of information constructs.

General Discussion

A discussion ensued to gauge the sense of the room over which frames should not be encapsulated SCSI?

Very High Frequency Data Response Frame

This frame does not lend itself to Encapsulated SCSI.

High Frequency Read and Write Data Response Frame

This may best be handled as Encapsulated SCSI

High Frequency Tape Alert Response Data Frame

The concept of the increased information density over current log pages is desired. Perhaps this should be outside of the Encapsulated SCSI traffic.

Low Frequency Drive Information Response Data Frame

This may best be handled as Encapsulated SCSI. Perhaps we should define what items we are most interested in, and present our findings to the SSC-x WG.

Low Frequency Media Information Response Data Frame

This may best be handled as Encapsulated SCSI. There are issues with MODE SENSE and reservations that will need to be discussed later. Compression Enabled and Write Protect are probably the same information returned by MODE SENSE. Perhaps we should move these two items into the Very High Frequency Data Response Frame.

Very Low Frequency Control Frame

There is no concept in the SCSI command layer of the data items in this frame. However, it may be viewed as analogous to the various port control mode pages. For now, perhaps this should remain outside of the Encapsulated SCSI mechanism.

Lunch

c) Electrical Layer Spec Proposals

Kevin Gingerich presented T10/02-063r0.

This document presented an analysis of the EIA/TIA-422 signalling standard, as a potential implementation of ADP. It covered both differential and single ended (-423?) configurations. Also discussed was EIA/TIA-485 for multidrop applications.

A single ended configuration may allow for 7V common mode noise, provided the noise is not steady state, and filtered by 27dB at 60 Hz. This may be too restrictive for our use.

Shall we employ multidrop? Exabyte and StorageTek each use multidrop, but this introduces some complications, such as:

- If unsolicited data is to be allowed, either collision detection is necessary, or an arbitration scheme would be required;
- Some notion of address must be employed.

d) SAM & SPC Feedback

Lee Jesionowski initiated a discussion of his findings on how the ADI family of standards may fit within the SCSI Architecture Model. Specifically, what is the entity that is the recipient of ADC commands? Can it be mapped to an existing SAM object?

We want this new ADI entity to have access to the drive's logical unit's Task Set. However, this entity cannot be that logical unit, as we cannot abide by the reservations rules.

We discussed whether Well-Known Logical Units (WKLUs) provide a mechanism for implementing this entity's functionality. There were a couple of problems that were detected with this scheme:

- WKLUs are separate logical units. As such, they have their own task set. Any access of the sequential-access logical unit within the same tape drive would be outside any SAM-x architectural construct;
- WKLUs are identified by means of their LUN. This LUN is a very large 64-bit number. Any use of this on SPI-x protocols would require this LUN to be aliased to another LUN accessible via SPI.
- All commands of a WKLUs command set must be mandatory.

We discussed whether Asymmetric Logical Units (ALUs) provide a mechanism for implementing this entity's functionality. It was decided that this entity could not be an ALU, as if it was, it would be bound to the normal reservation rules.

We discussed whether the entity that parses ADC commands was just another logical unit within the same device. This would allow us to define a new device type that supports the ADC command set, which could be defined in any manner we desire. This would be a separate logical unit, so reservations would not be a problem. However, as it is a separate logical unit, access to the Task Set of the sequential-access logical unit in the drive would be outside the scope of SAM-x. There is a mitigating factor in that there is no known rule that states that the task set of each logical unit cannot affect a common underlying entity (the device itself).

It was pointed out that device types are scarce, and that obtaining one may be problematic. Accordingly, we discussed the possibility of resurrecting the device type modifier field of the INQUIRY data.

Action items were given to Bob Griswold to ask the CAP WG why WKLUs require all commands to be mandatory, and to request that the device type modifier field of the INQUIRY data be resurrected, with an aim to acquiring a new device type.

e) Required and Optional SCSI Commands

Paul Suhler presented T10/02-106r0, entitled "ADI: Required and Optional SCSI Commands". This document formed the basis of much discussion as to which commands an ADI logical unit may support.

Carried out activity to identify the commands that a library may wish to invoke upon the drive, irrespective of the interface (SCSI or ADI). This activity resulted in the column labeled 'Useful' in 106r1.

We tried to enumerate the configurations we are considering in order to bring order to the conversation:

- 'WKLU only' which would have all ADI communication from the media changer to the drive handled by a WKLU within the drive.
- 'WKLU plus multiport', which would split all ADI communication between a WKLU handling the new ADI-specific commands, as well as an SSC LU handling the standard SSC commands.
- 'Separate SSC LU', which would direct all ADI communication to a second SSC LU (apart from the default SSC LU), which has extended functionality to handle the ADI commands.

Eliminated 'WKLU only' configuration from consideration, as this would necessitate breaking reservations for some commands to break reservations for all commands.

f) Concurrent Operations (added to agenda)

Not discussed.

5 **Unscheduled business:**

The schedule developed last meeting for completing the standards development activity was recognized as being overly aggressive.

6 **Next meeting requirements:**

Paul Suhler led a discussion of the time requirements next meeting. It was determined that he would ask for the same time allotment next meeting.

7 **Review new action items:**

- a) Paul Entzel to disclose Quantum's physical layer specification.
- b) Joe Breher to investigate whether he is able to disclose Exabyte's physical layer specification, and to disclose it to the group if able to.
- c) Erich Oetting to investigate whether he is able to disclose StorageTek's tape to library interface specification, and to disclose it to the group if able to.
- d) Michael Banther to generate a straw man summary of the various vendors' physical layers.

- e) Bob Griswold to take concepts developed at the meeting as a straw man, and use them to develop an initial specification proposal for ADT.
- f) Michael Banther to define minimal set of control commands, and status items, as per autoloader.
- g) Lee Jesionowski to develop straw man interface status page.
- h) Lee Jesionowski to scrutinize TapeAlert mechanism, and begin developing usage and persistence rules, and error reporting, and additional data items for ADI.
- i) Paul Suhler to generate and post 106r1, incorporating discussion.
- j) Bob Griswold to take “Why do well known logical units require that all their commands be mandatory?” to CAP.
- k) Bob Griswold to take “Can we resurrect standard Inquiry data device-type modifier field?” to CAP.
- l) Michael Banther to contact T10 chair for proper handling of patent disclosure.
- m) Paul Suhler to schedule teleconference.
- n) Bob Griswold to ask plenary for permission to schedule teleconference for week of April 17th.
- o) Rod Wideman to update the command proposal as 097r1.

8 Adjournment:

The meeting was adjourned at 5:10pm.