

Accredited Standards Committee\*  
**InterNational Committee for Information Technology Standards (INCITS)**

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| Doc. No.: T10/03-105r0 |
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Date: February 27, 2003

Reply to: John Lohmeyer

To: T10 Membership  
From: John Lohmeyer  
Subject: SAS Protocol WG -- Feb 24-25, 2003  
Phoenix, AZ

## Agenda

1. Opening Remarks
2. Approval of Agenda
3. Attendance and Membership
4. Old Business
  - 4.1 SAS Working Draft Review (SAS) [Elliott]
  - 4.2 SAS Disconnect-Reconnect Mode Parameters (02-324) [Gardner]
  - 4.3 CRC on Frame Header [Roberts]
  - 4.4 Transport Layer Retries (02-487) [Jones]
5. New Business
  - 5.1 SAS Revision 3 T10 letter ballot comment resolution (03-055) [Elliott]
  - 5.2 SAS Expander internal devices (03-034) [Fairchild]
  - 5.3 SAS Requests and Confirmations (03-023) [Evans]
  - 5.4 SAS Port Layer Description Modifications (03-024) [Evans]
  - 5.5 SAS PHY CHANGE COUNT (03-089) [Hoglund]
  - 5.6 SAS Target Port Transfer Tag (03-091) [Penokie]
  - 5.7 SAS Fixes (03-093) [Penokie]
  - 5.8 SAS STP affiliations (03-109) [Galloway]
  - 5.9 SAS SL\_IR state receiving IDENTIFY frames (03-112) [Evans]
  - 5.10 SAS logo: do we adopt the STA logo? [Lohmeyer]
6. Review of Recommendations
7. Meeting Schedule
8. Adjournment

## Results of Meeting

### 1. Opening Remarks

John Lohmeyer called the meeting to order at 9:00 a.m. Monday, February 24, 2003. He thanked Bob Sheffield of Intel for hosting the meeting. As usual, the people present introduced themselves.

### 2. Approval of Agenda

The draft agenda was approved with no changes, however a large number of subtopics were identified for agenda item 5.1.

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**INCITS Secretariat, Information Technology Industry Council (ITI)**  
1250 Eye Street NW, Suite 200, Washington, DC 20005-3922  
Email: incits@itic.org Telephone: 202-737-8888 FAX: 202-638-4922

The following items was added or revised during the course of the meeting:

- 5.8 SAS STP affiliations (03-109) [Galloway]
- 5.9 SAS SL\_IR state receiving IDENTIFY frames (03-112) [Evans]
- 5.10 SAS logo: do we adopt the STA logo? [Lohmeyer]

### 3. Attendance and Membership

Attendance at working group meetings does not count toward minimum attendance requirements for T10 membership. Working group meetings are open to any person or organization directly and materially affected by T10's scope of work. The following people attended the meeting:

| Name                  | S | Organization          | Electronic Mail Address      |
|-----------------------|---|-----------------------|------------------------------|
| Mr. Robert H. Nixon   | P | Emulex                | bob.nixon@emulex.com         |
| Mr. Rob Elliott       | P | Hewlett Packard Co.   | Elliott@hp.com               |
| Mr. Steven Fairchild  | V | Hewlett Packard Co.   | Steve.Fairchild@hp.com       |
| Mr. George O. Penokie | P | IBM / Tivoli Systems  | gop@us.ibm.com               |
| Mr. Pak Seto          | V | Intel                 | pak-lung.seto@intel.com      |
| Mr. Cris Simpson      | P | Intel Corp.           | cris.simpson@intel.com       |
| Mr. Robert Sheffield  | A | Intel Corp.           | robert.l.sheffield@intel.com |
| Mr. John Lohmeyer     | P | LSI Logic Corp.       | lohmeier@t10.org             |
| Mr. Brian Day         | V | LSI Logic Corp.       | brian.day@lsil.com           |
| Mr. Tim Hoglelund     | V | LSI Logic Corp.       | tim.hoglelund@lsil.com       |
| Mr. Sam Chou          | V | Marvell Semiconductor | schou@marvell.com            |
| Mr. Chee Hoe Chu      | V | Marvell Semiconductor | chchu@marvell.com            |
| Mr. Abhilash Mathew   | V | Marvell Semiconductor | amathew@marvell.com          |
| Mr. Jothi Venkatesan  | V | Marvell Semiconductor | jothiv@marvell.com           |
| Mr. Mark Evans        | P | Maxtor Corp.          | mark_evans@maxtor.com        |
| Mr. Bill Galloway     | P | Pivot3, Inc.          | billg@pivot3.com             |
| Mr. Jim Jones         | A | Quantum Corp.         | jim.jones@quantum.com        |
| Mr. Jim Coomes        | V | Seagate Technology    | jim.coomes@seagate.com       |
| Mr. John Worden       | V | Seagate Technology    | john.worden@seagate.com      |
| Mr. Kenneth Hirata    | P | Vixel Corp.           | Ken.Hirata@Vixel.com         |

20 People Present

Status Key: P - Principal  
 A,A# - Alternate  
 AV - Advisory Member  
 L - Liaison  
 V - Visitor

### 4. Old Business

#### 4.1 SAS Working Draft Review (SAS) [Elliott]

This agenda item was not covered separately from agenda item 5.1.

## 4.2 SAS Disconnect-Reconnect Mode Parameters (02-324) [Gardner]

In the absence of Ed Gardner, discussion of this topic was deferred to the next meeting.

## 4.3 CRC on Frame Header [Roberts]

In the absence of Ron Roberts, this topic was deferred to the next meeting.

## 4.4 Transport Layer Retries (02-487) [Jones]

George Penokie noted that he plans to bring a proposal in for data recovery only for SAS-2. He felt that command recovery is unnecessary and too complicated.

## 5. New Business

### 5.1 SAS Revision 3 T10 letter ballot comment resolution (03-055) [Elliott]

Rob Elliott noted that the following documents are relevant:

- 03-055r3.pdf - comments sorted by author
- 03-055r3.zip - contains a zip file with sas-r03 with comments (PDF database)
- sas-r03d.pdf - latest version of SAS
- sas-r03d.zip - Frame source for SAS rev 3d

Rob Elliott led the group in a discussion of the letter ballot comments on SAS. Rob noted that the following topics need to be addressed under this agenda item:

- Port layer
- primitive inside frame wording
- STP affiliations
  - o mandatory or optional
  - o meaning for native STP targets (Proposal from B.Galloway)
- UML pictures
- George's list of issues
- EdNote 3.1.41 definition of fanout expander
- EdNote 4.4.2 hard reset section wording
- EdNote 4.6.11.3 cascaded wording
- EdNote 6.7.4.3.1 change how SP and SP\_DWS work together
- EdNote 6.8.2 how to define invalid dword in text
- Page 4 normative reference for SATA
- Page 6 definition for signal
- Page 8 use of "idle"
- Page 10 singular/plural making
- Page 16 mixed case for state names (interpret comment)
- Page 17 using quotes should be allowed
- Page 49 section 4.4.2 stop transmitting
- Page 109 section 6.8.2 "to all states" in figures
- Page 122 section 6.9.1 cutouts in figures
- Page 149 section 7.5 scrambling initialization text
- Page 154 section 7.8.1 "shall expect to"
- Page 155 section 7.8.1 which port to disable if loop is found (multiple initiators)
- Page 155 section 7.8.4 interpret comment on 1st para
- Page 157 section 7.8.6.1.2.1 states don't do things, state machines do

- Page 185 section 7.14.3 edge vs level signals in XL
- Page 198 section 7.16.7.2 parameters is bad name; should use signals or something else
- Page 251 section 9.2.6.3.1 figure keep Nexus Lost upstream (call it an indication?)
- Page 254 section 9.2.6.3.4.1 ACK Transmitted - need NAK Transmitted too?
- Page 254 section 9.2.6.3.4.1 keep Nexus Lost upstream
- Page 259 section 9.3.2 STP affiliation wording to address Microsoft comment
- Page 259 section 9.3.2 STP affiliations mandatory or optional
- Page 260 section 9.4.2 mention error handling next to FUNCTION, etc. fields (prelim recommend a pointer to the error table)
- Page 260 section 9.4.2 handling bad SMP frame types 40h and 41h (prelim recommend generate BREAK at transport layer)
- Page 264 section 9.4.4.2.3.1 how to specify transitions that carry arguments
- Page 298 section 10.3.1.3 remove (MSB)/(LSB) from string variables since they are structures (arrays) consisting of smaller structures (bytes) each of which has its own MSB/LSB
- Page 305 section 10.3.1.5 outside of phy reset sequences
- Page 305 section 10.3.1.6 name of REPORT PHY SATA if native STP can support
- request/indication/response/confirmation definitions
- modeling expander internals as below the XL layer
- ERROR handling - treat as invalid dword and force frame error, or allow devices to throw away like an ALIGN (prelim: shall ignore is unacceptable; may is ok but weak; shall cause error is best)
- any places where we have "reserved" where we mean "shall ignore"?
- review all comments marked REVIEW
- review unaddressed comments

Detailed minutes of the above items were not kept here except as noted below. Please refer to the next revision of the draft ballot resolution document (03-055r4) for more information.

Mark Evans presented wording that would address various issues with address frames, including BREAK handling. While there is no defined way for a transmitter to send a BREAK primitive sequence in an address frame, the question was what does a receiver do if a BREAK primitive sequence is received? The conclusion was to ignore all primitives inside address frames (in the first 8 dwords).

Rob noted that the XL state machine has a bug. The XL0:Idle state should not respond to BREAK by sending BREAK.

Bob Nixon moved and Bill Galloway seconded that in section 7.8.2, 'the application client within an initiator device shall perform a discovery process' be changed to 'the application client within an initiator device should perform a discovery process' (i.e., 'shall' becomes 'should'). The motion passed unanimously.

John Worden moved and Bill Galloway seconded that a new confirmation, Done Received, be added to the port layer and that the same confirmation be added from the port layer to the transport layer and from the transport layer to the application layer. The motion passed 5:2:1.

George Penokie discussed the issue of primitives inside frames. George Penokie moved and Jim Coomes seconded that the statement in 7.12.4.1 that says "This state shall not respond to incoming BREAKs, OPEN\_REJECTs, and OPEN\_ACCEPTs until after the OPEN address frame has been transmitted." be changed to "This state shall not respond to incoming OPEN\_REJECTs or OPEN\_ACCEPTs until after the OPEN address frame has been transmitted.". The motion passed 9:1:1

George Penokie discussed the issue of clarifying OPEN\_REJECT wording. An editorial correction was made.

Rob Elliott moved and Bob Sheffield seconded that the SATA references be changed to the appropriate document references in T13. The motion passed unanimously.

George Penokie moved and Bill Galloway seconded that we reject the Elliott comment on eliminating (MSB) and (LSB) on character strings. The motion passed 3:2:2.

## **5.2 SAS Expander internal devices (03-034) [Fairchild]**

George Penokie reported that this topic was resolved during the letter ballot teleconference calls. In absence of objections, the working group accepted 03-034r4 for inclusion in SAS.

## **5.3 SAS Requests and Confirmations (03-023) [Evans]**

Mark Evans asked that this item be deferred.

## **5.4 SAS Port Layer Description Modifications (03-024) [Evans]**

Mark Evans presented 'SAS PLtimer5 jbw\_me.pdf', a proposal that John Worden and Mark are working on to address port layer timer issues. This proposal would be included in a revision of 03-024 once the group is happy with the wording.

## **5.5 SAS PHY CHANGE COUNT (03-089) [Hoglund]**

George Penokie reported that this topic was resolved during the letter ballot teleconference calls. In absence of objections, the working group accepted 03-089r0 for inclusion in SAS.

## **5.6 SAS Target Port Transfer Tag (03-091) [Penokie]**

George Penokie reported that this topic was resolved during the letter ballot teleconference calls, creating a rev 1 of this proposal. In absence of objections, the working group accepted 03-091r1 for inclusion in SAS.

## **5.7 SAS Fixes (03-093) [Penokie]**

George Penokie requested that this agenda item be dropped from future agendas.

## **5.8 SAS STP affiliations (03-109) [Galloway]**

Bill Galloway presented a 03-109r0.doc, SAS STP affiliations. He received input and prepared revision 1 on screen. Bill Galloway moved and Jim Coomes seconded that 03-109r1 be accepted for inclusion in SAS. The motion passed 8:0:3.

## **5.9 SAS SL\_IR state receiving IDENTIFY frames (03-112) [Evans]**

Mark Evans presented 03-112r0, SAS SL\_IR state receiving IDENTIFY frames. Mark Evans moved and George Penokie second that 03-112r0 be accepted for inclusion in SAS. The motion passed 10:0:0.

## **5.10 SAS logo: do we adopt the STA logo? [Lohmeyer]**

George Penokie spoke against the idea of using the STA logo unless all restrictions are removed from the legal agreement. George Penokie moved and Cris Simpson seconded that the T10 Vice Chair contact STA and request usage of the STA logo for SAS with no restrictions. The motion passed 8:0:1.

## **6. Review of Recommendations**

John Lohmeyer noted that the following documents were accepted for inclusion in SAS during this meeting:

03-034r4, SAS Expander internal devices

03-089r0, SAS PHY CHANGE COUNT  
03-091r1, SAS Target Port Transfer Tag  
03-109r1, SAS STP affiliations  
03-112r0, SAS SL\_IR state receiving IDENTIFY frames

The following motions were passed:

that in section 7.8.2, 'the application client within an initiator device shall perform a discovery process' be changed to 'the application client within an initiator device should perform a discovery process' (i.e., 'shall' becomes 'should').

that a new confirmation, Done Received, be added to the port layer and that the same confirmation be added from the port layer to the transport layer and from the transport layer to the application layer.

that the statement in 7.12.4.1 that says "This state shall not respond to incoming BREAKs, OPEN\_REJECTs, and OPEN\_ACCEPTs until after the OPEN address frame has been transmitted." be changed to "This state shall not respond to incoming OPEN\_REJECTs or OPEN\_ACCEPTs until after the OPEN address frame has been transmitted."

that the SATA references be changed to the appropriate document references in T13.

that the T10 Vice Chair contact STA and request usage of the STA logo for SAS with no restrictions.

John Lohmeyer noted that the following recommendations were made during the January 13-14, 2003 meeting:

Accept the comment in 7.1.4.4 that increases the number of broadcast primitives from 4 to 8. [14:0:4]  
Make one of the new broadcast-reserved primitives a broadcast-reserved-changed primitive. [16:2:3]  
Accept the comment regarding the 20 dword rule in 7.1.6.3. [11:0:6]  
Remove the 64 entry limit of the number of indices in fanout expanders.[10:1:6]  
Remove near end analog loop back. [8:2:10]  
Remove note 12. [5:1:10]  
SAS Definitions (03-022r1) [Evans] {r0 as revised, unanimous}  
SAS SMP error codes (03-058r0) [Fairchild] {unanimous}

## 7. Meeting Schedule

SAS Protocol Working Group meetings are scheduled for:

Monday-Tuesday, March 10-11, 2003 commencing at 10 a.m., or ten minutes following the conclusion of the SPI Working Group meeting which ever is earlier in Dallas, TX at the Crowne Plaza Suites Hotel (972-233-7600), hosted by Texas Instruments. If there is no SPI Working Group meeting, the SAS Protocol Working Group meeting will commence at 9:00 a.m.

Additional teleconference calls may be announced on the T10 reflector as needed.

## 8. Adjournment

John Worden moved and Bob Nixon seconded to adjourn. The motion passed unanimously. The meeting was adjourned at 7:18 p.m. on Tuesday February 25, 2003.