

Accredited Standards Committee\*

## InterNational Committee for Information Technology Standards (INCITS)

Doc. No.: T10/02-456r0

Date: November 6, 2002

Reply to: John Lohmeyer

To: T10 Membership  
From: Ralph Weber & John Lohmeyer  
Subject: SAS Protocol WG -- Nov 4-5, 2002

### Agenda

1. Opening Remarks
2. Approval of Agenda
3. Attendance and Membership
4. Old Business
  - 4.1 SAS Working Draft Review [Elliott]
  - 4.2 SAS Disconnect-Reconnect Mode Parameters (02-324) [Gardner]
  - 4.3 CRC on Frame Header [Roberts]
  - 4.4 Project proposal for Serial Attached SCSI - 2 (SAS-2) (02-429) [Elliott]
  - 4.5 SAS SATA 1.0e Support (02-437) [Sheffield]
  - 4.6 SAS Simplified Support for Multiple STP Initiators (02-430) [Sheffield]
  - 4.7 SAS STP Buffering (02-435) [Sheffield]
  - 4.8 SAS Handling Link Rate Not Supported (02-443) [Elliott]
  - 4.9 SAS Simple Relative Offset (02-449) [Galloway]
  - 4.10 SAS Protocol-Specific mode page - make short format optional (02-472) [Elliott]
5. New Business
  - 5.1 SAS '(RESERVED)' primitive clarification (02-465) [Evans]
  - 5.2 SAS: SSP Link layer state machine rewrite (02-470) [Penokie]
  - 5.3 SAS Make Protocol-Specific mode page short format optional (02-472) [Elliott]
  - 5.4 SAS Spare Primitives (02-461) [Galloway]
  - 5.5 SAS Zero Length Data Frames (02-462) [Galloway]
  - 5.6 Processing Unknown Frame Types (02-459) [Coomes]
  - 5.7 SAS: Make Report General Page Larger (02-476) [Besmer]
  - 5.8 Transport Layer Retries [Jones]
  - 5.9 Remove SMP PHY CONTROL Function ENABLE (02-477) [Fairchild]
  - 5.10 SAS SSP Transport Layer State Machine Modification (02-478) [Evans]
  - 5.11 SAS - OOB and DWS state machines update (02-475) [Grieff]
6. Review of Recommendations to the Plenary
7. Meeting Schedule
8. Adjournment

### Results of Meeting

#### 1. Opening Remarks

John Lohmeyer called the meeting to order at 1:30 p.m. Tuesday, November 4, 2002. He thanked Skip Jones of QLogic for hosting the meeting.

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## 2. Approval of Agenda

The draft agenda was approved with the following changes:

- 5.4 SAS Spare Primitives (02-461) [Galloway]
- 5.5 SAS Zero Length Data Frames (02-462) [Galloway]
- 5.6 Processing Unknown Frame Types (02-459) [Coomes]

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

- 5.7 SAS: Make Report General Page Larger (02-476) [Besmer]
- 5.8 Transport Layer Retries [Jones]
- 5.9 Remove SMP PHY CONTROL Function ENABLE (02-477) [Fairchild]
- 5.10 SAS SSP Transport Layer State Machine Modification (02-478) [Evans]
- 5.11 SAS - OOB and DWS state machines update (02-475) [Grieff]

## 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. Ron Roberts	P	Adaptec, Inc.	Ron_Roberts@adaptec.com
Mr. Bill Galloway	P	BREA Technologies, Inc.	billg@breatech.com
Mr. Brian Forbes	P	Brocade Comm. Systems, Inc.	bforbes@brocade.com
Mr. Lafe Moon	V	Data Transit Corp.	lafe@data-transit.com
Mr. David Freeman	V	Data Transit Corp.	davidf@data-transit.com
Mr. Robert H. Nixon	P	Emulex	bob.nixon@emulex.com
Mr. Ralph O. Weber	P	ENDL Texas	roweber@acm.org
Mr. Mike Fitzpatrick	P	Fujitsu	mfitzpatrick@fcpa.fujitsu.com
Mr. Doug Prins	V	Fujitsu	dprins@ix.netcom.com
Mr. Rob Elliott	P	Hewlett Packard Co.	Elliott@hp.com
Mr. Steven Fairchild	V	Hewlett Packard Co.	Steve.Fairchild@hp.com
Mr. Werner Glinka	AV	Hitachi America	werner.glinka@attglobal.net
Mr. Hitoshi Ogawa	AV	Hitachi Ltd.	h-ogawa@gm.str.hitachi.co.jp
Mr. Matt Otto	V	I-TECH Corp.	matt_otto@i-tech.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. Richard Beckett	V	Intel Corp.	richard.c.beckett@intel.com
Mr. Tim Bradshaw	P	Iomega Corp.	bradshat@iomega.com
Mr. John Lohmeyer	P	LSI Logic Corp.	lohmeier@t10.org
Mr. Brad Besmer	V	LSI Logic Corp.	brad.besmer@lsil.com
Mr. Brian Day	V	LSI Logic Corp.	brian.day@lsil.com

Mr. Tim Hوجلund	V	LSI Logic Corp.	tim.hوجلund@lsil.com
Mr. Steve Schauer	V	LSI Logic Corp.	steve.schauer@lsil.com
Mr. Mark Evans	P	Maxtor Corp.	mark_evans@maxtor.com
Mr. Steve Byan	V	Maxtor Corp.	stephen_byan@maxtor.com
Mr. Martin Czekalski	V	Maxtor Corp.	marty_czekalski@maxtor.com
Mr. Arie Krantz	V	QLogic Corp.	l_krantz@qlc.com
Mr. Chris Smith	V	QLogic Corp.	chris.smith@qlogic.com
Mr. Jim Jones	A	Quantum Corp.	jim.jones@quantum.com
Mr. Gerald Houlder	P	Seagate Technology	gerry.houlder@seagate.com
Mr. Jim Coomes	V	Seagate Technology	jim.coomes@seagate.com
Mr. Ron Mathews	P	UNISYS Corporation	ronald.mathews@unisys.com
Mr. Haluk Aytac	V	Velio	haluk@velio.com
Mr. Kenneth Hirata	P	Vixel Corp.	Ken.Hirata@Vixel.com
Mr. Carl Mies	A	Vixel Corp.	Carl.Mies@Vixel.com

37 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 [Elliott]

George Penokie presented some proposed key phrases to be used consistently throughout SAS.

Rob Elliott reviewed the editor's notes starting in clause 9 (the transport layer) of SAS revision 2c.

Rob Elliott moved that in the REPORT PHY SATA function the group recommends that the editor be instructed to change OPEN REJECT (RETRY) to OPEN REJECT (NO DESTINATION) and make other related changes throughout SAS. Bill Galloway seconded the motion. In the absence of any objections, the motion passed unanimously.

### 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]

Ron Roberts asked that discussion of this topic be deferred to the next meeting.

### 4.4 Project proposal for Serial Attached SCSI - 2 (SAS-2) (02-429) [Elliott]

Rob Elliott presented the project proposal for SAS-2 (02-429r0). The group discussed the process of transitioning work from SAS to SAS-2. It was noted that the project proposal should include a reference to SAS and Rob agreed to revise the proposal.

John Lohmeyer moved that 02-429r1 (r0 as revised) be recommended for forwarding to INCITS. Ron Roberts seconded the motion. In the absence of any objections, the motion passed unanimously.

#### **4.5 SAS SATA 1.0e Support (02-437) [Sheffield]**

Bob Sheffield presented a proposal for SATA 1.0e support (02-437r1). He noted that the changes requested by the last meeting had been made. There was no other discussion.

Bob Sheffield moved that 02-437r1 be recommended for inclusion SAS. Ron Roberts seconded the motion. The motion passed on a vote of 12:0:11.

#### **4.6 SAS Simplified Support for Multiple STP Initiators (02-430) [Sheffield]**

Bob Sheffield reviewed a series of changes requested by the STP Study Group in the proposal for simplified support for multiple initiators (02-430r1). The group asked that Bob prepare a revised proposal containing the changes for review on the second day of the meeting.

During the review of 02-430r2, the group requested additional changes and Bob agreed to prepare an additional revision.

Bob Sheffield moved that 02-430r3 (r2 as revised) be recommended for inclusion in SAS. Bill Galloway seconded the motion. In the absence of any objections, the motion passed unanimously.

#### **4.7 SAS STP Buffering (02-435) [Sheffield]**

Bob Sheffield presented a proposal to involve all the expanders between an initiator and a SATA target in the management of the SATA buffering requirements (02-435r1). He noted that the requirements would be enforced in a bi-directional manner, as opposed to the current write-only requirements.

The group asked that Bob prepare the final format proposal for review on the second day of the meeting.

During the review of 02-435r2, the group requested additional changes and Bob agreed to prepare an additional revision.

Bob Sheffield moved that 02-435r3 (r2 as revised) be recommended for inclusion in SAS. Tim Hoglund seconded the motion. The motion passed on a vote of 7:0:8.

#### **4.8 SAS Handling Link Rate Not Supported (02-443) [Elliott]**

Rob Elliott presented a proposal to clarify handling of the Connection Rate field (02-443r1). He noted that the changes requested by the last teleconference had been made in the r1 revision.

Bill Galloway asked that the proposal include a requirement that the link rate of 1.5 not be rejected. Rob agreed to revise the proposal to include that change and other minor changes.

The group also discussed the handling of Connection Rate with SATA targets.

Rob Elliott moved that 02-443r2 (r1 as revised) be recommended for inclusion in SAS. Mark Evans seconded the motion. In the absence of any objection, the motion passed unanimously.

#### **4.9 SAS Simple Relative Offset (02-449) [Galloway]**

Bill Galloway presented a proposal to use relative offset to detect lost frames (02-449r2). He noted that all the changes requested by previous meetings had been incorporated in r2. The group reviewed the changes in r2. Editorial issues were raised and Bill agreed to prepare a new revision.

Bill Galloway moved that 02-449r3 (r2 as revised) be recommended for inclusion in SAS and SPC-3. Mark Evans seconded the motion.

Jim Coomes raised concerns about making a technical change this late in the development of SAS. Dave Prins supported Jim regarding the late technical change and raised concerns about the use of simpler solutions based on counting frames instead of bytes. George Penokie argued that counting bytes is the same as counting frames. Mark Evans supported George.

The motion passed on a vote of 9:3:4.

#### **4.10 SAS Protocol-Specific mode page - make short format optional (02-472) [Elliott]**

Rob Elliott presented a proposal to make the short format mode page optional (02-472r0). Concerns were raised about explicitly stating anything regarding mode pages is optional because mode page support is always optional. Other editorial corrections were noted and Rob agreed to prepare a revised proposal.

Rob Elliott moved that 02-472r1 (r0 as revised) be recommended for inclusion in SAS. Mark Evans seconded the motion. In the absence of any objection, the motion passed unanimously.

## **5. New Business**

### **5.1 SAS '(RESERVED)' primitive clarification (02-465) [Evans]**

Mark Evans presented a proposal describing what recipients should do with the SAS primitives that are currently marked as 'Reserved' (02-465r0). The group suggested several improvements in the proposal. Bill Galloway agreed to include the results of the working group discussion in his proposal to be discussed in 5.4.

### **5.2 SAS: SSP Link layer state machine rewrite (02-470) [Penokie]**

George Penokie led a discussion of the proposal that rewrites the SSP link layer state machine (02-470r0). He described the changes as editorial, stating that due to the number of changes a separate proposal was considered to be a good idea.

The group requested several changes in the proposal and George agreed to revise the proposal.

George Penokie moved that 02-470r1 (r0 as revised) be recommended for inclusion in SAS. Bill Galloway seconded the motion. In the absence of any objections, the motion passed unanimously.

### **5.3 SAS Make Protocol-Specific mode page short format optional (02-472) [Elliott]**

This item was covered under 4.10.

### **5.4 SAS Spare Primitives (02-461) [Galloway]**

Bill Galloway presented a proposal to define spare SAS primitives so that compatibility can be maintained between SAS and SAS-2 (02-461r0). The group requested several changes and Bill agreed to prepare a new revision.

Bill Galloway moved that 02-461r1 (r0 as revised) be recommended for inclusion in SAS. Mark Evans seconded the motion. The motion passed on a vote of 12:0:3.

### **5.5 SAS Zero Length Data Frames (02-462) [Galloway]**

Bill Galloway presented a proposal to prohibit use of zero length data frames (02-462r0). The group asked for minor changes and Bill agreed to prepare a revised proposal.

Bill Galloway moved that 02-462r1 (r0 as revised) be recommended for inclusion in SAS. Mark Evans seconded the motion. In the absence of any objections, the motion passed unanimously.

### **5.6 Processing Unknown Frame Types (02-459) [Coomes]**

Jim Coomes presented a proposal to require that unsupported frame types to be discarded by the recipient (02-459r0). The proposal offered two options and the group selected simply discarding the frames. Jim agreed to revise the proposal to reflect the group's decision.

Jim Coomes moved that 02-459r1 (r0 as revised) be recommended for inclusion in SAS. Mark Evans seconded the motion. In the absence of any objections, the motion passed unanimously.

### **5.7 SAS: Make Report General Page Larger (02-476) [Besmer]**

Brad Besmer presented a proposal to add 16 reserved bytes to the Report General Page (02-476r0).

Brad Besmer moved that 02-476r0 be recommended for inclusion in SAS. Mark Evans seconded the motion.

Rob Elliott suggested adding a length byte to all the pages and the group discussed that possibility. The preference was for adding some number of bytes (about 32) to all requests. However, the proposal and motion were not modified.

The motion passed on a vote of 7:0:10.

### **5.8 Transport Layer Retries [Jones]**

Jim Jones described issues with the lack of retries at the transport layer as they effect tape drives. The group noted that the issue may need to be processed as a letter ballot comment if the goal is to get the capability included in SAS, instead of SAS-2.

Concerns were raised about whether initiator software will implement any of the options described by Jim, with the result that some considered any form of the proposal to be objectionable.

Jim agreed to review the advice provided by the group with his organization and act according to the results of that review.

### **5.9 Remove SMP PHY CONTROL Function ENABLE (02-477) [Fairchild]**

Steve Fairchild presented a proposal to remove the SMP PHY CONTROL Function ENABLE (02-477r0). The group requested minor changes.

Steve Fairchild moved that 02-477r1 (r0 as revised) be recommended for inclusion in SAS. Bill Galloway seconded the motion.

Brad Besmer expressed concerns about excessive use of link reset, implying that the ENABLE offers a way to prevent that. Some in the group felt that propose use of link reset was unreasonable. The issue was discussed at length with several different interpretations of the existing standard offered.

The group considered the possibility of requiring that a LINK RESET sent to a disabled PHY will fail, whereas Steve's reading of the current SAS draft says that LINK RESET to a disabled PHY would have the same effect as an ENABLE.

Steve agreed to further revise the proposal based on the discussion.

The motion passed on a vote of 6:1:11.

### **5.10 SAS SSP Transport Layer State Machine Modification (02-478) [Evans]**

Mark Evans presented a draft proposal to cleanup issues in the SSP transport layer state machine.

Mark Evans moved that 02-478r0 be recommended for inclusion in SAS. Rob Elliott seconded the motion. In the absence of any objections, the motion passed unanimously.

### **5.11 SAS - OOB and DWS state machines update (02-475) [Grieff]**

Rob Elliott presented a proposal from Tom Grieff updating the OOB and DWS state machines (02-475r0). The group reviewed the contents of the proposal and recommended that the editor include it in SAS as editorial changes.

## **6. Review of Recommendations to the Plenary**

John Lohmeyer noted that the following recommendations were made during this meeting:

- Project proposal for Serial Attached SCSI - 2 (SAS-2) (02-429r1) [Elliott] {r0 as revised, unanimous}
- SAS SATA 1.0e Support (02-437r1) [Sheffield] {12:0:11}
- SAS Handling Link Rate Not Supported (02-443r2) [Elliott] {r1 as revised, unanimous}
- SAS Simple Relative Offset (02-449r3) [Galloway] {r2 as revised, 9:3:5}
- SAS: SSP Link layer state machine rewrite (02-470r1) [Penokie] {r0 as revised, unanimous}
- SAS Spare Primitives (02-461r1) [Galloway] {r0 as revised, 12:0:3}
- SAS Zero Length Data Frames (02-462r1) [Galloway] {r0 as revised, unanimous}
- Processing Unknown Frame Types (02-459r1) [Coomes] {r0 as revised, unanimous}
- SAS: Make Report General Page Larger (02-476r0) [Besmer] {7:0:10}
- Remove SMP PHY CONTROL Function ENABLE (02-477r1) [Fairchild] {r0 as revised, 6:1:11}
- SAS Simplified Support for Multiple STP Initiators (02-430r3) [Sheffield] {r1 as revised twice; unanimous}
- SAS STP Buffering (02-435r3) [Sheffield] {r1 as revised twice; 7:0:8}
- SAS SSP Transport Layer State Machine Modification (02-478r0) [Evans] {unanimous}

that in the REPORT PHY SATA function the editor be instructed to change OPEN REJECT (RETRY) to OPEN REJECT (NO DESTINATION) and make other related changes throughout SAS {unanimously}

The following recommendation was made on the October 29 conference call:

- that 02-291r2 be recommended for inclusion in SAS.
- that 02-418r2 (r1 as revised) be recommended for inclusion in SAS.
- that 02-444r0 be recommended for inclusion in SAS.
- that 02-450r0 be recommended for inclusion in SAS. [6:1:4]
- that 02-451r1 (r0 as revised) be recommended for inclusion in SAS.
- that 02-445r0 be recommended for inclusion in SAS.

The following recommendations were made at the October 24-25 meeting:

- that 02-360r3 (r2 as revised) be recommended for inclusion in SAS.
- that 02-363r3 (r2 as revised) be recommended for inclusion in SAS.
- that 02-397r0 be recommended for inclusion in SAS. [5:3:0]
- that 02-409r3 be recommended for inclusion in SAS. [6:1:2]
- that the SAS SMP margin control function be recommended for removal from SAS.
- that 02-424r2 (r1 as revised) be recommended for inclusion in SAS.
- that 02-427r1 (r0 as revised) be recommended for inclusion in SAS.
- that 02-433r1 (r0 as revised) be recommended for inclusion in SAS.
- that 02-441r1 (r0 as modified) be recommended for inclusion in SAS. [7:0:2]
- that 02-422r2 (r1 as revised) be recommended for inclusion in SAS.

The following recommendation was made on the October 22 conference call:

- that 02-396r2 (r1 as revised) be recommended for inclusion in SAS.
- that the Fallback and Increment Speed states be recommended for removal from the SP state machine in SAS.
- that 02-405r2 (r1 as revised) be recommended for inclusion in SAS.
- that it be recommended that a SAS address of all 0 bits is not a valid SAS address and may be used to indicate there is no device present or other meanings.

The following recommendation was made on the October 15 conference call:

- that 02-387r2 (r1 as revised) be recommended for inclusion in SAS.
- that 02-383r2 (r1 as revised) be recommended for inclusion in SAS.
- that 02-394r1 (r0 as revised) be recommended for inclusion in SAS.
- that DEVICE TYPE numbers be changed to start at 1 and DEVICE TYPE 0 means no device is attached be recommended for inclusion in SAS.

The following recommendation was made on the October 1 conference call:

- that 02-359r3 (r2 as revised) be recommended for inclusion in SAS. [4:3:2]
- that 02-393r1 (r0 as revised) be recommended for inclusion in SAS.

The following recommendation was made on the September 24 conference call:

- that 02-318r1 be recommended for inclusion in SAS.
- that 02-202r4 (r3 as revised) be recommended for inclusion in SAS.
- that 02-276r3 (r2 as revised) be recommended for inclusion in SAS.
- that we recommend to T10 that the SSP Task IU be changed to 28 bytes to match the command IU by removing the last 4 reserved bytes.

The following recommendation was made on the September 17 conference call:

- that a statement saying STP initiators shall not generate BIST frames be recommended for inclusion in SAS.

## 7. Meeting Schedule

SAS Protocol Working Group meetings are scheduled for:

Monday-Tuesday, January 13-14, 2003 commencing at 9:00 a.m. on Monday and ending at 8:00 p.m. on Tuesday in Portland, OR at the Embassy Suites Hotel (503-644-4000).

An editing meeting is planned for November 7-8, 2002 in Huntington Beach, CA. The meeting will start one hour following the plenary meeting and run through 1:00 p.m. on Friday.



One or more teleconference calls may be announced on the T10 reflector as needed.

## **8. Adjournment**

The meeting was adjourned at 7:10 p.m. on Tuesday November 5, 2002.