

Accredited Standards Committee\*

## InterNational Committee for Information Technology Standards (INCITS)

Doc. No.: T10/02-159r0
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Date: May 1, 2002

Reply to: John Lohmeyer

To: T10 Membership  
From: Ralph Weber & John Lohmeyer  
Subject: Serial Attached SCSI Study Group Meeting -- April 29-30, 2002  
Nashua, NH

### Agenda

1. Opening Remarks
2. Approval of Agenda
3. Attendance and Membership
4. Overview
  - 4.1 SAS Serial Attached SCSI technical overview (02-158) [Elliott]
  - 4.2 SAS Proposed Serial Attached SCSI working draft (02-157) [Elliott]
    - 4.2.1 Scrambler bit order [Coomes]
    - 4.2.2 Scrambler code sample [Coomes]
    - 4.2.3 CRC code sample [Coomes]
    - 4.2.4 ALIGN primitive encoding (02-168) [Galloway/Bastiani]
    - 4.2.5 STP connection closing [Elliott]
    - 4.2.6 SAS OOB Timing [Elliott]
    - 4.2.7 SAS Document Review (02-157r0) [Elliott]
5. New Business
  - 5.1 SAS REPORT MANUFACTURER ID (02-165) [Roberts]
  - 5.2 What to output when coding violation or disparity error received (02-\_\_\_\_) [Galloway]
  - 5.3 Wide lane rules (02-170) [Galloway]
  - 5.4 SAS Error primitive (02-167) [Galloway]
  - 5.5 SAS XFER\_RDY Rules (02-169) [Galloway]
  - 5.6 SAS PHY Control Request Modification (02-174) [Roberts]
  - 5.7 SAS Asynchronous Event Reporting (02-175r0) [Weber]
6. Review of Recommendations to the Plenary
7. Meeting Schedule
8. Adjournment

### Results of Meeting

#### 1. Opening Remarks

John Lohmeyer, the T10 Chair, called the meeting to order at 1:15 p.m., Monday, April 29, 2002. He thanked Zane Daggett of Hitachi Cable Manchester for hosting the meeting.

John noted that the private Serial Attached SCSI Working Group had agreed to turn over the proposed draft specification to T10 and, assuming T10 votes to accept the project, all future work technical work will be done in T10 following INCITS rules and procedures.

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

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## 2. Approval of Agenda

The draft agenda was approved with the following changes:

- 4.2.1 Scrambler bit order [Coomes]
- 4.2.2 Scrambler code sample [Coomes]
- 4.2.3 CRC code sample [Coomes]
- 4.2.4 ALIGN primitive encoding [Galloway/Bastiani]
- 4.2.5 STP connection closing [Elliott]
- 5.4 SAS Error primitive (02-167) [Galloway]
- 5.5 SAS XFER\_RDY Rules (02-169) [Galloway]
- 5.6 SAS PHY Control Request Modification (02-174) [Roberts]

The following items were added/revised during the course of the meeting:

- 4.2.6 SAS OOB Timing [Elliott]
- 4.2.7 SAS Document Review (02-157r0) [Elliott]
- 5.3 Wide lane rules (02-170) [Galloway]
- 5.7 SAS Asynchronous Event Reporting (02-175r0) [Weber]

## 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. Vince Bastiani	V	Adaptec Consultant	bass.tech@gte.net
Mr. Ron Roberts	P	Adaptec, Inc.	Ron_Roberts@adaptec.com
Mr. Don Allingham	V	Adaptec, Inc.	don_allingham@adaptec.com
Mr. Michael Wingard	P	Amphenol Interconnect	mikwingard@aol.com
Mr. Jan Dedek	V	Ancot Corp.	dedek@ancot.com
Mr. Bill Galloway	P	BREA Technologies, Inc.	billg@breatech.com
Mr. Brian Forbes	P	Brocade Comm. Systems, Inc.	bforbes@brocade.com
Mr. Nicholas Limberopoulos	V	C&M Corp.	nlimberopoulos@cmcorporation.com
Mr. Mark Hamel	V	Compaq Computer Co.	mark.w.hamel@compaq.com
Mr. Steve Lambest	V	Compaq Computer Co.	steve.a.lamest@compaq.com
Mr. Robert C. Elliott	P	Compaq Computer Corp.	Robert.Elliott@compaq.com
Mr. Steven Fairchild	V	Compaq Computer Corp.	Steve.Fairchild@compaq.com
Mr. T. Gionfriddo	V	Compaq Computer Corp.	
Mr. Edwin MacNeil	V	Compaq Computer Corp.	edwin.macneil@compaq.com
Mr. George Eisler	V	Conexant/Mindspeed	geisler@aol.com
Mr. John Tyndall	A	Crossroads Systems, Inc.	jtyndall@crossroads.com
Mr. Titkwan Hui	P	Dallas Semiconductor	tk.hui@dalsemi.com
Mr. Ronald Stockford	A	Dell Computer Corp.	ron_stockford@dell.com
Mr. Ralph O. Weber	P	ENDL Texas	roweber@acm.org
Mr. Gene Whetstone	AV	Foxconn Electronics	gene.whetstone@foxconn.com

Mr. Nathan Hastad	P	General Dynamics	nathan.hastad@gd-ais.com
Mr. Randy Haagens	P	Hewlett Packard Co.	randy_haagens@hp.com
Mr. Martin Goldstein	V	Hewlett Packard Co.	martin_goldstein@hp.com
Mr. Werner Glinka	AV	Hitachi America	werner.glinka@attglobal.net
Mr. Randy Wasylak	A	Hitachi Cable Manchester	rwasyak@hcm.hitachi.com
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. Dan Colegrove	V	IBM Corp.	dcolegro@us.ibm.com
Mr. Cris Simpson	P	Intel Corp.	cris.simpson@intel.com
Mr. John Lohmeyer	P	LSI Logic Corp.	lohmeier@t10.org
Mr. William Petty	A	LSI Logic Corp.	william.petty@lsil.com
Mr. Travis Bradfield	V	LSI Logic Corp.	travis.bradfield@lsil.com
Mr. Dave Gissel	V	LSI Logic Corp.	david.gissel@lsil.com
Mr. Tim Hoglund	V	LSI Logic Corp.	tim.hoglund@lsil.com
Mr. David Noeldner	V	LSI Logic Corp.	dave.noeldner@lsil.com
Mr. Mark Evans	P	Maxtor Corp.	mark_evans@maxtor.com
Mr. Russ Brown	V	Maxtor Corp.	russ_brown@maxtor.com
Mr. David Cressman	V	Maxtor Corp.	dave_cressman@maxtor.com
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Mr. James R. (Bob) Davis	AV	Network Appliance Inc.	bob@netapp.com
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Mr. Arie Krantz	V	QLogic Corp.	l_krantz@qlc.com
Mr. Dwayne Edling	V	Quantum Corp.	dwayne.edling@quantum.com
Mr. Gerald Houlder	P	Seagate Technology	gerry_houlder@seagate.com
Mr. Umesh Chandra	V	Seagate Technology	umesh_chandra@seagate.com
Mr. Jim Coomes	V	Seagate Technology	jim_coomes@seagate.com
Mr. Alvin Cox	V	Seagate Technology	Alvin.Cox@seagate.com
Mr. John Worden	V	Seagate Technology	john.worden@seagate.com
Mr. Vit Novak	P	Sun Microsystems, Inc.	vit.novak@sun.com
Mr. Paul D. Aloisi	P	Texas Instruments	Paul_Aloisi@ti.com
Mr. Donald R. Getty	A	Texas Instruments	donald_getty@ti.com
Mr. Ron Mathews	AV	UNISYS Corporation	ronald.mathews@unisys.com
Mr. Kenneth Hirata	AV	Vixel Corp.	Ken.Hirata@Vixel.com

60 People Present

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

## 4. Overview

### 4.1 SAS Serial Attached SCSI technical overview (02-158) [Elliott]

Rob Elliott presented an overview of Serial Attached SCSI (02-158r0), reviewing major features and design goals of SAS. The presentation was predominately tutorial. Several issues were raised, notably among them schedule concerns. Rob stated that the goal is to be ready for letter ballot in November.

John Lohmeyer thanked Rob for preparing the presentation.

### 4.2 SAS Proposed Serial Attached SCSI working draft (02-157) [Elliott]

#### 4.2.1 Scrambler bit order [Coomes]

Jim Coomes described the current thinking regarding the scrambling bit ordering rules. He said he wanted to combine all the drawings in a single drawing. Based on input provided by the group, Jim agreed to bring a more detailed presentation to the next meeting.

#### 4.2.2 Scrambler code sample [Coomes]

This topic was discussed under item 4.2.1.

#### 4.2.3 CRC code sample [Coomes]

Jim Coomes led a discussion of how to document the CRC algorithms for SAS. Based on the group's discussion, Jim agreed to bring a more detailed presentation to the next meeting.

#### 4.2.4 ALIGN primitive encoding (02-168) [Galloway/Bastiani]

Bill Galloway presented a proposal to modify how ALIGN primitives are transmitted (02-168r0) in order to reduce EMI, along with some computed FFT graphs showing the EMI effects of the current and proposed character patterns. The group discussed the validity of the FFT graphs.

Vince Bastiani agreed to put the FFT graphs in a new T10 document.

Concerns were raised about the statement that transmitters not cycle through the ALIGN dwords if they are not required to do so. Bill agreed to revise the proposal to allow cycling even when it is not required.

Bill Galloway moved that 02-168r1 (r0 as modified) be recommended for inclusion in SAS. Rob Elliott seconded the motion. In the absence of any objections, the motion was approved unanimously.

#### 4.2.5 STP connection closing [Elliott]

Rob Elliott led a discussion of an SAS editor's note concerning the closing of STP connections. He noted that a DONE exchange may be required. Bill Galloway suggested that there might be options based on the need to arbitrate to send. It was agreed that the expander can achieve the effect of a DONE by withholding the R\_RDY before closing a connection. With that agreement it place it was further agreed that only the expander can close an STP connection.

#### 4.2.6 SAS OOB Timing [Elliott]

Rob Elliott led a discussion of the problems related to the timing rules for Serial ATA out of band (OOB) operations.

Rob agreed to write a new document describing the agreements reached by the group for review at the next meeting.

#### 4.2.7 SAS Document Review (02-157r0) [Elliott]

Rob Elliott led a discussion of the SAS document. The group also reviewed several state diagrams.

## 5. New Business

### 5.1 SAS REPORT MANUFACTURER ID (02-165) [Roberts]

Ron Roberts presented a proposal to add the reporting of manufacturer identification based on standard Inquiry data to the expander interrogation in the SMP protocol (02-165r0). Changes were requested and Ron agreed to prepare a new revision.

Ron Roberts moved that 02-165r1 (r0 as revised) be recommended for inclusion in SAS. Mark Evans seconded the motion. In the absence of any objections, the motion passed unanimously.

### 5.2 What to output when coding violation or disparity error received (02-\_\_\_) [Galloway]

This topic was discussed as part of item 5.4

### 5.3 Wide lane rules (02-170) [Galloway]

Bill Galloway presented a discussion of the issues related to wide lane usage (02-170r0). Bill noted that the purpose of the presentation was information gathering for development of a specific change proposal. The group obliged Bill by providing detailed information on what should be included in the proposal.

A significant source of difficulty was using multiple links for a single data transfer. Accomplishing this requires the definition of a relative offset so that each link in use "knows" what part of the data transfer buffer it is accessing. However, the addition of relative offset to the standard opens the possibility that data can be transferred out of order, thus violating a basic precept of SAS. It was agreed not to include relative offset in this version of SAS.

Bill agreed to prepare a detailed proposal for consideration at the next meeting.

### 5.4 SAS Error primitive (02-167) [Galloway]

Bill Galloway presented a proposal intended to more clearly identify the link on which an error occurs (02-167r0). The gist of the proposal was that expanders replace dwords received with errors (coding violations or disparity errors) with an ERROR primitive. Concerns were raised about how the change affects error detection. Also of concern was how introduction of the ERROR primitive would affect interactions with a SATA drive and how best to communicate any detected conditions to a SATA drive.

Bill Galloway agreed to revise the proposal as recommended by the group. Bill Galloway moved that 02-167r1 (r0 as revised) be recommended for inclusion in SAS. Rob Elliott seconded the motion. In the absence of any objections, the motion passed unanimously.

### 5.5 SAS XFER\_RDY Rules (02-169) [Galloway]

Bill Galloway asked that discussion of this topic be deferred to the next meeting.

## **5.6 SAS PHY Control Request Modification (02-174) [Roberts]**

Ron Roberts presented a proposal to add four vendor unique bytes to the PHY CONTROL function (02-174r0). Concerns were raised about the use of vendor unique bytes and requests were made to add reserved bytes. Ting Chan suggested sending the proposal to the SAS PHY group to get specific definitions for the proposed new bytes.

Ron agreed to take the proposal to the SAS PHY group for development of specific field definitions.

## **5.7 SAS Asynchronous Event Reporting (02-175) [Weber]**

Ralph Weber raised concerns about the layering of the asynchronous event reporting planned for SAS (02-175r0). The group agreed that these concerns can and should be addressed in future SAS revisions.

Based on the agreements reached by the group, Ralph asked that this topic be removed from future agendas.

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

Ralph Weber noted that the following recommendations have been made to the T10 plenary:

- SAS REPORT MANUFACTURER ID (02-165r1) [Roberts] {r0 as modified}
- ALIGN primitive encoding (02-168r1) [Galloway/Bastiani] {r0 as modified}
- SAS Error primitive (02-167) [Galloway] {r0 as modified}

## **7. Meeting Schedule**

Serial Attached SCSI Working Group meetings are scheduled for:

Wednesday-Friday, June 5-7, 2002 commencing at 9:00 am on Wednesday and ending at noon on Friday in Minneapolis, MN at the Hilton Inn (952-854-2100).

Monday-Wednesday, June 24-26, 2002 commencing at 9:00 am on Monday and ending at noon on Wednesday in Denver, CO at the TBD.

Monday-Tuesday, July 15-16, 2002 commencing at 1:00 p.m. on Monday and ending at 8:00 pm on Tuesday in Colorado Springs, CO at the Wyndham Colorado Springs Hotel (719-260-1800).

Conference calls are typically held each Tuesday morning. The group agreed to schedule a call for Tuesday, May 7 with IBM hosting to be announced on the T10 reflector.

## **8. Adjournment**

The meeting was adjourned at 6:00 p.m. on Tuesday, April 30, 2002.