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

Doc. No.: T10/02-342r0

Date: September 13, 2002
Reply to: John Lohmeyer

To: T10 Membership
From: Ralph Weber and John Lohmeyer
Subject: Serial Attached SCSI Protocol Working Group Meeting -- September 9-10, 2002
           Minneapolis, MN

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 Port Control State Diagram Update (02-202) [Worden]
    4.3   Arbitration clarification (02-222) [Galloway]
    4.4   SAS - OOB and DWS state machines update (02-300) [Grieff]
    4.5   SAS Combined Request-Configuration List (02-276) [Worden]
    4.6   Rate Change Delay in speed negotiation window [Grieff]
    4.7   SAS SSP transport layer state machines (02-307) [Mark Evans]
    4.8   SAS Data Transfer Rules (02-318) [Gardner]
    4.9   SAS Relative Offset (02-319) [Gardner]
    4.10 SAS Simplified Arbitration (02-320) [Gardner]
    4.11 SAS Data Corruption Problem (02-323) [Gardner]
    4.12 SAS-Multiple Connections on Wide Ports (02-335) [Penokie]
    4.13 Time before OOB signals (02-350) [Penokie]
5. New Business
    5.1   Proposal for SAS phy error log page (02-338) [Evans]
    5.2   SAS - CRC Bit Order figure replacement (02-347) [Coomes]
    5.3   SAS-Idle at Start of OOB signals (02-350) [Penokie]
    5.4   SAS Expander Update (02-355) [Hoglund]
    5.5   SAS Spinup (02-360) [Elliott]
    5.6   SAS Disconnect-Reconnect Mode Parameters (02-324) [Gardner]
    5.7   Details of SAS Expander Configuration (02-359r0) [Fairchild]
    5.8   STP Initiators closing connections () [Day]
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 1:30 p.m., Monday, September 9, 2002. He thanked Dave Peterson of Cisco Systems for hosting the meeting.

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

2. Approval of Agenda

The draft agenda was approved with the following changes:

    5.4   SAS Expander Update (02-355) [Hoglund]
    5.5   SAS Spinup () [Elliott]
    5.6   SAS Disconnect-Reconnect Mode Parameters (02-324) [Gardner]
    5.7   Details of SAS Expander Configuration (02-359r0) [Fairchild]
    5.8   STP Initiators closing connections () [Day]

No items were added/revised during the course of the meeting.

3. Attendance and Membership

Attendance at working group meetings does not count toward minimum attendance requirements for T10 member-
ship. 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. James A. Lott, Jr.  P  Dallas Semiconductor     jim.lott@dalsemi.com
Mr. Ralph O. Weber      P  ENDL Texas               roweber@acm.org
Mr. Mike Fitzpatrick    P  Fujitsu                  mfitzpatrick@fcpa.
                                                    fujitsu.com
Mr. Rob Elliott         P  Hewlett Packard Co.      Elliott@hp.com
Mr. Steven Fairchild    V  Hewlett Packard Co.      Steve.Fairchild@hp.com
Mr. Thomas Grieff       V  Hewlett Packard Co.      Thomas.Grieff@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. Steven Wirtz        V  I-TECH Corp.             steve_wirtz@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. Pak Seto            V  Intel                    pak-lung.seto@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. John Lohmeyer       P  LSI Logic Corp.          lohmeyer@t10.org
Mr. William Petty       A  LSI Logic Corp.          william.petty@lsil.com
Mr. Brian Day           V  LSI Logic Corp.          brian.day@lsil.com
Mr. Tim Hoglund         V  LSI Logic Corp.          tim.hoglund@lsil.com
Mr. Brad Besmer         V  LSI Logic Corp.          brad.besmer@lsil.com
Mr. Steve Johnson       V  LSI Logic Corp.          sjohnson@lsil.com
Mr. Steven Schauer      V  LSI Logic Corp.          steve.schauer@lsil.com
Mr. Mark Evans          P  Maxtor Corp.             mark_evans@maxtor.com
Mr. David Cressman      V  Maxtor Corp.             dave_cressman@maxtor.com
```

```
Mr. Martin Czekalski   V  Maxtor Corp.              marty_czekalski@maxtor.
                                                    com
Mr. Rob Haydt          A  Microsoft Corp.           robhay@microsoft.com
Mr. Edward A. Gardner  P  Ophidian Designs          eag@ophidian.com
Mr. Arie Krantz        V  QLogic Corp.              l_krantz@qlc.com
Ms. Deborah Laurion    V  Quantum Corp.             deborah.laurion@quantum.
                                                    com
Mr. Gerald Houlder     P  Seagate Technology        gerry_houlder@seagate.com
Mr. Jim Coomes         V  Seagate Technology        jim_coomes@seagate.com
Mr. Scott Younger      V  Seagate Technology        Scott.Younger@seagate.com
Mr. Kenneth Hirata     P  Vixel Corp.               Ken.Hirata@Vixel.com

34 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]

Due to the late hour, Rob Elliott asked that the document review be deferred to the next meeting.

4.2 SAS Port Control State Diagram Update (02-202) [Worden]

In the absence of John Worden, Jim Coomes reviewed 02-202r3, SAS Port Control State Diagram Update as part of the discussion in item 4.5.

4.3 Arbitration clarification (02-222) [Galloway]

In the absence of Bill Galloway, this topic was deferred to the next meeting.

4.4 SAS - OOB and DWS state machines update (02-300) [Grieff]

Tom Grieff discussed 02-300r1, a collection of changes to the OOB requirements developed by the SAS PHY working group. George Penokie raised several issues about the way the OOB requirements are structured and suggested improvements.

Tom agreed to incorporate George's changes in his proposal and prepare a new revision.

Tom Grieff moved that the state machine changes on 02-300r2 (r1 as revised) be recommended for inclusion in SAS. George Penokie seconded the motion. In the absence of any objections, the motion passed unanimously.

4.5 SAS Combined Request-Configuration List (02-276) [Worden]

In the absence of John Worden, Jim Coomes presented 02-276r3, SAS Combined Request-Configuration List. The group advised Jim regarding additional changes needed in this proposal and in 02-202 (see item 4.2).

Jim agreed to prepare new revisions of 02-276 and 02-202 for consideration during the conference call.

4.6 Rate Change Delay in speed negotiation window [Grieff]

Tom Grieff moved that, based on a recommendation from the SAS PHY group, the Rate Change Delay be changed from 480 UIs to 750,000 UIs in SAS. Jim Coomes seconded the motion. In the absence of any objections, the motion passed unanimously.

4.7 SAS SSP transport layer state machines (02-307) [Mark Evans]

Mark Evans asked the group to discuss requirements that have recently been moved to the transport layer and their representation in the state machines. He requested suggestions for updates to the transport layer state machine descriptions based on the newly moved text. The group recommended that Mark revise the proposal to use the response frame service response instead of involving upper layers.

Other revisions were requested during a second review of the proposal later in the meeting.

Mark Evans moved that 02-307r2 (r1 as revised) be recommended for inclusion in SAS. Rob Elliott seconded the motion. In the absence of any objections, the motion passed unanimously.

4.8 SAS Data Transfer Rules (02-318) [Gardner]

Ed Gardner presented a proposal that fill bytes can only be present on the last frame of a data transfer (02-318r1). The group requested changes in the proposal. Concerns were raised about the lack of time to review the proposal. Ed agreed to prepare a new revision of the proposal for consideration during the conference call.

4.9 SAS Relative Offset (02-319) [Gardner]

Ed Gardner presented a proposal to add relative data offsets to SAS data frames (02-319r1). The group requested editorial changes in the proposal. Because parts of this proposal depend on 02-318, Ed agreed to bring the new revision to the conference call for consideration.

4.10 SAS Simplified Arbitration (02-320) [Gardner]

Ed Gardner and Tim Hoglund asked that this topic be removed from this and future agendas.

4.11 SAS Data Corruption Problem (02-323) [Gardner]

Ed Gardner described a problem where lost frames cause write data to be written in the wrong place (02-323r1) and proposed a data frame sequence counter to address the problem. George Penokie argued that the data corruption was not any different from failures that exist today.

John Lohmeyer asked for a straw poll regarding whether the proposal should be pursued and the 6:9 vote was against continuing. Based on the vote, John recommended deferring further discussion to the next meeting.

4.12 SAS-Multiple Connections on Wide Ports (02-335) [Penokie]

George Penokie presented 02-335r2, SAS-Multiple Connections on Wide Ports. George Penokie moved that 02-335r2 be recommended for inclusion in SAS. Rob Elliott seconded the motion. In the absence of any objections, the motion passed unanimously.

4.13 Time before OOB signals (02-350) [Penokie]

With the SAS PHY group in attendance, George Penokie presented a proposal to define the COMINIT and COMSAS OOB sequences to start following an idle instead of at the beginning of a reset (02-350r0). The group requested changes in the proposal and George agreed to prepare a new revision.

George Penokie moved that 02-350r1 (r0 as revised) be recommended for inclusion in SAS. Rob Elliott seconded the motion. In the absence of any objections from the joint SAS and SAS PHY working groups, the motion passed unanimously.

5.   New Business

5.1   Proposal for SAS phy error log page (02-338) [Evans]

Mark Evans presented a proposal to add a log page for SAS PHY errors (02-338r0). The group requested that a table be added defining the values of the log parameter control bits and Mark agreed to revise the proposal. Other changes were also requested. It was agreed that the SAS PHY group should be consulted to determine what log information would be useful.

Other concerns revolved around how the initiator knows how many PHYs are present. Then discussion turned to how to control PHY settings, which the group agreed should be in a mode page.

Mark Evans moved that 02-338r1 (r0 as revised) be recommended for inclusion in SAS. Rob Elliott seconded the motion. Concerns were raised about the absence of a port world wide name in the log data. Mark agreed to add the world wide names of both ends of the connection. In the absence of any objections, the motion passed unanimously.

Later, with the SAS PHY working group present, questions were raised about the definition of the PHY Reset Problem Count field and Rob explained that the counter was for protocol sequencing errors and not directly a SAS PHY concern. Alvin Cox also noted that the SAS PHY group had a different list of interesting counters. It was suggested that the PHY group write a separate proposal for the further changes because 02-338r1 is expected to be included in the next revision of SAS.

5.2   SAS - CRC Bit Order figure replacement (02-347) [Coomes]

Jim Coomes presented a proposal to replace the CRC generator figure (02-347r1). Jim Coomes moved that 02-347r1 be recommended for inclusion in SAS. George Penokie seconded the motion. In the absence of any objections, the motion passed unanimously.

5.3   SAS-Idle at Start of OOB signals (02-350) [Penokie]

This topic was covered under item 4.13.

5.4   SAS Expander Update (02-355) [Hoglund]

Tim Hoglund reviewed the proposal describing SAS expander elements (02-355r0). The group requested numerous changes and raised several issues that Tim felt needed further study and possibly additional proposals.

Concerns were raised about the lack of SATA discussion in the proposal. Tim explained that SATA issues are handled by the link and protocol elements drawn in the block diagram but not covered by this section. Rob agreed that the SATA specifics should not be discussed in this section.

Tim Hoglund moved that 02-355r1 (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 Spinup (02-360) [Elliott]

Rob Elliott introduced the group to a proposal to provide spin up control for SAS drives similar to the controls defined in the SCA-2 connector for parallel SCSI drives. He noted that the proposal will be 02-360r0 when it is uploaded.

The proposal was to add a Spinup primitive that can be sent instead of an Align primitive to tell disk drives to spin up. In this way, the expander or initiator controls the spin up sequencing.

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

Due to the late hour, Ed Gardner asked that discussion of this topic be deferred to the next meeting.

5.7 Details of SAS Expander Configuration (02-359r0) [Fairchild]

Steve Fairchild presented a proposal to change the description of an edge expander to include edge expander components (02-359r0). Concerns were raised about the edge expander components being assigned SAS addresses without their being included in the SAS topology model.

During the lunch hour, Steve worked to address the issues raised. Later, he presented a preliminary proposal in the format requested by the group. Steve accepted additional suggestions regarding the proposal content.

Steve agreed to prepare a new revision of the proposal for consideration at the next meeting.

5.8 STP Initiators closing connections () [Day]

Due to the late hour, Brian Day asked that discussion of this topic be deferred to the SAS STP study group.

6. Review of Recommendations to the Plenary

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

    Change the Rate Change Delay from 480 UIs to 750,000 UIs {unanimous}
    SAS - OOB and DWS state machines update (02-300r2) [Grieff]
                    {r1 as revised, unanimous for state machine changes only}
    Proposal for SAS phy error log page (02-338) [Evans] {r1 as revised, unanimous}
    SAS Expander Update (02-355r1) [Hoglund] {r1 as revised, unanimous}
    Time before OOB signals (02-350r1) [Penokie] {r0 as revised, unanimous SAS & SAS PHY}
    SAS-Multiple Connections on Wide Ports (02-335r2) [Penokie] {unanimous}
    SAS - CRC Bit Order figure replacement (02-347r1) [Coomes] {unanimous}
    SAS SSP transport layer state machines (02-307r2) [Mark Evans] {r1 as revised, unanimous}

The following recommendations were made at the September 3, 2002 teleconference:

    that the discover function be numbered 10h instead of 00h and that the PHYSICAL LINK RATE in the IDEN-
                TIFY address frame be marked 'ignored'.

The following recommendations were made at the August 21-23, 2002 meeting:

    that it be recommended that SAS be modified to require targets to not send a response frame for a command
                until all data associated with any outstanding XFER_RDY for that command have been
                received.

that it be recommended that the open originator shall start rate matching on the next dword after the OPEN
         address frame has been transmitted.
that 02-259r1 be recommended for inclusion in SAS.
that 02-279r4 (r3 as revised) (changes 1 through 13) be recommended for inclusion into SAS.
that it be recommended that AEN be removed from SAS.

7. Meeting Schedule

SAS Protocol Working Group meetings are scheduled for:

Monday-Tuesday, November 4-5, 2002 commencing at 1:00 p.m. on Monday and ending at 5:00 p.m. on Tues-
day in Huntington Beach, CA at the Hilton Waterfront Hotel (714-960-7873).

George Penokie agreed to host a SAS Protocol teleconferences September 24th and October 1st:

```
Tuesday September 24, 2002 and October 1, 2002
11:00 am -- 2:00 pm  EDT
10:00 am -- 1:00 pm  CDT
 9:00 am -- noon     MDT
 8:00 am -- 11:00 am PDT

USA Toll Free Number: 877-921-6914
        Toll Number: +1-712-923-0332
Participant Passcode: 338024
```

```
WebEx Session: http://seagate.webex.com/
 Meeting Name: SAS Protocol teleconference
     Password: Carol19 for 9/24/02 and Carol20 for 10/1/02
```

An editing meeting is planned for October 3-4, 2002 in Houston, TX at HPQ. Rob Elliott will host this editing ses-
sion.

The group discussed the possibility of adding one more face-to-face technical meeting, perhaps in coordination
with the T13 meeting in Las Vegas on October 24-25.

8. Adjournment

The meeting was adjourned at 4:55 p.m. on Tuesday, September 10, 2002.