SAS Plugfest Administration Plan

1.0 Overview:

A Plugfest is an event to test policies and procedures of products (hardware, firmware and software) that implement the Serial Attached SCSI protocol as defined from time to time by the T10 Committee. Each SAS Plugfest event will be self-funded through participation fees collected by SCSI Trade Association (STA). Each Plugfest will be separately planned and funded in this manner. STA will engage the University of New Hampshire's (UNH) InterOperability Laboratory services (described herein) and pay UNH directly for those Plugfest event services on behalf of its participating members.

Without actually committing to future Plugfest events, STA does expect to conduct 3 or 4 Plugfests in calendar year 2004, with the initial Plugfest currently slated for the February of 2004 time frame. A final decision for the dates of the first Plugfest will be made at the November 2003 STA meeting.

It is the goal of the SAS Plugfest Program to ensure that different Serial SCSI (SAS) devices operate together to attain an 'installed base maturity' in the market by making SAS and Serial ATA (SATA) solutions easy to install, manage, configure, diagnose, and trouble shoot.

To achieve this goal, the SAS Plugfest Program will adopt specific guidelines and principles, develop various test suites, and develop a process, which test specific aspects of the SAS specification. If for any reason, the SAS Plugfest Program discovers any problems or difficulties with the SAS specification, it will forward that information back to the T10 SAS Committee.

Individual SAS Plugfest tests address critical "high priority" aspects of existing standards, to promote consistency and compatibility among mainstream SAS/SATA devices and products, as well as foster continuous operation in heterogeneous environments. However, the program does not produce industry standards, nor address all required aspects of adherence to industry standards. Additionally, the program does not certify that all adherence to standards and interoperability issues have been addressed. Therefore, the SAS Plugfest program does not certify any combinations of SAS Plugfest branded product will operate error free, or guarantee 100% interoperability. The program is not intended to provide a conformance suite for all portions of all available standards.

2.0 SAS Plugfest Program Guidelines

2.1 The following guidelines will be observed through out the implementation of this program.

The SAS Plugfest Program will not:

1. be used to fix prices or otherwise lessen competition;
2. have the effect of boycotting or excluding competitors;

3. have the effect of withholding or controlling production;
4. deny participation for any of the following reasons:
   a. that the applicant is not a member of the STA;
   b. that the applicant is a foreign competitor; or
5. charge fees to participate that are unreasonable as related to the direct and indirect costs involved;
6. charge non-members fees so large as to effectively compel joining the organization;

2.2 Summary of Individual Responsibilities

1. Each company wishing to participate at a STA sanctioned SAS Plugfest must have submitted a signed NDA at least one week prior to the event.
2. Each individual wishing to participate in a STA sanctioned SAS Plugfest must have submitted a signed Registration from at least one week prior to the event.
3. Each individual looking to participate in Technical Coordination Committee (TCC) meetings related to the SAS Plugfest Program must have a signed NDA in place starting with the November 2003 meeting.
4. Each individual participating in STA sanctioned TCC meetings and/or SAS Plugfest must be aware they are under NDA and must protect any information received, written, digital or verbal, with utmost confidentiality.

2.3 Related Documents

1. Plugfest Agreement
2. NDA Agreement
3. Plugfest Registration Form
4. Test Suite Documentation Template

3.0 Definition of Product

Cables and connectors

Test tools

Controllers

Host Bus Adapters A device which connects between a host system and the SAS interconnect. The device usually performs the lower layers of the SCSI protocol and normally operates in the initiator role. This function may be integrated into the host system.

System on a chip

FPGA/ASIC

Edge expander device: An expander device that is part of a single edge expander device set.

Edge expander device set: A group of one or more edge expander devices that may be attached to no more than one other edge expander device set or one fan-out expander device.

End device: A SAS device that is not contained within an expander device.

Fanout devices (expanders, Serial ATA port multipliers)

Fanout expander device: An expander device that is capable of being attached to two or more edge expander device sets.

HDD, and other storage devices

Motherboards/Systems

Bridges – SCSI to Serial Attached SCSI

4.0 Plugfest:

4.1 General:

SAS Plugfest will be conducted 3 or 4 times a year for any vendor of SAS or SATA products. The Plugfest will be administered by a co-operative effort of STA and the University of New Hampshire InterOperability Laboratory as specified in the SAS Agreement. The UNH-IOL personnel represent a neutral third party.

The Plugfest will be conducted in an open environment during which a formal test process will be conducted. Tests run during the Plugfest will come from both open and private sources. Tests developed by either the UNH-IOL or paid for by STA will be open sourced and available to participants. Those tests developed and provided for use by individual companies may or may not be available to participating companies, depending upon the conditions set forth but the company developing the test. It will be up to individual companies to make arrangements with those companies that provide test scripts that are not provided as an open source test script.

The SAS Plugfest will be open to members of participating companies and the staff of the UNH-IOL. Visitors will NOT be allowed into the Plugfest area anytime a Plugfest is being conducted.

4.2 Participants:

Participation in the SAS Plugfest is open to all vendors of SAS and SATA products. Membership in STA is not a requirement to participate in the SAS Plugfest. A participation fee will be assessed on participating companies based on section 4.7 of this document. STA reserves the right to limit the number of participants per company for logistical reasons. Companies may participate with several products.

4.3 Notification of Plugfest:

A notice of an upcoming Plugfest will be posted on the STA web page and distributed by email at least 6 weeks prior to the event.

4.4 Formal Test Plan:

An outline of the Formal Test Plan will be posted on the STA web page and distributed by email at least 2 weeks prior a Plugfest event. Although there will be a Formal Test Procedure for each Plugfest, adhoc and private testing between individual companies is NOT discouraged.

In addition to identifying the test plan, a list of test equipment/test systems will be provided on the same notice of the Formal Test Plan.

4.5 Plugfest Non Disclosure Agreements (NDA):

All companies and individuals participating in a SAS Plugfest are required to sign an NDA prior to entering the Plugfest that will prohibit the discussions and/or disclosure of:

a) any test results other than the individual's own company's results
b) any other company's products that are used during the Plugfest
c) any other companies test results
d) any intellectual property exposed by another company

4.6 Plugfest Results:

All individual and group test results accumulated during a SAS Plugfest will be controlled and maintained by the UNH-IOL staff. Each company participating in a SAS Plugfest will receive detailed results only on each of the different products they bring to the Plugfest and are tested during the Plugfest. No company will have access to any other companies detailed test results.

At the conclusion of a Plugfest, if there are enough vendors of a particular product such as HBAs, Disk Drives, etc., the UNH-IOL staff will generate a summary report. Within the summary report, each company will be identified by a key code such as Company A, Company B, etc. Each company will be given their individual key code. The UNH-IOL staff will not share a company's key code with another company. The results, either detailed or summary, for any particular Plugfest are the sole property of the individual

companies that participated in that particular Plugfest and may not be shared with any other individuals or organizations. The total summary report may be used internally by the individual companies but may not be published or distributed to any company not participating in the Plugfest, organization, press or any other group or body.

4.7 Fees:

The fees to participate in a SAS Plugfest will be established from time-to-time by STA. The fee structure will be based upon whether a company is a STA member or not and upon the company's level of membership if they are a STA member, and the degree of testing (SATA vs. SAS, etc). All Plugfest fees must be paid in advance by individual companies prior to participating in a Plugfest.

4.8 Plugfest Hardware/Software requirements

When the Formal Test Plan is published at least 2 weeks prior to a Plugfest, a list of test equipment/test systems that will be present at the Plugfest will be provided. If an individual company does not see specific equipment they require on the list, they should plan to bring whatever equipment they need to test their devices. As an example, if a drive company plans to bring just individual drives to the Plugfest, then they should make sure that they bring power supplies with them in order to power the drives.

If an individual company requires any special equipment or special software, they should make that requirement known to the SAS coordination person at UNH-IOL at least 4 weeks in advance of a Plugfest. They should also be prepared to bring any special equipment or software to the Plugfest in case it cannot be provided by the UNH-IOL.

5.0 Overview of the SAS Plugfest Process

The SAS Plugfest Program is sponsored, operated, and promoted by the SCSI Trade Association (STA).

The purpose of the SAS Plugfest Program is to provide a fair and equitable measure of proper device behavior, which will lead to interoperability and device-level compatibility of products, which incorporate, or connect to devices, which, in turn, incorporate SAS or SATA interfaces. More simply put, the SAS Plugfest Program will NOT measure interoperability, but will enable it.

The SAS Plugfest Program includes provisions for identifying applicable standards, defining which aspects of the standard are deemed the most important to test, creation of test suites by independent test developers (called Test Suite Providers), rigorous testing of test suites, cataloging of test suites, and review of test results. There will most likely be different test suites for different devices under test.

6.0 Interoperability Program Overview

6.1 SAS Plugfest Program Guidelines:

The SAS Plugfest Program will:

1. Establish a comprehensive set of SAS/SATA storage test suites that test adherence to the SAS Specification.
2. Schedule the release of tests, providing equal access to all interested parties.
4. Facilitate 'plugfests', which allow vendors to do live testing using the test suites before they are formally released.
5. Establish clear guidelines for press releases, which announce a company's passing a conformance test.
6. Organize currently independent testing efforts into one single all-encompassing program, including contributions from FCIA, SNIA, and other groups.
7. Market the SAS Plugfest program to the general public.

6.2 What the SAS Plugfest Program will ***NOT*** do:

The SAS Interoperability Program will NOT:

1. Guarantee or otherwise warrant the performance of Test Suites, nor does it own or maintain Test Suites.
2. Guarantee or otherwise warrant that any device tested under the SAS Plugfest Program adhere to any or all of the requirement of the SAS Specification.
3. Establish practices that can be used to lessen competition.
4. Have the effect of boycotting or excluding competitors.
5. Have the effect of withholding or controlling production.
6. Charge fees to participate that are unreasonable as related to the direct and indirect costs involved.
7. Charge non-members fees so large as to effectively compel joining the organization.
8. Will not issue any sort of "compliance"; i.e. this is not a compliance program.

6.3 Terms and Definitions

The following terms are used in this document:

Device Under Test (DUT) refers to specific products, which an individual company wishes to subject to SAS Plugfest Program testing. .

Test Suite Description (TSD) is an explicit written description of a Test Suite that is designed to test selected portions of the SAS and SATA standards. Each Test Suite Description should provide an overview of a specific Test Suite, define entrance and exit criteria and expected normal/abnormal results produced by the Test Suite while running on a Device Under Test (DUT) within a specific configuration.

Test Suite Provider (TSP) is a Test Equipment Vendor, University, or Third Party Independent Laboratory that develops one or more TS. A Test Suite Provider is encouraged to contribute significantly in the development of TS test definitions, which will be supported in their Test Suite portfolio, as well as provide assurance that Test Suites accurately reflect technical requirements specified in the pertinent TSs.

Test Suite (TS) is the package of necessary software, trouble-shooting elements, and instructional material, which are owned, maintained, and made available by a SAS Test Suite Provider, for the purpose of performing the test procedures explicitly described in the TSD. Test Suite Providers are responsible for maintaining version control, bug tracking, user manuals, and release notes, in addition to providing "Open Source Code" for test specific portions of the TS, along with related executable code to be run on the targeted test equipment hardware platform.

Product refers to a specific model of a SAS/SATA product (for example, a disk drive model, host adapter model, expander model, or RAID array model) where there is a single family of firmware & software applied within the model, specifically designed for a given ASIC/hardware generation. For example, if there were a single firmware/software image and common hardware applied to both an 8 port and 16 port device, this would be regarded as a single product or model. On the other hand, if there were fundamentally different firmware & software images applied to the various size devices, these would be regarded as separate products or models. The term "family of firmware & software" refers to the fact that some devices, such as disk drives, maintain a large number of firmware sets, based on the needs of their customers who integrate drives into larger assemblies. Even though there are a large number of firmware versions, this is regarded as a single product or model.

6.4 Operating Principles

The SAS Plugfest Program has adopted the following Operating Principles:

The SAS Plugfest Program shall promote the creation of standard based test suites by providing a program structure to facilitate the open industry development process.

The SAS Plugfest Program shall be conducted as an open industry program, with a structure, which seeks to facilitate the widest array of industry participation for technical insight, pragmatic judgment, engineering resources, and vendor equipment as needed to accomplish program goals.

The overall SAS Plugfest Program will attempt to be self funded to cover necessary expenses.

SAS Plugfest testing is designed to be 'self-administered', where vendors of SAS/SATA products may test with SAS Plugfest Test Suites in their own corporate labs, or within third party independent labs, which are capable of providing suitable test services.

The SAS Plugfest Program shall point to SAS Plugfest Test Suites, which are provided by Test Suite Providers who have met established criteria set by the STA and which have been designed to work reliably on a broad variety of SAS/SATA devices and products.

An individual Test Suite may be designed for very specific test equipment hardware. Test Suites should act as self-contained packages, with everything needed to run the tests, trouble-shoot device level issues, and ultimately provide sufficient "trace file" data.

The STA does not guarantee or otherwise warrant the performance of Test Suites, nor does it own or maintain test suites for the SAS Plugfest Program. It is the expectation of this program that all Test Suite support issues, including "bug tracking", shall be directed, managed, and owned by the Test Suite Provider. Test Suite Providers will maintain version control, user manuals, and release notes for the Test Suites they support. Test Suite Providers will also maintain a public web page, describing open industry availability of their SAS Plugfest Test Suites. If for any reason, the SAS Plugfest Program discovers any problems or difficulties with the SAS specification, it will forward that information back to the T10 SAS Committee.

6.5 Program Disclaimers

The STA does not take any responsibility, expressed or implied, for "enhancements" or "modifications" made to test suites, source code, guidelines, practices, or other published materials referenced by the SAS Plugfest program.

'SAS Plugfest Qualified' may be identified as a necessary or required element within an end user RFQ, an equipment or service providers' Customer Service Agreement (CSA), or other contract; however, this shall not represent any liability upon the STA, since providers are free to reference any number of conditions and specifications within the operation of their business. Equipment and service providers are fully and completely responsible for satisfying all elements within their CSAs and related business commitments.

A fairly comprehensive skill level is essential to execute and analyze SAS Plugfest tests. Tests may be performed within corporate labs or in third party independent labs having the appropriate resources.

6.6 SAS Plugfest Quality Statement and Assessment Criteria

The SAS Plugfest Qualified Program operates with the following quality guidelines.

The primary quality statement for all SAS Plugfest Program deliverables and associated volunteer contributed elements is the commitment to exert "due diligence" and "best efforts," in the process to capture, document, and promote "best general practices" of

available, open industry, standards based, and generally accepted mainstream SAS/SATA device & product characteristics.

SAS Plugfest Test Suites shall reflect wide review and consensus among industry standards development contributors, SAS/SATA device and product developers, contributing test equipment vendors, universities, and third party independent laboratories. Wide industry review and consensus shall be ensured through periodic calls to industry for input, tight interaction with the standards development community, regular technical development conference calls, and iteration of test description documents based on laboratory experience.

6.7 Test Suite Availability, Distribution, Open Source Code, and Business Assumptions

As noted above, the SAS Plugfest Program points to SAS Plugfest Test Suites, which are provided by Test Suite Providers who have met, established criteria set by the STA and which have been designed to work reliably on a broad variety of SAS/SATA devices and products.

In order to be recognized within the SAS Plugfest Program only, Test Suites that are available for wide distribution within the industry should be operational on generally available test equipment. Test Suite Providers shall provide a suitable reference URL, designating availability of the recognized Test Suite, preferably down loadable at the Test Suite Provider web site. The master list of all recognized SAS Interoperability Test Suites shall be located at the STA web site, which shall point to the collection of contributing Test Suite Provider web sites.

Please note: results of SAS Plugfest Program testing are the responsibility of those conducting the tests; therefore, SAS Interoperability "self qualification" assumes "best engineering" practice is applied by industry participants.

Nothing in this program is intended to prevent users from taking advantage of other forms of programmatic means to create extended functionality or integrate the basic Test Suite source file(s) into more comprehensive Test Suites for use in their corporate labs. However, these extended capabilities are strictly outside the scope of the SAS Plugfest Program. In general, the STA web site will link to the Test Suite Provider web sites where the Provider manages file version control.

6.8 Access to technical information

All technical dialog is conducted on the plugfests@scsita.org reflector.
Send subscription requests to info@scsita.org

About the SAS Plugfest Program
The SAS Plugfest Program is sponsored, operated, and promoted as an open industry, conformance test suite development program, within the non-profit SCSI Trade Association (STA). The program is open to members and non-members of the STA organization, and is intended to benefit the entire storage industry at large. To get involved in the program or ask questions, please send an email to info@scsita.org.

About the STA
The SCSI Trade Association (STA) is an international organization of manufacturers, systems integrators, developers, system vendors, industry professionals, and end-users. STA is committed to delivering a broad base of Serial Attached SCSI (SAS) infrastructure to support a wide array of industry applications within the mass storage and IT-based arenas. STA Working Groups focus on specific aspects of the technology that target both vertical and horizontal markets. For information, please contact the SCSI Trade Association at (415) 561-6273 or via e-mail at info@scsita.org, or visit the STA web site at http://www.scsita.org.

About the University of New Hampshire InterOperability Laboratory
Established in 1988, the University of New Hampshire InterOperability Laboratory (UNH-IOL) is a non-profit organization that currently offers comprehensive interoperability and conformance-based testing services. The mission of the UNH-IOL is two-fold: to educate and train undergraduate and graduate students from UNH in specific technology areas, and to foster a neutral multi-vendor environment for the purpose of identifying and solving complex interoperability problems. The test solutions that are created at the UNH-IOL offer a set of methods to increase interoperability through protocol operations, signaling, point-to-point and multi-system scenarios. More information about the UNH-IOL is available on the web at http://www.iol.unh.edu.