Document number 2006006

SBP-2 Mass Storage Functional, P2P and Network Test Specification

June 21, 2006

Sponsored by:

1394 Trade Association

Accepted for publication by

1394 Trade Association Board of Directors

Abstract

The purpose of this document is to define the way to test “Functional Test”, “Point-to-Point Test” and “Network Test” of SBP-2 Computer Mass Storage devices among the four tests defined by the 1394TA Compliance Logo Program.

Keywords

IEEE 1394, Serial Bus, Compliance Test, Logo program

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Fehler! Es konnten keine Einträge für ein Abbildungsverzeichnis gefunden werden.Annexes

Foreword

This specification defines the way to test “Functional Test”, “Point-to-Point Test” and “Network Test” of SBP-2 Computer Mass Storage devices among the four tests defined by the 1394TA Compliance Logo Program. For this test specification the “Functional Test” is the sum of the “Point-to-Point Test” and Network Test”, no other “Functional Tests” are defined.

There is one annexes in this specification which is informative and are not considered part of this specification.

This specification was accepted by the Board of Directors of the 1394 Trade Association. Board of Directors acceptance of this specification does not necessarily imply that all board members voted for acceptance. At the time it accepted this specification, the 1394 Trade Association. Board of Directors had the following members:

Eric Anderson, Chair
Zephra Freeman, Vice-Chair
David Thompson, Secretary

Organization Represented	*Name of Representative*
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Texas Instruments	Zephra Freeman

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Richard Mourn, Chair

Duncan Beadnell
Richard Mourn
Michael Scholles
Mark Slezak
David Thompson

Revision history

Revision 1.0 (June 21, 2006)

Initial revision

SBP-2 Mass Storage Functional, P2P and Network Test Specification

1 Scope and purpose

1.1 Scope

This test is intended for the following devices:

1394/SBP-2 enabled computer mass storage with Functional Conformance Test defined in the 1394TA Compliance Logo Program.

1.2 Purpose

The purpose of this document is to define the way to test “Functional Test”, “Point-to-Point Test” and “Network Test” of SBP-2 Computer Mass Storage devices among the four tests defined by the 1394TA Compliance Logo Program. For this test specification the “Functional Test” is the sum of the “Point-to-Point Test” and Network Test”, no other “Functional Tests” are defined.

1.3 Evaluation of results

The test procedures defined in this document result in a yes or no answer to a question. Unless specified otherwise all results should be evaluated as:

Yes = Pass

No = Fail

If any test fails then the devices fails to earn a compliance logo. Please note the tests defined in this document require several components (OS, other devices) that are beyond control of the test operator. Therefore the test operator must use their judgment when determining fault.

Determination of ‘successfully’ – Unless specifically specified within the test successfully means the test(s) completed with no errors reported by the application or operating system.

1.4 Cables, Connectors, and PHYsical Layer Silicon

For the purposes of this document the Device Under Test (DUT) will be viewed as a black box with the 1394 connector and perhaps DUT’s application as the only access to the DUT. With this limited view and the ultimate importance of the PHYsical Layer to interoperability of 1394 devices, this relies on the 1394 Qualification Review Boards (QRB) official database listing for Cables, Connectors, and PHY silicon. In the absence of this list using cables, connectors, or PHY silicon that have errata known to cause interoperability problems may be cause for the 1394TA to reject requests for product certification.

What does this mean?

1394 enabled end-products, which are likely to contain 1394 cables, connectors and PHY silicon, wishing to receive a 1394 logo for said product, must have the appropriate documentation declaring that the 1394 cables, connectors,

and whenever possible the PHY silicon incorporated in the product have passed their respective tests. Please see the following documents for details about each test:

- 1394 Connector and Cable Compliant Testing Criteria TA2004003
- 1394 PHY Silicon Test Specification TA2006022

2 Normative references

2.1 Reference scope

The specifications and standards named in this section contain provisions, which, through reference in this text, constitute provisions of this 1394 Trade Association Specification. At the time of publication, the editions indicated were valid. All specifications and standards are subject to revision; parties to agreements based on this 1394 Trade Association Specification are encouraged to investigate the possibility of applying the most recent editions of the specifications and standards indicated below.

2.2 Approved references

The following approved specifications and standards may be obtained from the organizations that control them.

IEEE Std 1394-1995, Standard for a High Performance Serial Bus

IEEE Std 1394a-2000, Standard for a High Performance Serial Bus—Amendment 1

IEEE Std 1394b-2002, Standard for a High Performance Serial Bus—Amendment 2

Serial Bus Protocol 2 (SBP-2), ANSI/NCITS 325-1998

Throughout this document, the term “IEEE 1394" shall be understood to refer to IEEE Std 1394-1995 as amended by IEEE Std 1394a-2000 and IEEE Std 1394b-2002.

2.3 References under development

At the time of publication, the following referenced specifications and standards were under development.

2.4 Reference acquisition

The references cited may be obtained from the organizations that control them:

1394 Trade Association, 1560 East Southlake Blvd, Suite 242, Southlake, TX 76092 USA; (817) 416-2200 / (817) 416-2256 (FAX); http://www.1394ta.org/

American National Standards Institute (ANSI), 11 West 42nd Street, New York, NY 10036, USA; (212) 642-4900 / (212) 398-0023 (FAX); http://www.ansi.org/

Institute of Electrical and Electronic Engineers (IEEE), 445 Hoes Lane, PO Box 1331, Piscataway, NJ 08855-1331, USA; (732) 981-0060 / (732) 981-1721 (FAX); http://www.ieee.org/

In addition, many of the documents controlled by the above organizations may also be ordered through a third party:

Global Engineering Documents, 15 Inverness Way, Englewood, CO 80112-5776; (800) 624-3974 / (303) 792-2192; http://www.global.ihs.com/

3 Definitions and notation

3.1 Definitions

3.1.1 Conformance

Several keywords are used to differentiate levels of requirements and optionality, as follows:

3.1.1.1 expected: A keyword used to describe the behavior of the hardware or software in the design models assumed by this specification. Other hardware and software design models may also be implemented.

3.1.1.2 ignored: A keyword that describes bits, bytes, quadlets, octlets or fields whose values are not checked by the recipient.

3.1.1.3 may: A keyword that indicates flexibility of choice with no implied preference.

3.1.1.4 reserved: A keyword used to describe objects (bits, bytes, quadlets, octlets and fields) or the code values assigned to these objects in cases where either the object or the code value is set aside for future standardization. Usage and interpretation may be specified by future extensions to this or other specifications. A reserved object shall be zeroed or, upon development of a future specification, set to a value specified by such a specification. The recipient of a reserved object shall ignore its value. The recipient of an object defined by this specification as other than reserved shall inspect its value and reject reserved code values.

3.1.1.5 shall: A keyword that indicates a mandatory requirement. Designers are required to implement all such mandatory requirements to assure interoperability with other products conforming to this specification.

3.1.1.6 should: A keyword that denotes flexibility of choice with a strongly preferred alternative. Equivalent to the phrase “is recommended.”

3.1.2 Glossary

3.1.2.1 byte: Eight bits of data, used as a synonym for octet.

3.1.2.2 CSR Architecture: A convenient abbreviation of the following reference (see clause 2): ISO/IEC 13213 : 1994 [ANSI/IEEE Std 1212, 1994 Edition], Information Technology—Microprocessor systems— Control and Status Register (CSR) Architecture for Microcomputer Buses.

3.1.2.3 quadlet: Four bytes of data.

3.1.2.4 Max Speed: Is the maximum bit rate supported by the PHY under test.

3.1.2.5 Explicitly: Used to describe test parameters or functions that are verified directly.

3.1.2.6 Implicitly: Used to describe test parameters or functions that are indirectly verified through the successful execution of a test or a series of tests. No direct observation is made.

3.1.3 Abbreviations

The following are abbreviations that are used in this specification:

DUT Device Under Test

SBP2 Serial Bus Protocol 2

IEEE The Institute of Electrical and Electronics Engineers, Inc.

3.2 Notation

3.2.1 Numeric values

Decimal and hexadecimal are used within this specification. By editorial convention, decimal numbers are most frequently used to represent quantities or counts. Addresses are uniformly represented by hexadecimal numbers. Hexadecimal numbers are also used when the value represented has an underlying structure that is more apparent in a hexadecimal format than in a decimal format.

Decimal numbers are represented by Arabic numerals without subscripts or by their English names. Hexadecimal numbers are represented by digits from the character set 0 – 9 and A – F followed by the subscript 16. When the subscript is unnecessary to disambiguate the base of the number it may be omitted. For the sake of legibility hexadecimal numbers are separated into groups of four digits separated by spaces.

As an example, 42 and $2A_{16}$ both represent the same numeric value.

3.2.2 Bit, byte and quadlet ordering

This specification uses the facilities of Serial Bus, IEEE 1394, and therefore uses the ordering conventions of Serial Bus in the representation of data structures. In order to promote interoperability with memory buses that may have different ordering conventions, this specification defines the order and significance of bits within bytes, bytes within quadlets and quadlets within octlets in terms of their relative position and not their physically addressed position.

Within a byte, the most significant bit, *msb*, is that which is transmitted first and the least significant bit, *lsb*, is that which is transmitted last on Serial Bus, as illustrated below. The significance of the interior bits uniformly decreases in progression from *msb* to *lsb*.

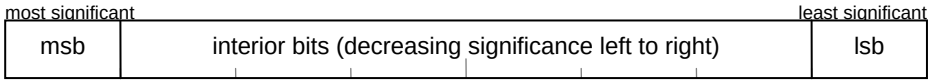

Figure 1 – Bit ordering within a byte

Within a quadlet, the most significant byte is that which is transmitted first and the least significant byte is that which is transmitted last on Serial Bus, as shown below.

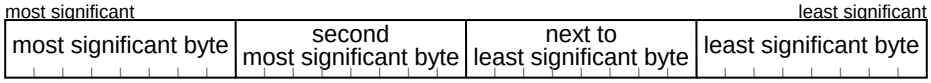

Figure 2 – Byte ordering within a quadlet

Within an octlet, which is frequently used to contain 64-bit Serial Bus addresses, the most significant quadlet is that which is transmitted first and the least significant quadlet is that which is transmitted last on Serial Bus, as the figure below indicates.

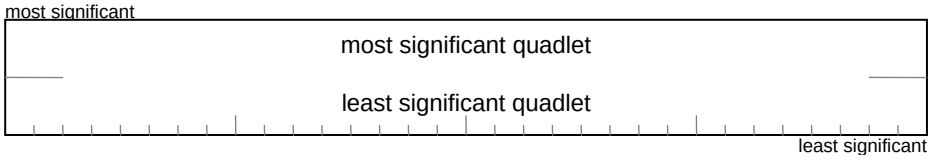

Figure 3 – Quadlet ordering within an octlet

When block transfers take place that are not quadlet aligned or not an integral number of quadlets, no assumptions can be made about the ordering (significance within a quadlet) of bytes at the unaligned beginning or fractional quadlet end of such a block transfer, unless an application has knowledge (outside of the scope of this specification) of the ordering conventions of the other bus.

4 Point-to-Point Test

4.1 Purpose

The purpose of this test is to check whether the performance between the Device Under Test (DUT) and the reference device is according to expectation when a DUT and a reference device are connected.

- In the case where the devices should be recognized in a certain combination, can the device be recognized?
- Can data be read from and/or written to the media correctly?
- Are there no issues when 1394 bus resets are initiated during data transfer?

4.2 Determination of reference devices

This section defines how to determine a reference device for DUT. For this test 5 different reference devices is required.

Policy regarding the way to determine reference devices:
1. List the categories of devices that can login into the DUT. (Discovered by operating system).

Example List:
- CH1 – Computer Host on host adapter
- CH2 – Computer Host on mother board

2. Select 5 reference devices:

   Select devices from CH category according to the following order of priority.
   a) Select the devices with 1394 TA compliance logo from other companies.
   b) Select the devices from other companies that are (were) available on the market.
   c) Select the devices with 1394 TA compliance logo from tester's company.
   d) Select the devices from tester's company that are (were) available on the market.

4.2.1 IEEE-1394B reference devices

If DUT is an IEEE-1394b device then at least 3/5 of reference devices shall also be IEEE-1394b capable. If DUT is not an IEEE-1394b device than at least 1/5 of reference devices shall be IEEE-1394b capable.

4.2.2 Multiple platforms/operating systems

If DUT advertises operation under multiple platforms/operating systems one of each platform/operating systems should be tested up to reference device limit of five.

Example:

- Mac PC
- Windows PC

4.3 Common Tests

Common tests must be executed regardless of the type of the DUT.

4.3.1 Common Tests Topology

For the tests listed in section **Fehler! Verweisquelle konnte nicht gefunden werden.** the following topology shall be used. Each test listed in section **Fehler! Verweisquelle konnte nicht gefunden werden.** shall be tested five times, once each for each reference device.

DUT ---------- Reference Device ---------- Bus Reset Generator Node

or

Reference Device ---------- DUT ---------- Bus Reset Generator Node

For tests requiring generation of bus reset if both the DUT and Reference device are single port devices then the following topology may be used.

DUT ---------- Bus Reset Generator Node ---------- Reference Device

4.3.2 Common test 1

Test ID	Test Description	Windows Test Result	Macintosh Test Result
PP311	Connect DUT to computer. Was DUT correctly listed in computer's device manager/registry?	Yes or No	Yes or No
PP312	Could the device be unplugged (without unmounting) and correctly removed from device manager/registry?	Yes or No	Yes or No
PP313	Repeat steps PP311 and PP312 four times. Was DUT correctly registered/unregistered each time?	Yes or No	Yes or No
PP314	**Windows specific step:** After connection of DUT, disable DUT's driver through device manager. Was DUT correctly disabled?	Yes or No	N/A
PP315	**Windows specific step:** Enable DUT's device manager through device manger. Was DUT correctly enabled or reactivated?	Yes or No	N/A
PP316	**Windows specific step:** Repeat steps PP314 and PP315 four times. Was DUT's driver correctly disabled/enabled each time?	Yes or No	N/A
PP317	Load movie (example .avi file) with video and sound on to DUT. Play movie using Window Media Player or Quicktime. Initiate 10 long bus resets while movie is playing. Did the movie continue with no interruption?[1]	Yes or No	Yes or No

[1] If interruptions occur the tester may use tools to determine if the cause of the interruptions is the device under test or other components in the system.

PP318	Load movie (example .avi file) with video and sound on to DUT. Play movie using Media Player or Quicktime. Initiate 10 short bus resets while movie is playing. Did the movie continue with no interruption?[2]	Yes or No	Yes or No
PP319	Read one giga-byte or largest possible file if media is smaller than one giga-byte file from DUT. Was file transfer completed successfully?	Yes or No	Yes or No
PP3110	**Writeable media test:** Write one giga-byte or largest possible file if media is smaller than one giga-byte file to DUT. Was file transfer completed successfully?	Yes or No or N/A	Yes or No or N/A
PP3111	Repeat steps PP319 and PP3110 4 times. Was each file transfer completed successfully?	Yes or No	Yes or No
PP3112	With computer active connect DUT. Put computer into sleep/suspend state. Did computer enter sleep/suspend state successfully?	Yes or No	Yes or No
PP3113	With computer asleep/suspended, wake/resume computer. Did computer wake/resume successfully?	Yes or No	Yes or No
PP3114	Repeat steps PP3112 and PP3113 4 times. Was each sleep/suspend and wade/resume completed successfully?	Yes or No	Yes or No

[2] If interruptions occur the tester may use tools to determine if the cause of the interruptions is the device under test or other components in the system.

4.3.3 Common test 2

Test ID	Test Description	Windows Test Result	Macintosh Test Result
PP321	With Windows/Mac PC powered off connect DUT to Windows/Mac PC.	-	-
PP322W	Power Windows PC, was DUT correctly listed in computer's device manager/registry?	Yes or No	-
PP322M	Power Mac PC, was DUT correctly listed in computer's device manager/registry?	-	Yes or No
PP323W	Power down Windows PC, did DUT correctly power down?	Yes or No	-
PP323M	Power down Max PC, did DUT correctly power down?	-	Yes or No
PP324W	Repeat steps PP321 through PP323n 4 times. Was each step completed successfully	Yes or No	-
PP324M	Repeat steps PP321 through PP323n 4 times. Was each step completed successfully	-	Yes or No

5 Network Test

5.1 Purpose

The purpose of this test is to check that other devices on the bus are not adversely affected when the DUT is connected to the bus or begins operation.

5.2 Basic configuration and topology

Two basic configurations are used for this test, Windows OS and Mac OS Computer. If DUT is specified to operate in one or the other but not both, testing maybe restricted to the one appropriate configuration. Otherwise, DUT shall be tested in both.

Connect the following reference devices to the bus (one from each)

Windows PC

Minimum Requirements:

- Latest version of Windows with all relevant updates.
- Pentium 4 or Celeron Processor - 1.5GHz, 512Mbytes Memory, HDD 40GB, Motherboard or add-in IEEE-1394 card.
- Amcap, Windows Media Player or Quicktime

Mac PC

Minimum Requirements:

- Latest version of Mac OS with the with all relevant updates.
- PowerPC or Intel based Mac - 512Mbytes Memory, HDD 40 GB, Motherboard or add-in 1394 card.
- iMovie, Quicktime

DV device (camcorder) – This device shall be IEEE-1394a only (not 1394b)

SBP-2 HDD

Bus analyzer or equivalent

Hub(s)

If only three port hubs are available (example 1394b) then multiple hubs maybe used or branching from other devices in the topology is acceptable.

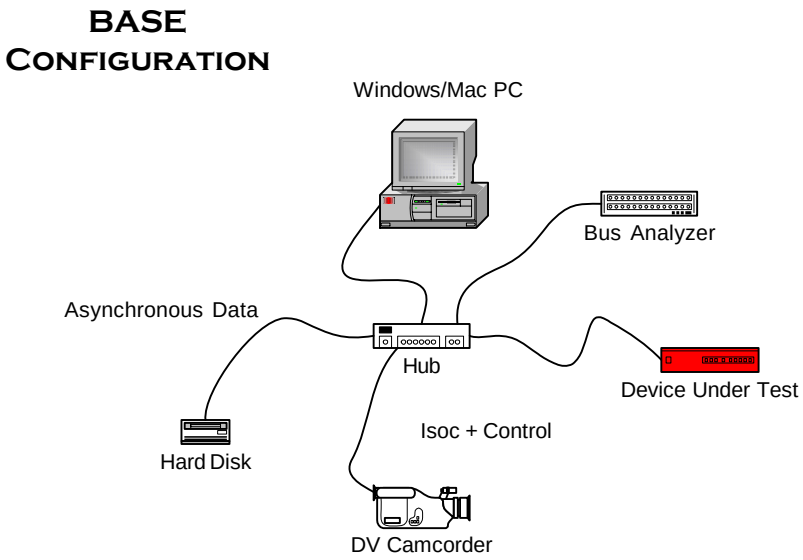

Figure 4. Base network topology diagram.

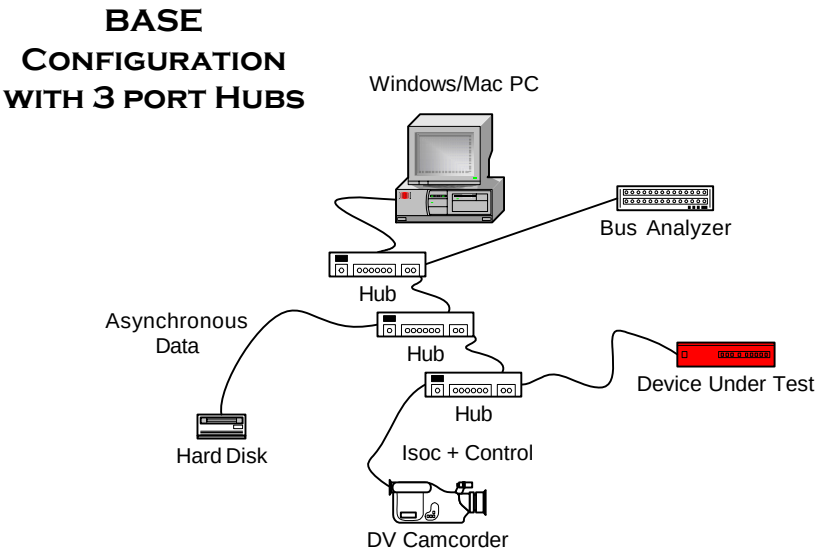

Figure 5. Base network topology with 3 port hub.

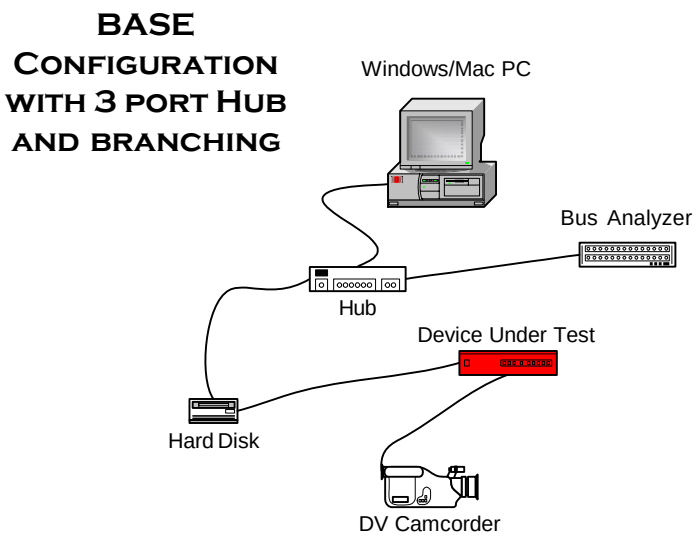

Figure 6. Base network topology with 3 port hub and branching.

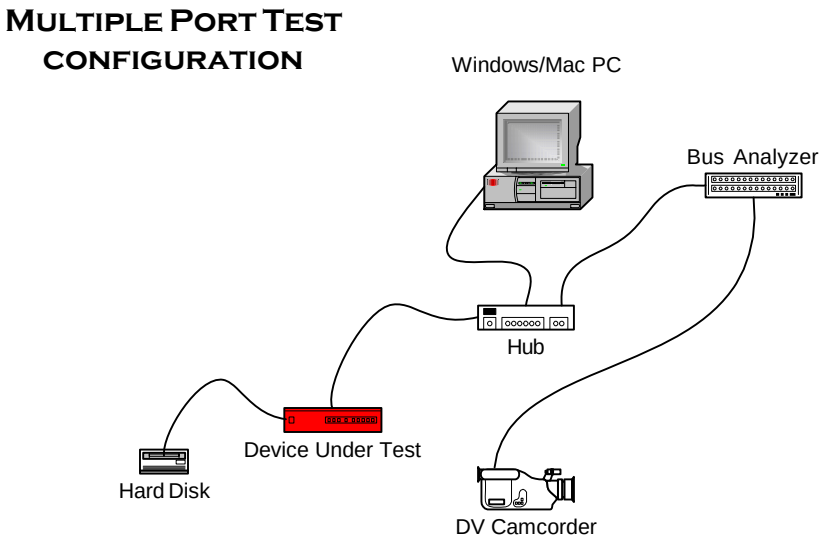

Figure 7. Multiple port test topology

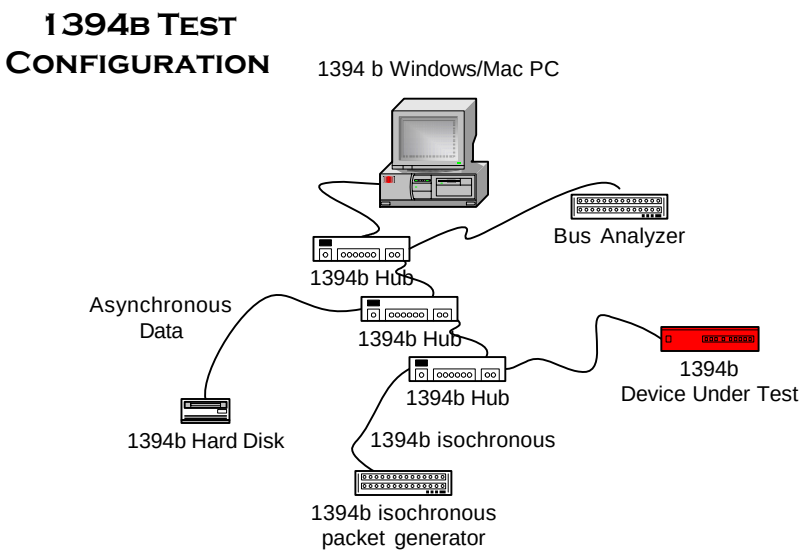

Figure 8. 1394b Test Configuration

5.3 Determination of reference device

This section is about how to select reference devices:

Select the device from each category according to the following order of priority.

a) Select the device with 1394 TA compliance logo from other company.
b) Select the device from other company that is (was) available on the market.
c) Select the device with 1394 TA compliance logo from tester's company.
d) Select the device from tester's company that is (was) available on the market.

5.3.1 IEEE-1394b reference devices

If DUT is an IEEE-1394b capable device then the Hub, HDD, and Windows/Mac PC shall be IEEE-1394b capable and the camcorder shall be IEEE-1394a. If DUT is not an IEEE-1394b capable device then the Hub and Windows/Mac PC are recommended to be IEEE-1394b capable. If a five port Hub is not available then multiple Hubs maybe used to enable the appropriate number of connections. If DUT is IEEE-1394b capable then Common test 6 is required. Common test 6 requires all devices be IEEE-1394b.

5.4 Common Test

Common test must be executed regardless of the types of the DUT.

This set of tests checks that both Isochronous and Asynchronous transmissions of the other devices are not affected while they are operating on the bus, when the DUT is connected and disconnected. Operations such as "file copy" may be accomplished by any procedure.

5.4.1 Common test 1

Test ID	Test Description	Windows Test Result	Macintosh Test Result
NT411	Establish base topology, without DUT, as shown in Figure 4, 2 or 3.	-	-
NT412	Wait for all bus traffic to stop, except cycle start and isochronous packets.	-	-
NT413	Verify Camcorder or Windows/Mac PC is root.	-	-
NT414	Connect DUT to Hub and verify:	-	-
NT415W	Is number of bus resets less than three (3)?	Yes or No	-
NT415M	Is number of bus resets less than three (3)?	-	Yes or No
NT416W	Is Camcorder or Windows PC root?	Yes or No	-
NT416M	Is Camcorder or Mac PC root?	-	Yes or No
NT417W	Is number of self-id's equal to number of nodes in topology[3]?	Yes or No	-
NT417M	Is number of self-id's equal to number of nodes in topology[1]?	-	Yes or No
NT418	Repeats steps NT414 through NT417x two more times. Did each test complete successfully?	Yes or No	Yes or No

5.4.2 Common test 2

Test ID	Test Description	Windows Test Result	Macintosh Test Result
NT421	Establish base topology, without DUT, as shown in Figure 4, 2 or 3.	-	-
NT422	Wait for all bus traffic to stop, except cycle start and isochronous packets.	-	-
NT423	Verify Camcorder or Windows/Mac PC is root.	-	-
NT424	Set DUT's RHB using PHY Configuration packet, initiate bus reset and verify:	-	-
NT425W	Is number of bus resets less than three (3)?	Yes or No	-
NT425M	Is number of bus resets less than three (3)?	-	Yes or No

[3] If any nodes present in the topology has more than 3 ports the number of self-ids will increase accordingly.

NT426W	Is Camcorder or Windows PC root?	Yes or No	-
NT426M	Is Camcorder or Mac PC root?	-	Yes or No
NT427W	Is number of self-id's equal to number of nodes in topology?	Yes or No	-
NT427M	Is number of self-id's equal to number of nodes in topology?	-	Yes or No
NT428	Repeats steps NT424 through NT429x two more times. Did each test complete successfully?	Yes or No	Yes or No

5.4.3 Common test 3

Test ID	Test Description	Windows Test Result	Macintosh Test Result
NT431	Establish base topology, without DUT, as shown in Figure 4, 2 or 3.	-	-
NT432	Wait for all bus traffic to stop, except cycle start and isochronous packets.	-	-
NT433	Verify Camcorder or Windows/Mac PC is root.	-	-
NT434	Start capture of isochronous stream from camcorder to Windows/Mac PC	-	-
NT435	Connect DUT to Hub and verify:		
NT436W	Did connection of DUT cause little or no noticeable interruption[4] of audio/video?	Yes or No	-
NT436M	Did connection of DUT cause little or no noticeable interruption of audio/video?	-	Yes or No
NT437	Repeats steps NT426 through NT437x four more times. Did each test complete successfully?	Yes or No	Yes or No

5.4.4 Common test 4

Test ID	Test Description	Windows Test Result	Macintosh Test Result

[4] Within IEEE-1394 networks expectation of audio/video reliability are very high. However, given OS inefficiencies connection of new storage devices may disrupt other tasks being performed (such as storage of isochronous stream). The size of this disruption may be larger for optical or flash media storage devices than faster magnetic storage devices. Therefore the test operator must use their judgment when defining 'little'.

NT441	Establish base topology, without DUT, as shown in Figure 4, 2 or 3.	-	-
NT442	Wait for all bus traffic to stop, except cycle start and isochronous packets.	-	-
NT443	Verify Camcorder or Windows/Mac PC is root.	-	-
NT444	Start capture of isochronous stream from camcorder to Windows/Mac PC	-	-
NT445	Start maximum (supported by Windows/Mac PC and HDD) speed and size asynchronous transfers between Windows/Mac PC and HDD.	-	-
NT445	Connect DUT to Hub and verify:		
NT446W	Did connection of DUT cause little or no noticeable interruption[5] of audio/video?	Yes or No	-
NT446M	Did connection of DUT cause little or no noticeable interruption of audio/video?	-	Yes or No
NT447W	Did connection of DUT cause little or no noticeable interruption or no disruption[6] of HDD transactions?	Yes or No	-
NT447M	Did connection of DUT cause little or no noticeable interruption or no disruption of HDD transactions?	-	Yes or No
NT448	Disconnect DUT from Hub and verify:		
NT449W	Did disconnect of DUT cause little or no noticeable interruption[2] of audio/video?	Yes or No	-
NT449M	Did disconnect of DUT cause little or no noticeable interruption of audio/video?	-	Yes or No
NT4410 W	Did disconnect of DUT cause little or no noticeable interruption or no disruption of HDD transactions?	Yes or No	-
NT4410M	Did disconnect of DUT cause little or no noticeable interruption or no disruption of HDD transactions?	-	Yes or No

[5] Within IEEE-1394 networks expectation of audio/video reliability are very high. However, given OS inefficiencies connection of new storage devices may disrupt other tasks being performed (such as storage of isochronous stream). The size of this disruption may be larger for optical or flash media storage devices than faster magnetic storage devices. Therefore the test operator must use their judgment when defining 'little'.

[6] Some HDDs are known to not handle bus resets during data transfer gracefully. The tester should take care to verify that the reference HDD does handle bus resets during data transfer gracefully before use in this test.

NT4411	Repeats steps NT445 through NT4410x four more times. Did each test complete successfully?	Yes or No	Yes or No

5.4.5 Common test 5 (Only required if DUT has more than one port)

Test ID	Test Description	Windows Test Result	Macintosh Test Result
NT451	Establish base topology, with DUT, as shown in Figure 7.	-	-
NT452	Wait for all bus traffic to stop, except cycle start and isochronous packets.	-	-
NT453	Verify Camcorder or Windows/Mac PC is root.	-	-
NT454	Start capture of isochronous stream from camcorder to Windows/Mac PC	-	-
NT455	Write two giga-byte or largest possible file if media is smaller than two giga-byte file to HDD (not DUT but test HDD).	-	-
NT456W	Did isochronous transfer complete with no noticeable interruption of audio/video?	Yes or No	-
NT456M	Did isochronous transfer complete with no noticeable interruption of audio/video?	-	Yes or No
NT457W	Did HDD transfer complete with no errors?	Yes or No	-
NT457M	Did HDD transfer complete with no errors?	-	Yes or No
NT458	Repeats steps NT454 through NT457x four more times. Did each test complete successfully?	Yes or No	Yes or No

5.4.6 Common test 6

Test ID	Test Description	Windows Test Result	Macintosh Test Result
NT461	With Windows/Mac PC powered off establish base topology, with DUT, as shown in Figure 1, 2, 3 or Figure 5 if DUT is 1394b capable.	-	-
NT462W	Power Wndows/Mac PC was DUT correctly listed in computer's device manager/registry?	Yes or No	-
NT462W	Power Wndows/Mac PC was DUT correctly listed in computer's device manager/registry?	-	Yes or No
NT463	Verify Camcorder or Windows/Mac PC is root.	-	-
NT464	Start capture of isochronous stream from camcorder to Windows/Mac PC	-	-
NT465	Write two giga-byte or largest possible file if media is smaller than two giga-byte file to HDD (not DUT but test HDD).	-	-
NT466W	Did isochronous transfer complete with no noticeable interruption of audio/video?	Yes or No	-
NT466M	Did isochronous transfer complete with no noticeable interruption of audio/video?	-	Yes or No
NT467W	Did HDD transfer complete with no errors?	Yes or No	-
NT467M	Did HDD transfer complete with no errors?	-	Yes or No
NT468	Repeats steps NT464 through NT467x four more times. Did each test complete successfully?	Yes or No	Yes or No

5.4.7 Common test 7 (Only required if DUT has 1394b PHY)

Test ID	Test Description	Windows Test Result	Macintosh Test Result
NT471	Establish base topology, with DUT, as shown in Figure 8.	-	-

NT472	Wait for all bus traffic to stop, except cycle start and isochronous packets. Start isochronous packet stream if not already started.	-	-
NT473	Verify root is sending cycle starts packets.	-	-
NT474	Write two giga-byte file to HDD (not DUT but test HDD).	-	-
NT475	Was no bus reset detected?	Yes or No	Yes or No
NT476W	Did HDD transfer complete with no errors?	Yes or No	-
NT476M	Did HDD transfer complete with no errors?	-	Yes or No
NT477	Repeats steps NT464 through NT476x four more times. Did each test complete successfully?	Yes or No	Yes or No

5.5 Individual test

Individual tests are tests targeting a specific device category. For this specification the targeted category is Mass Storage (MS) and the specific device categories are:

- MS1 – SBP-2 HDD supporting RBC/SBC Command Set
- MS2 – SBP-2 CD/DVD read/write support RBC/SBC Command Set
- MS3 – SBP-2 Tape drive supporting RBC/SBC Command Set
- MS4 – SBP-2 Flash drive supporting RBC/SBC Command Set

5.5.1 MS1 – SBP-2 HDD

Test ID	Test Description	Windows Test Result	Macintosh Test Result
NT511	Establish base topology, with DUT, as shown in Figure 4, 2, 3 or Figure 5 if DUT is 1394b capable.	-	-
NT512	Wait for all bus traffic to stop, except cycle start and isochronous packets.	-	-
NT513	Verify Camcorder or Windows/Mac PC is root.	-	-
NT514	Start capture of isochronous stream from camcorder to DUT.	-	-
NT515	Transfer at least two giga-byte or largest possible file if media is smaller than two giga-byte file from Windows/Mac PC to DUT.	-	-

NT516	Verify:	-	-
NT517W	Once file transfer completes verify both isochronous stream and file transfer complete without error?	Yes or No	-
NT517M	Once file transfer completes verify both isochronous stream and file transfer complete without error?	-	Yes or No
NT518	Repeats steps NT511 through NT517x two more times. Did each test complete successfully?	Yes or No	Yes or No
NT519	Repeat steps NT511 through NT518 with one hub operating at S100 only. Did each test pass successfully?	Yes or No	Yes or No

5.5.2 MS2 – CD/DVD read/write device

NT521	Establish base topology, with DUT, as shown in Figure 4, 2, 3 or Figure 5 if DUT is 1394b capable.	-	-
NT522	Wait for all bus traffic to stop, except cycle start and isochronous packets.	-	-
NT523	Verify Camcorder or Windows/Mac PC is root.	-	-
NT524	Write and verify file(s) (for CD 500mega-byte, for DVD two giga-byte) from Windows/Mac PC to DUT.	-	-
NT526	Verify:	-	-
NT527W	Once file copy completes verify file copy completed without error?	Yes or No	-
NT527M	Once file copy completes verify file transfer completed without error?	-	Yes or No
NT528	From Windows/Mac PC read copied file(s) from DUT.	-	-
NT529W	Did file read complete without error?	Yes or No	-
NT529M	Did file read complete without error?	-	Yes or No
NT5210	Repeats steps NT524 through NT529x two more times. Did each test complete successfully?	Yes or No	Yes or No

NT5211	Repeat steps NT521 through NT5210 with one hub operating at S100 only. Did each test pass successfully?	Yes or No	Yes or No

5.5.3 MS2 – CD/DVD read test

Test ID	Test Description	Windows Test Result	Macintosh Test Result
NT531	Establish base topology, with DUT, as shown in Figure 4, 2, 3 or Figure 5 if DUT is 1394b capable.	-	-
NT532	Wait for all bus traffic to stop, except cycle start and isochronous packets.	-	-
NT533	Verify Camcorder or Windows/Mac PC is root.	-	-
NT534	Insert media into DUT. If DUT is CD then the media should contain at least 4 tracks of audio. If the DUT is DVD then the media should contain at least 4 tracks of DVD video.	-	-
NT535	Using appropriate player play CD/DVD content for at least 4 tracks.	-	-
NT536W	Did media play without error?	Yes or No	-
NT536M	Did media play without error?	-	Yes or No
NT537	Using pause button from player pause media.	-	-
NT538W	Did media pause correctly?	Yes or No	-
NT538M	Did media pause correctly?	-	Yes or No
NT539	Using play button start media playing then using skip forward button move to next track or chapter.	-	-
NT5310 W	Did media skip to next track or chapter correctly?	Yes or No	-
NT5310M	Did media skip to next track or chapter correctly?	-	Yes or No
NT5311	Using play button start media playing then using skip backward button move to previous track or chapter.		
NT5312 W	Did media skip to previous track or chapter correctly?	Yes or No	-

NT5312M	Did media skip to previous track or chapter correctly?	-	Yes or No
NT5313	Using eject button eject media.	-	-
NT5314W	Did media eject correctly?	Yes or No	-
NT5314M	Did media eject correctly?	-	Yes or No
NT5315	Using eject button reinsert media.	-	-
NT5314W	Did media reinsert correctly?	Yes or No	-
NT5314M	Did media reinsert correctly?	-	Yes or No
NT5315	Repeats steps NT531 through NT5314x two more times. Did each test complete successfully?	Yes or No	Yes or No
NT5316	Repeat steps NT531 through NT5315 with one hub operating at S100 only. Did each test pass successfully?	Yes or No	Yes or No

5.5.4 MS4 – SBP-2 Flash drive

Test ID	Test Description	Windows Test Result	Macintosh Test Result
NT541	Establish base topology, with DUT, as shown in Figure 4, 2, 3 or Figure 5 if DUT is 1394b capable.	-	-
NT542	Wait for all bus traffic to stop, except cycle start and isochronous packets.	-	-
NT543	Verify Camcorder or Windows/Mac PC is root.	-	-
NT544	Transfer at least two giga-byte or largest possible file if media is smaller than two giga-byte file from Windows/Mac PC to DUT.	-	-
NT545	Verify:	-	-
NT546W	Once file transfer completes verify file transfer completed without error?	Yes or No	-
NT546M	Once file transfer completes verify file transfer completed without error?	-	Yes or No
NT547	Repeats steps NT541 through NT546x two more times. Did each test complete successfully?	Yes or No	Yes or No
NT548	Repeat steps NT541 through NT547 with one hub operating at S100 only. Did each test pass successfully?	Yes or No	Yes or No

Annex A
(informative)

Bibliography

[B1] IEEE Std 1212-2001, Standard for a Control and Status Registers (CSR) Architecture for microcomputer buses

[B2] IEEE Std 1394-1995, Standard for a High Performance Serial Bus

[B3] IEEE Std 1394a-2000, Standard for a High Performance Serial Bus—Amendment 1

[B4] IEEE Std 1394b-2002, Standard for a High Performance Serial Bus—Amendment 2