



# **TA Document TS2006006**

## **SBP-2 Mass Storage Functional, P2P and Network Test Spec**

### **Draft 0.9:21**

**February 28, 2006**

**Sponsored by:**  
1394 Trade Association

**Accepted for Release by:**  
This document has not yet been accepted for release by the 1394 Trade Association Board of Directors.

**Abstract:**  
This document provides a test specification for Functional, Point-to-Point and Network Tests for Mass Storage devices.

**Keywords:**  
Point-to-Point Test, Network Test, Mass Storage..

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NOTE — The information on this page should be removed when this document is accepted.

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## Change history

The following table shows the change history for this specification.

### Version 0.1 (date)

June 25, 2004 - Original version.

### Version 0.9:17 (January 24, 2006)

**Table 1 – Content change for version 0.9:17**

Category	Description
Editorial	Major re-write to include MS1-MS4 and 1394b tests
Technical	Major re-write to include MS1-MS4 and 1394b tests

### Version 0.9:21 (February 28, 2006)

**Table 2 – Content change for version 0.9:21**

Category	Description
Editorial	Added...
Technical	



## 1. Overview

### 1.1 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.

### 1.2 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.

### 1.3 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.

## 2. References

The following standards contain provisions, which through reference in this document constitute provisions of this standard. All the standards listed are normative references. Informative references are given in Annex A. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

- [R1] IEEE Std 1394-1995, Standard for a High Performance Serial Bus.
- [R2] IEEE Std 1394a-2000, Supplement
- [R3] SCSI-3 Serial Bus Protocol 2 (SBP-2), ANSI/NCITS 325-1998

## 3. Definitions

### 3.1 Conformance levels

**3.1.1 expected:** A key word 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.

**3.1.2 may:** A key word that indicates flexibility of choice with *no implied preference*.

**3.1.3 shall:** A key word indicating a mandatory requirement. Designers are *required* to implement all such mandatory requirements.

**3.1.4 should:** A key word indicating flexibility of choice with a strongly preferred alternative. Equivalent to the phrase *is recommended*.

**3.1.5 reserved fields:** A set of bits within a data structure that are defined in this specification as reserved, and are not otherwise used. Implementations of this specification shall zero these fields. Future revisions of this specification, however, may define their usage.

**3.1.6 reserved values:** A set of values for a field that are defined in this specification as reserved, and are not otherwise used. Implementations of this specification shall not generate these values for the field. Future revisions of this specification, however, may define their usage.

NOTE —The IEEE is investigating whether the “may, shall, should” and possibly “expected” terms will be formally defined by IEEE. If and when this occurs, draft editors should obtain their conformance definitions from the latest IEEE style document.

### 3.2 Glossary of terms

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

**3.2.2 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.

**3.2.3 quadlet:** Four bytes of data.

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

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

**3.2.6 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.

### 3.3 Acronyms and abbreviations

DUT Device Under Test

SBP2 Serial Bus Protocol 2

IEEE The Institute of Electrical and Electronics Engineers, Inc.

## 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?
- Is there any issue with 1394 bus resets occurring during data transfer?

### 4.2 Determination of reference devices

This section defines how to determine a reference device for DUT.

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 5.

Example:

- Mac PC
- Windows PC

### 4.3 Common Tests

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

### 4.3.1 Common Tests Topology

For the tests listed in section 4.3.2 the following topology shall be used. Each test listed in section 4.3.2 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 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	<b>Window specific step:</b> After connection of DUT, disable DUT's driver through device manager. Was DUT correctly disabled?	Yes or No	N/A
PP315	<b>Window specific step:</b> Enable DUT's device manager through device manger. Was DUT correctly enabled or reactivated?	Yes or No	N/A
PP316	<b>Window specific step:</b> 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. Was movie interrupted by bus reset?	Yes or No	Yes or No
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. Was movie interrupted by bus reset?	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	<b>Writeable media test:</b> 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

## 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

Requirements:

- Window XP Professional SP1 or SP2
- Pentium 4 or Celeron Processor - 1.5GHz, 256Mbytes Memory, HDD 40GB, Motherboard or add-in IEEE-1394 card.
- Amcap, Windows Media Player or Quicktime

#### Mac PC

Requirements:

- OS X
- G4 – GHz, 256Mbytes Memory, HDD 40 GB, Motherboard or add-in 1394 card.
- iMovie, Quicktime

**DV device** (camcorder)

**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.

## BASE Configuration

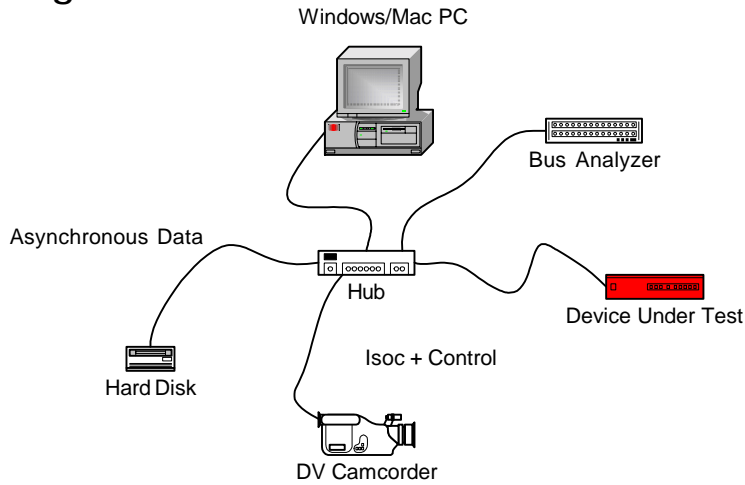


Figure 1. Base network topology diagram.

## BASE Configuration with 3 port Hubs

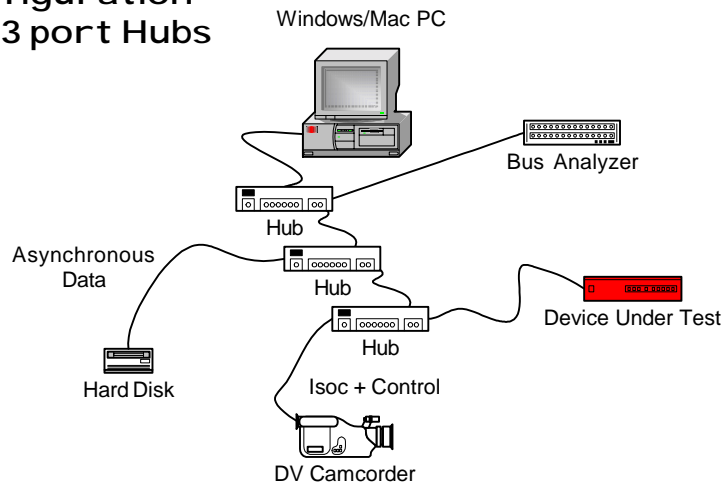


Figure 2. Base network topology with 3 port hub.

**BASE  
Configuration  
with 3 port Hub  
and branching**

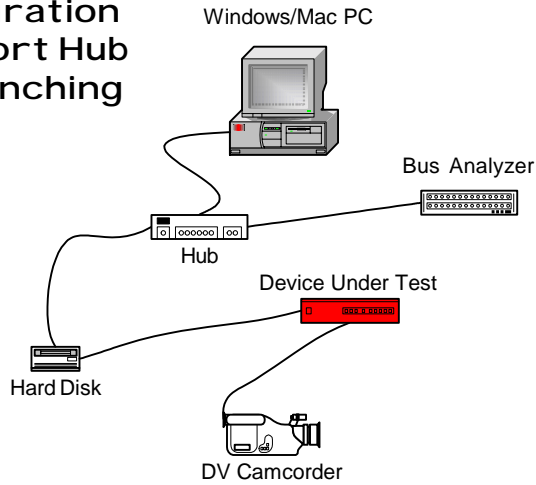


Figure 3. Base network topology with 3 port hub and branching.

**Multiple Port Test  
configuration**

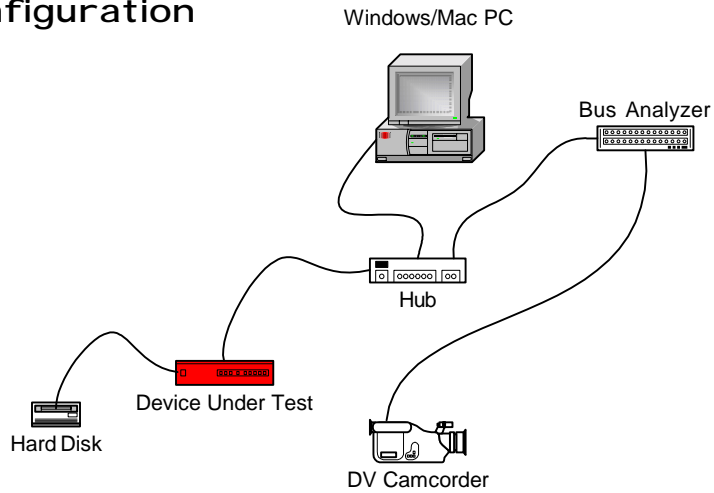


Figure 4. Multiple port test topology

## 1394b Test Configuration

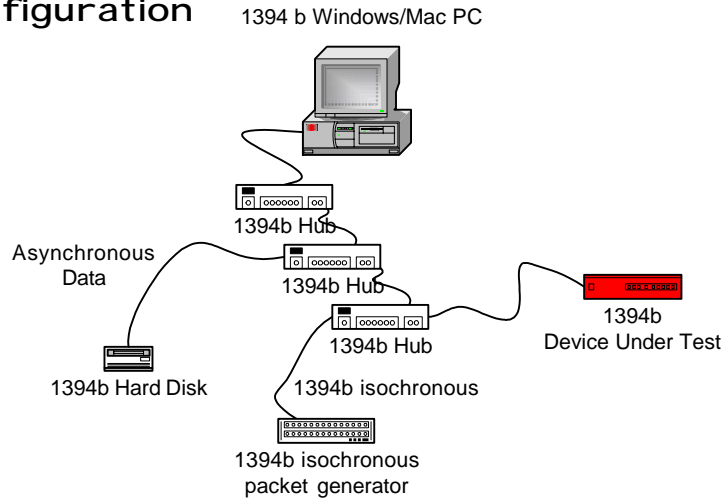


Figure 5. 1394b Test Configuration

### 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. 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 device 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 1, 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 is less than three (3)?	Yes or No	-
NT415M	Is number of bus resets is 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?	Yes or No	-
NT417M	Is number of self-id's equal to number of nodes in topology?	-	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 1, 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	Connect DUT to Hub and then force DUT to become root and verify:	-	-
NT425	Set DUT's RHB, initiate bus reset and verify:	-	-
NT426W	Is number of bus resets less than three (3)?	Yes or No	-
NT426M	Is number of bus resets less than three (3)?	-	Yes or No
NT427W	Is Camcorder or Windows PC root?	Yes or No	-

NT427M	Is Camcorder or Mac PC root?	-	Yes or No
NT428W	Is number of self-id's equal to number of nodes in topology?	Yes or No	-
NT428W	Is number of self-id's equal to number of nodes in topology?	-	Yes or No
NT429	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 1, 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	Connect DUT to Hub and then force DUT to become root and verify:	-	-
NT435	Start capture of isochronous stream from camcorder to Windows/Mac PC	-	-
NT436	Connect DUT to Hub and verify:		
NT437W	Did connection of DUT cause little or no noticeable interruption <sup>1</sup> of audio/video?	Yes or No	-
NT437M	Did connection of DUT cause little or no noticeable interruption of audio/video?	-	Yes or No
NT4238	Repeats steps NT426 through NT437x four more times. Did each test complete successfully?	Yes or No	Yes or No

<sup>1</sup> 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'.

#### 5.4.4 Common test 4

Test ID	Test Description	Windows Test Result	Macintosh Test Result
NT441	Establish base topology, without DUT, as shown in Figure 1, 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 <sup>2</sup> 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 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 <sup>3</sup> of audio/video?	Yes or No	-
NT449M	Did disconnect of DUT cause little or no	-	Yes or No

<sup>2</sup> 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'.

<sup>3</sup> 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'.

	noticeable interruption of audio/video?		
NT4410W	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
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 4.	-	-
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 one 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 (Only required if DUT has 1394b PHY)

Test ID	Test Description	Windows Test Result	Macintosh Test Result
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NT461	Establish base topology, with DUT, as shown in Figure XX.	-	-
NT462	Wait for all bus traffic to stop, except cycle start and isochronous packets. Start isochronous packet stream if not already started.	-	-
NT463	Verify root is send cycle starts packets.	-	-
NT464	Write two giga-byte file to HDD (not DUT but test HDD).	-	-
NT465	Were no bus resets detected?	Yes or No	Yes or No
NT466W	Did HDD transfer complete with no errors?	Yes or No	-
NT466M	Did HDD transfer complete with no errors?	-	Yes or No
NT467	Repeats steps NT464 through NT466x 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 Command Set
- MS2 – SBP-2 CD/DVD read/write support RBC Command Set
- MS3 – SBP-2 Tape drive supporting RBC Command Set
- MS4 – SBP-2 Flash drive supporting RBC 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 1.	-	-
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

### 5.5.2 MS2 – CD/DVD read/write device

NT521	Establish base topology, with DUT, as shown in Figure 1.	-	-
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

**5.5.3 MS2 – CD/DVD read test**

<b>Test ID</b>	<b>Test Description</b>	<b>Windows Test Result</b>	<b>Macintosh Test Result</b>
NT531	Establish base topology, with DUT, as shown in Figure 1.	-	-
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.	-	-
NT5310W	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.		
NT5312W	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

## Annex