

**UNH-IOL
FIBRE CHANNEL CONSORTIUM**

**Multi Target Fabric
Interoperability Test Suite
Version 1.2**

Technical Document



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MODIFICATION RECORD

October 30, 2006	(Version 1.0)	Initial version (mhagen)
November 1, 2006	(Version 1.1)	Included Dan's review comments (mhagen)
November 29, 2006	(Version 1.2)	Included Dave' review comments (mhagen)

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Daniel Reynolds	UNH InterOperability Laboratory
Dave Woolf	UNH InterOperability Laboratory

INTRODUCTION

Overview

The University of New Hampshire's InterOperability Laboratory (IOL) is an institution designed to improve the interoperability of standards based products by providing an environment where a product can be tested against other implementations of a standard. This Multi Target Fabric test suite has been developed to isolate communication issues within a Fabric environment. It should be clear that successful completion of this test process does not guarantee that the tested device will operate with other Fibre Channel devices. However, it does provide a good opportunity to observe the behavior of an Initiator, Target, and Switch in a multi-vendor, Fibre Channel Fabric.

Test Number and Title

The test number is given based on the order of the test within the test group. Groups are arranged according to similar test setups or similar observable results. The title is a basic description of the test.

Purpose

The purpose is a short statement describing what the test attempts to achieve. The test is written at the functional level.

References

The references section lists cross-references to the Fibre Channel standards and other documentation that might be helpful in understanding and evaluating the test and results.

Resource Requirements

The requirements section specifies the software, hardware, and test equipment that will be needed to perform the test. The items contained in this section are special test devices, software that must reside on the DUT, or other facilities that may not be available on all devices.

Last Modification

This specifies the date of the last modification to this test.

Discussion

The discussion covers the assumptions made in the design or implementation of the test as well as known limitations. Other items specific to the test are covered here. It also contains additional information that may be helpful in understanding the operation of the test.

Test Setup

The setup section describes in detail the configuration of the test environment and may include a block diagram for clarification as well as information such as the interconnection of devices, what monitoring equipment should capture, what the generation equipment should send, and any other configuration information vital to carrying out the test. Small changes in the configuration are included in the procedure section.

Procedure

The procedure section of the test description contains the step-by-step instructions for carrying out the test. It provides a cookbook approach to testing, and will often be interspersed with observable results.

Observable Results

The observable results section lists observables that can be examined by the tester to verify that the DUT is operating properly. When multiple values are possible for an observable, this section provides a short discussion on how to interpret them.

Possible Problems

This section provides some clues to look for if the test does not yield the expected results.

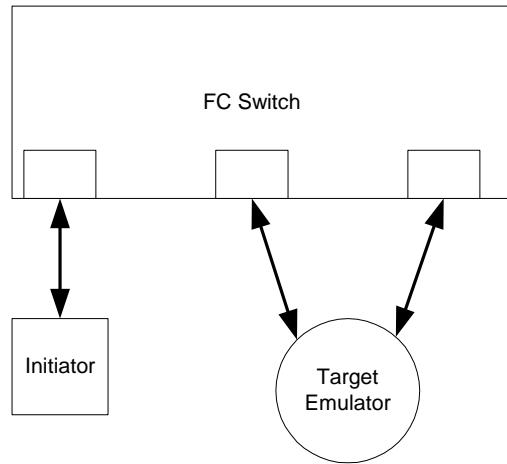
REFERENCES

The following documents are referenced in this text:

- [1] T11/Project 1674-D/Rev 7.8 – Fibre Channel – Switch Fabric 4 – (FC-SW-4)
- [2] T11/Project 1133-D/Rev 7.0 Amendment – Fibre Channel Arbitrated Loop 2 (FC-AL-2)

TEST SETUPS

Test Setup (example with switch connected to two port target emulator):



Group 1: Screening

Overview: The following tests cover the transitions made by an initiator, target emulator and switch on power-on and on fiber removal/re-insertion. The goal of this group of tests is to verify the basic interoperability of the switch with the initiator and target emulator.

Test 1.1: Initial Power On

Purpose: To confirm proper initialization and recognition after power on.

References:

- [1] FC-SW-4
- [2] FC-AL-2

Resource Requirements:

- Analyzer to capture Primitive Signals, Primitive Sequences, FC-2 layer frames, and errors.

Last Modification: November 1, 2006

Discussion: It is expected that on power up the initiator and targets will login into the switch and the switch will present each target to the initiator. The initiator is expected to present each target to the host operating system.

Test Setup: *Test Setup.* All of the devices are powered off.

Procedure:

1. Power on the target emulator.
2. Create a single target on each port of the target emulator.
3. Power on the switch, followed by the initiator.

Observable results:

- Verify that each target was recognized in the host operating system of the initiator.
- Verify that SCSI operations succeeded to each of the targets.

Possible Problems: If either observable result fails, traces will need to be taken and further analysis done.

Test 1.2: Initial Power Disruptions

Purpose: To confirm proper initialization and recognition after power disruptions.

References:

- [1] FC-SW-4
- [2] FC-AL-2

Resource Requirements:

- Analyzer to capture Primitive Signals, Primitive Sequences, FC-2 layer frames, and errors.

Last Modification: November 1, 2006

Discussion: It is expected that after power disruptions the initiator and targets will re-initialize with the switch, re-login to the switch and the switch will present each target to the initiator. The initiator is expected to present each target to the host operating system.

Test Setup: *Test Setup.* All of the devices are powered on and each target emulator port has one target created.

Procedure:

1. Power cycle the initiator.
2. Verify the observable results.
3. Power cycle the switch.
4. Verify the observable results.
5. Power cycle the target emulator.
6. Create a single target on each port of the target emulator.
7. Verify the observable results.

Observable results:

- Verify that each target was recognized in the host operating system of the initiator.
- Verify that SCSI operations succeeded to each of the targets.

Possible Problems: If either observable result fails, traces will need to be taken and further analysis done.

Test 1.3: Initial Fiber Disconnect/Reconnect

Purpose: To confirm proper initialization and recognition after fiber disconnect/reconnect.

References:

- [1] FC-SW-4
- [2] FC-AL-2

Resource Requirements:

- Analyzer to capture Primitive Signals, Primitive Sequences, FC-2 layer frames, and errors.

Last Modification: November 1, 2006

Discussion: It is expected that after fiber disconnect/reconnect the initiator and targets will re-initialize with the switch, re-login to the switch and the switch will present each target to the initiator. The initiator is expected to present each target to the host operating system.

Test Setup: *Test Setup.* All of the devices are powered on and each target emulator port has one target created.

Procedure:

1. Disconnect the initiator from the switch for two seconds then reconnect.
2. Verify the observable results.
3. Disconnect the target emulator port from the switch for two seconds then reconnect.
4. Verify the observable results.
5. Repeat steps three and four for each target emulator port connected to the switch.

Observable results:

- Verify that each target was recognized in the host operating system of the initiator.
- Verify that SCSI operations succeeded to each of the targets.

Possible Problems: If either observable result fails, traces will need to be taken and further analysis done.

Group 2: Large Build Disruptions

Overview: The following tests cover the transitions made by an initiator, target emulator and switch on power-on and on fiber removal/re-insertion. The goal of this group of tests is to verify the interoperability of the switch with the initiator and target emulator when there are a large number of targets on the fabric.

Test 2.1: Power On

Purpose: To confirm proper initialization and recognition after power on.

References:

- [1] FC-SW-4
- [2] FC-AL-2

Resource Requirements:

- Analyzer to capture Primitive Signals, Primitive Sequences, FC-2 layer frames, and errors.

Last Modification: November 1, 2006

Discussion: It is expected that on power up the initiator and targets will login into the switch and the switch will present each target to the initiator. The initiator is expected to present each target to the host operating system.

Test Setup: *Test Setup.* All of the devices are powered off.

Procedure:

1. Power on the target emulator.
2. Create 125 targets on each port of the target emulator.
3. Power on the switch, followed by the initiator.

Observable results:

- Verify that each target was recognized in the host operating system of the initiator.
- Verify that SCSI operations succeeded to a target on each port of the target emulator.

Possible Problems: If either observable result fails, traces will need to be taken and further analysis done.

Test 2.2: Power Disruptions

Purpose: To confirm proper initialization and recognition after power disruptions.

References:

- [1] FC-SW-4
- [2] FC-AL-2

Resource Requirements:

- Analyzer to capture Primitive Signals, Primitive Sequences, FC-2 layer frames, and errors.

Last Modification: November 1, 2006

Discussion: It is expected that after power disruptions the initiator and targets will re-initialize with the switch, re-login to the switch and the switch will present each target to the initiator. The initiator is expected to present each target to the host operating system.

Test Setup: *Test Setup.* All of the devices are powered on and each target emulator port has 125 targets per port created.

Procedure:

1. Power cycle the initiator.
2. Verify the observable results.
3. Power cycle the switch.
4. Verify the observable results.
5. Power cycle the target emulator.
6. Create 125 targets on each port of the target emulator.
7. Verify the observable results.

Observable results:

- Verify that each target was recognized in the host operating system of the initiator.
- Verify that SCSI operations succeeded to a target on each port of the target emulator.

Possible Problems: If either observable result fails, traces will need to be taken and further analysis done. In some cases, if errors occur in early steps, the entire system will need to be rebooted in order to complete the test.

Test 2.3: Fiber Disconnect/Reconnect

Purpose: To confirm proper initialization and recognition after fiber disconnect/reconnect.

References:

- [1] FC-SW-4
- [2] FC-AL-2

Resource Requirements:

- Analyzer to capture Primitive Signals, Primitive Sequences, FC-2 layer frames, and errors.

Last Modification: November 1, 2006

Discussion: It is expected that after fiber disconnect/reconnect the initiator and targets will re-initialize with the switch, re-login to the switch and the switch will present each target to the initiator. The initiator is expected to present each target to the host operating system.

Test Setup: *Test Setup.* All of the devices are powered on and each target emulator port has 125 targets created.

Procedure:

1. Disconnect the initiator from the switch for two seconds then reconnect.
2. Verify the observable results.
3. Disconnect the target emulator port from the switch for two seconds then reconnect.
4. Verify the observable results.
5. Repeat steps three and four for each target emulator port connected to the switch.

Observable results:

- Verify that each target was recognized in the host operating system of the initiator.
- Verify that SCSI operations succeeded to a target on each port of the target emulator.

Possible Problems: If either observable result fails, traces will need to be taken and further analysis done.

Group 3: Application Load

Overview: The level of SCSI activity is increased and disruptions are introduced again. A Fibre Channel Initiator and Switch should be able to continue to operate properly while in a fabric topology that is near capacity with periodic disruptions. These test are designed to verify that while operating at a high load and disruptions are introduced, that the system under test continues to identify all targets and operate properly.

Test 3.1: Application Load

Purpose: To confirm proper continued operation of the initiator and switch during high load and disruptions.

References:

- [1] FC-SW-4
- [2] FC-AL-2

Resource Requirements:

- Analyzer to capture Primitive Signals, Primitive Sequences, FC-2 layer frames, and errors.

Last Modification: November 29, 2006

Discussion: It is expected that after disruptions the initiator and targets will re-initialize with the switch, re-login to the switch and the switch will present each target to the initiator. The initiator is expected to present each target to the host operating system.

Test Setup: *Test Setup.* All of the devices are powered on and each target emulator port has 125 targets created.

Procedure:

1. Generate application load from the initiator to all recognized targets.
2. If no errors have been reported by the SCSI application after a fifteen-minute period of time, then instruct the target emulator to introduce a LIP and verify continued operation.

Observable results:

- Verify that each target was recognized in the host operating system of the initiator.
- Verify that SCSI operations succeeded to all targets on each port of the target emulator.

Possible Problems: The fifteen-minute time period is chosen to correspond to 3×10^{12} bits transmitted. If a 2G line rate is used a thirty-minute time period should be used. If either observable result fails, traces will need to be taken and further analysis done.