

BACKPLANE ETHERNET CONSORTIUM

Clause 84
40GBASE-KR4 PMD Test Suite
Version 1.0

Technical Document



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Backplane Ethernet Consortium

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MODIFICATION RECORD

July 9, 2013 Version 0.1

Alexander McQuade: Informal preliminary draft. Internal IOL use only.

April 7, 2014 Version 0.2

Michael Klempa: Small Edits.

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ACKNOWLEDGMENTS

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Michael Klempa	UNH InterOperability Laboratory
Jeff Lapak	UNH InterOperability Laboratory
Curtis Donahue	UNH InterOperability Laboratory

INTRODUCTION

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 particular suite of tests has been developed to help implementers evaluate the functionality of the Physical Medium Dependent (PMD) sublayer of their 40GBASE-KR4 products.

These tests are designed to determine if a product conforms to specifications defined in Clause 84 of the IEEE 802.3-2012 Standard. Successful completion of all tests contained in this suite does not guarantee that the tested device will operate with other devices. However, combined with satisfactory operation in the IOL's interoperability test bed, these tests provide a reasonable level of confidence that the Device Under Test (DUT) will function properly in many 40GBASE-KR4 environments.

The tests contained in this document are organized in such a manner as to simplify the identification of information related to a test, and to facilitate in the actual testing process. Tests are organized into groups, primarily in order to reduce setup time in the lab environment, however the different groups typically also tend to focus on specific aspects of device functionality. A three-part numbering system is used to organize the tests, where the first number indicates the clause of the IEEE 802.3 standard on which the test suite is based. The second and third numbers indicate the test's group number and test number within that group, respectively. This format allows for the addition of future tests to the appropriate groups without requiring the renumbering of the subsequent tests.

The test definitions themselves are intended to provide a high-level description of the motivation, resources, procedures, and methodologies pertinent to each test. Specifically, each test description consists of the following sections:

Purpose

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

References

This section specifies source material *external* to the test suite, including specific subclauses pertinent to the test definition, or any other references that might be helpful in understanding the test methodology and/or test results. External sources are always referenced by number when mentioned in the test description. Any other references not specified by number are stated with respect to the test suite document itself.

Resource Requirements

The requirements section specifies the test hardware and/or software needed to perform the test. This is generally expressed in terms of minimum requirements, however in some cases specific equipment manufacturer/model information may be provided.

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.

Test Setup

The setup section describes the initial configuration of the test environment. Small changes in the configuration should not be included here, and are generally covered in the test procedure section, below.

Test Procedure

The procedure section of the test description contains the systematic instructions for carrying out the test. It provides a cookbook approach to testing, and may be interspersed with observable results.

Observable Results

This section lists the specific observables that can be examined by the tester in order to verify that the DUT is operating properly. When multiple values for an observable are possible, this section provides a short discussion on how to interpret them. The determination of a pass or fail outcome for a particular test is generally based on the successful (or unsuccessful) detection of a specific observable.

Possible Problems

This section contains a description of known issues with the test procedure, which may affect test results in certain situations. It may also refer the reader to test suite appendices and/or whitepapers that may provide more detail regarding these issues.

GROUP 1: ELECTRICAL SIGNALING REQUIREMENTS

Overview:

The tests defined in this section verify the electrical signaling characteristics of the Physical Medium Dependent (PMD) layer defined in Clause 84 of IEEE 802.3-2012.

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Test 84.1.1 – Signaling Speed

See Clause 72 10GBASE-KR PMD Test Suite Test 72.1.1 and repeat for all lanes.

Test 84.1.2 – Common Mode Output Voltage

See Clause 72 10GBASE-KR PMD Test Suite Test 72.1.2 and repeat for all lanes.

Test 84.1.3 – Differential Output Amplitude

See Clause 72 10GBASE-KR PMD Test Suite Test 72.1.3 and repeat for all lanes.

Test 84.1.4 – Transition Time

See Clause 72 10GBASE-KR PMD Test Suite Test 72.1.4 and repeat for all lanes.

Test 84.1.5 – Transmit Jitter

See Clause 72 10GBASE-KR PMD Test Suite Test 72.1.5 and repeat for all lanes.

Test 84.1.6 – Transmitter Output Waveform Requirements Related to Coefficient Update

See Clause 72 10GBASE-KR PMD Test Suite Test 72.1.6 and repeat for all lanes.

Test 84.1.7 – Transmitter Output Waveform Requirements Related to Coefficient Status

See Clause 72 10GBASE-KR PMD Test Suite Test 72.1.7 and repeat for all lanes.

GROUP 2: IMPEDANCE REQUIREMENTS

Overview:

The tests defined in this section verify the impedance characteristics of the Physical Medium Dependent (PMD) layer defined in Clause 84 of IEEE 802.3ap.

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Test 84.2.1 – Differential Output Return Loss

See Clause 72 10GBASE-KR PMD Test Suite Test 72.2.1 and repeat for all lanes.

Test 84.2.2 – Common-Mode Output Return Loss

See Clause 72 10GBASE-KR PMD Test Suite Test 72.2.2 and repeat for all lanes.

Test 84.2.3 – Differential Input Return Loss

See Clause 72 10GBASE-KR PMD Test Suite Test 72.2.3 and repeat for all lanes.

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APPENDICES

Overview:

Test suite appendices are intended to provide additional low-level technical detail pertinent to specific tests contained in this test suite. These appendices often cover topics that are outside of the scope of the standard, and are specific to the methodologies used for performing the measurements in this test suite. Appendix topics may also include discussion regarding a specific interpretation of the standard (for the purposes of this test suite), for cases where a particular specification may appear unclear or otherwise open to multiple interpretations.

Scope:

Test suite appendices are considered informative supplements, and pertain solely to the test definitions and procedures contained in this test suite.

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Appendix I - Test Fixtures and Setups

Purpose: To specify the measurement hardware, test fixtures, and setups used in this test suite

References:

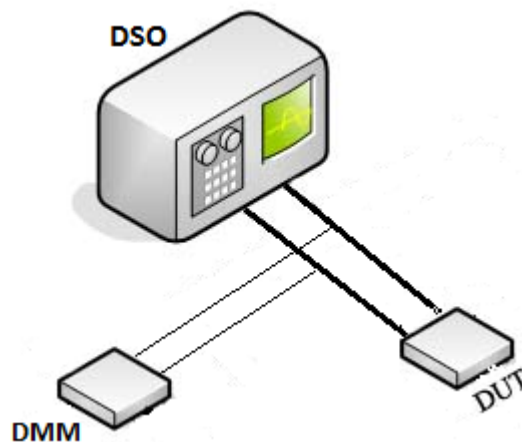
- [1] IEEE Std. 802.3-2008, subclause 72.7.1.1 – Test Fixtures

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Setup A:

Equipment List:

1. Digital Storage Oscilloscope, 20 GHz bandwidth (minimum)
2. Transmitter Test Fixture
3. Post Processing
4. Digital Multi-meter
5. SMA cables

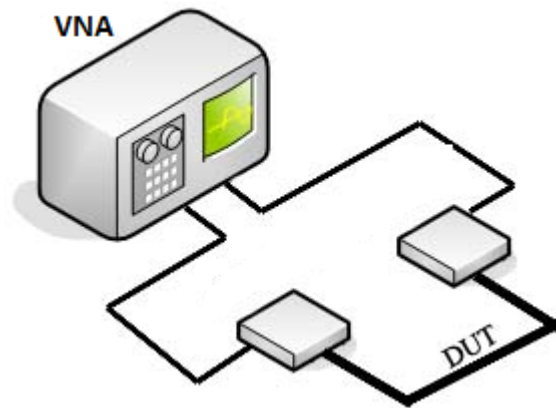


84A I: Setup A used for Group 1

Setup B

Equipment List:

1. Vector Network Analyzer
2. Post Processing Capabilities
3. 50Ω matched coax cables
4. Module compliance board



84A I: Setup B used for Group 2