



Open Networking Consortium

Open Network Systems Interoperability Test Report

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December 19, 2016

Enclosed are the results from the Open Network Systems Interoperability Plugfest performed on:

Module or Cable Assembly Under Test (MUT/CUT):

Vendor and Device Type	Siemons 3m SFP28 25G DAC
Part Number	S1S28P263.0-01P

Host Under Test (HUT):

Host System 1 Composition	
Network Operating System	Cumulus Linux
OS Version	3.2
Bare Metal Switch	Mellanox
Part Number	SN2410
ONIE Version	2014.08

This testing pertains to the Open Network Systems Interoperability Test Plan, which outlines a series of tests performed on a variety of optical transceivers and cables with bare-metal open switches running Network Operating Systems from multiple vendors. The focus of these tests was basic interoperability which aims to validate the operation of open network systems.

As always, we welcome any comments regarding this Test Suite. If you have any questions about the test procedures or results, please feel free to contact me via e-mail at david@iol.unh.edu or by phone at +1-603-862-0090.

Regards,
David Woolf

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In section 2, the following equipment was used:

Test System Hardware	
EEPROM Reader	Avago Aport USB-MDIO/TWI Interface Controller

In section 3, the following equipment was used:

Test System Hardware	
Network Analyzer	Agilent E5071C

In section 4, the following equipment was used:

Test System Hardware	
Wide Bandwidth Oscilloscope	Agilent DCA-X 86100D
Waveform Analyzer	Agilent 86105C
50GHz Waveform Analyzer	Agilent DCA-86108B
Clock Recovery Module	Agilent 83496A
High Performance Serial BERT	Agilent N4903B
Signal Quality Analyzer	Anritsu MP1800A with MU181020B 14Gbps PPG* Modules
De-Emphasis Signal Converter	Agilent N4916B

*Two modules used during testing

In section 6, an SANBlaze VirtuLUN was used to generate test traffic:

Test System Hardware	
Ethernet Traffic Generator	SANBlaze + Mellanox ConnectX4 NIC
Software Version	7.5
Port Types	SFP28

The following table contains possible results and their meanings.

Result	Interpretation
PASS	The Device Under Test (DUT) was observed to exhibit conformant behavior.
PASS W/ Comments	The specified behavior is demonstrated by the DUT, however this result indicates that either changes were made to the standard test procedure or results other than the expected results were observed.
FAIL	The DUT was observed to exhibit non-compliant behavior.
INFO	This Test is designed for informational purposes only. While the results may help ensure the interoperability of the DUT, a PASS/FAIL is not given for this test.
WARN	The DUT was observed to exhibit behavior that is not recommended.
N/A	Not Applicable. This test is not applicable for the DUT.
N/S	Not Supported. This test was not run due to features not implemented on the DUT.
N/T	Not tested. This test was not run.

Summary of Results- Conformance	
Test	Result
Test 1.1: ONIE Compliance Environment	N/A
Test 1.2: Installing and uninstalling a NOS through ONIE via HTTP server	PASS
Test 3.1.1: Return Loss for 25/100G Passive Cable	N/A
Test 3.1.2: Insertion Loss for 25/100G Passive Cable	N/A
Test 4.1.1: Calibration for 25/100G QSFP28 Module and AOC Testing	N/A
Test 4.1.2: 25/100G QSFP28 Golden Module Verification	N/A
Test 4.2.1: Transmitter Eye Mask for 25/100G QSFP28 (Modules Only)	N/A
Test 4.2.2: Output Eye Mask for 25/100G QSFP28	N/A
Test 5.1.1: Output Rise and Fall Times for 25/100G Host	N/A
Test 5.1.2: Transmitter Eye Mask for 25/100G Host	N/A
Test 5.1.3: Total Jitter for 25/100G Host	N/A
Test 5.1.4: Input and Output Return Loss on 25/100G Host	N/A

Summary of Results - Interoperability	
Test	Result
Test 2.1: Physical Compatibility with Supporting Devices	PASS
Test 2.2: Host Management of Module or Cable Assembly	PASS
Test 2.3: Diagnostic Optical Monitor Support	PASS
Test 6.1: Establish Baseline Performance Analysis	PASS
Test 6.2: Link Detection on Power Up	PASS
Test 6.3: Packet Error Rate Estimation	PASS
Test 6.4: Packet Loss/Stress Test	PASS

Notes

Conformance Test Results	
Test Information	Test Result
Test 1.1: ONIE Compliance Environment <i>Purpose:</i> To verify that a host can pass a random sampling of ONIE Compliance Environment tests.	N/A
Comments on Test Procedure	
The random sampling of tests from the ONIE Compliance Environment was not used.	
Comments on Test Results	
Additional Comments	
This test is only applicable to Hosts which have not performed ONIE compliance testing previously.	

Test Information	Test Result
Test 1.2: Installing and uninstalling a NOS through ONIE via HTTP server <i>Purpose:</i> To verify that a NOS can be successfully installed through ONIE.	PASS
Comments on Test Procedure	
This test was completed using the standard procedure as written in the Test Plan. The random sampling of tests from the ONIE Compliance Environment was not used.	
Comments on Test Results	
Part A: The DUT was able to install the NOS via ONIE. Part B: The DUT was able to uninstall the NOS via ONIE.	
Additional Comments	

Test Information	Test Result
<p>Test 3.1.1: Return loss for 25/100G Passive Cable</p> <p><i>Purpose:</i> To verify that the return loss of the DUT is within the conformance limits provided by SFF-8431 Appendix E, Table 37.</p>	PASS
Comments on Test Procedure	
This test was completed using the standard procedure.	
Comments on Test Results	
<p>The differential return loss observed did not violate the limits governed by SFF-8431 Appendix E.4, Table 37 for 10GBASE-CR passive cables:</p> $SDD11, SDD22 \geq \left\{ \begin{array}{ll} 12 - 2\sqrt{f}, & 0.01 \leq f < 4.1 \\ 6.3 - 13 \log_{10} \frac{f}{5.5}, & 4.1 \leq f \leq 11.1 \end{array} \right\} (db)$	
Additional Comments	

Test Information	Test Result
<p>Test 3.1.2: Insertion Loss for 25/100G Passive Cable</p> <p><i>Purpose:</i> To verify that the insertion loss of the Cable under test is within the conformance limits provided by IEEE Std. 802.3-2012 Annex , Table 37.</p>	PASS
Comments on Test Procedure	
This test was completed using the standard procedure.	
Comments on Test Results	
<p>The insertion loss of the cable under test does not violate the requirements passive cable assemblies.</p> $3dB \leq SDD21, SDD12 \leq 17.04dB, \quad \text{at } 5.15625 \text{ GHz}$	
Additional Comments	

Test Information	Test Result
<p>Test 4.1.1: Calibration for 25/100G QSFP28 Module and AOC Testing</p> <p><i>Purpose:</i> To establish Electrical input baseline of the SFP+ optical modules.</p>	PASS
Comments on Test Procedure	
<p>This test was completed using the standard procedure.</p>	
Comments on Test Results	
<p>The signal at point TP1 was calibrated to meet SFF-8431 requirements for Module Electrical Input Signals.</p>	
Additional Comments	

Test Information	Test Result
<p>Test 4.1.2: 25/100G QSFP28 Golden Module Verification</p> <p><i>Purpose:</i> To record the optical output eye mask margin of the Golden Optical Unit. This unit will be used to test SFP+ Modules at TP4.</p>	PASS
Comments on Test Procedure	
<p>This test was completed using the standard procedure.</p>	
Comments on Test Results	
<p>Using the input signal calibrated during 4.1.1, a Golden Module was selected that was compliant to IEEE Std. 802.3-2012 for a 10G signal at TP2.</p>	
Additional Comments	

Test Information	Test Result
<p>Test 4.2.1: Transmitter Eye Mask for 25/100G QSFP28</p> <p><i>Purpose:</i> To verify that the device (Module or Cable Assembly) under test (DUT) demonstrates electrical output characteristics that meets the specified requirements.</p>	PASS
Comments on Test Procedure	
This test was completed using the standard procedure.	
Comments on Test Results	
The hit ratio did not exceed 5×10^{-5} . The Mask Margin was greater than 0.	
Additional Comments	

Test Information	Test Result
<p>Test 4.2.2: Output eye mask for 25/100G QSFP28</p> <p><i>Purpose:</i> To verify that the device (Module or Cable Assembly) under test (DUT) demonstrates electrical output characteristics that meets the specified requirements.</p>	PASS
Comments on Test Procedure	
This test was completed using the standard procedure.	
Comments on Test Results	
The hit ratio did not exceed 5×10^{-5} . The Mask Margin was greater than 0.	
Additional Comments	

Test Information	Test Result
<p>Test 5.1.1: Output Rise and Fall Times for 25/100G Host</p> <p><i>Purpose:</i> To verify that the Eye Mask Hit Ratio is within the conformance limits.</p>	PASS
Comments on Test Procedure	
<p>The test was completed with the standard procedure.</p>	
Comments on Test Results	
<p>The device under test exhibited the expected behavior.</p>	
Additional Comments	

Test Information	Test Result
<p>Test 5.1.2: Transmitter Eye Mask on 25/100G Host</p> <p><i>Purpose:</i> To verify that the Eye Mask Hit Ratio is within the conformance limits.</p>	PASS
Comments on Test Procedure	
<p>The test was completed with the standard procedure.</p>	
Comments on Test Results	
<p>The device under test exhibited the expected behavior.</p>	
Additional Comments	

Test Information	Test Result
<p>Test 5.1.3: Total Jitter for 25/100G Host</p> <p><i>Purpose:</i> To verify that the Total Jitter (TJ) is within the conformance limit.</p>	PASS
Comments on Test Procedure	
<p>The test was completed with the standard procedure.</p>	
Comments on Test Results	
<p>The device under test exhibited the expected behavior.</p>	
Additional Comments	

Test Information	Test Result
<p>Test 5.1.4: Input and Output Return Loss on 25/100G Host</p> <p><i>Purpose:</i> To verify that the differential input and output return loss of the DUT is within conformance limits.</p>	PASS
Comments on Test Procedure	
<p>The test was completed with the standard procedure.</p>	
Comments on Test Results	
<p>The device under test exhibited the expected behavior.</p>	
Additional Comments	
<p>See Appendix B</p>	

Interoperability Test Results	
Test Information	Test Result
<p>Test 2.1: Physical Compatibility with Supporting Devices</p> <p><i>Purpose:</i> To verify that the mechanical form factor is compatible with devices for interoperability purposes.</p>	PASS
Comments on Test Procedure	
The test was completed with the standard procedure.	
Comments on Test Results	
<p>Part A: The MUT/CUT was able to be inserted into the Host. Part B: This test is not applicable to Cable Assemblies. Part C: The MUT/CUT was able to be removed from the Host.</p>	
Additional Comments	

Test Information	Test Result
<p>Test 2.2: Host Management of Module or Cable Assembly</p> <p><i>Purpose:</i> To verify that the MUT/CUT is manageable via the Host complex.</p>	PASS
Comments on Test Procedure	
The test was completed with the standard procedure.	
Comments on Test Results	
<p>Part B: The EEPROM data of the MUT/CUT was readable. The serial number and vendor information extracted from the EEPROM data matches the serial number and vendor information of the part.</p>	
Additional Comments	

Test Information	Test Result
Test 2.3: Diagnostic Optical Monitor Support <i>Purpose:</i> To verify that the MUT/CUT (active optical cable only) supports diagnostic functions via the Host complex.	PASS
Comments on Test Procedure	
The test was completed with the standard procedure.	
Comments on Test Results	
Part A: The MUT/CUT supports diagnostic monitoring and the diagnostic information from the EEPROM was readable by the NOS.	
Additional Comments	

Test Information	Test Result
<p>Test 6.1: Establish Baseline Performance Analysis</p> <p><i>Purpose:</i> To establish a baseline performance analysis of the HUT.</p>	<p>PASS</p>
<p>Comments on Test Procedure</p>	
<p>This test was completed using a modified procedure. Because of a lack of 40G Golden Modules, the Host was baselined using each 40G MUT/CUT.</p>	
<p>Comments on Test Results</p>	
<p>The baseline performance of the Host was determined to be 90% line rate. All proceeding tests in Group 6 were conducted using this line rate.</p>	
<p>Additional Comments</p>	

Test Information	Test Result
<p>Test 6.2: Detection on Power Up</p> <p><i>Purpose:</i> To determine if the MUT/CUT, HUT and LP establish a link while varying the power up sequence.</p>	<p>PASS</p>
<p>Comments on Test Procedure</p>	
<p>This test was completed using the standard procedure.</p>	
<p>Comments on Test Results</p>	
<p>Part A: The Host and Link Partner were able to establish a valid link with this MUT/CUT while fully powered and operational. Part B: The Host and Link Partner were able to establish a valid link with this MUT/CUT when the Link Partner was powered on after the Host. Part C: The Host and Link Partner were able to establish a valid link with this MUT/CUT when the Host was powered on after the Link Partner.</p>	
<p>Additional Comments</p>	

*Cumulus 3.2, Mellanox NS2410, Siemons SIS28P263.0-01P
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Test Information	Test Result
<p>Test 6.3: Packet Error Rate Estimation</p> <p><i>Purpose:</i> To determine if a Host can exchange packets with a Module or Cable Assembly such that a bit error rate of 10^{-12} is achieved</p>	PASS
Comments on Test Procedure	
<p>This test was completed using the standard procedure.</p>	
Comments on Test Results	
<p>Part A: All 247,000,000 frames transmitted by TS1 were received by TS2. Part B: All 10,506,539,320 frames transmitted by TS1 were received by TS2.</p>	
Additional Comments	
<p style="text-align: center; opacity: 0.5; font-size: 48px;">101</p>	

Test Information	Test Result
<p>Test 6.4: Packet Loss/Stress Test</p> <p><i>Purpose:</i> To verify that no obvious buffer management problems occur when directing a large volume of traffic at the Host and Module/Cable Assembly combination.</p>	PASS
Comments on Test Procedure	
<p>This test was completed using the standard procedure.</p>	
Comments on Test Results	
<p>Parts A-D: All 1,000,000,000 64-byte frames transmitted by TS1 were received by TS2. All 1,000,000,000 1518-byte frames transmitted by TS1 were received by TS2.</p>	
Additional Comments	
<p style="text-align: center; opacity: 0.5; font-size: 48px;">101</p>	

Appendix A: EEPROM Data

Siemon SFP/SFP+/SFP28 module
Part Number: S1S28P263.0-01P Serial Number: 16330008849
Siemon__16330008849____EEPROMdecode_20161212134855.txt

SERIAL_ID Keys:
BR_MAX: 25750.0
BR_MIN: 25750.0
BR_NOMINAL: 25750
CABLE_SPEC: 0x1 0x0
CONNECTOR: 35
DATE_CODE: 16112500
DIAGNOSTIC_MONITORING_TYPE: 0
ENCODING: 0
ENHANCED_OPTIONS: 0
EXT_IDENTIFIER: 4
IDENTIFIER: 3
LENGTH_50UM: 0
LENGTH_62_5UM: 0
LENGTH_OM3: 0
LENGTH_OM4_OR_CU: 128
LENGTH_SMF: 0
LENGTH_SMF_KM: 0
OPTIONS: 0x0 0x0
RATE_IDENTIFIER: 0
SFF_8472_COMPLIANCE: 0
TRANSCEIVER: 0x1 0x0 0x0 0x0 0x0 0x4 0x80 0xf5
TRANSCEIVER_EXT: 13
VENDOR_NAME: Siemon
VENDOR_OUI: 0x0 0x1e 0x62
VENDOR_PN: S1S28P263.0-01P
VENDOR_REV: A
VENDOR_SN: 16330008849
WAVELENGTH: 0

Vendor Specific: 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0
0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0

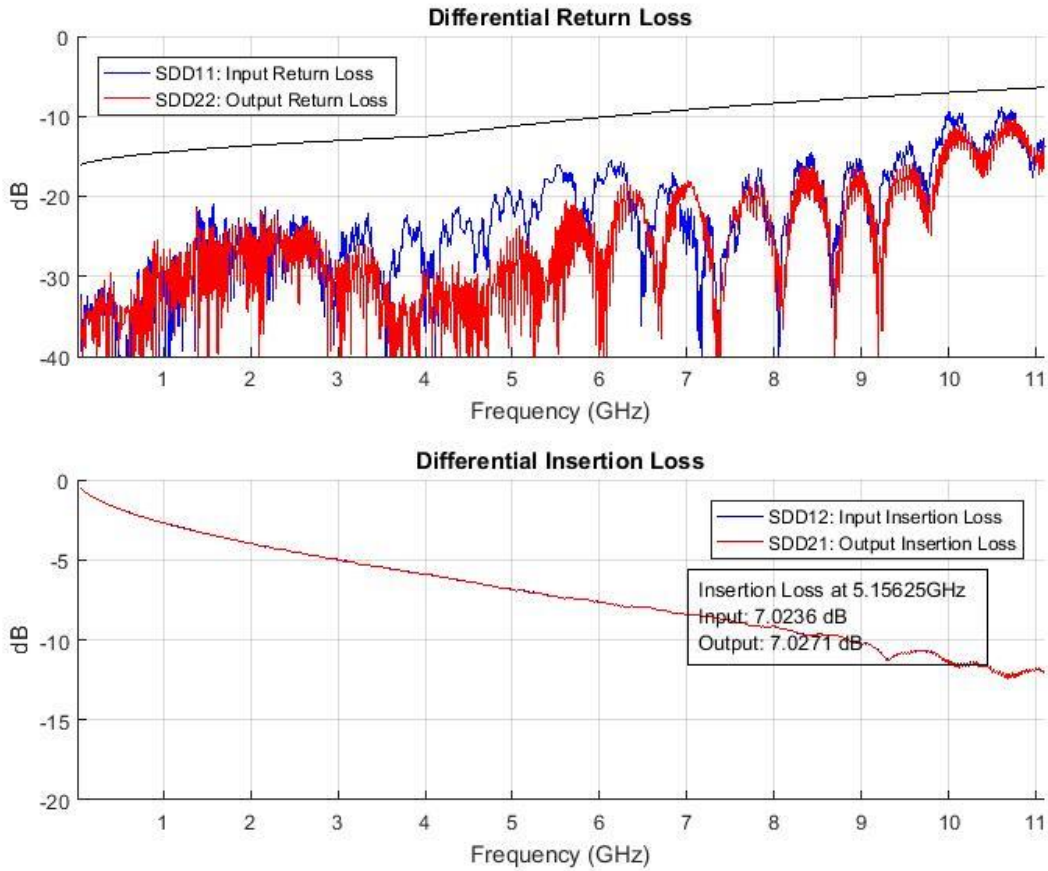
I2C Address A0h, bytes 0-127, in hex
0000x: 03042301 00000000 0480f500 ff000000
0010x: 00000300 5369656d 6f6e2020 20202020
0020x: 20202020 0d001e62 53315332 38503236
0030x: 332e302d 30315020 41202020 01000008
0040x: 00006700 31363333 30303038 38343920
0050x: 20202020 31363131 32353030 000000d1
0060x: 00000000 00000000 00000000 00000000
0070x: 00000000 00000000 00000000 00000000

I2C Address A2h, bytes 0-127, in hex

error: no bytes read
...check cabling, power to the eval board
0000x: 00000000 00000000 00000000 00000000
0010x: 00000000 00000000 00000000 00000000
0020x: 00000000 00000000 00000000 00000000
0030x: 00000000 00000000 00000000 00000000
0040x: 00000000 00000000 00000000 00000000
0050x: 00000000 00000000 00000000 00000000
0060x: 00000000 00000000 00000000 00000000
0070x: 00000000 00000000 00000000 00000000

Identifier : 0x03 (SFP)
Extended identifier : 0x04 (GBIC/SFP defined by 2-wire interface ID)
Connector : 0x23 (No separable connector)
Transceiver codes : 0x01 0x00 0x00 0x00 0x00 0x04 0x80 0xf5
Transceiver type : Infiniband: 1X Copper Passive
Transceiver type : FC: Copper Passive
Transceiver type : FC: Twin Axial Pair (TW)
Transceiver type : FC: 1200 MBytes/sec
Transceiver type : FC: 800 MBytes/sec
Transceiver type : FC: 400 MBytes/sec
Transceiver type : FC: 200 MBytes/sec
Transceiver type : FC: 100 MBytes/sec
Encoding : 0x00 (unspecified)
BR, Nominal : 25500MBd
Rate identifier : 0x00 (unspecified)
Length (SMF,km) : 0km
Length (SMF) : 0m
Length (50um) : 0m
Length (62.5um) : 0m
Length (Copper) : 3m
Length (OM3) : 0m
Passive Cu complnce. : 0x01 (SFF-8431 appendix E) [SFF-8472 rev10.4
only]
Vendor name : Siemon
Vendor OUI : 00:1e:62
Vendor PN : S1S28P263.0-01P
Vendor rev : A
Option values : 0x00 0x00
BR margin, max : 103%
BR margin, min : 0%
Vendor SN : 16330007149
Date code : 16112500
Optical diagnostics support : No

Appendix B: Pluggable Module / Cable Electrical Data



Appendix C: Host Electrical Data