40 and 100 Gigabit Ethernet Consortium
Interoperability Test Suite version 1.0

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Enclosed are the results from the Interoperability testing performed on:

Device Under Test (DUT):	Siemon QSFP+ Direct Attached Copper Cables
UNH-IOL Device ID #:	16180-16184

The test suite referenced in this report is available at the UNH-IOL website:

ftp://ftp.iol.unh.edu/pub/10gec/10GEC_Optical_Interop_test_suite_v1.0.pdf

No issues were observed during the testing period. For further information please see the detailed test results.

Testing Completed 06/20/2012
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Result Key

The following table contains possible results and their meanings:

Result	Interpretation
A	The QSFP+ cable assembly worked with the default equipment configuration.
B	The QSFP+ cable assembly did not work with the default equipment configuration and the equipment provided an error message.
C	The QSFP+ cable assembly did not work with the default equipment configuration, however the equipment could be configured to support the QSFP+ cable assembly.
D	The QSFP+ cable assembly did not work with the equipment.
N/A	This test case is not applicable when testing with an QSFP+ Cable Assembly.

Comments on Test Procedure:

Test #1 Link Configuration

Case 1: This test entails powering on the DUT and the link partner separately and then connecting them together once they have booted up and have been configured. Traffic is then sent from one of the two devices and checked at the other end for correct reception. Additionally, the devices are disconnected and reconnected several times. Refer to the following tables for further information regarding the results of this test.

Case 2: This test entails power cycling both the link partner and the DUT with the devices connected during power up; however the DUT is brought to a fully operational state before turning the link partner on. Once the link partner has booted up, a link should be established between the two devices and traffic should be able to be transmitted between them. Refer to the following tables for further information regarding the results of this test.

Case 3: This test mimics Case 2 except that the link partner is turned on before the DUT. Refer to the following tables for further information regarding the results of this test.

Case 4: This test entails power cycling both the link partner and the DUT with the DUT's pluggable transceiver removed during power up. When the DUT and Link Partner are brought to a fully operational state, plug in the DUT's transceiver. Verify that a link has been established between the two devices and that traffic can be transmitted in both directions. Repeat this test with the Link Partner's transceiver if applicable. Refer to the following tables for further information regarding the results of this test.

Case 5: This test entails power cycling both the link partner and the DUT. When the DUT and Link Partner are brought to a fully operational state, confirm a valid link and transmit traffic in both directions. Remove the DUT's transceiver and then reinsert the transceiver shortly after. Verify that a link has been established between the two devices and that traffic can be transmitted in both directions. Repeat this test with the Link Partner's transceiver if applicable. Refer to the following tables for further information regarding the results of this test.

Test #2 Packet Error Ratio Estimation
The two devices are connected to each end of a copper QSFP+ cable. A number of ICMP echo requests (Refer to the 10 Gigabit Ethernet Optical Interoperability Test Suite: Table 2) are sent to verify that traffic can successfully be sent between the link partners. The number of packets lost is noted. Refer to the following tables for further information regarding the results of this test.

Test Matrix
The matrices are divided into sections according to the type of device being tested against. Each matrix contains three columns:
- The manufacturer and name of the device being tested against.
- Results of link speed detection testing.
- Results of the packet error ratio test over the reference channel.

Test Results

Siemon 1m 30awg QSFP+ Direct Attached Copper Cable

Test Configurations	Test 1 Link Configuration				
	Case 1	Case 2	Case 3	Case 4	Case 5
Broadcom BCM56840 with Extreme BlackDiamond 8806	N/A	A	A	A	A
Extreme BlackDiamond 8806 with Extreme Summit X670	N/A	A	A	A	A

Test Configurations	Test 2: BER Est.
	1518-byte
Broadcom BCM56840 with Extreme BlackDiamond 8806	0
Extreme BlackDiamond 8806 with Extreme Summit X670	0

Siemon 2m 30awg QSFP+ Direct Attached Copper Cable

Test Configurations	Test 1 Link Configuration				
	Case 1	Case 2	Case 3	Case 4	Case 5
Broadcom BCM56840 with Extreme BlackDiamond 8806	N/A	A	A	A	A
Extreme BlackDiamond 8806 with Extreme Summit X670	N/A	A	A	A	A

Test Configurations	Test 2: BER Est.
	1518-byte
Broadcom BCM56840 with Extreme BlackDiamond 8806	0
Extreme BlackDiamond 8806 with Extreme Summit X670	0

Siemon 3m 30awg QSFP+ Direct Attached Copper Cable

Test Configurations	Test 1 Link Configuration				
	Case 1	Case 2	Case 3	Case 4	Case 5
Broadcom BCM56840 with Extreme BlackDiamond 8806	N/A	A	A	A	A
Extreme BlackDiamond 8806 with Extreme Summit X670	N/A	A	A	A	A

Test Configurations	Test 2: BER Est.
	1518-byte
Broadcom BCM56840 with Extreme BlackDiamond 8806	0
Extreme BlackDiamond 8806 with Extreme Summit X670	0

Siemon 5m 26awg QSFP+ Direct Attached Copper Cable

Test Configurations	Test 1 Link Configuration				
	Case 1	Case 2	Case 3	Case 4	Case 5
Broadcom BCM56840 with Extreme BlackDiamond 8806	N/A	A	A	A	A
Extreme BlackDiamond 8806 with Extreme Summit X670	N/A	A	A	A	A

Test Configurations	Test 2: BER Est.
	1518-byte
Broadcom BCM56840 with Extreme BlackDiamond 8806	0
Extreme BlackDiamond 8806 with Extreme Summit X670	0

Siemon 6m 24awg QSFP+ Direct Attached Copper Cable

Test Configurations	Test 1 Link Configuration				
	Case 1	Case 2	Case 3	Case 4	Case 5
Broadcom BCM56840 with Extreme BlackDiamond 8806	N/A	A	A	A	A
Extreme BlackDiamond 8806 with Extreme Summit X670	N/A	A	A	A	A

Test Configurations	Test 2: BER Est.
	1518-byte
Broadcom BCM56840 with Extreme BlackDiamond 8806	0
Extreme BlackDiamond 8806 with Extreme Summit X670	0

ANNEX A: TEST SETUP

Test Equipment

The following test equipment was used in performing all Interoperability testing:

Testing Equipment	Brand and Version Information
Software	SmartWindows v8.0, UNH-IOL Packet Generator software v3.6a
Traffic Generator	SMB 600B Chassis with XLW-3721A Module and Ixia XM2 chassis with HSE40GEQSFP1-01 Load Module
Fiber Power Meter	Fluke FM150

Test Configuration

For the possible test configurations, refer to Figures 1-1 through 1-3 in the Interoperability Test Suite.