REAL-TIME COMMUNICATIONS TESTING

UNH INTEROPERABILITY LAB

OVERVIEW

The UNH InterOperability Lab (UNH-IOL) has been testing Networking and Communications since 1988. Fully owned by the University of New Hampshire, the lab receives 100% of its funding from commercial companies in exchange for professional and testing services. Testing services include areas such as Ethernet, xDSL, Storage, Wireless, IPv6, Routing, SIP, Consumer, and Home Networking.

IOL TESTING BENEFITS

- **Reduce time to market** – An IOL Consortium is an extension of your lab. Our technical expertise, test tools, and test bed will help you pinpoint bugs you may have missed. Not only will this free up valuable time for your company, it will also improve your user experience.

- **Unsurpassed In-House equipment** - Testing is conducted in the laboratory's **32,000+ square foot facility**, which houses a multi-million dollar array of test equipment and the latest devices from Member companies. In return for their latest devices and support, Members are entitled to high-caliber interoperability testing against other vendors' devices.

- **Test Tools** – Through an IOL Membership, you have access to the IOL's customized homegrown Test Software. The IOL has developed some of the most advanced protocol testing software available for use in conducting both Conformance and Interoperability testing. Many of the IOL's testing packages are available to purchase for use in your own lab. In addition, the IOL has access to some of industry's most sought after test and measurement equipment, for protocol and performance testing.

- **Group test events** - The corporate world is often more competitive than cooperative. For this reason we have created the group test event. This is an opportunity to gather with technological peers and test the interoperability of your device with others in order to create more seamless, quality networks worldwide.

- **Forum Partnerships –** The UNH-IOL partners with various standards bodies and forums to stay informed and to provide feed on various industry trends. Our forum partnerships allow us to fill a crucial testing and development role in advancing the current state of technology. The RTC Consortium is actively involved in the IETF, and have partnerships with the Open Video Communications Consortium (OVCC), SIP Forum, and the Unified Communication Interoperability Forum (UCI Form).

- **ISO/IEC 17025 accredited Testing -** The UNH-IOL offers accredited testing that has passed vigorous quality and procedural standards.

RTC CONSORTIUM

- **OVCC** – The RTC Consortium partners with the Open Video Communications Consortium to provide Visual Communications Service Architecture Testing. This testing is performed using a fully integrated, end-to-end reference architecture. When combined with an OVCC membership, Members have the opportunity to obtain OVCC Certification.

- **IMTC** – The International Multimedia Telecommunications Consortium has partnered with the IOL to provide SIPv6 Pre-certification testing for the Department of Defense Unified Capabilities Requirements (DoD UCR). A Fully Automated SIPv6 Conformance Testing Tool is available to those Members who are also members of IMTC, for use in their own labs, or at the IOL. Vendors may also schedule use of a SIPv6 test network and Interoperability Environment, to further validate their equipment.

- **SIPconnect 1.1 Testing –** The RTC Consortium partners with the SIP Forum to provide SIPconnect 1.1. Compliance and Interoperability testing. Contact UNH-IOL or SIP Forum for more information on SIPconnect testing.

TESTING FEES

RTC Consortium Membership	**Annual Fees**
OVCC Reference Architecture (OVCC Membership required)	
• **OVCC MCU Testing**	INCLUDED
• **OVCC SBC Testing**	INCLUDED
• **OVCC Endpoint Testing**	INCLUDED
IMTC SIPv6 Endpoint and Core Testing (IMTC Membership required)	INCLUDED
SIP Trunking	INCLUDED
SIP Conformance, Interoperability, and Feature Testing	INCLUDED
Schedule one test slot per membership on a first come first serve basis. (See Proposed Process)	INCLUDED
Free Regression testing	INCLUDED
Free failure retests in between test slots	INCLUDED
Overtime options for expedited testing (subject to additional fees)	
Consortium Membership Fee	$20,000 USD
Founding Members First Year Fee*	**$16,000 USD**

* *Join prior to July 1, 2015*

Pay-per-Test Services	**Test Fee**
OVCC Reference Architecture (OVCC Membership Required)	
• **OVCC MCU or SBC Testing**	$10,000 USD
• **OVCC Endpoint Testing**	$7,500 USD
IMTC SIPv6 Conformance Testing (IMTC Membership Required)	$10,000 USD
SIPconnect 1.1 Testing	CONTACT US

OVCC Endpoint Testing Tier

- **OVCC Endpoint** – The RTC Consortium partners with the Open Video Communications Consortium to provide Visual Communications Service Architecture Testing. This testing is performed using a fully integrated, end-to-end system as part of a reference architecture. When combined with an OVCC membership, RTC Members have the opportunity for OVCC Certification for devices. This testing is targeted specifically towards Endpoint devices that reside on the edge of the architecture.

Testing Fees

OVCC Endpoint Membership	Annual Fees
OVCC Reference Architecture (OVCC Membership Required)	
• **OVCC Endpoint Testing**	INCLUDED
Schedule one test slot per membership on a first come first serve basis. (See Proposed Process)	INCLUDED
Free Regression testing	INCLUDED
Free failure retests in between test slots	INCLUDED
Overtime options for expedited testing (subject to additional fees)	
Membership Fee	$16,000 USD
Founding Members First Year Fee*	**$13,000 USD**

* *Join prior to July 1, 2015*

Pay-per-Test Services	Test Fee
OVCC Reference Architecture (OVCC Membership Required)	
• **OVCC MCU or SBC Testing**	$10,000 USD
• **OVCC Endpoint Testing**	$7,500 USD
IMTC SIPv6 Conformance Testing (IMTC Membership Required)	$10,000 USD
SIPconnect 1.1 Testing	CONTACT US

TESTING STRUCTURE

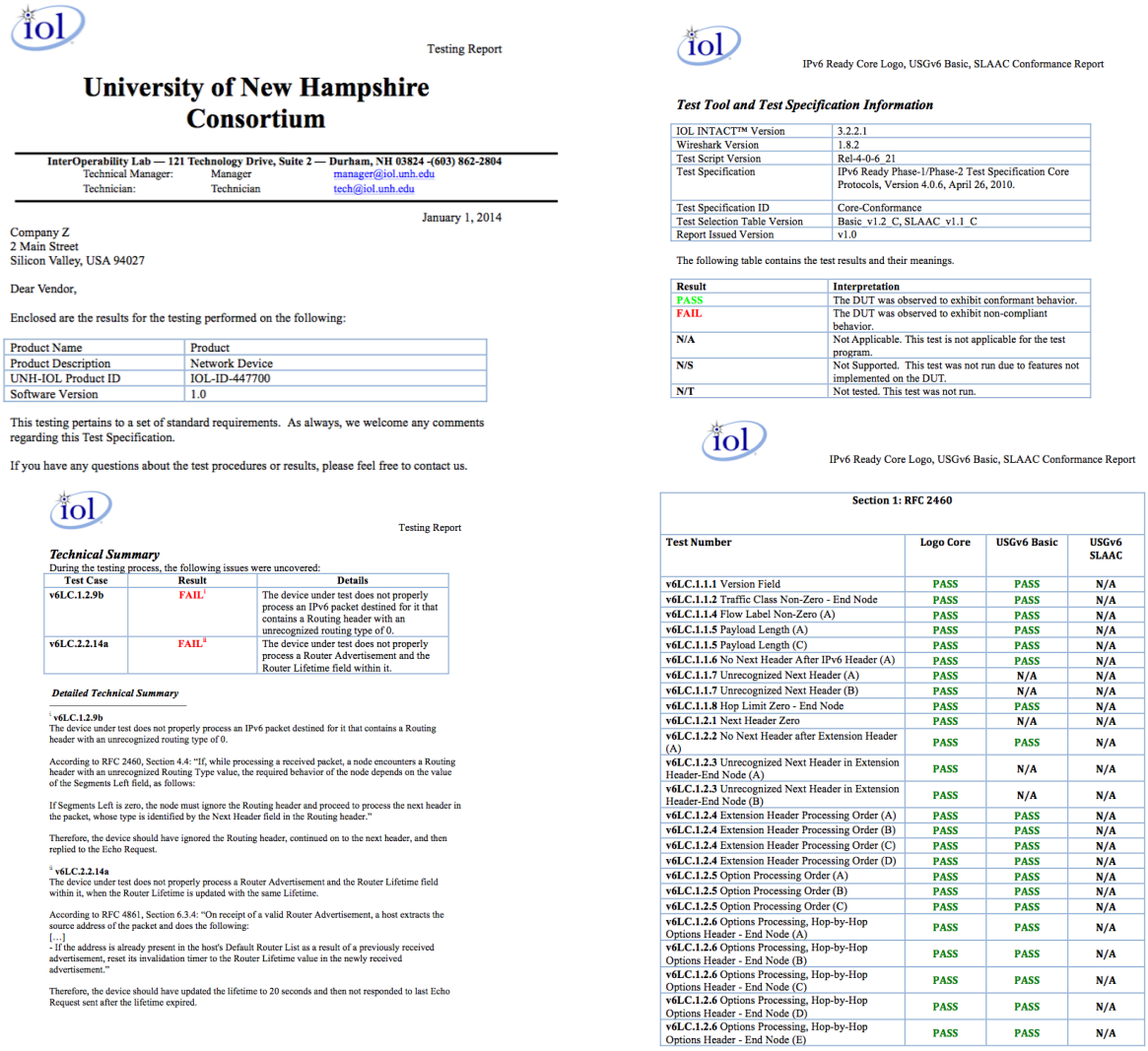
The Real-Time Communications Consortium at the UNH-IOL is structured to promote SIP and Real-Time Communications technology and devices..

An RTC Consortium Membership provides comprehensive testing for all provider and enterprise core devices, as well as a range of other devices, including gateways, servers, and endpoints. In addition, the Consortium provides a variety of performance and quality related testing options. Vendor devices in this category would include SBCs, PBX, Gateways, and Web or Media Servers, as well as Phones, Web Browsers and other media Endpoints.

SAMPLE REPORT STYLE

The technical results will be documented in a standard report format. These reports will be sent to the membership owners via secure file transport.

A sample figure of the report format is included below.



Testing Report

University of New Hampshire Consortium

InterOperability Lab — 121 Technology Drive, Suite 2 — Durham, NH 03824 -(603) 862-2804

Technical Manager: Manager manager@iol.unh.edu
Technician: Technician tech@iol.unh.edu

January 1, 2014

Company Z
2 Main Street
Silicon Valley, USA 94027

Dear Vendor,

Enclosed are the results for the testing performed on the following:

Product Name	Product
Product Description	Network Device
UNH-IOL Product ID	IOL-ID-447700
Software Version	1.0

This testing pertains to a set of standard requirements. As always, we welcome any comments regarding this Test Specification.

If you have any questions about the test procedures or results, please feel free to contact us.

Testing Report

Technical Summary

During the testing process, the following issues were uncovered:

Test Case	Result	Details
v6LC.1.2.9b	FAIL[1]	The device under test does not properly process an IPv6 packet destined for it that contains a Routing header with an unrecognized routing type of 0.
v6LC.2.2.14a	FAIL[2]	The device under test does not properly process a Router Advertisement and the Router Lifetime field within it.

Detailed Technical Summary

[1] **v6LC.1.2.9b**
The device under test does not properly process an IPv6 packet destined for it that contains a Routing header with an unrecognized routing type of 0.

According to RFC 2460, Section 4.4: "If, while processing a received packet, a node encounters a Routing header with an unrecognized Routing Type value, the required behavior of the node depends on the value of the Segments Left field, as follows:

If Segments Left is zero, the node must ignore the Routing header and proceed to process the next header in the packet, whose type is identified by the Next Header field in the Routing header."

Therefore, the device should have ignored the Routing header, continued on to the next header, and then replied to the Echo Request.

[2] **v6LC.2.2.14a**
The device under test does not properly process a Router Advertisement and the Router Lifetime field within it, when the Router Lifetime is updated with the same Lifetime.

According to RFC 4861, Section 6.3.4: "On receipt of a valid Router Advertisement, a host extracts the source address of the packet and does the following:
[…]
- If the address is already present in the host's Default Router List as a result of a previously received advertisement, reset its invalidation timer to the Router Lifetime value in the newly received advertisement."

Therefore, the device should have updated the lifetime to 20 seconds and then not responded to last Echo Request sent after the lifetime expired.

IPv6 Ready Core Logo, USGv6 Basic, SLAAC Conformance Report

Test Tool and Test Specification Information

IOL INTACT™ Version	3.2.2.1
Wireshark Version	1.8.2
Test Script Version	Rel-4-0-6_21
Test Specification	IPv6 Ready Phase-1/Phase-2 Test Specification Core Protocols, Version 4.0.6, April 26, 2010.
Test Specification ID	Core-Conformance
Test Selection Table Version	Basic_v1.2_C, SLAAC_v1.1_C
Report Issued Version	v1.0

The following table contains the test results and their meanings.

Result	Interpretation
PASS	The DUT was observed to exhibit conformant behavior.
FAIL	The DUT was observed to exhibit non-compliant behavior.
N/A	Not Applicable. This test is not applicable for the test program.
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.

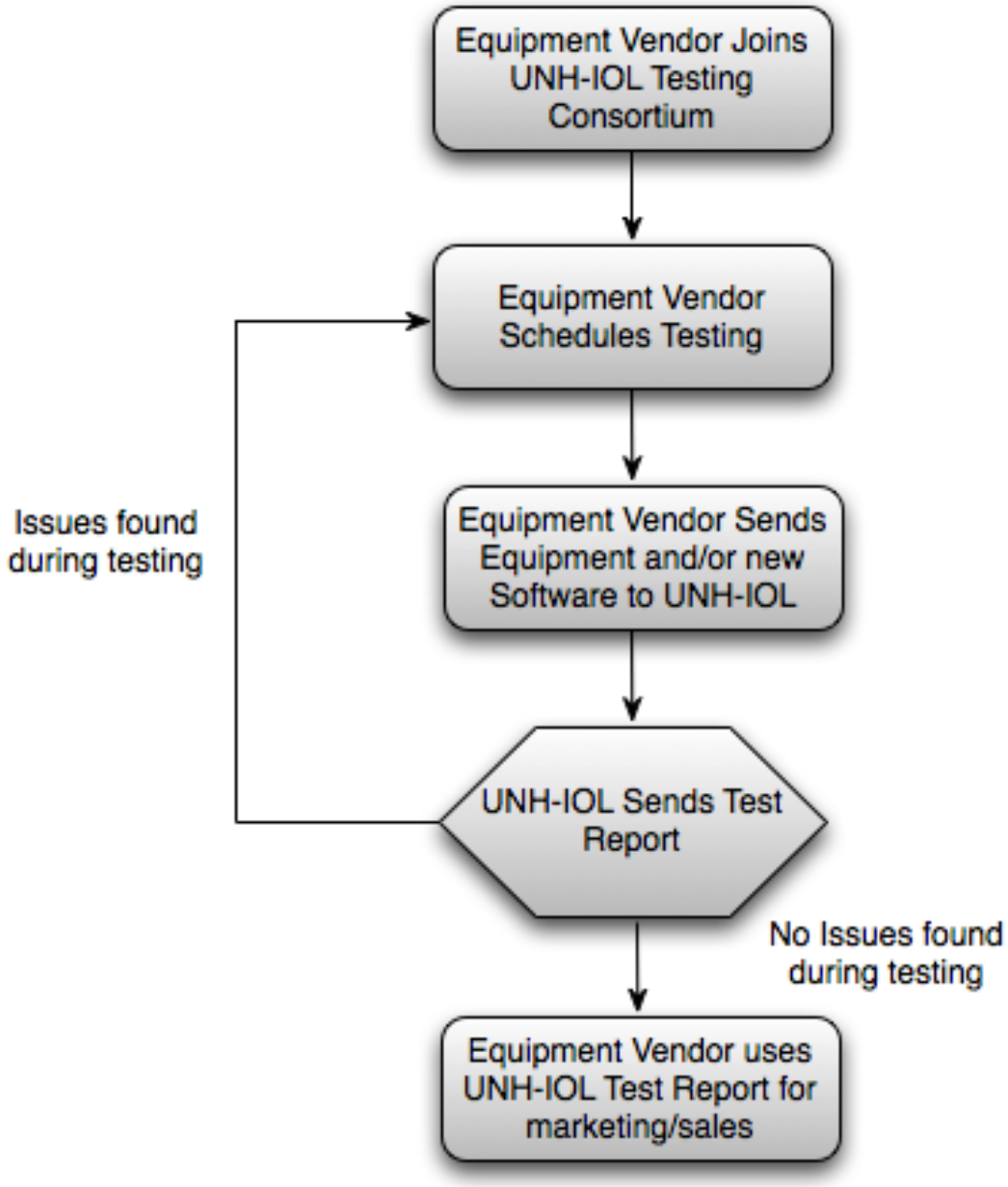
IPv6 Ready Core Logo, USGv6 Basic, SLAAC Conformance Report

Section 1: RFC 2460

Test Number	Logo Core	USGv6 Basic	USGv6 SLAAC
v6LC.1.1.1 Version Field	PASS	PASS	N/A
v6LC.1.1.2 Traffic Class Non-Zero - End Node	PASS	PASS	N/A
v6LC.1.1.4 Flow Label Non-Zero (A)	PASS	PASS	N/A
v6LC.1.1.5 Payload Length (A)	PASS	PASS	N/A
v6LC.1.1.5 Payload Length (C)	PASS	PASS	N/A
v6LC.1.1.6 No Next Header After IPv6 Header (A)	PASS	PASS	N/A
v6LC.1.1.7 Unrecognized Next Header (A)	PASS	N/A	N/A
v6LC.1.1.7 Unrecognized Next Header (B)	PASS	N/A	N/A
v6LC.1.1.8 Hop Limit Zero - End Node	PASS	PASS	N/A
v6LC.1.2.1 Next Header Zero	PASS	N/A	N/A
v6LC.1.2.2 No Next Header after Extension Header (A)	PASS	PASS	N/A
v6LC.1.2.3 Unrecognized Next Header in Extension Header-End Node (A)	PASS	N/A	N/A
v6LC.1.2.3 Unrecognized Next Header in Extension Header-End Node (B)	PASS	N/A	N/A
v6LC.1.2.4 Extension Header Processing Order (A)	PASS	PASS	N/A
v6LC.1.2.4 Extension Header Processing Order (B)	PASS	PASS	N/A
v6LC.1.2.4 Extension Header Processing Order (C)	PASS	PASS	N/A
v6LC.1.2.4 Extension Header Processing Order (D)	PASS	PASS	N/A
v6LC.1.2.5 Option Processing Order (A)	PASS	PASS	N/A
v6LC.1.2.5 Option Processing Order (B)	PASS	PASS	N/A
v6LC.1.2.5 Option Processing Order (C)	PASS	PASS	N/A
v6LC.1.2.6 Options Processing, Hop-by-Hop Options Header - End Node (A)	PASS	PASS	N/A
v6LC.1.2.6 Options Processing, Hop-by-Hop Options Header - End Node (B)	PASS	PASS	N/A
v6LC.1.2.6 Options Processing, Hop-by-Hop Options Header - End Node (C)	PASS	PASS	N/A
v6LC.1.2.6 Options Processing, Hop-by-Hop Options Header - End Node (D)	PASS	PASS	N/A
v6LC.1.2.6 Options Processing, Hop-by-Hop Options Header - End Node (E)	PASS	PASS	N/A

PROPOSED PROCESS

The diagram below outlines the process used by the UNH InterOperability Lab from the point of a new member joining the consortium to an official IOL Report. This process may be repeated as often as scheduling allows throughout the membership.



UNH-IOL USAGE AGREEMENT

Members agree to abide by the UNH-IOL Usage Agreement (UNH-IOL UA) located at (http://www.iol.unh.edu/services/usageAgreement.pdf), except in cases where this proposal conflicts with the UNH-IOL UA. In such cases, this proposal shall supersede the UNH-IOL UA.

SUMMARY

The UNH-IOL maintains a strong reputation for accuracy, technical excellence and non-biased leader in equipment analysis. Selection by your company will significantly reduce costs to alternative testing efforts. The UNH-IOL would like to establish a repeatable model in order to sustain a long-term relationship. The collaborative membership model has proven success over 25 years of data communications and storage testing at the UNH-IOL.