UNH-IOL Overview
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#OFSUserGroup
Overview

• Introduction
• IOL
• OpenFabrics
• Future

InterOperability Laboratory

https://www.iol.unh.edu/
IOL

- 3rd-party test facility for data, telecom and storage networking technology & consumer electronics
- 100% funded by commercial industry
  - 150+ companies
- ~25 Full Time Staff, ~110 Students
- 32,000 sq. ft. lab – Boston, USA Metro Area
- 7,200 sq. ft. dedicated Plugfest space
- New Custom Built Facility opening in 2016
Member Involvement
(150+ Companies)

March 19-20, 2015 #OFAUserGroup
Our Model

• Focused, collaborative Conformance and Interoperability effort established/based at UNH-IOL
• Funded and guided by vendor community in a neutral, not-for-profit environment
  – Develops testing tools
  – Maintains knowledge center (online)
  – Coordinates interoperability demonstrations
  – Provides testing services
  – Can operate independently, or serve as “technical arm” for an industry body

• Offers 25 years of helping industry bring “interoperable” technology to market
Technology Testing Areas

• Broadband
  – DSL
  – Home Networking (TR-069 & IPv6 CE Router)
  – VDSL2 Vectoring
  – GPON
  – G.fast

• IP Networking
  – IPv6
  – Real-Time Communications
  – Routing/SDN

• Consumer/Home
  – DLNA/RVU
  – Wireless

• Switching/Timing
  – Avnu
  – IEEE 1588
  – Ethernet Switching Protocols

• Storage
  – Fibre Channel
  – iSCSI
  – NVMe
  – PCIe

• High Performance Computing
  – OpenFabrics
  – 40 & 100 Gigabit Ethernet
  – 10 G Ethernet
  – Ethernet Switching Protocols

• Mobile/Wireless
  – MIPI Camera
  – MIPI Display
  – MIPI Battery
  – MIPI M-PHY
  – Wireless

• Ethernet/Enterprise
  – Power over Ethernet
  – 40 & 100 Gigabit Ethernet
  – Backplane Ethernet
  – 10 Gigabit Ethernet
  – Automotive Ethernet
  – Gigabit Ethernet
  – Fast Ethernet
  – 10BASE-T Testing
  – Cable/Channel Testing
Automated Test Tools
IOL Developed

• Ethernet Physical Layer (100 mb/s – 40/100 Gb/s)
  – PoE Cert
  – HW (FPGA)/SW
• IMTC Test Tool (IMTC Certification Program)
• INTERACT Software (NVMe Integrator’s List)

• IOL INTACT Software (IPv6 Forum IPv6 Ready Logo, USGv6 Test Program)
• MIPI Test Boards (MIPI Alliance)
• VIOLETT (AVnu Alliance Certification)
• TR-069 Scripts, QA Café Partnership (BBF.069 Certification Program)
OpenFabrics

- OpenFabrics Interoperability Logo Group (OFILG)
  - Members participate in test events validating OpenFabrics Software (OFS)

- OpenFabrics Cluster
  - Hosted at IOL – Durham, NH
  - Remote Access to Members
  - IB, iWARP, RoCE, Automated Install, Testing
Interoperability Logo List

- **OFILG Interoperability Logo List - May 2014**

OpenFabrics Alliance Interoperability Working Group (OFA-IWG)

**OFED Version Tested: 3.12**

**Introduction**

This Logo List contains products which were found to pass all Mandatory testing required for the OFILG Logo. The reports listed on this page have been approved for publication by their respective member company.

**Contents**

- InfiniBand Host Channel Adapters
- Ethernet RNICs
- RoCE Channel Adapters
- InfiniBand Switches With Managers
- InfiniBand Switches Without Managers
- SRP Targets
- OFILG Cluster Contributors
OFILG Cluster

- OpenFabrics Cluster hosted at IOL – Durham, NH
  - 7 racks of equipment hosted at UNH-IOL
  - 56 heterogeneous nodes
  - 11 Switches
  - 5 SRP Targets
- Servers: AMD Opteron, IBM PPC64, Intel x86_64
- InfiniBand: Intel, Mellanox
- iWARP: Intel, Chelsio
- RoCE: Emulex, IBM, Mellanox
- SRP Targets: DataDirect Networks, NetApp
- OFED: 1.5.x, 3.5.x, 3.12, 3.12-1, 3.18
- PXE Boot: CentOS, RHEL, SLES, Ubuntu
- Scripted and Automated
- Remote VPN Access
Upcoming Events

• Event Dates
  – IBTA PF 27
    • 13-April => 24-April
    • 12-October => 23-Oct
  – OFA Interop Debug Event (Followed by Logo)
    • 20-April => 24-April
    • 19-Oct => 23-Oct

• April OFA Debug
  – OFED 3.18 or 3.20
  – ULP - iSER, NFSoRDMA
Test Topology - InfiniBand
Topology - iWARP

Fujitsu Switch
XG2000C
20-port 10Gb/s

Cisco Switch
WS-C4900X-32
32-port 10Gb/s

Chelsio T520-CR
SFP+ 10Gb/s

Intel XECC
C4 10Gb/s

Intel XECC
C4 10Gb/s

Intel XECC
C4 10Gb/s
## Required Tests - InfiniBand

<table>
<thead>
<tr>
<th>Test Procedures</th>
<th>Linux</th>
</tr>
</thead>
<tbody>
<tr>
<td>IB Link Initialize</td>
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<tr>
<td>IB Fabric Initialization</td>
<td></td>
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<tr>
<td>IB IPoIB Connected Mode</td>
<td></td>
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<tr>
<td>IB IPoIB Datagram Mode</td>
<td></td>
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<tr>
<td>IB SM Failover/Handover - OpenSM</td>
<td></td>
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<tr>
<td>IB SM Failover/Handover - Vendor SM</td>
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<tr>
<td>IB SRP</td>
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<tr>
<td>IB Ethernet Gateway</td>
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<tr>
<td>IB Fibre Channel Gateway</td>
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<tr>
<td>Transport Independent Tests</td>
<td>Linux</td>
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<tr>
<td>TI iSER</td>
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<tr>
<td>TI NFS over RDMA</td>
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<td>TI RSocket</td>
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<tr>
<td>TI uDAPL</td>
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- Mandatory
- Beta
### Required Tests - iWARP

**iWARP Transport - Test Status for April 2015 Interop Event**

<table>
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# Required Tests - RoCE

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<tr>
<td>RoCE Link Initialize</td>
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<tr>
<td>RoCE Fabric Initialization</td>
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<tr>
<td>RoCE IPoCE</td>
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RDMA Research

• Implementation and Comparison of iSCSI Over RDMA
  – iSCSI Extensions for RDMA (iSER)

• Implementation of an RDMA Verbs Driver for GRIDFTP

• UNH Extended Sockets Library (UNH-EXS)
  – Implementation of Extended Sockets-API (OpenGroup)
Looking Ahead

- RoCE Bridge
- RoCEv2
- EDR
- Virtualization
- OS Involvement
- Speed/Performance
- NVMe
- IPv6 – IPoIB, IPoCE, iWARPoIPv6
- OFA Interfaces WG Collaboration
- Conformance
Growing the Relationship

• What UNH-IOL can offer:
  – Guidance on testing programs based on 25 years of best practices
  – Standards feedback from a testing perspective
    • (IEEE, IETF, ITU Experience)
  – Develop customized test tools
  – Training opportunities
  – Vendor Testing with detailed reports

• What can we help with?
Thank You

OpenFabrics Software User Group Workshop

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