

IBM Corporation

Nortel 1/10Gb Uplink Ethernet Switch Module for IBM BladeCenter



Test Summary

Functionality Certification and Cooperative Interoperability Evaluation

***Premise:** Heterogeneous, multivendor networks are the rule rather than the exception. IT managers who deploy a variety of Fast Ethernet, Gigabit Ethernet and 10GbE switching devices in their networks need guaranteed interoperability of these switches in order to maintain a functional network.*

Blade Network Technologies, Inc. (BLADE) commissioned The Tolly Group to evaluate an integrated Nortel blade switch module - designed and manufactured by BLADE for IBM BladeCenter - for interoperability with other switch brands.

Tolly Group engineers subjected the Nortel 1/10Gb Uplink Ethernet Switch Module to ten different tests with switches from 3Com, Cisco Systems, Enterasys Networks, Force10 Networks, Foundry Networks, Hewlett-Packard, and NEC.

Engineers subjected the Nortel switch module to advanced LAN services tests, including support for auto-negotiation, 802.1p/Q VLAN tag propagation, 10GbE LAN PHY Support, 802.3ad LACP Support, Rapid Spanning Tree Protocol, Multiple Spanning Tree Protocol, RIPv2, OSPFv2, BGP4, Virtual Router Redundancy Protocol (VRRP) and Jumbo Frames. The Nortel switch achieved interoperability with other switches in all the tests.

Tests were conducted in August 2008 in Santa Clara, CA at Ixia's iSimCity lab facility.

Test Highlights

- ▶ Earns 11 Switch Interoperability certifications for Layer 2 and Layer 3 advanced LAN functions
- ▶ Achieves broad Layer 2 and Layer 3 interoperability with 19 switches from seven vendors
- ▶ Interoperates with other devices tested when supporting 10GbE LAN PHY interface, 802.1p/Q VLAN tags, Link Aggregation, Multiple Spanning Tree Protocol, RSTP, VRRP, OSPF, BGP protocols and more

Nortel 1/10Gb Uplink Switch Module for IBM BladeCenter Certified Interoperability Features/Functions

Certification	Result
802.1p/Q VLAN Tag Propagation	✔
Jumbo Frame support	✔
Link Aggregation Control Protocol (LACP)	✔
10GbE LAN PHY support	✔
Rapid Spanning Tree Protocol (RSTP)	✔
Multiple Spanning Tree Protocol (MSTP)	✔
Open Shortest Path First v2 (OSPFv2)	✔
RIPv2	✔
Border Gateway Protocol v4 (BGP4)	✔
Virtual Router Redundancy Protocol (VRRP)	✔

Source: The Tolly Group, August 2008

Figure 1

Executive Summary

Nortel 1/10Gb Uplink Switch Module for IBM BladeCenter demonstrated broad interoperability with 19 other switches respectively for advanced LAN and routing functions at Layer 2 and Layer 3.

In a world of ever-evolving standards and tight budgets, network managers searching for new equipment need to know that the switches they purchase are interoperable with their current infrastructures. It is important for managers to know which devices can maintain their interoperability with different standardized functions.

Engineers tested 20 switches from eight vendors to determine the various levels of interoperability offered.




In Layer 2 interoperability tests, the Nortel Switch Module con-

sistently demonstrated interoperability with switches from 3Com, Cisco Systems, Inc., Force10, Inc., HP, NEC, Foundry Networks, Inc. & Enterasys Networks, Inc.

(The IBM, NEC & HP integrated blade switch modules were manufactured by Blade Network Technologies, Inc.)

In Layer 3 interoperability tests, the Nortel switch achieved interoperability with a 3Com Switch 4800G, five Enterasys Networks models tested, a Cisco Catalyst 6500, two HP switches, four Foundry

Layer 2 Interoperability Certifications Awarded to Nortel 1/10Gb Uplink Switch Module for IBM BladeCenter							
Certifications	10/100/1000 Auto-Negotiation	802.1p/Q VLAN Tag Propagation	Jumbo Frame support	Link Aggregation (LACP) support	10G LAN PHY	Rapid Spanning Tree Protocol Support	Multiple Spanning Tree Protocol Support
3Com Switch 4800G 24-Port	✓	✓	✓	✓	✓	✓	✓
Cisco Catalyst 6506-E	✓	✓	✓	✓	✓	✓	✓
Enterasys SecureStack A2H124-48	✓	✓	✓	✓	N/S	✓	✓
Enterasys SecureStack B3G124-24	✓	✓	✓	✓	N/S	✓	✓
Enterasys SecureStack C3G124-48	✓	✓	✓	✓	✓	✓	✓
Enterasys D2G124-12	✓	✓	✓	✓	N/S	✓	✓
Enterasys G3G124-24P	✓	✓	✓	✓	✓	✓	✓
Enterasys Matrix-N 7G4282-49	✓	✓	✓	✓	✓	✓	✓
Enterasys Matrix-X4	✓	✓	✓	✓	✓	✓	✓
Force10 C300 Resilient Switch	✓	✓	✓	✓	✓	✓	✓
Foundry FastIron GS 624P-PoE	✓	✓	✓	✓	✓	✓	✓
Foundry FastIron LS 624	✓	✓	✓	✓	✓	✓	✓
Foundry FastIron Edge X 624E+2XG-PREM6	✓	✓	✓	✓	✓	✓	✓
Foundry BigIron RX-4-AC	✓	✓	✓	✓	✓	✓	✓
HP 1:10Gb BL-c Switch	✓	✓	✓	✓	✓	✓	✓
HP 10Gb BL-c Switch	N/S	✓	✓	✓	✓	✓	✓
NEC 1G Intelligent L2 Switch	✓	✓	✓	✓	N/S	✓	✓
NEC 1G Intelligent L3 Switch	✓	✓	✓	✓	N/S	✓	✓
NEC 10G Intelligent L3 Switch	N/S	✓	✓	✓	✓	✓	✓

 PASS
  N/S= Not Supported
  N/A= Not Tested

Source: The Tolly Group, August 2008 Figure 2

switches, one Force10 C300 switch and two NEC intelligent switches.

Layer 2 Functions

10/100/1000

Auto-negotiation

The Nortel Switch Module interoperated with all of the switches tested. Devices earning this certification have demonstrated the ability to establish the highest available speed and duplex settings in all possible vendor combinations.

802.1P/Q VLAN Tag Propagation

The Nortel Switch Module interoperated with all of the switches tested. Devices earning this certification have demonstrated the ability to recognize and maintain 802.1p/Q tags across all vendor combinations tested.

Jumbo Frame Support

The Nortel Switch Module interoperated with every switch tested. Devices earning this certification have demonstrated the ability to transmit Jumbo Frames (9K bytes) across all possible vendor combinations.

10GbE LAN PHY

This verifies that the Nortel Switch Module tested has the ability to transmit data between multiple vendors' 10-Gigabit LAN PHY interfaces.

In this test, the Nortel switch successfully interoperated with almost all of the switches, except for models that do not offer the 10-GbE support.

Link Aggregation Control Protocol (LACP)

This test verifies a device's ability to trunk ports across multiple vendor combinations using IEEE 802.3ad Link Aggregation Control Protocol (LACP). For this test, the Nortel Switch Module achieved interoperability with all 19 other participating switches.

Devices earning this certification have demonstrated the ability to balance the loads evenly across the aggregated link.

Rapid Spanning Tree Protocol (RSTP)

Devices earning this certification have demonstrated the ability to detect a failure of the Layer 2 spanning tree via IEEE 802.1w Rapid Spanning Tree protocol and to establish a new Layer 2 "tree."

In networks where multiple data paths exist, this approach provides a quicker re-establishment of traffic paths and dramatically reduces user downtime when compared with the recovery mechanism of traditional 802.1D spanning tree bridges/switches.

For this test, the Nortel Switch Module tested demonstrated interoperability with all switches. Switches from 3Com, Cisco, Enterasys, Force10, Foundry, HP, and NEC.

Multiple Spanning Tree Protocol (MSTP)

This test verifies that the Nortel Switch Module tested implements IEEE 802.1s Multiple Spanning Tree instances on a switch port to selectively allow

BLADE
Network
Technologies,
Inc



- Nortel 1/10Gb Uplink Switch Module for IBM BladeCenter

Layer 2/3 Feature Interoperability

Product Specifications
Vendor-supplied information not necessarily verified by The Tolly Group

**BLADE Network
Technologies, Inc.**

**Nortel 1/10Gb Uplink Ethernet
Switch Module For IBM
BladeCenter (Part Number
44W4404)**

Uplinks:

- 6 x 1Gb RJ45 ports
- 3 x 10Gb SFP+

Internal ports:

- 14 x 1Gb ports
- 100Mb management port

Performance:

- Full line rate performance: 104 Gbps full duplex
- Supported in all five IBM BladeCenter chassis in addition to the Multi-Switch Interconnect Module (MSIM).
- Designed for extremely low power consumption.

Software features:

- Up to 16K MAC addresses for a larger networking
- Availability/Resiliency: Ready for mission critical applications:
- VLANs: Customizable Virtual LAN support for up to 1,024 VLANs, including protocol-based VLANs
- Traffic Management and Routing: Full Ethernet Layer 2/3 functionality comes standard (OSPF, VRRP, BGP4, IGMP v3)
- Security: Filtering, HTTPS, SSH, RADIUS
- CLI: Industry-based CLI (like Cisco) and Alteon AoS CLI
- Cluster management: cluster of switches can be managed from one central location
- Secure Management: Via HTTPS, SSH v1/v2, SNMP v1-3 and more
- Additional features planned: IPV6 compatibility* and SmartConnect (virtual switching, stacking and VMReady™)

For more detailed product specifications, go to:

http://www.bladenetwork.net/pages/products_ibm_bladecenter.html#ESM1TO1OU

For more information contact:

BLADE Network Technologies.
<http://www.bladenetwork.net>

or block multiple VLANs., without blocking the entire traffic traversing the port.

Layer 3 Functions

RIPv2

This test verifies that the switches exchanges IPv4 routing table information via RIPv2 protocols. The Nortel Switch Module

interoperated with switches from 3Com, Cisco, Enterasys, Force10, HP, Foundry and NEC.

OSPFv2

Tolly Group engineers verified that the Nortel switch module exchanged routing table information via OSPFv2 with other brand switches.


Tests show that the Nortel Switch Module shares OSPF routing table data with partici-

pating switches from 3Com, Cisco, Enterasys, Force10, Foundry, HP and NEC.

Virtual Router Redundancy Protocol (VRRP)

Devices earning this certification have demonstrated interoperability using VRRP in both Master and backup configurations with all possible vendor combinations. This veri-

Layer 3 Interoperability Certifications Awarded to Nortel 1/10Gb Uplink Switch Module for IBM BladeCenter				
Certifications	RIP v2	OSPF v2	BGP4	VRRP
Devices under test				
3Com Switch 4800G 24-Port	✓	✓	✓	✓
Cisco Catalyst 6506-E	✓	✓	✓	✓
Enterasys SecureStack B3G124-24	✓	N/S	N/S	N/S
Enterasys SecureStack C3G124-48	✓	✓	N/S	✓
Enterasys G3G124-24P	✓	✓	N/S	✓
Enterasys Matrix-N 7G4282-49	✓	✓	N/S	✓
Enterasys Matrix-X4	✓	✓	✓	✓
Force10 C300 Resilient Switch	✓	✓	✓	✓
Foundry FastIron GS 624P-PoE	N/S	N/S	N/S	✓
Foundry FastIron LS 624	N/S	N/S	N/S	✓
Foundry FastIron Edge X 624E+2XG-PREM6	✓	✓	✓	✓
Foundry BigIron RX-4-AC	✓	✓	✓	✓
HP 1:10Gb BL-c Switch	✓	✓	N/S	✓
HP 10Gb BL-c Switch	✓	✓	N/S	✓
NEC 1G Intelligent L3 Switch	✓	✓	N/S	✓
NEC 10G Intelligent L3 Switch	✓	✓	N/S	✓

 **PASS** N/S= Not Supported N/A= Not Tested

Source: The Tolly Group, August 2008 Figure 3

fies a device's ability to act as a standby router in the event of failure using VRRP standards in a multivendor network.

For this test, the Nortel Switch Module tested achieved interoperability using VRRP with participating switches from 3Com, Enterasys, Cisco, Force10, Foundry, HP and NEC.

Test Setup and Methodology

Tolly Group engineers tested one Nortel 1/10Gb Uplink Switch Module for IBM BladeCenter - designed and manufactured by BLADE Net-

work Technologies, Inc.

See the chart below for full details on the software versions of the Nortel Switch Module tested, and info on the other 19 switches.

The Cisco Catalyst 6506-E switch and associated accessories were provided by Network Hardware Resale, LLC, a leading provider of pre-owned, used and refurbished equipment from leading vendors like Cisco Systems, Juniper Networks, Extreme Networks, etc.

Ixia provided valuable facilities and logistics support for the Switches Interoperability Study 2008 Tests. Ixia's new iSim City lab facility in Santa Clara, CA hosted the testing, and provided state-of-the-art power

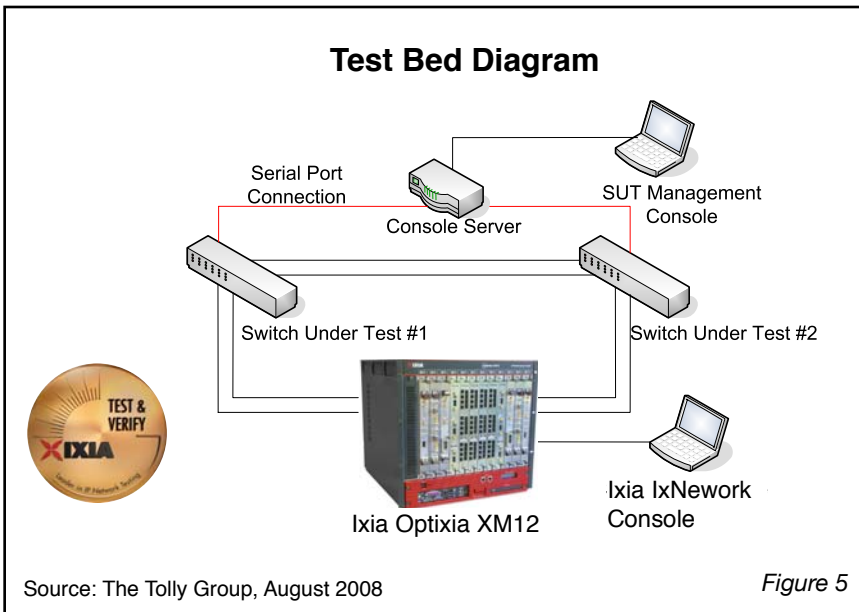
provisioning, management and cooling that were critical to a test of this scale.

The testbed utilized IxYukon, Ixia's latest solution for testing 10 GbE devices and networks. IxYukon interface modules are inserted into the Ixia's latest XM family of chassis: the XM12 and XM2. IxYukon's high-density packaging provides up to 96 ports of 10 GbE in a 10U rack-mount chassis and 16 ports in a 2-slot portable chassis. Ixia IxNetwork (Ver. 5.30 EA SP2) application was used to control the Ixia test platform.

Device Under Test (DUT) Information		
Device Under Test	Software Version	HW Revision (Chassis Revision for Modular Switch)
3Com Switch 4800G 24-Port	5.2	REV. B
Cisco Catalyst 6506-E	12.2	WS-C6506-E
Enterasys SecureStack A2H124-48	A2-Series 02.01.02.0001	N/A
Enterasys Secure Stack B3G124-24	B3-Series 01.01.05.0004	N/A
Enterasys SecureStack C2K122-24	C2-Series 05.01.05.0004	N/A
Enterasys G3G124-24P w/G3K-4XFP	G3-Series 01.00.03.0002	N/A
Enterasys D2G124-12	D2-Series 01.00.01.0005	N/A
Enterasys Matrix N 7G4282-49 w/7K-2XFP	6.01.01.020	N1chassis
Enterasys Matrix X4	1.6.4.P3	N/A
Force10 C300 Resilient Switch	FTOS 7.7.1.0	N/A
IBM Nortel 1/10Gb Uplink Ethernet Switch Module	1.0.1	N/A
HP 1:10Gb Ethernet Blade Switch for C-Class Blade System	1.0.51.0	N/A
HP 10GB Ethernet BL-C Switch	1.0.51.0	N/A
NEC 1G Intelligent L2 Switch	1.2.0.10	N/A
NEC 1G Intelligent L3 Switch	N/A	N/A
NEC 10G Intelligent L2 Switch	1.0.2.0	N/A
Foundry FastIron GS 624-PoE	4.200a	N/A
Foundry FastIron LS 624	4.2.00b	N/A
Foundry FastIron Edge Series X624E+2XG-PREM6	4.1.00a	N/A
Foundry BigIron RX-4-AC	2.4.0e	N/A

Source: The Tolly Group, August 2008

Figure 4




The Tolly Group is a leading global provider of third-party validation services for vendors of IT products, components and services.



The company is based in Boca Raton, FL and can be reached at <http://www.tolly.com>, sales@tolly.com or (561) 391-5610

Test Equipment Summary

The Tolly Group gratefully acknowledges the providers of test equipment used in this project.

Vendor	Product	Web
IXIA	Ixia Optixia XM12 chassis with IxYukon 8-port 10GbE module	http://www.ixiacom.com
 NETWORK HARDWARE RESALE	Cisco Catalyst 6506-E	http://www.networkhardware.com

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