

# Fujitsu Computer Products of America, Inc.



Test Summary

## XG700 and XG2000 Switches

### Functionality Certification and Cooperative Interoperability Evaluation

**Premise:** Network 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.

Fujitsu Computer Products of America, Inc. commissioned The Tolly Group to evaluate its Fujitsu XG700 and XG2000 LAN switches for interoperability with other brand switches.

Tolly Group engineers subjected the Fujitsu XG700 and XG2000 switches to more than a dozen tests with devices from 3Com, Alcatel-Lucent, Cisco Systems, Enterasys, Extreme Networks, Foundry Networks, IBM Nortel and Hewlett-Packard Co.

Engineers subjected the Fujitsu XG700 and XG2000 switches to advanced LAN services tests, including support for 802.1p/Q VLAN tag propagation, Rapid Spanning Tree Protocol (RSTP) and Jumbo Frames. The Fujitsu switches achieved interoperability with other devices tested.

Tests were conducted in March/April 2007 at Terremark Worldwide Inc.'s world-class NAP of the Americas facility in Miami, a major Internet peering point for carriers and service providers.

#### Test Highlights

- ▶ Earns five Switch Interoperability certifications for Layer 2 advanced LAN functions
- ▶ Achieves broad Layer 2 interoperability with 15 switches from nine vendors
- ▶ Interoperates with other devices tested when supporting 10-Gigabit Ethernet LAN PHY interface, 802.1p/Q VLAN tags, Jumbo Frame Support, Link Aggregation, and Rapid Spanning Tree Protocol

#### Fujitsu Switches Tested Partial List of Tolly Switch Interoperability Certifications Earned

Certification	Result
802.1p/Q VLAN Tag Propagation	
10GbE LAN PHY support	
Rapid Spanning Tree Protocol (RSTP)	
Link Aggregation Control Protocol (LACP)	
Jumbo Frame Support	

Source : The Tolly Group, April 2007

Figure 1

# Executive Summary

**The Fujitsu switches demonstrated broad interoperability with 15 other switches for advanced LAN and routing functions at Layer 2.**

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 infrastructure. It is important for managers to know which devices can maintain their interoperability with different standardized and non-standardized functions.

Engineers tested 23 switches from nine vendors to determine the various levels of interoperability offered.

In Layer 2 interoperability tests, both Fujitsu switches tested — the XG700 and XG2000 Switch Models — consistently demonstrated interoperability with switches from 3Com, Alcatel-Lucent, Cisco Systems, Enterasys Networks, Extreme Networks, Foundry Networks, IBM Nortel and HP.

## LAYER 2 FUNCTIONS

### 802.1P/Q VLAN TAG PROPAGATION

The Fujitsu XG700 and XG2000 switches interoperated with all of the switches tested. Devices earning this certification have demonstrated the ability to maintain and recognize 802.1p/Q tags across all vendor combinations tested. (See Figure 2.)

### JUMBO FRAME SUPPORT

The Fujitsu XG700 and XG2000 switches interoperated with every switch tested. Devices earning this certification demonstrated the ability to transmit Jumbo Frames (9K bytes) across all vendor switch combinations. (See Figure 2.)

### 10GbE LAN PHY SUPPORT

This verifies that the device tested has the ability to transmit data between multiple vendors' 10GbE interfaces. In this test, the Fujitsu XG700 and XG2000 switches successfully interoperated with all other devices tested. See Figure 2.

### LINK AGGREGATION 802.3AD

This test verifies a device's ability to trunk ports across multiple ven-

dor combinations using LACP. For this Layer 2 test, the Fujitsu XG700 and XG2000 switches achieved interoperability with 15 other participating switches.

Note that the Fujitsu XG700 and XG2000 switches were not tested with a 3Com 5500G-EI PWR 48-port switch module and the Fujitsu XG700 switch was not tested with an Alcatel-Lucent OmniSwitch 6850-P24X due to the lack of common physical interfaces. See Figure 2.

### RAPID SPANNING TREE PROTOCOL (802.1W)

Devices earning this certification have demonstrated the ability to detect a failure of the Layer 2 Spanning Tree via the Rapid Spanning Tree protocol and to establish a new Layer 2 "tree." In networks where multiple data paths exist, this

Layer 2 Tolly Interoperability Certifications Awarded to Fujitsu XG700 and XG2000 Switches					
Certification	802.1p/Q VLAN Tag Propagation	Jumbo Frame support	10GbE LAN PHY support	Link aggregation	Rapid Spanning Tree Protocol support
3Com Switch 4200G 24-Port	✓	✓	✓	✓	✓
3Com Switch 4500G 24-Port	✓	✓	✓	✓	✓
3Com Switch 5500G-EI PWR 48-Port	✓	✓	✓	*	*
Alcatel-Lucent OmniSwitch 6850-P24X	✓	✓	✓	*	*
Alcatel-Lucent OmniSwitch 9800	✓	✓	✓	✓	✓
Cisco Catalyst 6509-E	✓	✓	✓	✓	✓
Enterasys Matrix X4 Secure Core Router	✓	✓	✓	✓	✓
Extreme Summit X450a-24t	✓	✓	✓	✓	✓
Extreme BlackDiamond 8806	✓	✓	✓	✓	✓
Foundry FastIron Edge X424 Premium	✓	✓	✓	✓	✓
Foundry FastIron SX 800	✓	✓	✓	✓	✓
Foundry NetIron MLX	✓	✓	✓	✓	✓
Foundry BigIron RX	✓	✓	✓	✓	✓
Fujitsu XG700	✓	✓	✓	✓	✓
Fujitsu XG2000	✓	✓	✓	✓	✓
IBM Nortel 10Gb Ethernet Switch Module	✓	✓	✓	✓	✓
IBM Nortel 10Gb Uplink Ethernet Switch Module	✓	✓	✓	✓	✓

- ✓ = PASS
- N/A = Feature not supported
- = Not enough 10GbE interfaces when paired with the Fujitsu XG700 and Fujitsu XG2000
- = Not enough 10GbE CX-4 interfaces when paired with the Fujitsu XG700

Source: The Tolly Group, April 2007

Figure 2

approach provides a quicker re-establishment of traffic paths and dramatically reduces user downtime when compared with traditional 802.1D Spanning Tree devices.

Note that due to the lack of common physical interfaces, Fujitsu XG700 and XG2000 switches were not tested with a 3Com 5500G-EI PWR 48-port switch module and the Fujitsu XG700 switch was not tested with an Alcatel-Lucent OmniSwitch 6850-P24X.

## TEST SETUP AND METHODOLOGY

Tolly Group engineers tested the Fujitsu XG700 and XG2000 switches. Full details on the software versions of the Fujitsu

switches tested can be found in Figure 3 below.

Details on the methodology used for each of the tests can be located on The Tolly Group's Web site at [www.tolly.com](http://www.tolly.com).

Terremark Worldwide provided facilities and logistics support for the Switch Interoperability Study 2007. Terremark's NAP of the Americas facility in Miami provided state-of-the-art power provisioning, management and cooling that were critical to a test of this scale.

The Siemon Company provided custom length, reliable, high quality patch cables for the testing – 10G Augmented Cat 6 Shielded patch cables, and XGLO™ Singlemode Fiber Optic Cables.

The Tolly Group Switch Interoperability Study 2007 Device Under Test (DUT) Information		
Device Under Test	SW Version	HW Revision (Chassis revision for modular switch)
3Com Switch 4200G 24-Port	3Com OS V3.01.00s168	REV. B
3Com Switch 4500G 24-Port	3Com OS V5.01.00s168p01	REV. B
3Com Switch 5500G-EI PWR 48-Port	3Com OS V3.02.00s168	REV. C
Alcatel-Lucent OmniSwitch 6850-P24X	6.1.3.719.R01	06
Alcatel-Lucent OmniSwitch 9800 (OS9800-CFM, OS9700-U2, OS9700-24)	6.1.3.719.R01	B05
Cisco Catalyst 6509-E (WS-SUP720-3BXL, WS-X6704-10GE, WS-X6748-GE-TX)	IOS 12.2(18)XF4	1.2
Enterasys SecureStack A2H124-48	01.04.05	BCM5655 REV 18
Enterasys SecureStack B3G124-24	01.00.70	BCM56504 REV 19
Enterasys SecureStack C3G124-48	01.00.76	BCM56504 REV 19
Enterasys Matrix N1-DFE (7G4202-30)	05.35.16	0
Enterasys Matrix X4 Secure Core Router (X-CM-00-RH, X4-FM-RH, X-M2-00-RH, X-T32-00)	1.3.3	0
Extreme Summit X424a-24t	ExtremeXOS ver. 11.6.1.9	1.0
Extreme Blackdiamond 8806 (800112-00-20, 800116-00-02, 800159-00-04)	ExtremeXOS ver. 11.6.1.9	5.0
Fujitsu XG700	E10L10 XF0073 2005/10/26-13:14:42	
Fujitsu XG2000	E10L10 X12 2007/02/09-08:26:03	
Foundry FastIron Edge X424 Premium	03.2.00T3e3	
Foundry FastIron SX800 (SX-FI2XGMR4, SX-F424C)	03.2.00T3e3	
Foundry NetIron MLX (NI-MLX-MR, NI-MLX-10Gx4, NI-MLX-1Gx20-GC)	IronWare Ver. 3.3.0T163	
Foundry BigIron RX (RX-BI-MR, RX-BI-4XG, RX-BI-24C)	IronWare Ver. 2.3.0bT143	
IBM Nortel Layer2-3 GbE Switch Module (Copper)	1.2.5.0	1
IBM Nortel 10Gb Uplink Ethernet Switch Module	1.0.1.1	0
IBM Nortel 10Gb Ethernet Switch Module	1.0.1.1	5
HP GbE2c L2/L3 Ethernet Blade Switch for HP c-Class BladeSystem	2.0.0	0A

The Tolly Group, April 2007

Figure 3

**Fujitsu  
Computer  
Products of  
America,  
Inc.**



- XG700 Switch
- XG2000 Switch

## Layer 2 Feature Interoperability

### Product Specifications

*Vendor-supplied information not necessarily verified by The Tolly Group*

**Fujitsu Computer Products of America, Inc.**

#### Fujitsu XG700 Switch:

- 12-port CX4 10GbE switch
- Single chip, non-blocking ASIC enables low latency of 450ns in a compact 1U form factor
- Hot plug, redundant power supplies and fans standard
- Cut-through and store-and-forward switching
- Jumbo Frame support up to 15KB

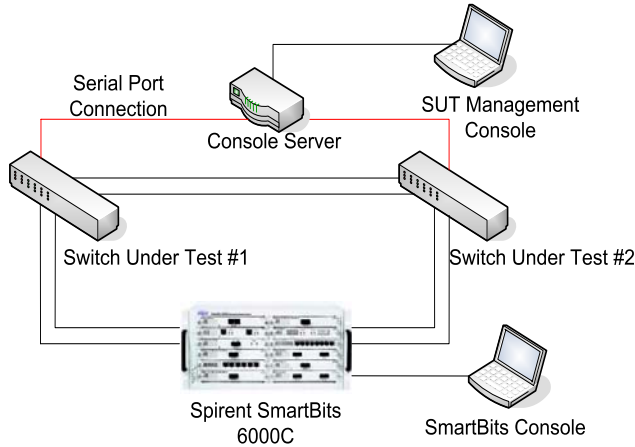
#### Fujitsu XG2000 Switch:

- 20-Port 10-GbE Switch
- Single chip, non-blocking ASIC enables low latency of 300ns in a compact 1U form factor
- On-chip 3MB proprietary, multi-stream buffer
- Available as 20-port XFP optical solution or 16 CX4 ports with four additional ports of XFP optics
- Hot plug, redundant power supplies and fans standard
- Cut-through and store-and-forward switching
- Jumbo Frame support up to 15KB

#### For more information contact:

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### Switch Interoperability Test Bed



Source: The Tolly Group, April 2007

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 by phone at (561) 391-5610, or via the Internet at <http://www.tolly.com>, [sales@tolly.com](mailto:sales@tolly.com)

### Test Equipment Summary

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

Vendor	Product	Web
Spirent Communications 	SmartFlow 5.5, SmartWindow 9.0, SmartBits 6000C, SmartMetrics 10G Ethernet module XFP-3730A, SmartMetrics XD module LAN-3324A	<a href="http://www.spirent.com">http://www.spirent.com</a>

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