

# Nortel Networks Alteon Application Switch 2424 Layer 7 Switching Competitive Analysis versus Cisco Systems CSS 11503 and F5 Networks BIG-IP 5000

## Test Summary

*Premise: Network managers implementing Layer 7 switches need reliable data that reveals the true device performance around which they can plan network designs. The expectation among users is that Layer 7 switches should deliver high connection rates while maintaining zero session loss. Some devices may suffer performance degradation due to physical system constraints – such as the number and speed of system processors.*

Nortel Networks commissioned The Tolly Group to evaluate the Alteon Application Switch 2424, a switching platform that performs Layer 2/3 switching and high-performance Layer 4-7 intelligent traffic management for applications such as server and network device load balancing, application redirection, security acceleration, and bandwidth management.

Nortel Networks asked The Tolly Group to evaluate the session rate of the Alteon 2424 against a Cisco Systems Content Services Switch (CSS) 11503 and an F5 Networks BIG-IP 5000. The session rate constitutes the number of sessions supported by the switch on a per second basis. Tests were conducted in January 2003.

Test results show that the Alteon 2424 delivers three to four times the session performance of the Cisco and F5 Networks switches with zero session loss, while actively filtering content for a real-world mix of traffic sizes.

## RESULTS

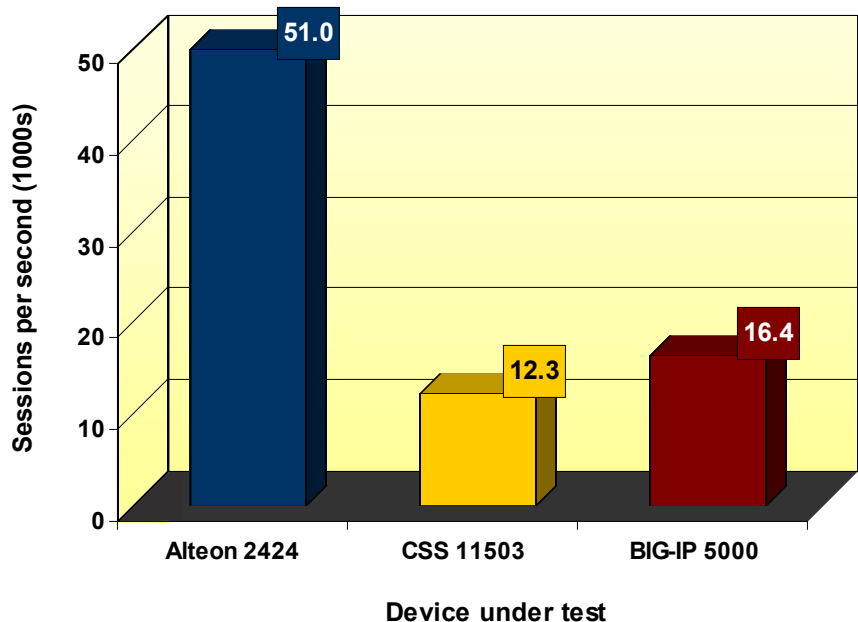
### LAYER 7 CONNECTION RATE TESTS

Engineers measured the session rate of the devices under test when subjected to three different scenarios.

## Test Highlights

- Delivers up to 4X more sessions/second than Cisco CSS 11503 and F5 Networks BIG-IP 5000 in zero-loss connection rate tests with 200 clients creating 1 million sessions
- Maintains 51,000 requests/second with zero session loss and Layer 7 filters enabled
- Increases session rate to 51,250 sessions/second when subjected to a real-world traffic scenario, while Cisco and F5 session rates remained unchanged or slipped

**Steady-State Connection Rate with  
Zero Session Loss with 1-Byte Requests  
Using 200 Clients Creating 1,000,000 Sessions  
As Reported by Ixia's IxWeb**



Source: The Tolly Group, January 2003

Figure 1

First, engineers measured the device session rate in a scenario using a single client-side Gigabit Ethernet (GbE) port and a single server-side GbE port on each of the devices under test (DUTs). The Tolly Group created 1,000,000 constant sessions requesting 1 byte of data in this test scenario.

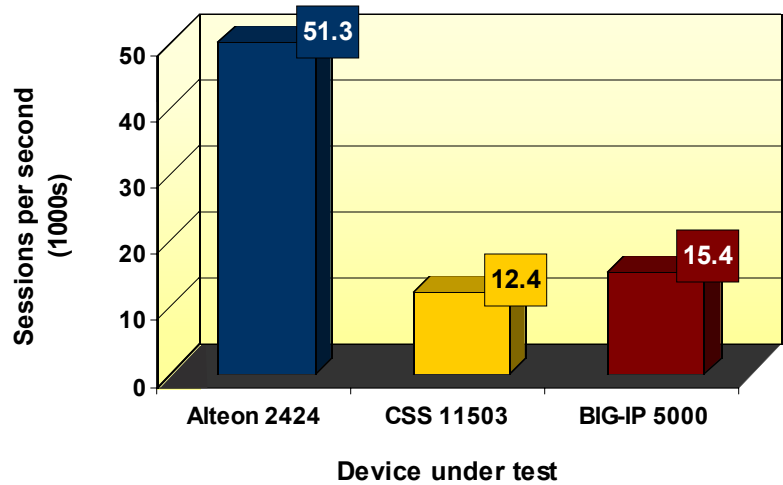
Here the Alteon 2424 delivered 51,000 sessions/second with zero session loss, or more than four times the number of sessions supported by the Cisco CSS 11503, and three times the performance of the F5 Networks BIG-IP 5000. (See Figure 1.)

Next, engineers continued the connection rate testing, this time using a real-world mix of traffic sizes including 64-, 512-, and 1,024-byte requests. These traffic sizes represent common real-world traffic the Layer 7 switch usually would encounter.

In this scenario, the Alteon 2424 achieved 51,250 sessions/second, actually improving slightly the previous session rate. Meanwhile, Cisco's CSS 11503 maintained its session rate at 12,400 sessions/second, while the F5 Networks BIG-IP 5000's session rate degraded by 1,000 sessions/second to 15,400. (See Figure 2)

In the third scenario, The Tolly Group attempted to ascertain each device's absolute maximum session rate. This

**Steady-State Connection Rate with Zero Session Loss with 64-, 512-, 1,024-byte Request Mix Using 200 Clients Creating 1,000,000 Sessions As Reported by IxWeb**



Source: The Tolly Group, January 2003

Figure 2

testing was conducted by creating 1,000,000 sessions of 1-byte files, with all three DUTs forwarding at the Ixia IxWeb maximum port rate of 66,000 sessions/second.

The Alteon 2424 forwarded at a maximum of 64,495 sessions/second with an average of 59,964 sessions/second. Cisco's CSS 11503 handled 21,203 sessions/second and F5

Networks' BIG-IP 5000 achieved 11,512 maximum sessions/second. (See Figure 3.)

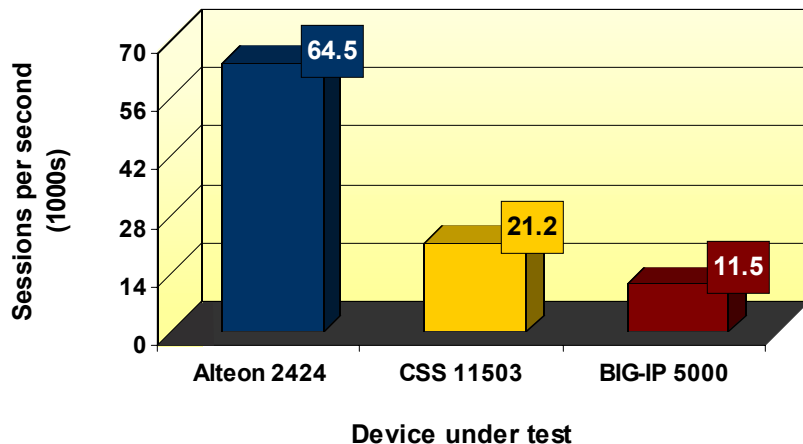
**ANALYSIS**

With some Layer 4-7 switch makers, their idea of performance benchmarking is to overload a switch with session traffic, then stand back and see what the device can handle in terms of sessions supported. The resulting measure is what some vendors characteristically refer to as "goodput." Unfortunately, the practice produces results that look good, but are not a true measure of the switch's session performance.

The downside with such an approach is that it does not offer a repeatable method to obtain consistent results. The maximum number of sessions that can be supported can be affected by a variety of factors beyond just switch load. Moreover, the resulting number likely does not indicate a consistent rate of session support, meaning how many sessions can be supported at any given time.

A single retransmission in every 1,000 sessions attempted can lead to unacceptable levels of performance degradation across critical links. Although devices may advertise given

**Steady-State Connection Rate with Zero Session Loss, Using 1-Byte Requests When Forwarding Available Maximum of 66,000 Sessions per Second from Ixia's IxWeb**



Source: The Tolly Group, January 2003

Figure 3

rates when being saturated with requests, they may only offer a true sustainable rate at a much lower point. Given the intense load on switches performing the Layer 7 deep packet inspection required for managing demanding applications like VoIP, database applications, Web services, etc., a switch's reliable Layer 7 performance is critical to performing its function without adding latency to a network. Considering the needs and requirements of constant reliability, accessibility, and scalability, it becomes obvious that a more refined metric must be used in determining behavior.

In this test of Nortel's Alteon 2424 against Cisco and F5 Networks switches, The Tolly Group utilized an approach that factored in zero-loss performance when evaluating the session capabilities of the switches under test. This enables the session measurement to be based upon a consistent performance variable that offers a more accurate indicator of consistent session loads supported by the switch.

In each of the three scenarios employed, the Alteon 2424 provided between three to five times the session load capabilities of the Cisco and F5 Networks products tested. This data provides network designers with real-world results to help accurately gauge the session-rate characteristics of the Layer 4-7 switches they plan to deploy. Such results indicate to network designers the actual scaling capability of the switches tested.

The Alteon 2424 emerged as the most scaleable, in terms of overall sessions supported. The order of magnitude increase in the session rate of the Alteon 2424 over the Cisco and F5 Networks products means that organizations deploying Layer 7 switches for Internet/intranet applications and other enterprise applications can confidently use the Alteon devices in high-volume TCP/UDP traffic scenarios.

## TEST CONFIGURATION AND METHODOLOGY

For performance tests, The Tolly Group tested a Nortel Networks Alteon 2424, version 20.1.1. Tolly Group engineers also tested a Cisco Systems, Inc. Content Services Switch 11503, version 5.20 outfitted with CSS5-SAM: Cisco

CSS11500 Session Accelerator Module and CSS5-SCM-2GE: Cisco CSS 11500 System Control Module and an F5 Networks BIG-IP 5000, version 4.1 and 4.5 (retesting).

The DUT connected to an IXIA 400T Traffic Generator running IxWeb version 1.25 configured for bi-directional HTTP traffic of 1 byte and a mix of 64, 512, 1,024 bytes. Engineers configured 200 clients to generate one million sessions in order to determine zero-loss at a given rate. All connections were via Gigabit Ethernet.

Each system first ran through a quick baseline test verifying device configuration and client/server connectivity. During prototype testing, an Agilent Technologies Software Advisor sat in line between the DUT and the IXIA to verify packet content and network utilization, but it was removed prior to testing.

For each test procedure, engineers reset the device to factory defaults. Then they configured each port on the DUT for the link speed it would support and full-duplex operation. Engineers disabled Spanning Tree, flow control and other ancillary features that would otherwise impact device performance. Then they configured the IXIA 400T for the tested frame size, network utilization, test duration and operational mode. (See Figure 4.)

Engineers initiated each test and recorded results. If frame loss occurred, they repeated the procedure and lowered the network utilization in 50 session increments until no frame loss occurred. The IXIA 400T recorded total transmitted frames and total received frames, plus frame loss, if any. Tests were run for 60 seconds for each of three iterations and results were averaged.

## EQUIPMENT ACQUISITION AND SUPPORT

The Cisco CSS 11503 and the F5 Networks BIG-IP 5000 were acquired through normal product distribution channels. The Tolly Group contacted executives at Cisco and F5 Networks and invited them to provide a higher level of support than available through normal channels. Cisco executives did not

Nortel Networks

Alteon 2424

Competitive Evaluation



### Nortel Networks Alteon Applications Switch 2424 Product Specifications\*

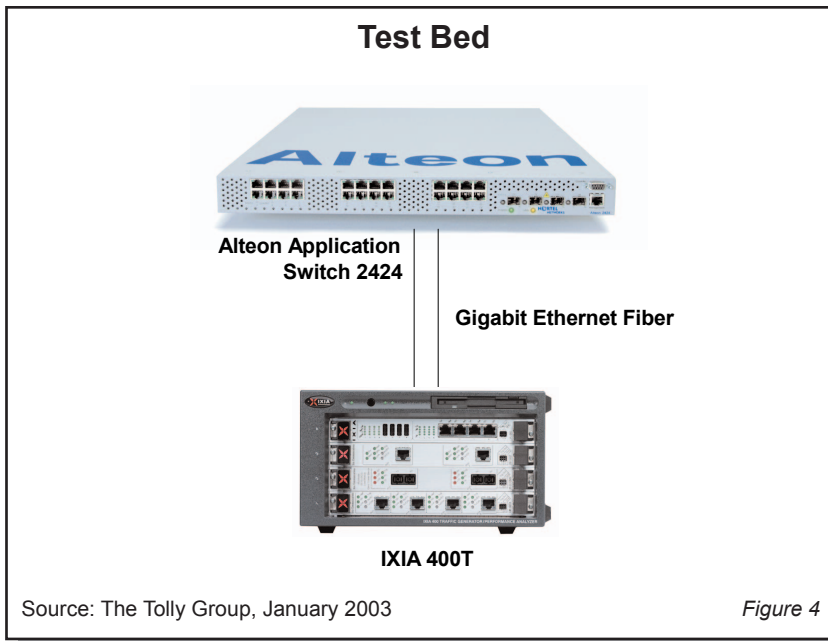
#### Feature

- Server load balancing
  - Application (LDAP, DNS, Web, mail, etc.)
  - Global
  - High availability and health checks
- Network device load balancing
  - Firewalls, Intrusion Detection Systems, VPNs, DNS, etc.
  - WAN link
  - Wireless Internet (WAP) gateways
- Application redirection
  - Web site
  - Cache
  - Streaming media (RTSP, etc.)
- Advanced filtering
  - Layer 2-7 attributes
  - VLAN filtering
  - Accept, deny, NAT, redirect
- Content-Intelligent (Layer 4-7) Switching
  - Layer 7 Inspect
  - Cookie, URL, HTTP header, User agent (PDA, Browser)
- Embedded security services
  - SSL acceleration & SSL VPN
  - Access control
  - DoS attack prevention
  - Application abuse protection
  - Layer 7 deny filters
- Bandwidth management and rate limiting
- Persistence support
  - Source IP and port
  - Cookies
  - SSL identifier
- Network services
  - Network Address Translation
  - VLAN Tagging
  - Trunking
  - Layer 2/3
- Ports: 24 10/100 Ethernet + 4 GbE (1000Base-SX/LX)

#### For more information contact:

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Research Triangle Park, NC, 27709  
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<http://www.nortelnetworks.com>

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



respond. Executives from F5 Networks agreed to provide a higher level of support than normally offered through traditional channels.

The Tolly Group verified product release levels and shared test configurations with F5 executives in order to give them an opportunity to optimize their device for the tests. Results were shared with Cisco and F5 Networks executives. Cisco did not respond to queries; F5 Networks accepted some of the results but challenged others.



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

Vendor	Product	Web address
Agilent Technologies	Software Advisor V12.0	<a href="http://www.agilent.com">http://www.agilent.com</a>
Ixia	IXIA 400T	<a href="http://www.ixiacom.com">http://www.ixiacom.com</a>
Ixia	IxWeb V1.25	<a href="http://www.ixiacom.com">http://www.ixiacom.com</a>

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## PROJECT PROFILE

**Sponsor:** Nortel Networks

**Document number:** 203100

**Product Class:** Layer 7 switch

**Products under test:**

- Nortel Networks Alteon Application Switch 2424, running Alteon OS version 20.1.1
- Cisco Systems, Inc. CSS 11503, version 5.20 outfitted with CSS5-SAM: Cisco CSS 11500 Session Accelerator Module and CSS5-SCM-2GE: Cisco CSS 11500 System Control Module
- F5 Networks, Inc. BIG-IP 5000, version 4.5

**Testing window:** January 2003

**Software status:** Generally available

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