

## Brocade ServerIron ADX 1000 Application Switch with Secure Sockets Layer (SSL) Acceleration

### EXECUTIVE SUMMARY

Tolly engineers benchmarked the SSL acceleration capabilities of the Brocade ServerIron ADX 1000 and compared those results with products from Cisco Systems, Citrix Systems and F5 Networks using performance capacities advertised by the respective vendor.

The Brocade solution provides significantly greater SSL capacity at the lowest cost-per-transaction among the systems analyzed.

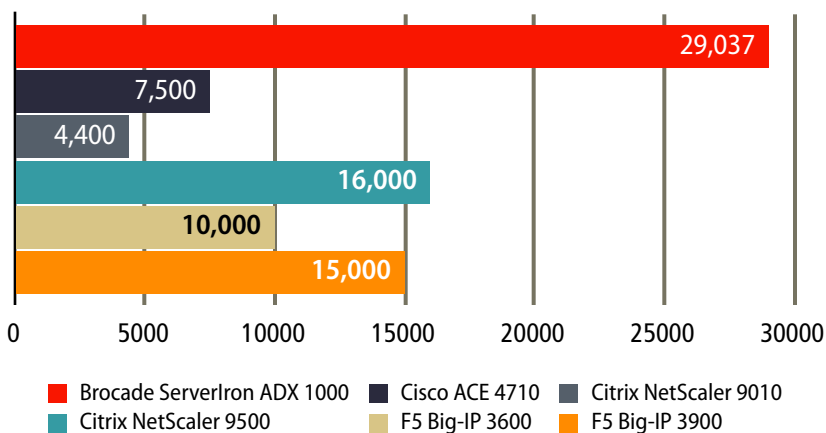
### THE BOTTOM LINE

The Brocade ServerIron ADX 1000 offers:

- 1 Better SSL performance and price/performance than the Cisco, Citrix and F5 switches analyzed
- 2 Nearly 4X the SSL transaction throughput of Cisco's ACE 4710, priced at 30% less than Cisco's offering
- 3 Port connectivity flexibility with 16 Gigabit Ethernet ports and two 10 Gigabit Ethernet ports
- 4 9.4 Gbps of layer 7 throughput - more than twice that of any other switch analyzed
- 5 No impact to layer 7 load balancing throughput while processing SSL traffic flows up to 20,000 SSL TPS

### SSL Transaction Performance

In Transactions per Second



Note: Only Brocade results are Tolly Certified. Other results use vendor-claimed performance figures. Comparison should be considered approximate as the specifics of the competing vendors' tests cannot be determined.

Source: Tolly, December 2009

Figure 1



# Overview & Test Results

Engineers benchmarked the Brocade ServerIron ADX 1000 application switch to determine its SSL transaction capacity. SSL provides dynamic encryption for web browser traffic and is most frequently associated with e-Commerce and increasingly being used for secure web-based applications and services.

The application switch, tested using two 10 Gigabit Ethernet ports (the switch also has 16 GbE ports not used for this test) and built around 4 application processing cores, was subjected to a range of performance tests that included throughput and transaction processing for SSL and unencrypted layer 7 traffic.

Engineers then compared the performance and price of the Brocade offering with the advertised performance of similar devices from Cisco Systems, Citrix Systems and F5 Networks.

## Raw Performance

The Brocade ADX 1000 was able to process just over 29,000 SSL transactions per second, nearly twice that of a fully-licensed NetScaler 9500, its closest competitor, and nearly quadruple the performance of the Cisco ACE 4710. When compared to similar offerings from F5 Networks, the ServerIron ADX 1000 provides 2X to 3X the performance. (See Figures 1 and 5.)

Given that transaction processing is frequently a bottleneck in real networks, the Brocade transaction processing capabilities can provide a significant benefit.

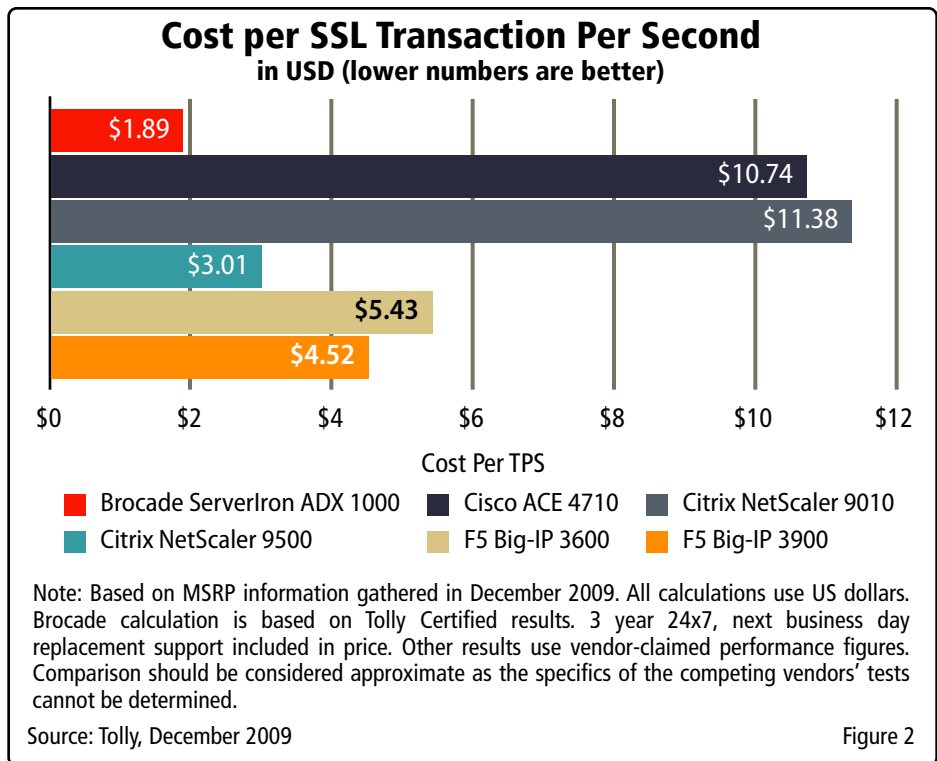
## The Business Impact of SSL Performance

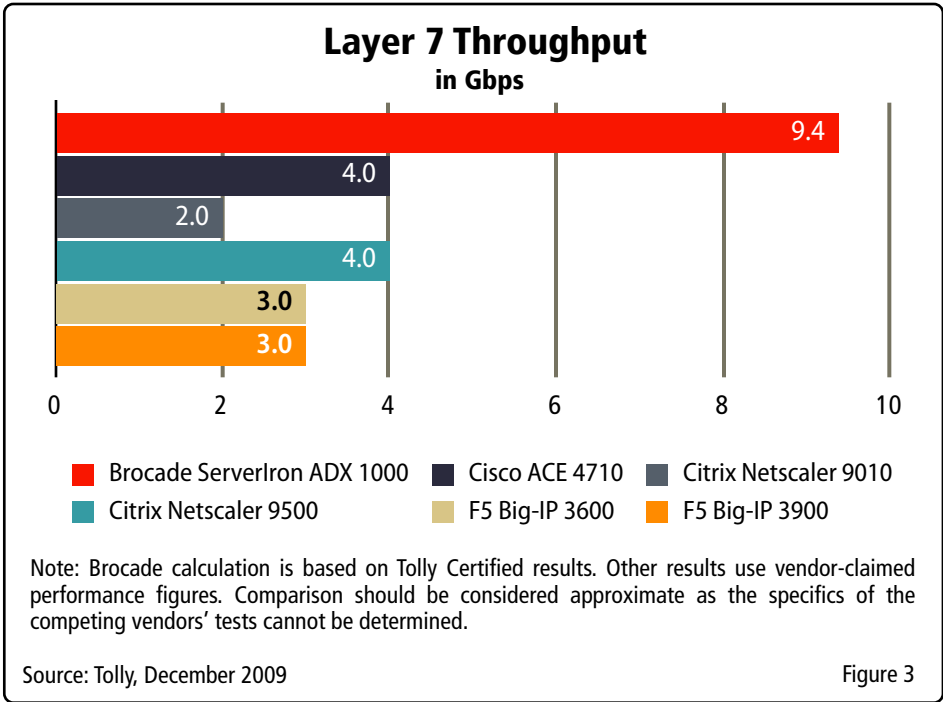
Secure Sockets Layer (SSL) is an essential element of various browser-based communications (from email to e-Commerce) and provides an effective method for securing confidential information or transactions in transit.

This protection is provided by dynamic encryption and decryption of data and these cryptographic functions require processor power. Thus, if application switch infrastructure is not properly sized with adequate SSL acceleration processing capacity, it will slow down the application switch and reduce its capacity to perform other required load balancing and server offload tasks concurrently.

This reduced capacity can manifest itself as longer wait times for users. As an example, it is a generally accepted fact that users quickly become impatient as response time degrades, which can result in users abandoning a shopping cart and/or e-Commerce transaction. These abandoned transactions translate to lost sales for retailers as users simply find the product on a more responsive site.

Thus, it is prudent to seek adequate levels of transaction processing from your infrastructure and deploy application switches with enough SSL offload or acceleration capabilities to ensure sufficient headroom to accommodate peak periods.





The Brocade ServerIron ADX 1000 delivered over 2 Gbps of SSL throughput which places it in the middle of the switches analyzed.

In terms of unencrypted Layer 7 throughput, the ServerIron ADX 1000 outperformed the competition by more than 2X, processing nearly 9.4 Gbps of Layer 7 traffic, compared to the maximum of 4 Gbps offered by the F5 Big-IP 3900 and Cisco ACE 4710. (See Figure 3.)

In addition, the data gathered allowed engineers to use regression analysis to estimate that the switch can process up to 20,000 SSL TPS, without degrading Layer 7 throughput.

### Price/Performance

The Brocade ServerIron ADX 1000 provides the lowest cost per SSL TPS

among the products analyzed, \$1.89 compared to \$3.01 for the NetScaler 9500, and \$10.75 per SSL TPS on the Cisco ACE 4710.

Implementing the ServerIron ADX 1000 also provides for the lowest cost per gigabit per second of layer 7 throughput, at just over \$5,800. Similar competitive offerings cost at least twice this, ranging from \$16,900 for the F5 Big-IP 3900, to \$27,100 for the lower-end Big-IP 3600. (See Figure 4.)<sup>1</sup>


## Test Setup & Methodology

The test bed for this performance evaluation consisted of one Brocade ServerIron ADX 1000 (Model: SI-1216-4), running software version 12.1.00B2, equipped with 16 10/100/1000 Base-T and 2 10GbE XFP ports. Both 10GbE ports

**Brocade Communication Systems, Inc.**

**ServerIron ADX 1000**

**SSL/L7 Switch Performance**



*Tested December 2009*

were connected to a Spirent TestCenter 9000A chassis with two, dual port 10GbE Application Performance Modules. The Gigabit Ethernet ports were not used for testing.

The methodology for this testing complies with version 1.5 of the Tolly Common Test Plan #1077: Application Switch Performance, please reference this document for greater detail on the test scenarios.

### Comparison Caveat

Only the Brocade ServerIron ADX 1000 was tested. Performance results for all other products were gleaned from vendor data sheets and/or other vendor-published data available to the general public.

In many cases, the vendors fail to note the specifics of the tests. For example, where the Tolly test used 1,000-byte objects to quantify SSL transaction performance, it is often unclear what particular object sizes or other parameters were involved for the other vendors.

<sup>1</sup> Although the ServerIron ADX 4000 and 10000 chassis products are not included in this evaluation, for informational purposes their performance, not Tolly Certified, is advertised by Brocade at 114,688 SSL TPS / 6.9Gbps SSL Bulk for the ADX 4000 and 229,376 SSL TPS / 13 Gbps SSL Bulk for the ADX 10000.



Thus, any comparison made herein must, necessarily, be considered approximate and be used only for high-level comparisons. Readers should conduct their own tests to determine the actual performance levels of the non-Brocade products.

To ensure a fair comparison, Tolly engineers researched vendor-published SSL performance evaluations, matching data sheet information to documented test cases in the evaluation, applying similar conditions to the ServerIron ADX 1000 testing.

### SSL Transactions per Second (SSL TPS)

Engineers configured Spirent's Avalanche to generate connections to 7 SSL servers hosted on the ServerIron, using the SSL RC4-MD5 cipher and SSL ID re-use. These simulated users then create as many 1Kbyte object requests as possible. The test results were taken by averaging the maximum sustained TPS over a span of five minutes, repeated for a total of five runs.

### SSL Throughput

Engineers configured Spirent's Avalanche to generate fewer requests, but increased the object response to 1MB, in order to maximize throughput. Engineers averaged the steady-state SSL throughput over a span of five minutes, summing the incoming and outgoing traffic.

### SSL Concurrent Connections

Engineers configured Spirent's Avalanche to open SSL sessions to the ServerIron ADX 1000 continually, stopping only when any new request was denied. The results were checked in two ways, by

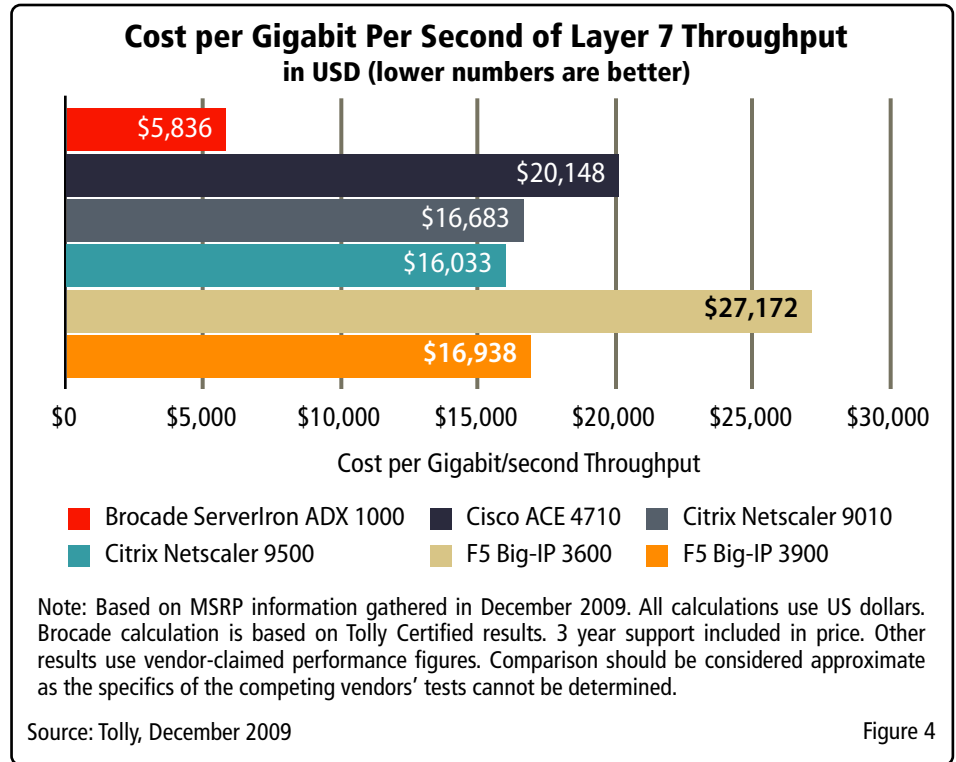


Figure 4

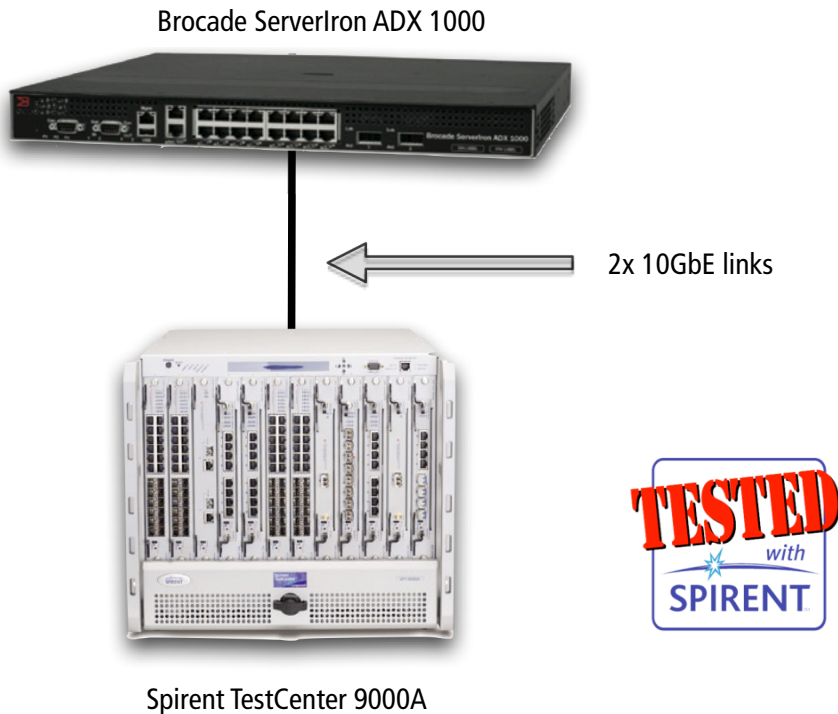
Vendor	Product	SSL TPS	SSL Throughput	Layer 7 Throughput
Brocade	ServerIron ADX 1000	29,037	2.005 Gbps	9.39 Gbps
Cisco Systems	ACE 4710	7,500	1.0 Gbps	4.0 Gbps
Citrix Systems	NetScaler 9010	4,400	500 Mbps	3.0 Gbps
Citrix Systems	NetScaler 9500	16,000	3.0 Gbps	3.0 Gbps
F5 Networks	Big-IP 3600	10,000	2.0 Gbps	2.0 Gbps
F5 Networks	Big-IP 3900	15,000	2.4 Gbps	4.0 Gbps

Note: Only Brocade performance data was certified by Tolly. All non-Brocade data as stated on vendor data sheets.

Source: Tolly, December 2009

Figure 5

### Test Bed Topology



Source: Tolly, December 2009

Figure 6

### Brocade Test Parameter Summary

Variable/Test	SSL TPS	SSL Throughput	L7 Throughput
LAN Topology	2x 10GbE	2x 10GbE	2x 10GbE
Object Size	1Kbyte	1Mbyte	1Mbyte
Application Type	HTTPS	HTTPS	HTTP 1.1
Session Term Procedure	RST	RST	RST
Simulated Clients	400	400	400
Requests per Connection	Unlimited	Unlimited	Unlimited

Source: Tolly, December 2009

Figure 7



The test methodology used for this report relies upon test procedures, metrics and documentation practices as defined by Tolly Common Test Plan, #1077 Application Switch Performance V1.5.

To learn more about Tolly Common Test Plans, go to:

<http://CommonTestPlan.org>

summing the open sessions reported by both the test tool and the DUT.

### SSL TPS & Layer 7 Throughput

To show that you can have both a high amount of SSL TPS and layer 7 throughput, engineers needed to use a different approach to simulate substantial loads of SSL transactions and layer 7 traffic simultaneously. Engineers first went back to the initial SSL TPS test, and scaled it back such that data could be gathered to correlate the CPU utilization on the ServerIron ADX 1000 to the amount of SSL transactions per second.

Once this data was gathered, engineers created a new test configuration which would test the layer 7 throughput and, likewise, incremented the target values to gather CPU data.

With the information, engineers then created equations to find the critical point, at which both metrics would be



### Application Switch Cost Summary In USD (lower numbers are better)

Vendor	Product	MSRP	3 Year Support	Total	Cost per SSL TPS	Cost per Megabit SSL Throughput	Cost Per Megabit Layer 7 Throughput
Brocade	ServerIron ADX 1000	\$40,995	\$13,785	\$54,780	\$1.89	\$27.33	\$5.84
Cisco Systems	ACE 4710	\$57,495	\$23,097	\$80,592	\$10.75	\$80.59	\$20.15
Citrix Systems	NetScaler 9010	\$32,500	\$17,550	\$50,050	\$11.38	\$100.10	\$16.68
Citrix Systems	NetScaler 9500	\$32,500	\$15,600	\$48,100	\$3.01	\$16.03	\$16.03
F5 Networks	Big-IP 3600	\$35,990	\$18,354	\$54,344	\$5.43	\$27.17	\$27.17
F5 Networks	Big-IP 3900	\$45,990	\$21,762	\$67,752	\$4.52	\$28.23	\$16.94

Note: Only Brocade performance data was certified by Tolly. All non-Brocade data as stated on vendor data sheets. See "Comparison Caveat" section elsewhere in this document. MSRP components included: all applicable licenses/upgrades to obtain maximum stated SSL performance, 3 year 24x7 next business day hardware replacement support.

Source: Tolly, December 2009

Figure 8

maximized, while remaining within the ServerIron ADX 1000's CPU constraints.

### Cost Components

To obtain the total cost in the comparisons, product prices were obtained through publicly-available portals, with all applicable upgrades. Support is 24x7, next business day hardware replacement for 3 years.

The Cisco Systems MSRP data was sourced from <http://price.c-group.com.ua/cisco/-0026.html>, the F5 Networks MSRP data was gathered from <http://www.f5.com/pdf/nys/products-nys.pdf>, and the Citrix Systems NetScaler prices were gathered from <http://www.wiat.ru/price/CitrixNSPrice.html>, factoring out sales tax and VAT.

The Brocade ServerIron ADX 1216 was a

model SI-1216-4-SS. The Cisco ACE 4710 includes both the ACE-AP-04-LIC and the ACE-AP-SSL-7K-K9 license. The Citrix NetScaler 9010 and 9500 were models EW3Z0000223 and MW3X0000047, respectively. The F5 Big-IP 3600 was a model F5-BIG-LTM-3600-4G-R, with the additional F5-ADD-BIG-SSL-3600 license, and the Big-IP 3900 was model F5-BIG-LTM-3900-8G-R, with the F5-ADD-BIG-SSL-3900 license.



## About Tolly...

The Tolly Group companies have been delivering world-class IT services for over two decades. Tolly is a leading global provider of third-party validation services for vendors of IT products, components and services.

You can reach the company via E-mail at [sales@tolly.com](mailto:sales@tolly.com), or via telephone at +1 561.391.5610.

Visit Tolly on the Internet at:  
<http://www.tolly.com>

## Competitive Information

For competing products, Tolly used vendor-advertised performance claims available to the general public. The claims therein were not certified by Tolly.



Pricing as of December, 2009 excluding taxes.  
Pricing for competing products as found on public distributor portals.

For more information on the Tolly Fair Testing Charter, visit:  
<http://www.tolly.com/FTC.aspx>

## Terms of Usage

This document is provided, free-of-charge, to help you understand whether a given product, technology or service merits additional investigation for your particular needs. Any decision to purchase a product must be based on your own assessment of suitability based on your needs. The document should never be used as a substitute for advice from a qualified IT or business professional. This evaluation was focused on illustrating specific features and/or performance of the product(s) and was conducted under controlled, laboratory conditions. Certain tests may have been tailored to reflect performance under ideal conditions; performance may vary under real-world conditions. Users should run tests based on their own real-world scenarios to validate performance for their own networks.

Reasonable efforts were made to ensure the accuracy of the data contained herein but errors and/or oversights can occur. The test/audit documented herein may also rely on various test tools the accuracy of which is beyond our control. Furthermore, the document relies on certain representations by the sponsor that are beyond our control to verify. Among these is that the software/hardware tested is production or production track and is, or will be, available in equivalent or better form to commercial customers. Accordingly, this document is provided "as is", and Tolly Enterprises, LLC (Tolly) gives no warranty, representation or undertaking, whether express or implied, and accepts no legal responsibility, whether direct or indirect, for the accuracy, completeness, usefulness or suitability of any information contained herein. By reviewing this document, you agree that your use of any information contained herein is at your own risk, and you accept all risks and responsibility for losses, damages, costs and other consequences resulting directly or indirectly from any information or material available on it. Tolly is not responsible for, and you agree to hold Tolly and its related affiliates harmless from any loss, harm, injury or damage resulting from or arising out of your use of or reliance on any of the information provided herein.

Tolly makes no claim as to whether any product or company described herein is suitable for investment. You should obtain your own independent professional advice, whether legal, accounting or otherwise, before proceeding with any investment or project related to any information, products or companies described herein. When foreign translations exist, the English document is considered authoritative. To assure accuracy, only use documents downloaded directly from Tolly.com.

No part of any document may be reproduced, in whole or in part, without the specific written permission of Tolly. All trademarks used in the document are owned by their respective owners. You agree not to use any trademark in or as the whole or part of your own trademarks in connection with any activities, products or services which are not ours, or in a manner which may be confusing, misleading or deceptive or in a manner that disparages us or our information, projects or developments.