

# Nokia Enterprise Solutions

## Nokia IP2250 Security Platform

### Competitive Performance Evaluation versus Juniper Networks NetScreen-5400



Test  
Summary

*Premise: High-end security appliances that roughly share the same price points also should offer comparable performance when it comes to throughput, session rate and connections supported under real-world traffic loads.*

Nokia Enterprise Solutions commissioned The Tolly Group to evaluate its Nokia IP2250 Security Platform, a diskless, network processor-based platform that runs the Check Point VPN-1Pro NG with Application Intelligence firewall. Nokia says the Nokia IP2250 is designed to support up to 800,000 firewall connections and to deliver up to 7.5 Gbps of firewall throughput for large-sized packets.

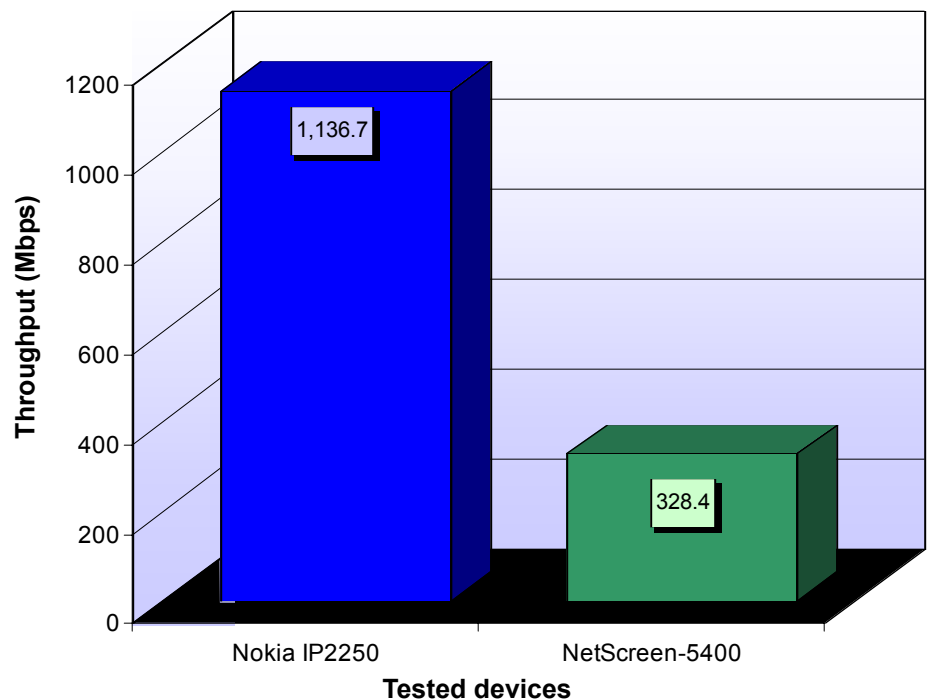
The Tolly Group tested the Nokia IP2250 in a number of areas, including firewall throughput using various packet sizes ranging from the taxing 64-byte packets to 1,518-byte packets; per-second session rate, as well as throughput and TCP connection rate in a mixed object size HTTP traffic-load environment.

Nokia requested The Tolly Group to measure the performance of the Nokia IP2250 against the NetScreen-5400. According to its Fair Testing Charter, The Tolly Group contacted Juniper Networks and invited the company to

### Test Highlights

- Achieves 3.4X more transactions and 3.4X greater throughput than the NetScreen-5400 when handling HTTP traffic of mixed object sizes
- Delivers up to twice the firewall throughput of the NetScreen-5400 when tested with packet sizes ranging from 64 bytes to 1,518 bytes
- Supports almost 5X the number of TCP sessions set up on a per-second basis than delivered by the NetScreen-5400

Mixed Object Size HTTP Traffic Throughput as Reported by Spirent Avalanche



Source: The Tolly Group, October 2004

Figure 1

test. Executives from Juniper accepted the invitation to participate. For a greater understanding of the interaction between The Tolly Group and Juniper, see the section marked Equipment Acquisition and Support in this report.

Test results show that the Nokia IP2250 outperformed the NetScreen-5400 in every test, offering more than three times the mixed object size HTTP traffic throughput, up to twice the firewall throughput, and nearly five times the connection rate of the NetScreen-5400. Tests were conducted from August to October 2004.

## RESULTS

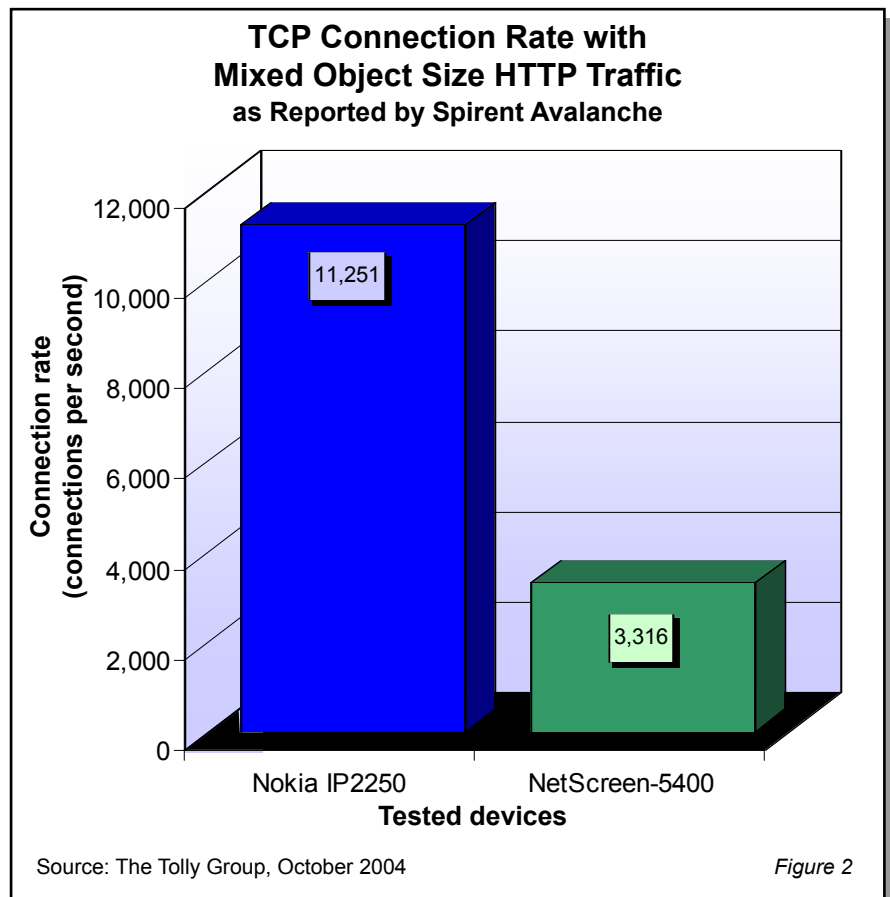
### MIXED OBJECT SIZE HTTP TRAFFIC PERFORMANCE

HTTP traffic loads consisting of mixed-sized objects more closely approximate real-world Internet traffic loads than just single object size traffic loads.

Here, Tolly Group engineers measured the maximum connections/sec and throughput of both tested devices for the same mixed object size traffic load created by Spirent's Avalanche and Reflector.

From a throughput perspective, the Nokia IP2250 offered an average throughput of 1.1 Gbps, which was 3.4 times greater than the 328.4 Mbps average offered by the NetScreen-5400. (See Figure 1.)

In terms of the TCP transaction/connection rate, the Nokia IP2250 sustained 11,251 connections/second, or 3.4 times greater



than the 3,316 connection/second achieved by the NetScreen-5400. (See Figure 2.)

### FIREWALL THROUGHPUT

Tolly Group engineers used Spirent's SmartFlow to measure the bidirectional zero-loss ( $\leq 0.0019\%$ ) Gigabit Ethernet throughput across a firewall configured with 100 rules, eight GBIC ports and supporting frame sizes of 64, 512 and 1,518 bytes.

When handling 1,518-byte frames, the Nokia IP2250 achieved almost twice as much zero-loss throughput than the NetScreen-5400 – 7.7 Gbps versus 4.1 Gbps, respectively. Likewise, the Nokia IP2250 offered more than double the throughput of the NetScreen-5400 when tested with 512-byte

frames; there the Nokia IP2250 achieved 7.3 Gbps versus 3.7 Gbps for the NetScreen firewall. (See Figure 3.)

When handling taxing 64-byte frames, the Nokia IP2250 delivered 2.2 Gbps of bidirectional, zero-loss throughput, which was 10% greater than the 2 Gbps delivered by the NetScreen-5400.

### TCP SESSION RATE

Engineers measured the maximum TCP session rate ( $\leq 1\%$  unsuccessful TCP connections) using Spirent's WebSuite for a firewall configuration of 100 firewall rules. Here, a TCP session constituted a TCP connection that is created using the sequence of SYN, SYN-ACK and ACK packets and then immediately closed using a standard three-way TCP

close (FIN, FIN-ACK and ACK). The rate at which TCP sessions were made and closed was varied to determine the actual session rate for a given device under test (DUT.)

Tests show that the Nokia IP2250 sustained 32,900 successful TCP sessions per second, or almost five times the session rate of 6,920 TCP sessions/second handled by the NetScreen-5400. (See Figure 4.)

## ANALYSIS

The Nokia IP2250 and the NetScreen-5400 represent high-end security appliances that are priced comparably. It is reasonable, then, that they offer comparable performance for throughput, session rate and connections supported under real-world traffic loads. But they do not.

Testing shows that there are considerable differences in performance between the Nokia IP2250 and the Juniper NetScreen-5400.

In mixed object size HTTP traffic performance tests, where the tested devices were exposed to a mix of HTTP traffic with different object sizes that are more reflective of real-world-type traffic, the Nokia IP2250 delivered 3.4 times the throughput and connection rate when compared to the NetScreen-5400. Thirdly, the Nokia IP2250 demonstrated it could sustain nearly five times the number of TCP sessions than the NetScreen-5400.

On the firewall throughput side, the Nokia IP2250 outperformed the NetScreen-5400 in each of three frame-size scenarios and proved that it delivers double the performance of the Juniper fire-

wall when tested at 512-byte and 1,518-byte frame sizes.

Considering that there is not a huge chasm in the pricing spread of the devices, users will be able to wring greater performance, and ultimately greater ROI, from the Nokia IP2250.

## TEST CONFIGURATION AND METHODOLOGY

For performance tests, The Tolly Group tested a Nokia IP2250 outfitted with four interface modules with 8 Mini GBIC ports. The Nokia IP2250 was running Nokia IPSO Release: 3.8-Build 039 and Check Point VPN-1 Pro NG with Application Intelligence R55. The Tolly Group also tested a Juniper Networks NetScreen-5400 supporting hardware version 3010(0), firmware version: 5.0.0r.7.0. The NetScreen-5400 was equipped with one 5000-M and one 5000-8G module.

For the mixed object size HTTP traffic performance test, engineers employed Spirent Communications' Avalanche Network Edition application with Avalanche 2500 and Reflector 2500 chassis. The test script was created to simulate a real-world Internet traffic scenario of multiple client-server HTTP transactions with different object sizes. The DUT was stressed to determine the maximum performance capability by changing the load profile.

Tolly Group engineers configured the tested devices with 100 firewall rules (with the 100th rule passing the test traffic), with NAT disabled, and appropriate IP addresses for the interfaces. They next connected the Avalanche

**Nokia Enterprise Solutions**

**Nokia IP2250**

**Firewall and VPN Performance**

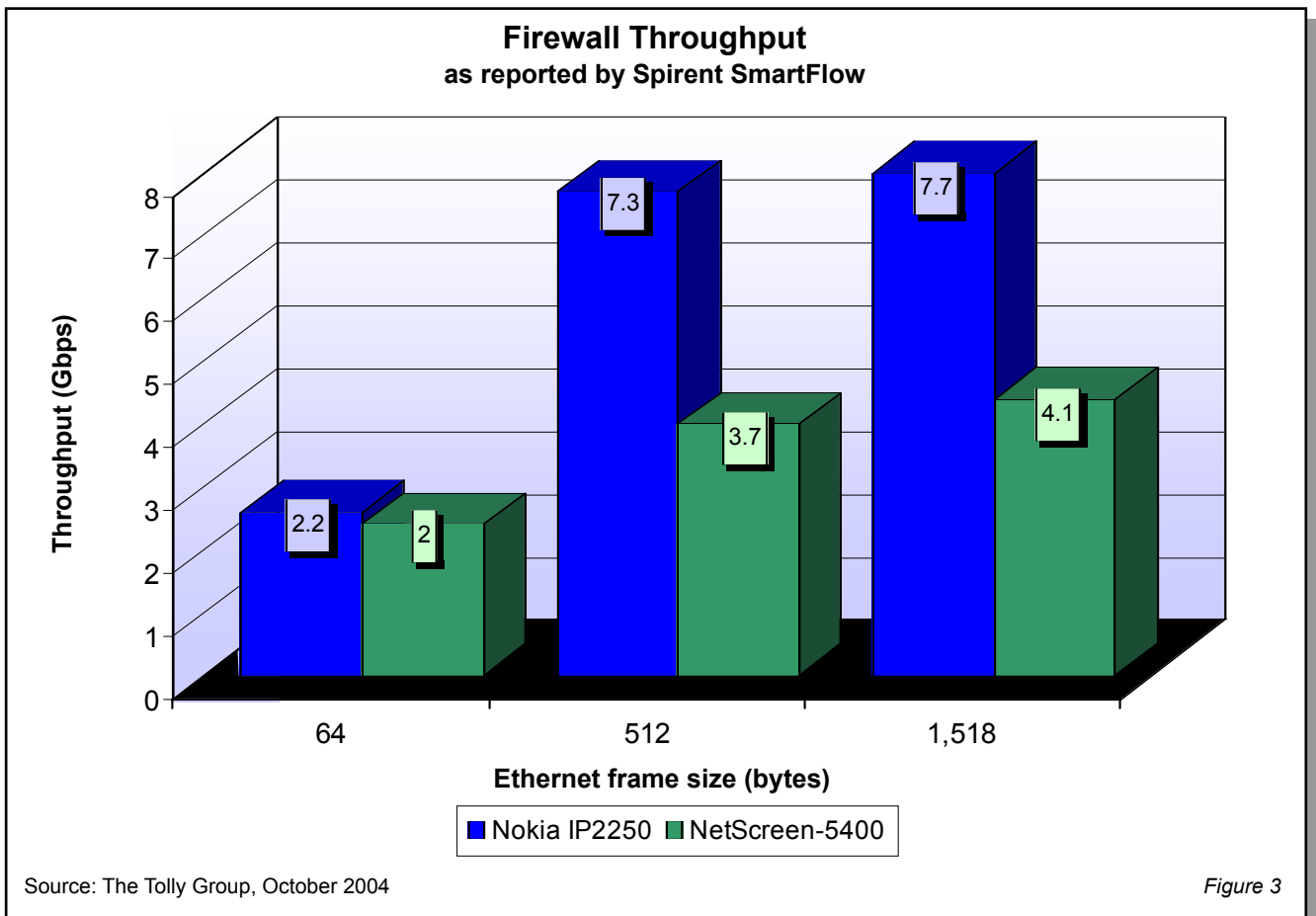


### Nokia Enterprise Solutions Nokia IP2250 Product Specifications\*

- Network processor-based system with "Accelerated Data Path" technology providing high performance for the most demanding perimeter and internal security locations
- Runs Check Point VPN-1 Pro NG with Application Intelligence firewall application, providing best-of-breed protection against the latest network and application attacks
- Built-in hot swap interface cards, load-sharing dual power supplies and fans and diskless operation provide carrier-class reliability
- Industry standard VRRP with full state synch for high availability. Optional VPN acceleration card for high speed VPN throughput
- Four expansion slots support up to 36 10/100 Ethernet/Fast Ethernet ports or up to eight 1000-Mbps Gigabit Ethernet ports
- Includes IPv6 and a full suite of dynamic (RIP, RIPv2, OSPF, BGP) and multicast (IGMP, PIM-SM, PIM-DM) routing protocols
- Delivered with Check Point VPN-1 Pro NG with Application Intelligence pre-installed
- Nokia Network Voyager and Nokia command line interface for single appliance management, or Nokia Horizon Manager for multiple appliance management
- Support for SNMP, SNMPv2, SNMPv3

**For more information contact your authorized Nokia representative**  
URL: <http://www.nokiaforbusiness.com>

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



and Reflector test tools to the target test device. Engineers used the Avalanche Commander console to connect to these devices and configured the test script. The test script was configured to provide the client side with eight total subnets with 254 IP addresses in each. The server was configured to provide object sizes of 27,699, 10,716, 1,526, 2,169, 64,460, 278, 613, 3,449, 972, 243, 43, 28,702, 1,162, 1,952, and 1,635 bytes. The test used HTTP 1.0 with no keep-alive packet. The load profile was set to provide 80 sessions at the steady phase of the test. The load profile of the test script was optimized to obtain the maximum performance of the tested device. The result file generated by the Avalanche Commander was analyzed to deduce the average value

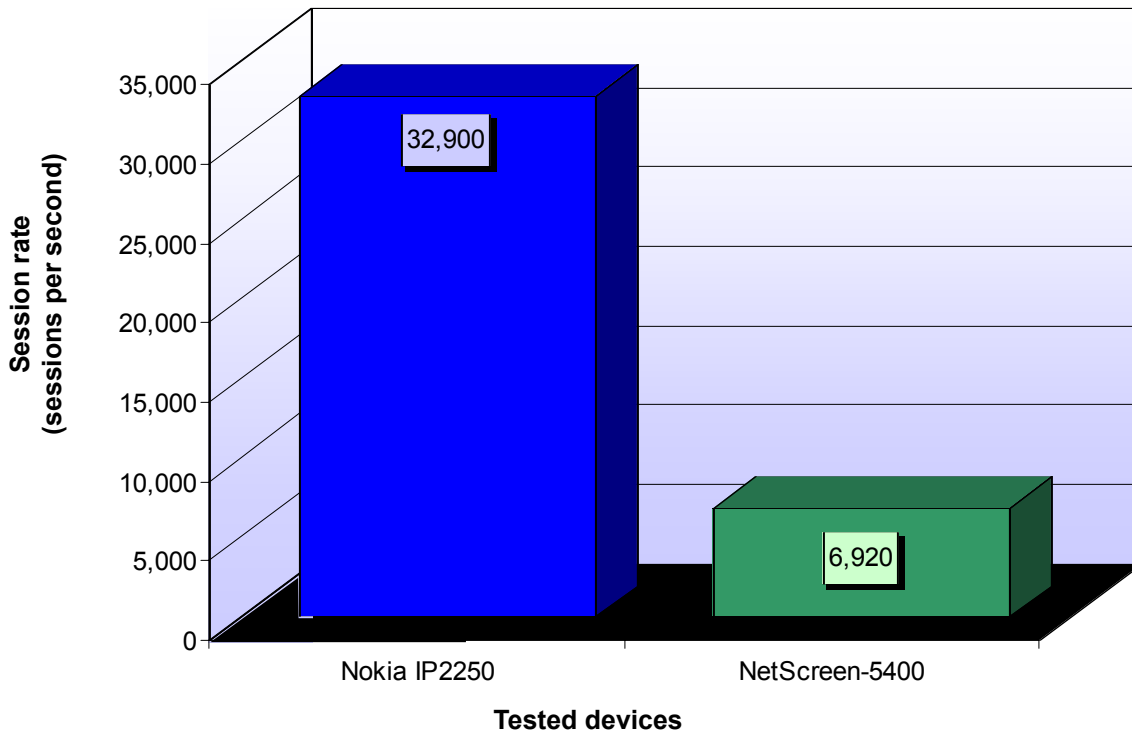
of successful connections per second during the steady phase of the test. This value was reported as the connection rate performance number of the tested device. The total traffic rate processed by the tested device during the steady phase of the test was (traffic handled by the clients and the servers together) reported as the throughput result.

For firewall throughput tests, both devices were configured to support 100 rules, with the NetScreen-5400 supporting the rules on Trust-to-Untrust and Untrust-to-Trust zones. The DUT was configured so the 100th rule passed the test traffic, with NAT disabled, and appropriate IP addresses for the interfaces. SmartBits/SmartFlow was connected and configured to execute

the test at the appropriate load, ranging from frame sizes of 64, 512, and 1,518 bytes for a 60-second test duration. Engineers used the binary search algorithm of SmartFlow to determine the maximum zero-loss ( $\leq 0.0019\%$ ) throughput. They recorded the throughput as the Layer 2 received bps reported by SmartFlow. The test was repeated twice more and the results were averaged.

For the TCP session-rate test, engineers utilized a SmartBits Chassis, SMB 6000B equipped with LAN-3327A TeraMetrics modules and WebSuite console. The tested device was configured with 100 firewall rules (with the 100th rule passing the test traffic), with NAT disabled, and appropriate IP addresses for the interfaces. SmartBits/WebSuite

### TCP Session Rate as reported by Spirent WebSuite



Source: The Tolly Group, October 2004

Figure 4

was connected and configured to execute the test at the appropriate settings of connection request rates, total TCP connections of 100,000 iterations. The benchmarking criteria used in this test was  $\leq 1\%$  unsuccessful TCP connections. Each connection needed to be established using SYN, SYN-ACK and ACK packets and closed using a standard three-way close (FIN, FIN-ACK and ACK packets) for a successful session. Engineers recorded the maximum connection request rate corresponding to 99% or above successful TCP sessions.

#### EQUIPMENT ACQUISITION AND SUPPORT

The Juniper Networks NetScreen-5400 was acquired through normal product distribution channels. The

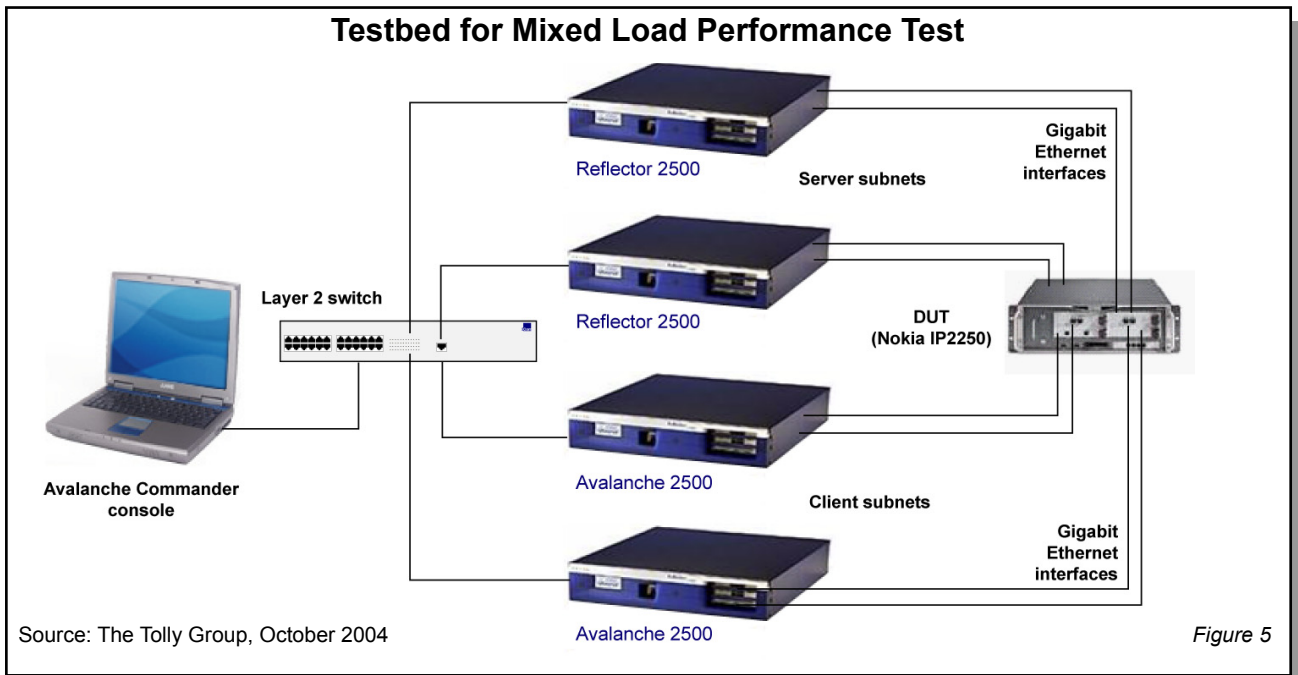
Tolly Group contacted executives at Juniper Networks and invited them to provide a higher level of support than available through normal channels.

Juniper Networks responded positively to our invitation to participate in these tests. The test results were shared with the Juniper Networks team for review. There was no specific technical support required from Juniper for this project, but the company provided us feedback on the test results. The Juniper team suggested using a specific port-pairing scheme for the firewall throughput test, and this indeed resulted in an improved performance of the NetScreen-5400.

Juniper Networks did dispute the test results of TCP session

rate and mixed object size HTTP traffic performance. After the review of the configuration and results files, Juniper opted not to pursue the matter further. A company spokesman could not provide any explanation as to why the performance reported for the NetScreen-5400 was lower than the vendor expected; the company ventured that the variance could be related to an issue with the test tool, or a combination of the test tool and the device together.



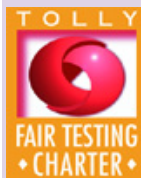


The Tolly Group gratefully acknowledges the providers of test equipment used in this project.

Vendor	Product	Web address
Spirent Communications	SMB6000B/LAN-3327A	<a href="http://www.spirentcom.com">http://www.spirentcom.com</a>
Spirent Communications	SmartFlow v.4.0	<a href="http://www.spirentcom.com">http://www.spirentcom.com</a>
Spirent Communications	Avalanche Network Edition v.6.23	<a href="http://www.spirentcom.com">http://www.spirentcom.com</a>
Spirent Communications	WebSuite Ver 2.6	<a href="http://www.spirentcom.com">http://www.spirentcom.com</a>

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For info on the Fair Testing Charter, visit: <http://www.tolly.com/Corporate/FTC.aspx>

## PROJECT PROFILE

**Sponsor:** Nokia Enterprise Solutions

**Document number:** 204150

**Product class:** Security appliance

**Products under test:**

- Nokia IP2250 SW ver. 3.8-Build 039
- Juniper Networks NetScreen-5400 SW ver. 5.0.0r.7.0

**Testing window:** August to October, 2004

**Software status:**

- Generally available

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