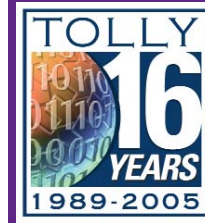


Nortel

VPN Gateway 3070

SSL VPN Throughput, Scalability and Voice Quality Benchmark Evaluation



Test
Summary

Premise: Not all virtual private network (VPN) gateways are the same. With the emergence of VPN gateways that support the Secure Sockets Layer protocol, users now must examine the SSL capabilities of any gateway alongside the capabilities such a device offers to support more traditional IPSec security. Device throughput and scalability have always been important to enterprise buyers, but now with convergence, the ability to support toll-quality voice is a critical factor as well.

Nortel commissioned The Tolly Group to evaluate the Nortel VPN Gateway 3070, an enterprise-class device that combines support for IPSec and SSL VPNs into a single device.

Tolly Group engineers benchmarked the throughput of the Nortel VPN Gateway 3070, examined the limits of the device's scalability and identified the extent of voice quality supported by the gateway. Testing was performed at The Tolly Group's Boca Raton, FL., facilities in March 2005.

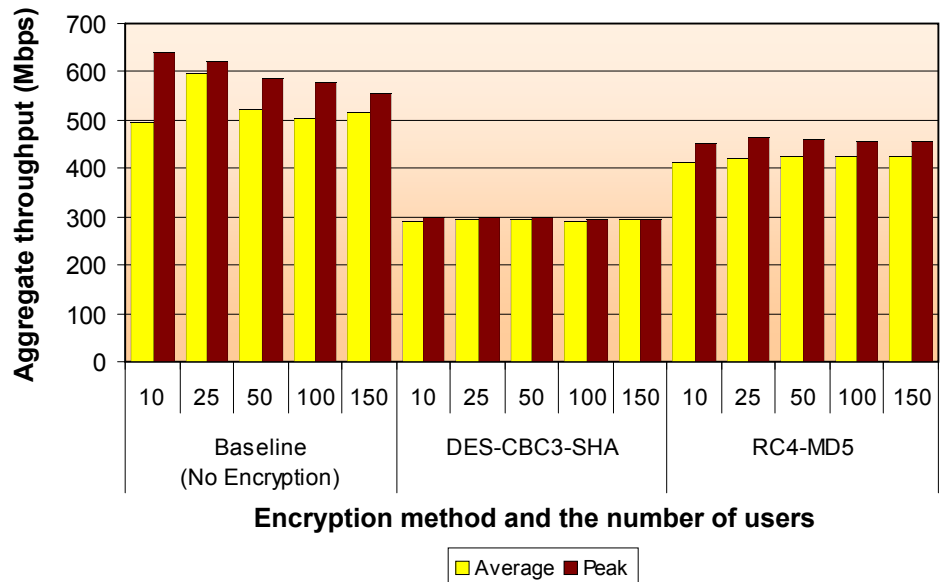
Tests show that the Nortel VPN Gateway 3070 delivers consistent throughput when tested across work-groups scaling from 10 users, to 5,000 users. Scalability tests show

Test Highlights

- Provides steady-state SSL throughput of 600 Mbps, 422 Mbps and 295 Mbps for no encryption, RC4-MD5 and DES-CBC3-SHA encryption respectively during the 25-user test
- Delivers consistently high 3DES VPN throughput even under heavily loaded conditions (5,000 concurrent users)
- Sustains over 2,400 steady-state transactions per second for RC4-MD5 encryption and more than 2,200 tps when supporting DES-CBC3-SHA encryption
- Delivers toll-quality VoIP (via SIP) while securing the media (voice) and signaling call path

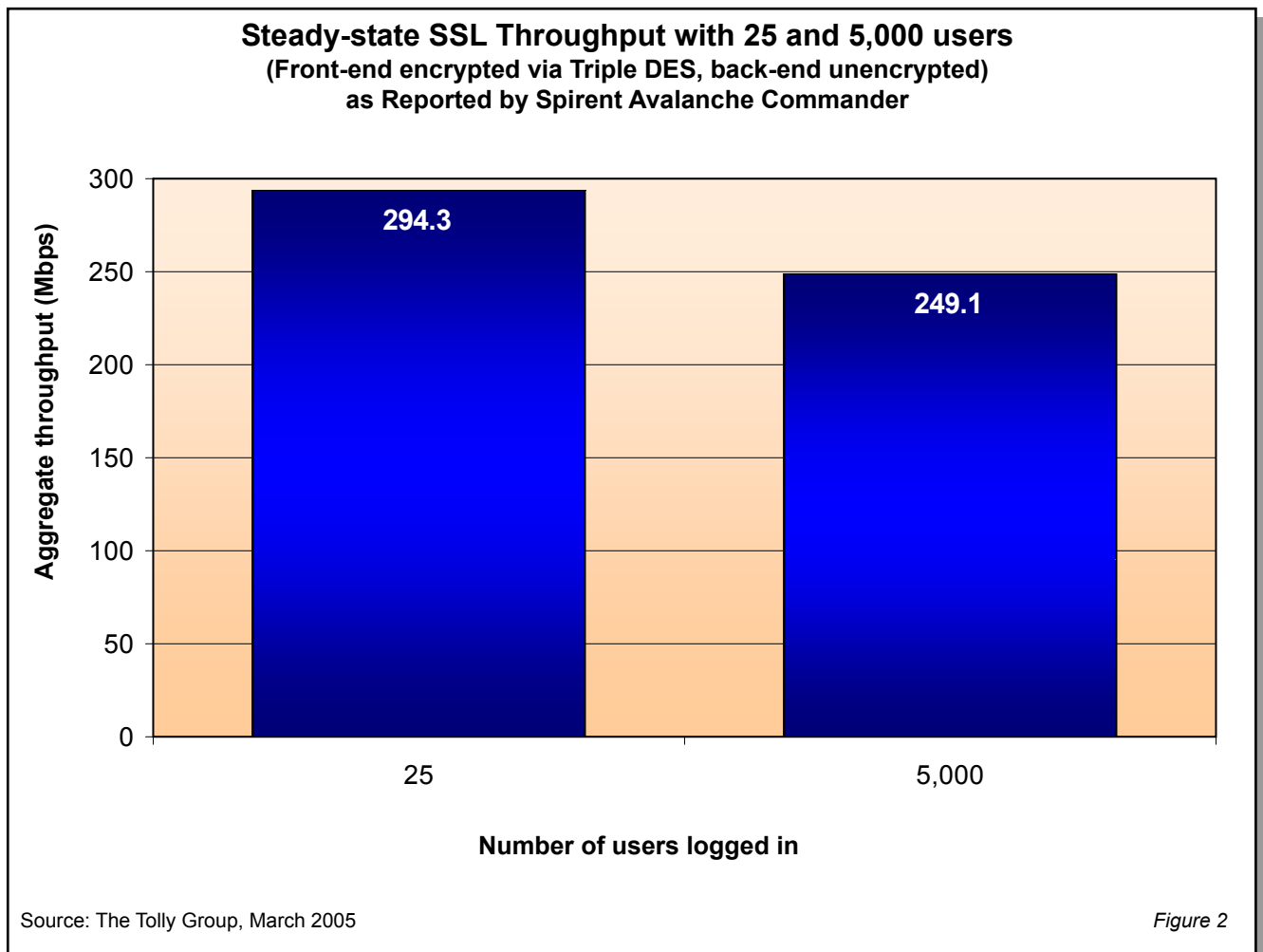
Steady-state SSL VPN Throughput under Variable User Scenarios

(Front-end encrypted, back-end unencrypted)
as Reported by Spirent Avalanche Commander



Source: The Tolly Group, March 2005

Figure 1



that even as the number of users scales to 5,000, the device does not sacrifice significant throughput. Finally, the Nortel VPN Gateway 3070 yielded toll-quality voice during tests focusing on voice quality.

Tolly Group engineers also examined the SSL VPN functionality of the Nortel VPN Gateway 3070 and came away impressed with the application access, end-point security, access controls, overall VPN scalability and Nortel's ability to support secure real-time multimedia and VoIP services over SSL VPN.

RESULTS

THROUGHPUT

Tolly Group engineers put the Nortel VPN Gateway 3070 through a variety of user scenarios, starting at 10 VPN users and scaling all the way up to 5,000 users. In every case, engineers examined throughput with varying levels of encryption ciphers – RC4-MD5 encryption (the de facto encryption algorithm used in Microsoft Windows environments when Internet Explorer is launched) and the more complex DES-CBC3-SHA (Triple DES).

Even as the number of concurrent users increased during tests,

the amount of aggregate throughput delivered remained near constant, an indicator that the Nortel VPN Gateway 3070 has plenty of headroom to deliver ample bandwidth. Test after test shows the VPN Gateway 3070 achieves throughput of at least 300 Mbps while under SSL VPN tunnel loads. (See Figure 1.)

When tested with the more taxing DES-CBC3-SHA (Triple DES) encryption, the Nortel gateway delivered 294 Mbps at 25 users and 249 Mbps with 5,000 users. (See Figure 2.) This demonstrates that even as the number of users scale, the Nortel VPN Gateway 3070 still delivers plenty of bandwidth for campus

and WAN networks. In effect, the message is that the VPN Gateway 3070 will not be a bottleneck to network applications.

TRANSACTION RATE

Engineers measured the steady-state transaction per second rate of the VPN Gateway 3070 (front-end encrypted, back-end unencrypted) and determined that the device can handle 2,413 tps when using RC4-MD5 encryption and 2,248 tps when using Triple DES encryption. (See Figure 3.)

VOICE QUALITY OVER SSL VPNS

Tolly Group engineers tested the voice quality across SSL VPN connections supported by the Nortel VPN Gateway 3070 and found that voice quality levels are fine. In fact, in tests that measured voice call quality on calls that originated from a SIP-based soft phone (the Java-based Nortel Multimedia Web Client) and then traveled over secure VPN connections to the PSTN, the Nortel VPN Gateway 3070 delivered toll-quality voice.

The Tolly Group used the Perceptual Evaluation Speech Quality (PESQ) metric to measure voice quality; PESQ scores voice on a scale of -1 to 4.5, with toll-quality scores considered to be within a range from 3.8 to 4.5. In each of the SSL VPN instances tested under the SIP-to-PSTN scenario, the Nortel VPN Gateway 3170 delivered toll-quality scores of 4.01 or higher using a G.711u codec with no compression. (See Figure 4.)

The upshot here is that the Nortel VPN Gateway 3070 does support IP-based phone calls over SSL VPN connections without sacrificing toll quality.

SSL VPN FUNCTIONALITY

Performance testing of the Nortel VPN Gateway 3070 is a subset of a broader evaluation of the Nortel device that is chronicled extensively in a 24-page white paper, "Building a World-Class VPN Solution to Meet Today's Needs – and Tomorrow's," Tolly Group Document #205103 available for free at <http://www.tolly.com>. The white paper provides extensive details concerning the SSL functionality evaluated by Tolly Group personnel, which is far too detailed for accurate presentation in this report. Moreover, the white paper provides a total cost-of-ownership assessment of how the Nortel VPN Gateway 3070 stacks up against other VPN gateways that purely support SSL.

SCALABILITY

Tolly Group engineers examined the scalability of IPSec/SSL VPNS on the Nortel VPN Gateway 3070. Engineers determined that the Nortel VPN Gateway 3070 can support up to 5,000 IPSec or SSL VPN users simultaneously in any blended combination. Tests did show that the 3070 could support 2,500 SSL VPN users and 2,500 IPSec VPN users simultaneously.

Nortel

VPN Gateway 3070

**Throughput,
Scalability and
Voice Quality**



Nortel VPN Gateway 3070 Product Specifications*

- Deployment: Large enterprises and service providers
- 5,000 maximum concurrent VPN session
- CPU: (1) Intel Xeon 2.8 GHz
- Memory: 2-Gbyte DDR 266 MHz
- On-board LANs: (2) 10/100/1000-TX
- Expansion: (1) Dual 10/100/1000-TX or -FX (fiber)

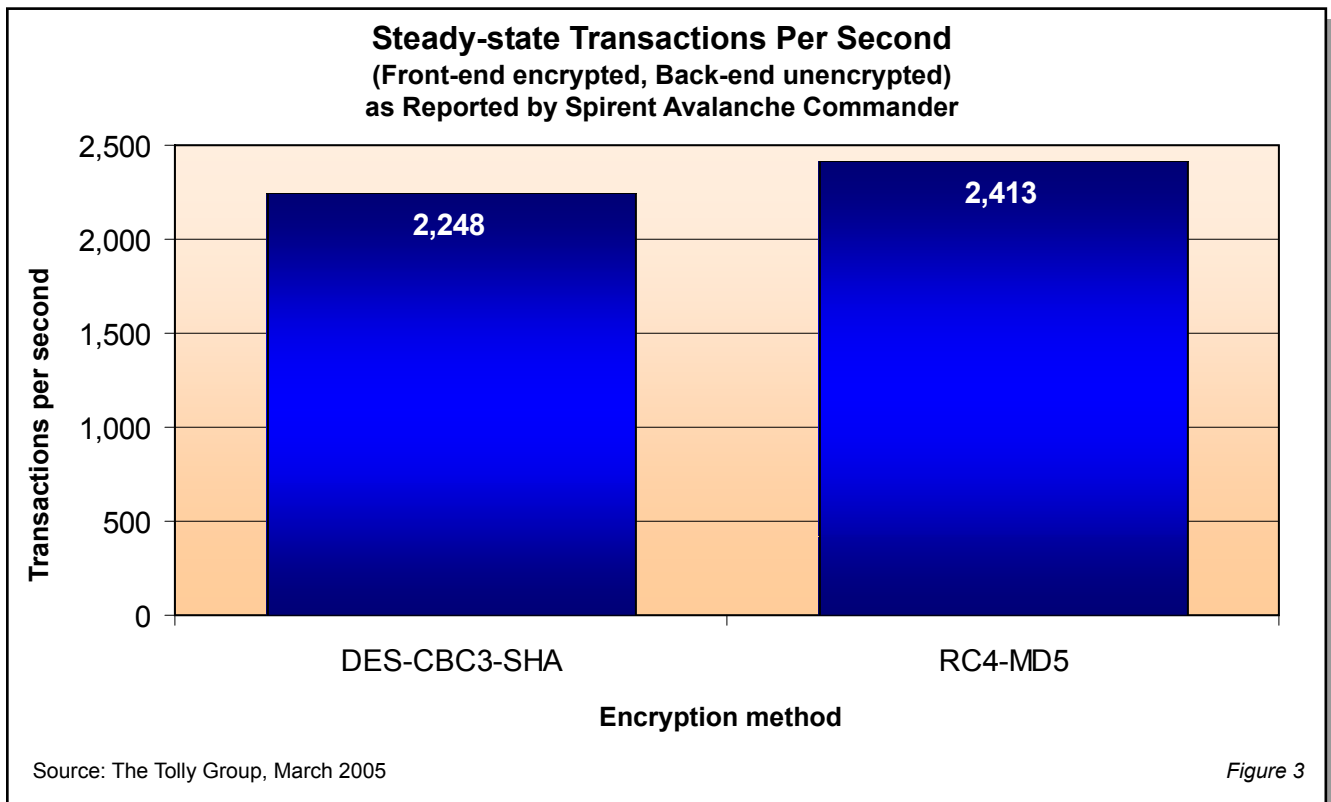
Nortel VPN Gateway 3050 Product Specifications*

- Deployment: Medium to large enterprises
- 2,000 maximum concurrent VPN session
- CPU: (1) Intel Pentium 4 2.4 GHz
- Memory: 1-Gbyte DDR 266 MHz
- On-board LANs: (2) 10/100/1000-TX
- Expansion: (1) Dual 10/100/1000-TX

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



ANALYSIS

With the emergence of SSL VPNs, enterprise users need to determine how best to integrate the new technology alongside existing IPsec VPN gateways. The vast majority of SSL VPNs offer point-specific solutions, meaning their gateways support SSL VPNs only. This has enormous implications for management and for TCO.

The Nortel gateway integrates support for both SSL and IPsec VPN on a common security appliance. This integration allows enterprises to deploy a common VPN solution – rather than having to deploy and “manage multiple VPN devices as they transition to SSL VPN access.

Many enterprise that will continue using traditional IPsec-based access for the foreseeable future can protect their existing IPsec investment while they migrate to SSL VPN access at their own pace - as it makes sense for their business.

Enterprise network managers also must consider the scalability and performance of a solution and Nortel has an excellent story there, too. Tolly Group tests show that the Nortel VPN Gateway 3070 scales to 5,000 users per gateway while maintaining throughput that is comparable to workgroups of fewer than 100 users. Throughput is consistently high across the user scenarios tested. And Nortel integrates clustering support, traffic management and SSL acceleration/offload capabilities into its packaged solution – not as extra-cost options.

Other products either require multiple devices to scale to the same level as Nortel, or do not deliver enterprise-class scalability. Nortel's approach to SSL VPNs shows that it respects the investments enterprises have made in IPsec, and further that the company understands that IPsec VPNs will be around for quite some time.

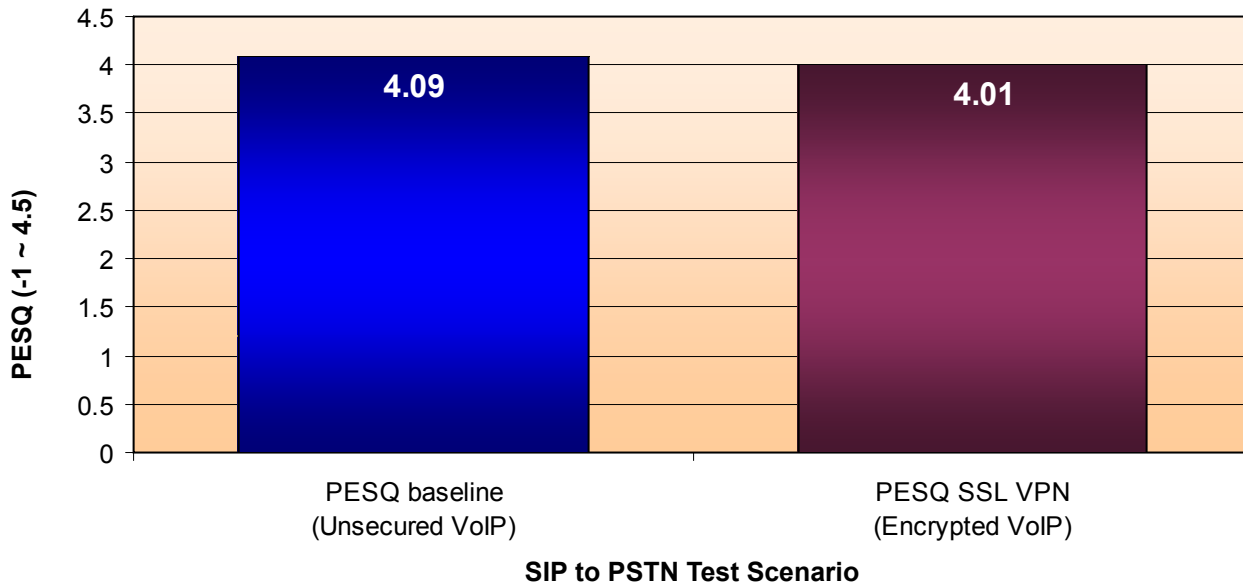
TEST

CONFIGURATION AND METHODOLOGY

For performance tests, The Tolly Group tested a Nortel VPN Gateway 3070 version SSL-5.0.3.

The Nortel VPN Gateway 3070 came configured with four Gigabit Ethernet ports. Two of those ports were used for all tests. Engineers modified the default configuration such that the Nortel VPN Gateway 3070

Voice Quality Measurements on SSL VPN Networks
as Reported by Agilent Voice Quality Tester
(Higher PESQ numbers are better)



Source: The Tolly Group, March 2005

Figure 4

distributed the HTTP and HTTPS requests to five HTTP servers on the back end.

In the test bed, the Nortel VPN Gateway 3070 was connected to a pair of Spirent Communications Avalanche 2500C and Reflector 2500C units, which, in turn, were connected to an Avalanche management console running Avalanche Commander 6.51 via an out-of-band management interface.

In the baseline throughput test (no encryption), engineers configured the Avalanche to generate the HTTP requests to the Nortel VPN Gateway 3070. The Nortel VPN Gateway 3070 redirected and load-balanced the traffic to five backend HTTP servers. Engineers also configured the Avalanche to set up the user sessions such that one user attempted to retrieve five HTTP pages (512-Kbyte HTTP page size). Users sessions tested

were 10, 25, 50, 100 and 150 sessions. Engineers recorded the average throughput during the five-minute steady state without any failed transactions.

For the SSL throughput performance test, engineers configured the Avalanche to generate the encrypted or secure HTTP (HTTPS) requests to the Nortel VPN Gateway 3070. The Nortel VPN Gateway 3070 decrypted the packets and distribute to the five backend servers. The response from the servers was also encrypted in between the Avalanche (emulates the SSL clients) and the Nortel VPN Gateway 3070. The engineers used the DES-CBC3-SHA and RC4-MD5 for the encryption and hashing method.

For the SSL throughput test with the maximum users, engineers configured the Avalanche to create the 5,000 user sessions and

have these users logged in to the Nortel VPN Gateway 3070. After all 5,000 users successfully logged in, the Avalanche started generating HTTPS requests to the Nortel VPN Gateway 3070. This test only used the DES-CBC3-SHA encryption algorithm. During the test, engineers checked the real-time statistics of the Nortel VPN Gateway 3070 to verify that the 5,000 users actually logged in via the gateway. Other than these, the test procedure was same as the baseline test above.

For the voice quality over SSL VPN test, engineers performed two different test scenarios. One was a baseline voice quality test without SSL VPN, and for the other, engineers placed the Nortel VPN Gateway 3070 in front of a Nortel corporate network. For both tests, the same voice path was used for more accurate comparison. The Nortel

Web client (SIP soft phone) called to an analog telephone across the Internet and PSTN. An Agilent Voice Quality Tester acted as the analog telephone, sent the audio to the endpoint on the other side (tested both directions, one at a time) and measured the PESQ scores. A G.711u codec was used for this test. The test was run seven iterations using four different voice samples, first transmitting from the soft phone to the analog

telephone and then repeated by running from the analog telephone to the soft phone. Engineers recorded PESQ scores from all scenarios and averaged them.

For the Scalability test, engineers used the scripting to have such number of users log in the Nortel VPN Gateway 3070. Engineers first tested the 5,000 IPsec users log in, second 5,000 SSL VPN users log in, and lastly 2,500 IPsec users/2,500 SSL VPN

users log in. Engineers verified these from the active user table in the Nortel VPN Gateway 3070.



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

Vendor	Product	Web address
Agilent	Voice Quality Tester 4.4	http://www.agilent.com
Spirent Communications	Avalanche 2500C/Reflector 2500C	http://www.spirentcom.com
Spirent Communications	Avalanche Commander 6.51	http://www.spirentcom.com

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PROJECT PROFILE

Sponsor: Nortel

Document number: 205113

Product class: IPsec/SSL VPN gateway

Products under test:

- Nortel VPN Gateway 3070

Testing window: March 2005

Software versions tested:

- VPN Gateway 3070 version SSL-5.0.3

Software status:

- Generally available

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