

# Viking InterWorks™, Inc.

## Viking V 2-Gigabit VPN/Firewall Appliance

### Firewall/VPN Appliance Performance Evaluation



*Premise: Businesses understand the need for a LAN-speed firewall/VPN technology to protect data across the Internet, on the network perimeter and within the LAN. It is critical that these devices are not easily congested by small-packet video, voice and other protocol traffic.*

Viking InterWorks, Inc. commissioned The Tolly Group to evaluate its Viking V 2-Gigabit VPN/Firewall Appliance, which employs an entirely new silicon architecture that makes it possible to protect data centers, perimeters and areas inside the LAN with minimal to no impact on throughput.

Tolly Group engineers conducted firewall and VPN throughput tests, measuring the zero-loss bidirectional performance of the Viking 2-Gigabit VPN/Firewall Appliance when subjected to a variety of packet sizes: 64, 128, 256, 512, 768, 1,024, 1,280, 1,518 bytes plus an Internet mix (IMIX) and Tolly IMIX. (IMIX and Tolly IMIX are traffic blends to measure device performance under several "typical" customer scenarios. This is a means to more accurately determine device performance in a real-world environment.)

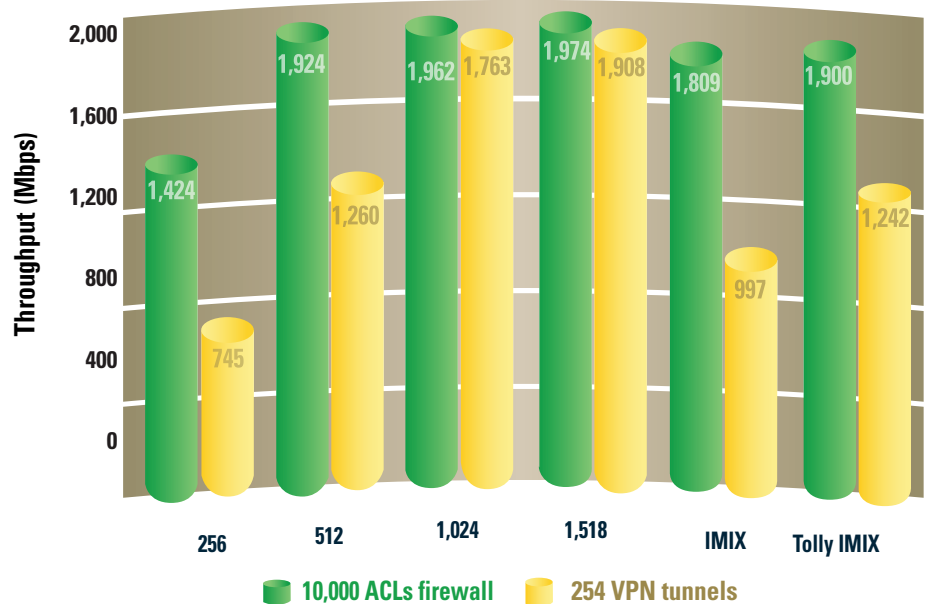
For the firewall measurement, throughput was recorded with 100 and 10,000 access control lists (ACLs) active, an indicator that the Viking V 2-Gigabit VPN/Firewall Appliance can handle the overhead of ACL services while simultaneously processing packets. For the VPN performance test, throughput was measured as the Viking V supported 254 VPN tunnels.

Tests were conducted during April 2006.

### Test Highlights

- Scales to 64,000 sessions, 10,000 ACLs and NAT-enabled scenarios while staying within 5% of peak throughput performance at frame sizes larger than 512 bytes
- Efficiently consumes less than 22 Watts of power with multi-Gigabit firewall throughput and 23 Watts with multi-Gigabit VPN throughput
- Supports over 850,000 packets per second at 64-byte frame size

### Zero-Loss ( $\leq 0.001\%$ ) Bidirectional Firewall/VPN Throughput, 10,000 ACLs in Route Mode and 254 VPN Tunnels



Note: This test utilized IMIX and Tolly IMIX traffic blends to measure device performance under several 'typical' customer scenarios. This is a means to more accurately determine device performance in a real environment. IMIX traffic consisted of seven 64-byte packets, four 570-byte packets and one 1,518-byte packet. Tolly IMIX traffic consisted of 55 64-byte packets, five 78-byte packets, 17 576-byte packets and 23 1,518-byte packets.

Source: The Tolly Group, April 2006

Figure 1

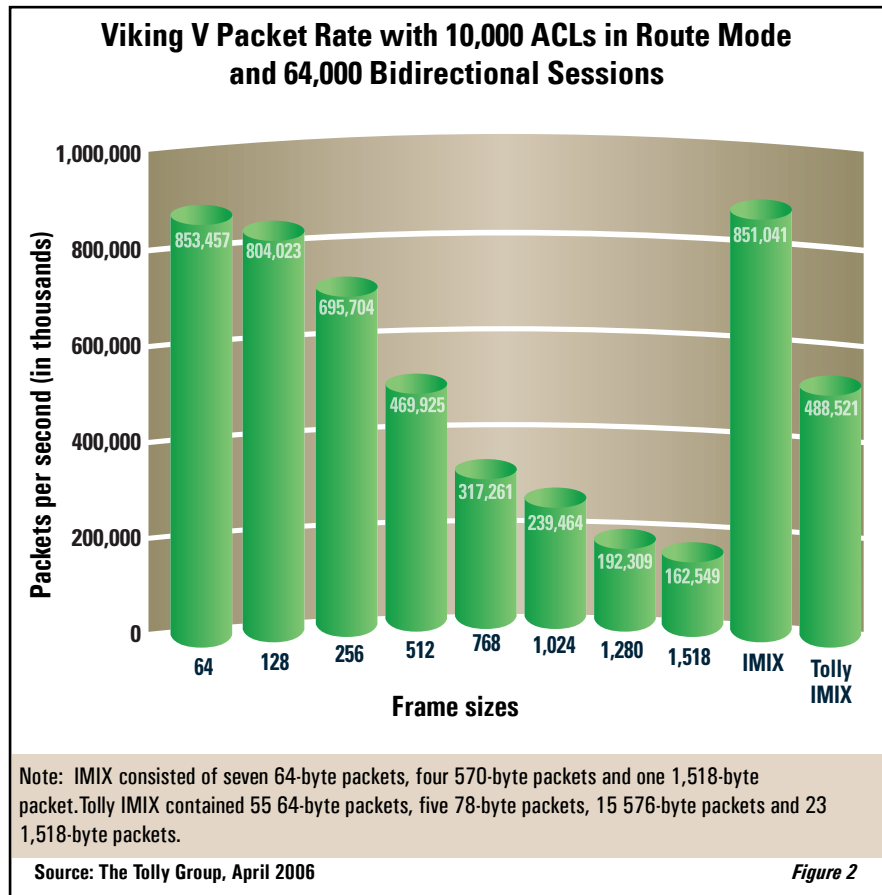
**EXECUTIVE SUMMARY**

Tolly Group tests show that the Viking V 2-Gigabit VPN/Firewall Appliance maintains multi-gigabit performance levels when faced with demanding small packets and a large number of rule sets. Zero-loss ( $\leq 0.001\%$ ) bidirectional firewall throughput peaked at 2 Gbps when tested at 512-, 1,024- and 1,518-byte packets, and hovered near wire-speed for Internet mix traffic. At smaller 256-byte packets the Viking V 2-Gigabit VPN/Firewall Appliance still delivered well in excess of 1 Gbps of bidirectional firewall throughput with 10,000 ACLs active. (See Figure 1.)

On the VPN side, Tolly Group engineers recorded peak bidirectional throughput of 1.9 Gbps at 1,464-byte packets with 256 VPN tunnels. VPN throughput hovered around 1 Gbps to 1.2 Gbps for the IMIX and Tolly IMIX packets.

Tests also show that the performance of the Viking V 2-Gigabit VPN/Firewall Appliance remains steady as the number of sessions scaled to 64,000 even with 10,000 active ACLs and Network Address Translation (NAT) services enabled. During this time performance remained within 5% of the peak throughput performance when tested with packet sizes of 512 bytes and larger.

Engineers also measured the packet rate of the Viking V 2-Gigabit VPN/Firewall Appliance when it was loaded with 10,000 ACLs active and handled 64,000 sessions of bidirectional traffic. Tests show that the Viking V 2-Gigabit VPN/Firewall Appliance

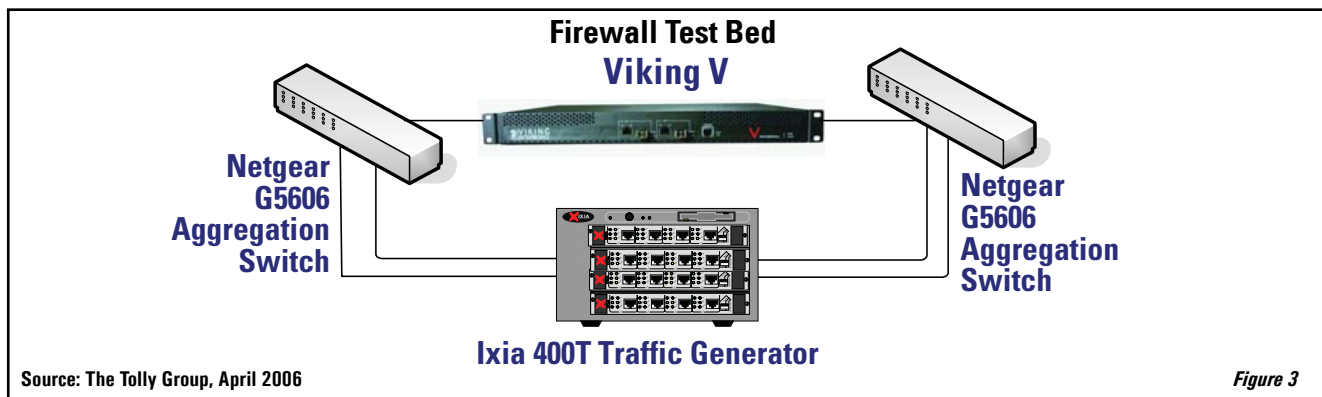


can handle 853,000 packets per second (pps) when handling demanding 64-byte packets. (See Figure 2.) Further, when handling an Internet mix traffic blend (seven 64-byte packets, four 570-byte packets and one 1,518-byte packet), the Viking V 2-Gigabit VPN/Firewall Appliance packet rate was 851,000 pps.

This demonstrates that even under intense loads of small packets, the Viking V 2-Gigabit VPN/Firewall Appliance maintained high throughput when challenged with a small-packet

traffic mix and large numbers of ACLs and sessions.

Tests also focused on the number of TCP connections the Viking V 2-Gigabit VPN/Firewall Appliance could establish on a per-second basis. The TCP connection rate was measured at 15,844 TCP connections per second when handling 100 ACLs and 15,484 when handling 10,000 ACLs. That means that the TCP connection rate dips less than 1% even when handling 100 times the ACL load.



Finally, engineers measured the amount of power, in terms of watts consumed by the Viking V 2-Gigabit VPN/Firewall Appliance during various packet size tests. On average, the Viking V 2-Gigabit VPN/Firewall Appliance consumed just 22 watts of power.

## TEST CONFIGURATION & METHODOLOGY

Tolly Group engineers tested the Viking V 2-Gigabit VPN/Firewall Appliance with release 1, build 10 firmware.

Engineers used an Ixia 400T Traffic Generator chassis with two Ixia Blade LM1000STXS4 modules connected inside the chassis. Each module has a set of two Gigabit Ethernet ports and a set of two Gigabit Fibre Channel ports. Only one set of ports can be used at a time. For throughput tests, engineers used IxExplorer 4.0.200 Build 25 to generate the applicable traffic load and measure/record throughput. For the TCP performance tests, engineers used IxLoad 2.2.23.14 to generate the traffic load and measure/report the TCP rate.

For Firewall throughput testing, engineers connected 2 GbE ports on the Ixia 400T Traffic Generator with the Ixia IxExplorer 4.0.200 Build 25 directly to the Viking V2-Gigabit VPN/Firewall Appliance. The Ixia traffic generator created traffic similar to that of a large network (complete with users) and was programmed to replicate 'relatively' accurate customer traffic. (See Figure 3.)

With regards to the IxExplorer settings, engineers turned on 64,000 sessions to generate unidirectional and bidirectional traffic. Engineers configured the Viking V 2-Gigabit VPN/Firewall Appliance separately for 100 ACLs, 10,000 ACLs, NAT mode, and Route mode for unidirectional and bidirectional traffic. Therefore, there were eight permutations for throughput firewall testing: 1) 100 ACLs, NAT mode, and unidirectional traffic; 2) 100 ACLs, NAT mode, and bidirectional traffic; 3)

100 ACLs, Route mode, and unidirectional traffic; 4) 100 ACLs, Route mode, and bidirectional traffic; 5) 10,000 ACLs, NAT mode, and unidirectional traffic; 6) 10,000 ACLs, NAT mode, and bidirectional traffic; 7) 10,000 ACLs, Route mode, and unidirectional traffic; 8) 10,000 ACLs, Route mode, and bidirectional traffic. All permutations were run three times and averaged.

For VPN throughput testing, engineers used two Viking V 2-Gigabit VPN/Firewall Appliances connected to the Ixia 400T Traffic Generator using IxExplorer software test tool. (See Figure 4.) A single GbE port from each Viking V 2-Gigabit VPN/Firewall Appliance was connected to each other and the remaining GbE ports on each device were connected to Ixia 400T GbE ports. This created the necessary VPN tunnels for testing. In this case, engineers configured the Viking V 2-Gigabit VPN/Firewall Appliance separately for one VPN tunnel and 254 VPN tunnels.

Comparing with the firewall testing, VPN testing required fewer permutations: 1) a single VPN tunnel with unidirectional traffic; 2) one VPN tunnel with bidirectional traffic; 3) 254 VPN tunnels with unidirectional traffic; 4) 254 VPN tunnels with bidirectional traffic. All tests were run three times and averaged. For this test, 3DES and SHA-1 were used for encryption and authentication methods.

For power consumption testing, engineers used Valhalla Scientific's Model 2100 Digital Power Analyzer. This tool was connected between the Viking V 2-Gigabit VPN/Firewall Appliance and the power source. Any amount of power consumed by the DUT will be shown on the digital display. The 3 iterations of power consumption results were averaged and captured by engineers.

For the TCP connection rate test, engineers connected two Ixia Blade modules and four GbE ports to a Layer 2 switch and then two GbE ports from the switch were connected to the

**Viking  
InterWorks, Inc.**

**Viking V 2-  
Gigabit  
VPN/Firewall  
Appliance**



**Firewall/VPN Performance**

### Viking Interworks Viking V 2-Gigabit VPN/Firewall Appliance Product Specifications\*

#### Performance and capacity

- Firewall performance: 2 Gbps
- 3DES/AES performance: 1 Gbps
- Concurrent sessions(NAT) : 32,000
- Concurrent sessions(route): 64,000
- New sessions/second: 15,000
- Policies: 24,000
- VPN tunnels: 8,000

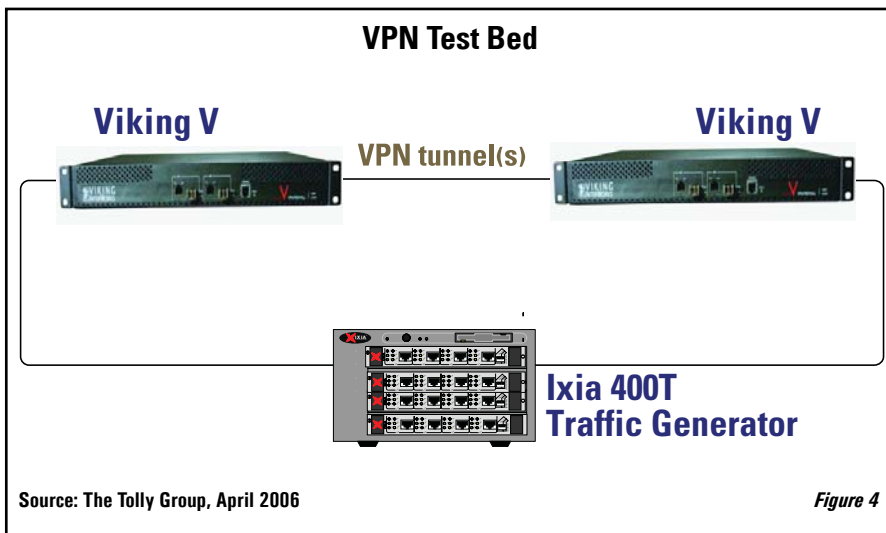
#### Key features

- Stateful inspection firewall
- Route and NAT mode firewall
- Firewall security zones
- Policy-based firewall rules
- Remote access IPsec VPN
- DoS and DDoS attack prevention
- Static and dynamic NAT
- Policy-based NAT
- Static and dynamic routing (RIP)
- 802.1q virtual LANs
- CLI and Web browser management

#### For more information contact:

Viking InterWorks  
30200 Avenida de las Banderas  
Rancho Santa Margarita, CA 92688 USA  
Phone: +1 949 643 7255, (800) 529-7710  
(US and Canada only)  
Fax: +1 949 459 2480  
URL: [www.vikinginterworks.com/security](http://www.vikinginterworks.com/security)

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



Viking V 2-Gigabit VPN/Firewall Appliance. An Ixia IxLoad 2.2.23.14 was used to simulate maximum TCP connections. The Viking V 2-Gigabit VPN/Firewall Appliance was configured for 100 ACLs and 10,000 ACLs in NAT mode. There were two permutations: 100 ACLs and 10,000 ACLs. In order to allow for enough time for the Viking V 2-Gigabit VPN/Firewall Appliance to create TCP connections (total 9.6 million TCP connections established and closed), every iteration ran 10 minutes. Results of three iterations were recorded and averaged.

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

Vendor	Product	Web address
IXIA	Ixia 400T Traffic Generator	<a href="http://www.ixiacom.com">http://www.ixiacom.com</a>
IXIA	Ixia Blade LM1000STXS4	<a href="http://www.ixiacom.com">http://www.ixiacom.com</a>
IXIA	IxExplorer 4.0.200 Build 25	<a href="http://www.ixiacom.com">http://www.ixiacom.com</a>
IXIA	IxLoad 2.2.23.14	<a href="http://www.ixiacom.com">http://www.ixiacom.com</a>
Valhalla Scientific	Model 2100 Digital Power Analyzer	<a href="http://www.valhallascientific.com">http://www.valhallascientific.com</a>



## TERMS OF USAGE

**USE THIS DOCUMENT ONLY IF YOU AGREE TO THE TERMS LISTED HEREIN.**

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 must be based on your own assessment of suitability.

This evaluation was focused on illustrating specific features and/or performance of the product(s) and was conducted under controlled, laboratory conditions and 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. Commercially 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.

The Tolly Group provides a fee-based service to assist users in understanding the applicability of a given test scenario to their specific needs. Contact us for information.

When foreign translations exist, the English document is considered authoritative. To assure accuracy, only use documents downloaded directly from The Tolly Group's Web site.

## PROJECT PROFILE

**Sponsor:** Viking InterWorks, Inc.

**Document number:** 206137

**Product class:** Firewall/VPN gateway

**Products under test:**

- Viking V 2-Gigabit VPN/Firewall Appliance with Version 2 Release 1 Build 10 Firmware

**Software status:**

- Generally available

**Testing window:** April 2006

For more information on this document, or other services offered by The Tolly Group, visit our World Wide Web site at <http://www.tolly.com>, send E-mail to [sales@tolly.com](mailto:sales@tolly.com), call (561) 391-5610.

*Information technology is an area of rapid growth and constant change. The Tolly Group conducts engineering-caliber testing in an effort to provide the interworking industry with valuable information on current products and technology. While great care is taken to assure utmost accuracy, mistakes can occur. In no event shall The Tolly Group be liable for damages of any kind including direct, indirect, special, incidental, and consequential damages which may result from the use of information contained in this document. All trademarks are the property of their respective owners.*

*The Tolly Group doc. 206137 rev. clk 25 May 06*