The Truth About Router Performance

ADTRAN NetVanta Multiservice Routers versus
Cisco Integrated Service Routers (Gen. 2)

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Router performance has become one of the most important factors for delivering services over the WAN. Today's technologies, such as Virtual Desktop Infrastructure (VDI), Voice over IP (VoIP), Unified Communications (UC), Virtual Private Networks (VPN) and security services demand low latency, high bandwidth solutions to properly perform and deliver critical enterprise services. However, many of the routers in place today fail to deliver the performance demanded by the current crop of technologies and will most surely come up short as newer, bandwidth-intensive applications arrive on the scene.

The Performance Puzzle
Several vendors present performance capabilities using traditional methods, such as raw Mbps, basic latency and CPU utilization. While those measurements may offer a baseline, that baseline is not an accurate representation of true performance. In other words, prospective router purchasers need to focus on the real-world performance capabilities of a router; performance measurements that include a mix of traffic and services that today's businesses encounter.

The Setup

Modern Routers are More Than Just Routers
Enterprises have come to expect much more from a router than just simply routing traffic across the WAN. Routers are expected to act as appliances that function at the edge of the network and often incorporate VPN access, Stateful Packet Inspection (SPI) fire-walls, Quality of Service (QoS) routing and many other capabilities that most enterprises can pick and choose from to customize what services a router must offer. Each of those elements can have a dramatic effect on performance, especially when it comes to throughput and latency. Simply put, the more a router is expected to do, the more processing power is needed.

This test is to evaluate the performance of the two market leading branch office routers: ADTRAN®'s NetVanta® Multiservice Routers and the latest Cisco® Integrated Services Routers (ISR), Gen 2. This head-to-head comparison tested like-products designed for the same market segment: mid-range branch office routers for the enterprise.

Products tested included:
- ADTRAN's NetVanta 4430 and Cisco's 3925 ISR G2
- ADTRAN's NetVanta 3450 and Cisco's 2911 ISR G2
- ADTRAN's NetVanta 3430 and Cisco's 1941 ISR G2

In these head-to-head evaluations of ADTRAN NetVanta routers and Cisco ISR G2 routers, throughput was measured in an Ethernet WAN-to-Ethernet LAN test setup where integrated services including SPI firewall, Network Address Translation (NAT), and 3DES IPSec VPN were enabled. Three separate tests were conducted to measure various customized configurations that an enterprise would typically implement.

- **Internet Security:** Throughput test with SPI firewall and NAT enabled

- **Secure Corporate Connectivity:** Throughput test with SPI, NAT, and the addition of IPSec with 3DES encryption VPN services enabled

- **Real World Bandwidth Utilization:** A real-world throughput test balancing a mix of services, traffic and the utilization of bandwidth

Configuration 1: Internet Security

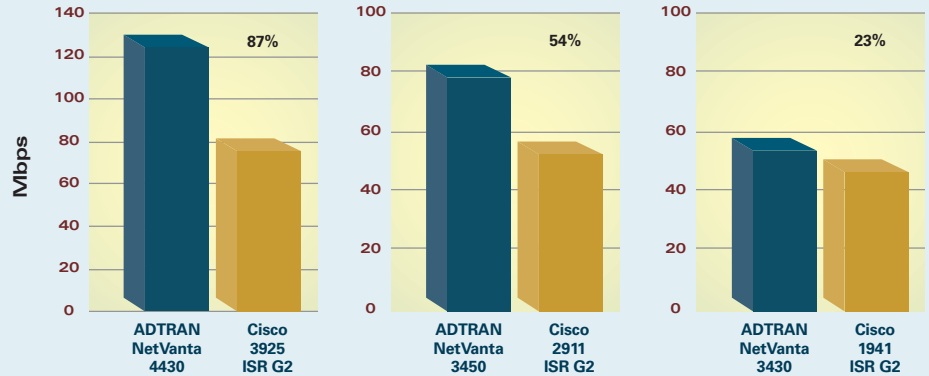**SPI Firewall and NAT Throughput**
Out of the box, all the products offer advanced IP routing capabilities. The ADTRAN products add an Integrated SPI firewall to the mix, while Cisco offers a SPI firewall as an option on their unit. With the SPI firewall and NAT enabled, the first test shows that the NetVanta routers demonstrated superior performance in this area, yielding up to 285 percent increase over that of Cisco.
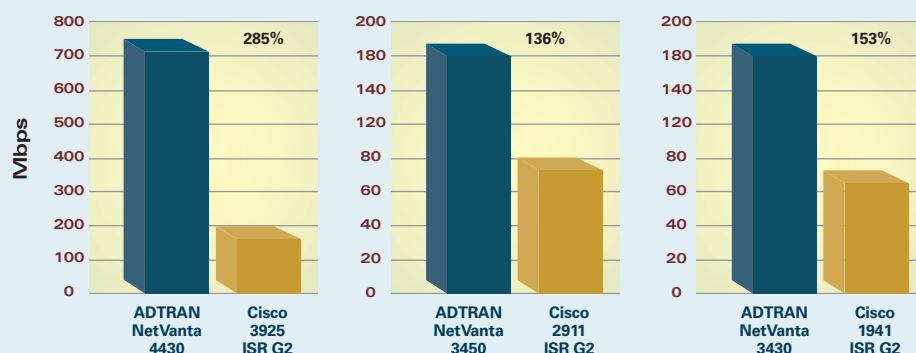
Configuration 2: Secure Corporate Connectivity

Firewall, NAT and VPN Throughput

IPSec VPN is one of the most processor intensive services taxing a router. This is due to the vast amount of computations needed to run various encryption algorithms to protect traffic for safe passage over unsecure networks, like the Internet. With the addition of IPSec VPN added to the original test suite, the ADTRAN routers continue to show impressive performance numbers, still exceeding that of Cisco, up to 87 percent.
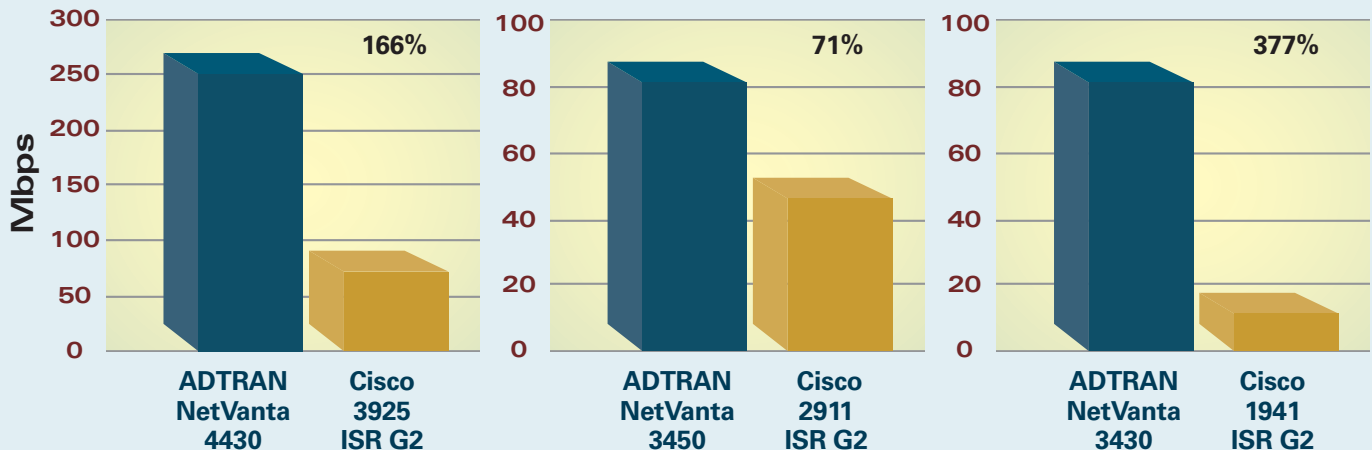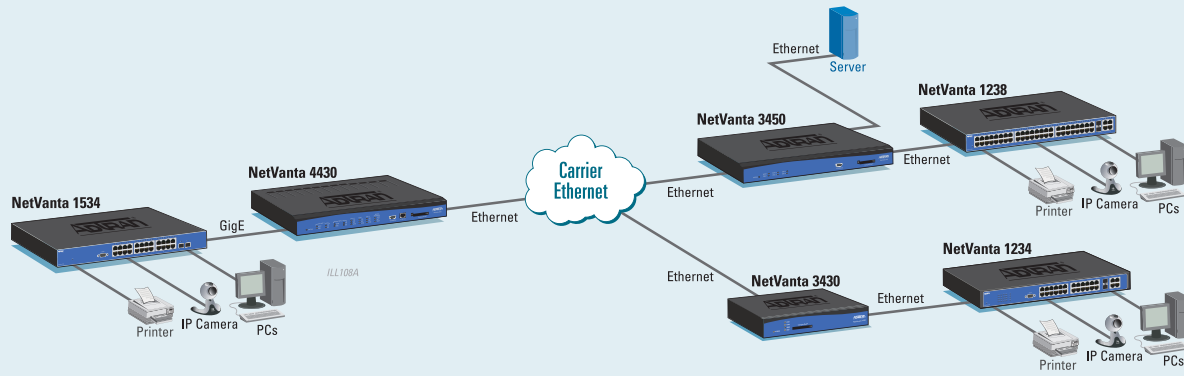
87%
Mbps

ADTRAN NetVanta 4430 — Cisco 3925 ISR G2

54%

ADTRAN NetVanta 3450 — Cisco 2911 ISR G2

23%

ADTRAN NetVanta 3430 — Cisco 1941 ISR G2

Configuration 3: Real-world Bandwidth Utilization

The Importance of Real-world Performance

Several technologies have been introduced or have evolved over time that change how traffic must be treated over the network. That mix of technologies affects the efficiency of routing hardware and places new demands on the intelligence incorporated into a router. What's more, each technology may have different requirements in how it is routed across a WAN. For example, VPN traffic requires encryption and decryption to be performed by the router, while VoIP traffic requires that latency is minimized to improve call performance. Virtualization technologies place further demands on a router, where virtulization's display protocols often use significant bandwidth and require a low latency connection to provide an acceptable end user experience. Simply put, new technologies place new demands on routers and real-world performance proves to be the primary metric to judge the suitability of a router. What's more, that performance must be balanced against costs, and issues such as future proofing must be added to the mix.

ADTRAN routers configured for Ethernet WAN and LAN connections consistently outperformed the Cisco models in a number of test scenarios including firewall with NAT and firewall with NAT and VPN. Although these numbers definitively showed superior performance, in a poll of IT managers, it was determined that in most real-world network examples of today's traffic flows, approximately 60 percent of traffic is often routed through a NAT-enabled firewall, with the remaining 40 percent of the traffic load utilizing VPN tunnels. Therefore, to make these tests even more authentic to that of a real-world condition, not only was the traffic mix representative, but the bandwidth utilization was also adjusted to mimic that of a true SME networking environment by splitting the bandwidth into this 60/40 arrangement. The chart below clearly shows continued superior routing performance for all three models of ADTRAN branch office routers, yielding up to 377 percent greater throughput than the comparable Cisco model.

166%
Mbps

ADTRAN NetVanta 4430 — Cisco 3925 ISR G2

71%

ADTRAN NetVanta 3450 — Cisco 2911 ISR G2

377%

ADTRAN NetVanta 3430 — Cisco 1941 ISR G2

Test Scenario

Real-world Traffic is in the Mix—IMIX

Typically, businesses have a need for a routing product that accommodates multiple functions and can handle an array of traffic types simultaneously. A typical traffic mix would include both firewall and VPN traffic. Likewise, testing individual packet sizes provides a throughput estimate but is not indicative of a services enabled environment or real-world product and application usage. To more accurately assess the head-to-head performance of each routing engine, these performance tests used an industry-accepted mix of traffic patterns, types, and sizes called IMIX (Internet Mix). IMIX simulates real Internet traffic patterns and distributions for data access. Using an IMIX traffic distribution provides a real-life

modeling of user traffic with various profiles that include traffic patterns based on real-world sampling of Internet traffic, VoIP, a variety of business applications, and web browsing.

Engineers used a Spirent Test Center to test each router using an IMIX 741 packet profile with a traffic distribution of 66 byte packets with a weighting of 58 percent (7–66 byte frames) of the load, 594 byte packets for 33 percent of the traffic load (4–594 byte frames), and 1518 byte packets for the remaining 8 percent of the traffic load (1–1518 byte frame), which provided a variation in packet sizes tested from small to large packets with a test run time of 30 seconds.

Technical Results

The three tests showed that with services enabled, ADTRAN branch office routers consistently outperformed the comparable Cisco models. The chart below demonstrates the raw throughput results

for each test performed and the overall percentage of increased performance by the NetVanta routers.

	Internet Security		Secure Corporate Connectivity		Real-world Bandwidth Utilization	
ADTRAN NetVanta 3430	187,737,872 bps	153%	57,324,813 bps	23%	87,624,264 bps	377%
Cisco 1941 ISR G2	74,107,992 bps		46,612,143 bps		18,367,765 bps	
ADTRAN NetVanta 3450	187,737,872 bps	136%	81,408,678 bps	54%	88,045,720 bps	71%
Cisco 2911 ISR G2	79,693,768 bps		53,026,288 bps		51,438,408 bps	
ADTRAN NetVanta 4430	771,062,656 bps	285%	131,108,432 bps	87%	259,317,128 bps	166%
Cisco 3925 ISR G2	200,111,464 bps		69,958,728 bps		97,318,939 bps	

Technology Behind the Numbers

The performance improvement offered by the ADTRAN equipment is due to a combination of factors, ranging from the processing power contained within the router, efficient firmware and the incorporation of ADTRAN's innovative *RapidRoute*™ technology. Any way you slice it, ADTRAN offered a performance boost over the comparable Cisco product.

ADTRAN's *RapidRoute* technology enabled each NetVanta router to meet the high performance needs of high-speed Ethernet

services. The revolutionary *RapidRoute* technology interprets session traffic and the performance-injected NetVanta 3430, 3450, and 4430 platforms deliver faster processing cycles and therefore make higher-speed routing decisions. Even with processor-intensive services enabled, like Firewall, NAT, VPN, and even QoS, the NetVanta Modular and Multiservice Routers with *RapidRoute* technology outperform the competition with higher throughput to accommodate today's larger-bandwidth applications.

More than Just the Numbers

Qualified testing has shown that ADTRAN's NetVanta Series of routers offer significant performance increases over competing products, such as those from Cisco. ADTRAN also offers signifi-cant Return on Investment (ROI) advantages over Cisco's similar products, and lowers the Total Cost of Ownership (TCO) of routing technology, in general.

Ease-of-Use

The NetVanta Series is designed to make implementation, deployment, and maintenance simple, resulting in saved time and money for your network. ADTRAN's line of NetVanta routers, switches, wireless access points, business gateways, telephony, and unified communications solutions merge seamlessly into existing networks, and are easy to configure and operate. All ADTRAN network products are standards-based for ease of integration in multi-vendor network environments and provide a breadth of ease-of-use features that make it easy to install, manage, and monitor the network.

Wireless Controller

The NetVanta Series features a standards-based wireless LAN solution with a centralized control architecture for easy deployment and management. NetVanta routers are Wi-Fi® access controller capable and can manage up to 24 NetVanta Wi-Fi products. This allows the entire wireless LAN network, to be centrally managed from a single device. Unlike many competing Wireless LAN (WLAN) controller solutions, NetVanta routers offer wireless management at no additional charge.

VoIP-ready

ADTRAN's NetVanta Series of routers are VoIP-ready with QoS, hierarchal QoS, Class of Service (CoS), SIP Transparent Proxy, Net Flow 9 Traffic Monitoring, and Voice Quality Monitoring (VQM). As voice and data net-works converge into a single communications network, QoS is of the utmost importance. QoS allows a network to provide better service to selected traffic and enables the network to handle both mission-critical and best-effort traffic on the same infrastructure.

VQM moves beyond QoS and can save network administrators valuable time in the troubleshooting process by examining the full data stream and identify problem areas down to the packet level in an easy-to-use, graphically-intuitive interface. VQM captures data for Mean Opinion Score (MOS), jitter, delay, and packet loss statistics necessary to troubleshoot VoIP calls.

Management

The NetVanta Command Line Interface (CLI) mimics the *de facto* industry standard, and is both familiar and easy to use. It supports multiple configuration scripts to simplify setup of local and remote units. Using the Web-based GUI and setup wizards with a set of pre-determined parameters allows users to quickly prepare the unit for opera-tion. NetVanta products provide a troubleshooting and diagnostics webpage that details any errors or problems in configuration and offers possible suggestions.

Security

The NetVanta Series of routers provides a stringent line of defense against common security threats to your network. The security portfolio features a stateful inspection firewall to protect against Denial of Service (DoS) and other unauthorized access attempts; and optional IPSec-compliant VPN with DES/3DES/AES encryption to secure transmissions across a public infrastructure.

Innovative features like the security audit tool allow network users to quickly and easily assess configura-tion of ADTRAN devices in the network to determine wired and wireless network threats and possible vulnerabilities and provides suggested changes based on industry best-practices for network security.

Warranty and Support

ADTRAN provides an industry-leading five-year warranty and world-class support on all their router platforms. This affords IT staff the ability to invest wisely in networking hardware without incurring ongoing expenses for support. ADTRAN also believes there is no need for costly mainte-nance contracts just to keep your devices up-to-date with the latest firmware. With ADTRAN routers, firmware upgrades are included for the life of the product, so IT funds can be utilized for items that move your network into the future and not just for maintaining existing equipment.

	ADTRAN NetVanta 4430	Cisco 3925 ISR G2	ADTRAN NetVanta 3450	Cisco 2911 ISR G2	ADTRAN NetVanta 3430	Cisco 1941 ISR G2

Features	ADTRAN NetVanta 4430	Cisco 3925 ISR G2	ADTRAN NetVanta 3450	Cisco 2911 ISR G2	ADTRAN NetVanta 3430	Cisco 1941 ISR G2
IP Router	✔	✔	✔	✔	✔	✔
Stateful Inspection Firewall	✔	✔	✔	✔	✔	✔
IPSec VPN	Upgrade	Upgrade	Upgrade	Upgrade	Upgrade	Upgrade
Quality of Service (QoS)	✔	✔	✔	✔	✔	✔
Voice Quality Monitoring (VQM)	✔	—	✔	—	✔	—
WAN Slots	3	4	2	4	1	2
10/100Base-T Ports	1	—	2	—	2	—
10/100/1000Base-T Ports	2	3	—	3	—	2
SFP Fiber Interface	2	2	—	—	—	—
Compact Flash	✔	✔	✔	✔	✔	✔
Content Filtering	✔	✔	✔	✔	✔	✔
Remote Survivability	✔	✔	✔	✔	✔	—
Command Line Interface	✔	✔	✔	✔	✔	✔
Web GUI	✔	✔	✔	✔	✔	✔
Warranty	5-year	90-Day	5-year	90-Day	5-year	90-Day
Firmware Upgrade	Free	Under Contract	Free	Under Contract	Free	Under Contract
Form Factor	1U	3U	1U	2U	1U	2U
Dimensions	1.75" H, 17.25" W, 11" D	5.25" H, 17.25" W, 18.75" D	1.25" H, 17.25" W, 7.75" D	3.5" H, 17.25" W, 12" D	1.72" H, 10.5" W, 5.8" D	3.5" H, 13.5" W, 11.5" D
Weight	7.5 lbs.	39 lbs.	7.5 lbs.	18 lbs.	4 lbs.	12 lbs.
Power	75 W	100 W	40 W	50 W	25 W	35 W
Cost						
MSRP	**$3,890**	**$10,895**	**$2,440**	**$3,595**	**$1,290**	**$2,495**

Test Summary						
Internet Security	NetVanta 4430: **285%** higher performance		NetVanta 3450: **136%** higher performance		NetVanta 3430: **153%** higher performance	
Secure Corporate Connectivity	NetVanta 4430: **87%** higher performance		NetVanta 3450: **54%** higher performance		NetVanta 3430: **23%** higher performance	
Real-world Bandwidth Utilization	NetVanta 4430: **166%** higher performance		NetVanta 3450: **71%** higher performance		NetVanta 3430: **377%** higher performance	

Frank Ohlhorst—Lab Director/Product Analyst

Frank J. Ohlhorst is an award-winning technology journalist, professional speaker and IT business consultant with over 25 years of experience in the technology arena. Frank has written for several leading technology publications, including ComputerWorld, TechTarget, PCWorld, ExtremeTech and Toms Hardware.

Frank's testing background started when he joined CMP Technology's Channel group in 1999 as a Technical Editor assigned to the CRN Test Center, within a year, Frank became the Senior Technical Editor, and was responsible for designing product testing methodologies, assigning product reviews, roundups and bakeoffs to the CRN Test Center staff. In 2003, Frank was named Technology Editor of CRN. In that capacity, he ensured that CRN maintained a clearer focus on technology and increased the integration of the Test Center's review content into both CRN's print and web properties. For more information, visit *Ohlhorst.net*