NETWORK INTRUSION PREVENTION SYSTEMS

INDIVIDUAL PRODUCT TEST RESULTS

McAfee® Network Security Platform M-8000

METHODOLOGY VERSION: 6.0
SEPTEMBER 2010

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1 Introduction

During Q3 2010, NSS Labs performed an independent group test of network intrusion prevention systems (IPS) currently on the market. Each product was subjected to thorough testing at the NSS Labs facility in Austin, Texas, based on methodology v6.0 available on www.nsslabs.com. IPS vendors were invited to submit their products to NSS Labs free of charge and we did not receive any compensation in return for their participation.

While the Network IPS Group Test Report provides comparative information about those products, this Individual Test Report provides further detailed information not available elsewhere.

NSS Labs evaluated the products configured with the pre-defined recommended settings, then again as optimally tuned by the vendor prior to testing to provide readers with a range of information on key IPS security effectiveness and performance dimensions.

As part of this test, McAfee submitted the **McAfee Network Security Platform M-8000.**

NSS Labs' Rating: Recommended

Product	Effectiveness	Throughput
M-8000	94.7%	11,533 Mbps

Using the default policy, McAfee products blocked 91.9% of attacks (the most of any product's default in tests conducted to date). Using an existing tuned policy configured by a McAfee engineer, the effectiveness improved by 2.8% to 94.7%, all the while handling 100% of our evasion attempts without error.

NSS Labs rates throughput based upon tuned settings—averaging out the results from tests 6.6.1, 6.6.2, and 6.4.2: "Real World" Protocol Mix (Perimeter), "Real World" Protocol Mix (Core), and 21KB HTTP Response respectively.

Compared to the December 2009 test, tuned security effectiveness blocked 21.8% more attacks, default security effectiveness blocked by 25% more attacks, and performance increased by 2.5Gbps. These improvements reflect a concerted effort on behalf of the development team. To ensure there was no error in testing, nor any cheating, we ran several tests numerous times, including a wide array of traffic designed to trigger false positives. The M-8000 offers the highest accuracy and throughput of any product we've tested to date.

McAfee's Network Security Manager (NSM) was simple to use and flexible, allowing for rapid deployment of devices with effective pre-defined policy choices. Tuning and maintenance is simple and well-thought out.

For high throughput 10 Gigabit environments, the McAfee M-8000 provides an outstanding 3-year TCO (including labor).

2 SECURITY EFFECTIVENESS

To show the range of expectations a user should have, NSS Labs evaluated the products configured with the predefined recommended settings, then again as optimally tuned by the vendor prior to testing.

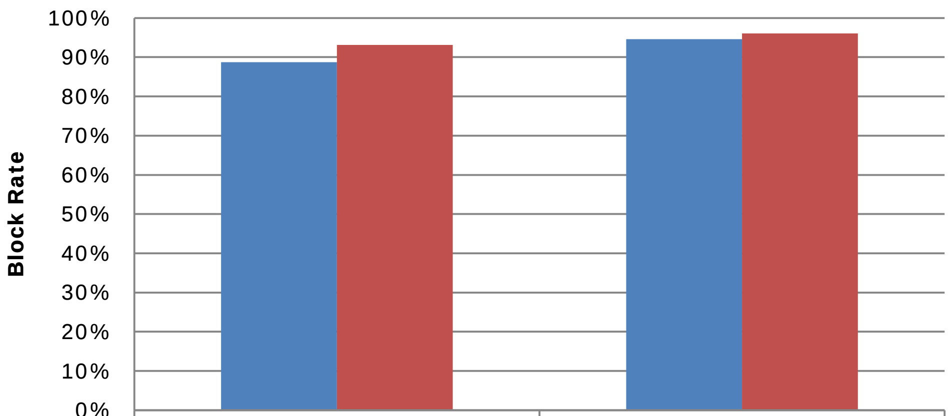
Live Exploit Testing: NSS Labs' security effectiveness testing leverages the deep expertise of our engineers utilizing multiple commercial, open source and proprietary tools as appropriate. With 1,179 live exploits, this is the industry's most comprehensive test to date. We retired 92 attacks and added 112 new exploits compared to our Q4 2009 test set of 1,159. Most notable, all of the live exploits and payloads in our test have been validated in our lab such that:

- a reverse shell is returned
- a bind shell is opened on the target allowing the attacker to execute arbitrary commands
- a malicious payload installed
- a system is rendered unresponsive
- etc.

Configuration	Total Number of Exploits Run	Total Number Blocked	Block Percentage
Default Configuration	1,179	1,083	91.9%
Tuned Configuration	1,179	1,117	94.7%

2.1 COVERAGE BY ATTACK VECTOR

Because a failure to block attacks could result in significant compromise and impact to critical business systems, network IPS should be evaluated against a broad set of exploits. Exploits can be categorized into two groups: attacker-initiated and target initiated. Attacker-initiatied exploits are threats executed remotely against a vulnerable application and/or operating system by an individual while target-initiatied exploits are initiated by the vulnerable target. In target-initatied exploits, the attacker has little or no control as to when the threat is executed.



	Attacker Initiated	Target Initiated
Default	89%	95%
Tuned	93%	96%

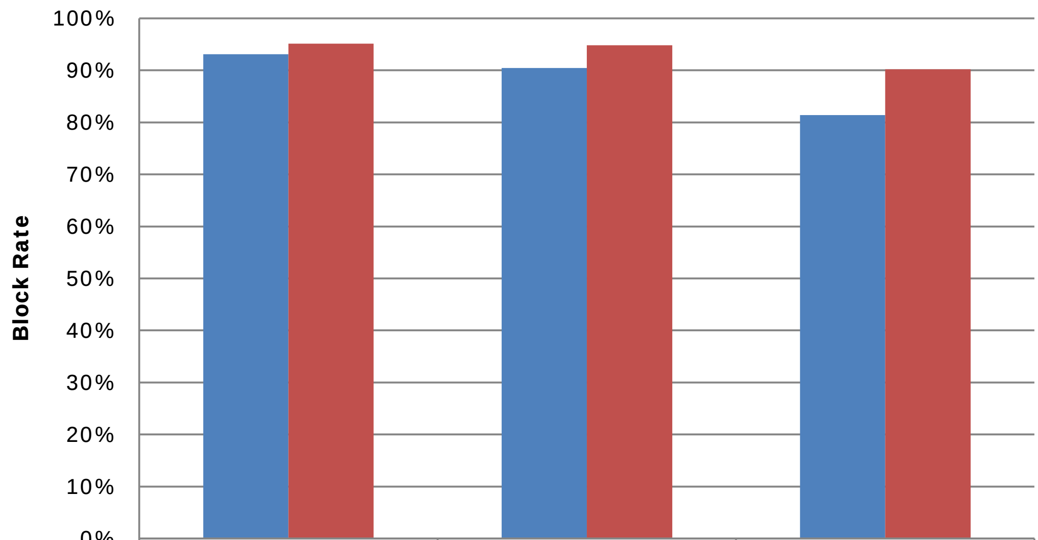
Figure 1: Coverage by Attack Vector – Default vs. Tuned Configurations

2.2 COVERAGE BY IMPACT TYPE

The most serious exploits are those which result in a remote system compromise, providing the attacker with the ability to execute arbitrary system-level commands. Most exploits in this class are "weaponized" and offer the attacker a fully interactive remote shell on the target client or server.

Slightly less serious are attacks that result in an individual service compromise, but not arbitrary system-level command execution. Typical attacks in this category include service-specific attacks—such as SQL injection—that enable an attacker to execute arbitrary SQL commands within the database service. These attacks are somewhat isolated to the service and do not immediately result in full system-level access to the operating system and all services. However, using additional localized system attacks, it may be possible for the attacker to escalate from the service level to the system level.

Finally, there are the attacks (often target initiated) which result in a system or service-level fault that crashes the targeted service or application and requires administrative action to restart the service or reboot the system. These attacks do not enable the attacker to execute arbitrary commands. Still, the resulting impact to the business could be severe, as the attacker could crash a protected system or service.



	System Exposure	Service Exposure	System or Service Fault
Default	93%	90%	81%
Tuned	95%	95%	90%

Figure 2: Product Coverage by Impact – Default vs. Tuned Configurations

2.3 ATTACK LEAKAGE

By default, the M-8000 will drop new connections when resources (such as state table memory) are low, or when traffic loads exceed the device capacity. This will theoretically block legitimate traffic, but maintain state on existing connections (preventing evasion). All NIPS devices have to make the choice whether to risk denying legitimate traffic or allowing malicious traffic once they run low on resources.

2.4 RESISTANCE TO EVASION

Description	IP Packet Fragmentation	TCP Stream Segmentation	RPC Fragmentation	URL Obfuscation	HTML Evasion	FTP Evasion	TOTAL
McAfee M-8000	✓	✓	✓	✓	✓	✓	✓

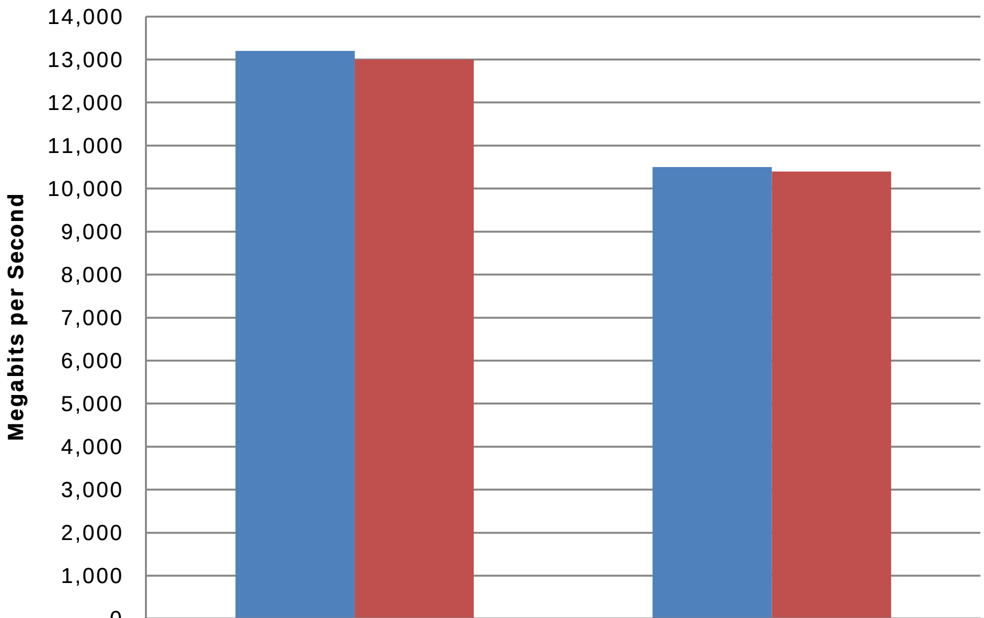
Resistance to known evasion techniques was perfect, with the McAfee M-8000 Network IPS achieving a 100% score across the board in all related tests. *IP fragmentation, TCP stream segmentation, RPC fragmentation, URL obfuscation, HTML Evasion* and *FTP evasion* all failed to trick the product into ignoring valid attacks. Not only were the fragmented and obfuscated attacks blocked successfully, but all of them were also decoded accurately.

3 Performance

There is frequently a trade-off between security effectiveness and performance. Because of this trade-off, it is important to judge a product's security effectiveness within the context of its performance (and *vice versa*). This ensures that new security protections do not adversely impact performance and security shortcuts are not taken to maintain or improve performance.

3.1 Real-World Traffic Mixes

Whereas previous tests provide a pure HTTP environment with varying connection rates and average packet sizes, the aim of this test is to simulate a "real world" environment by introducing additional protocols and real content while still maintaining a precisely repeatable and consistent background traffic load (something rarely seen in a real world environment). For details about real world traffic protocol types and percentages, see the NSS Labs IPS Test Methodology, available at www.nsslabs.com.



	Real World Protocol Mix (Perimeter)	Real World Protocol Mix (Core)
Default	13,200	10,500
Tuned	13,000	10,400

Figure 3: Real-World Traffic Mixes – Default vs. Tuned Configurations

3.2 CONNECTION DYNAMICS – CONCURRENCY AND CONNECTION RATES

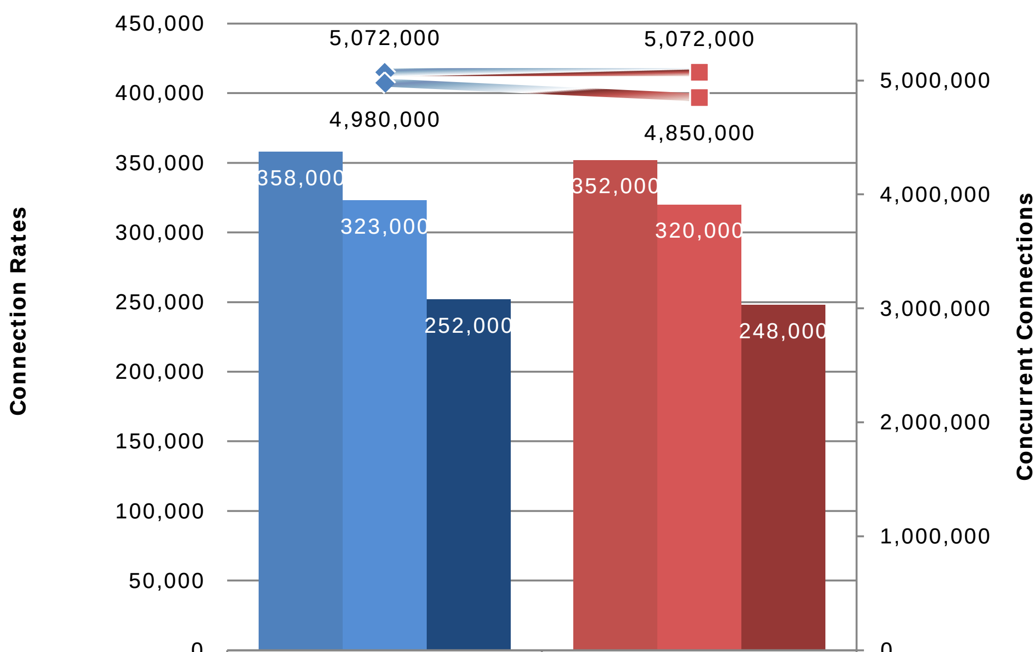
The aim of these tests is to stress the detection engine and determine how the sensor copes with large numbers of TCP connections per second, application layer transactions per second, and concurrent open connections. All packets contain valid payload and address data and these tests provide an excellent representation of a live network at various connection/transaction rates.

Note that in all tests, the following critical “breaking points”—where the final measurements are taken—are used:

Excessive concurrent TCP connections - latency within the IPS is causing unacceptable increase in open connections on the server-side.

Excessive response time for HTTP transactions/SMTP sessions - latency within the IPS is causing excessive delays and increased response time to the client.

Unsuccessful HTTP transactions/SMTP sessions – normally, there should be zero unsuccessful transactions. Once these appear, it is an indication that excessive latency within the IPS is causing connections to time out.



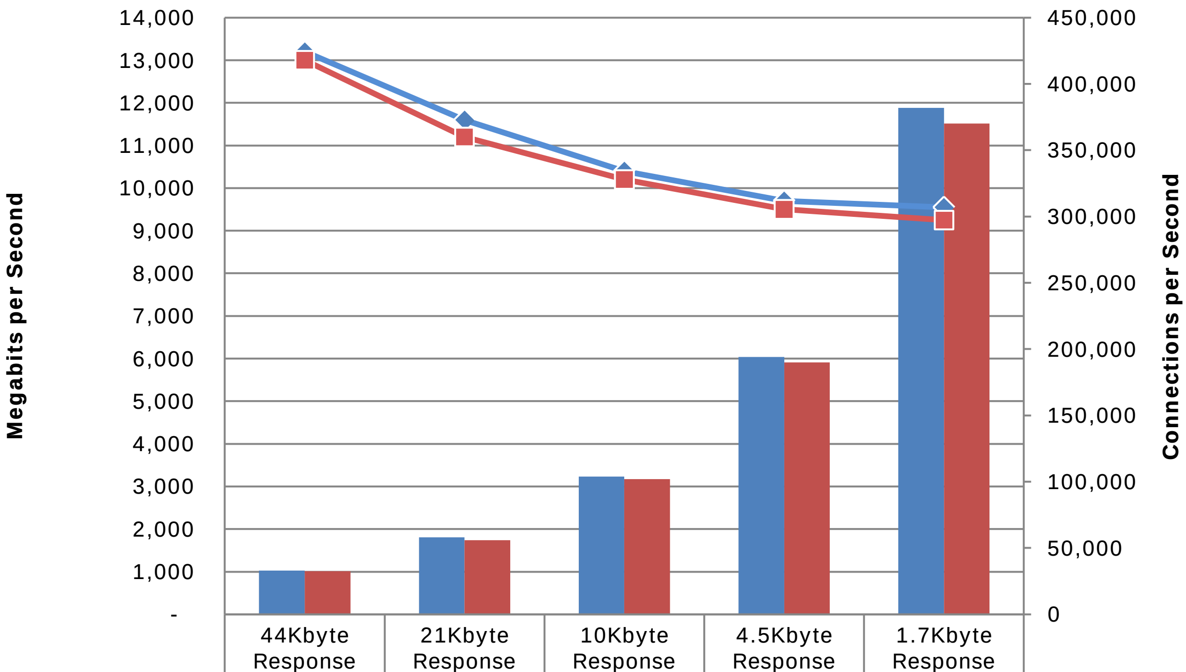
	Default	Tuned
TCP Connections/Second	358,000	352,000
HTTP Connections/Second	323,000	320,000
HTTP Transactions/Second	252,000	248,000
Concurrent TCP Connections	5,072,000	5,072,000
Concurrent TCP Conns w/Data	4,980,000	4,850,000

Figure 4: Concurrency and Connection Rates – Default vs. Tuned Configurations

3.3 HTTP CONNECTIONS PER SECOND AND CAPACITY

These tests aim to stress the HTTP detection engine in order to determine how the sensor copes with detecting and blocking exploits under network loads of varying average packet size and varying connections per second. By creating genuine session-based traffic with varying session lengths, the sensor is forced to track valid TCP sessions, thus ensuring a higher workload than for simple packet-based background traffic.

Each transaction consists of a single HTTP GET request and there are no transaction delays (i.e. the web server responds immediately to all requests). All packets contain valid payload (a mix of binary and ASCII objects) and address data. This test provides an excellent representation of a live network (albeit one biased towards HTTP traffic) at various network loads.

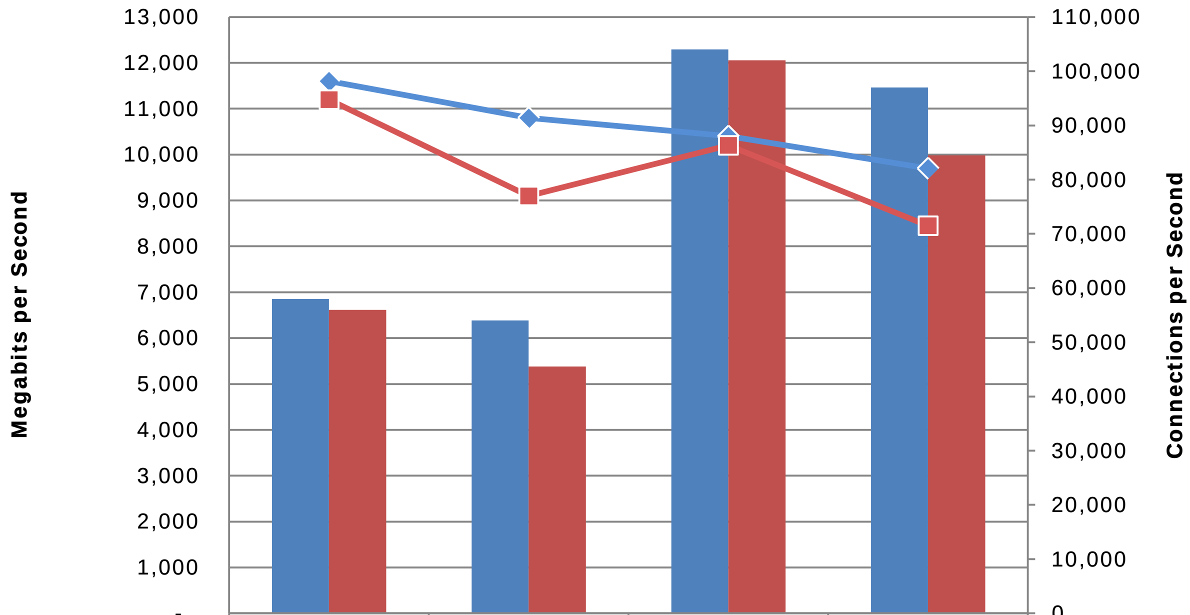


	44Kbyte Response	21Kbyte Response	10Kbyte Response	4.5Kbyte Response	1.7Kbyte Response
Default	33,000	58,000	104,000	194,000	382,000
Tuned	32,500	56,000	102,000	190,000	370,000
Default Mbps	13,200	11,600	10,400	9,700	9,550
Tuned Mbps	13,000	11,200	10,200	9,500	9,250

Figure 5: HTTP Connections per Second and Capacity – Default vs. Tuned Configurations

3.4 HTTP CONNECTIONS PER SECOND AND CAPACITY WITH DELAYS

Typical user behavior introduces delays in between requests and reponses, e.g. as users read web pages and decide which links to click next. This next set of tests is identical to the previous set except that these include a 10-second delay in the server response for each transaction. This has the effect of maintaining a high number of open connections throughout the test, thus forcing the sensor to utilize additional resources to track those connections.



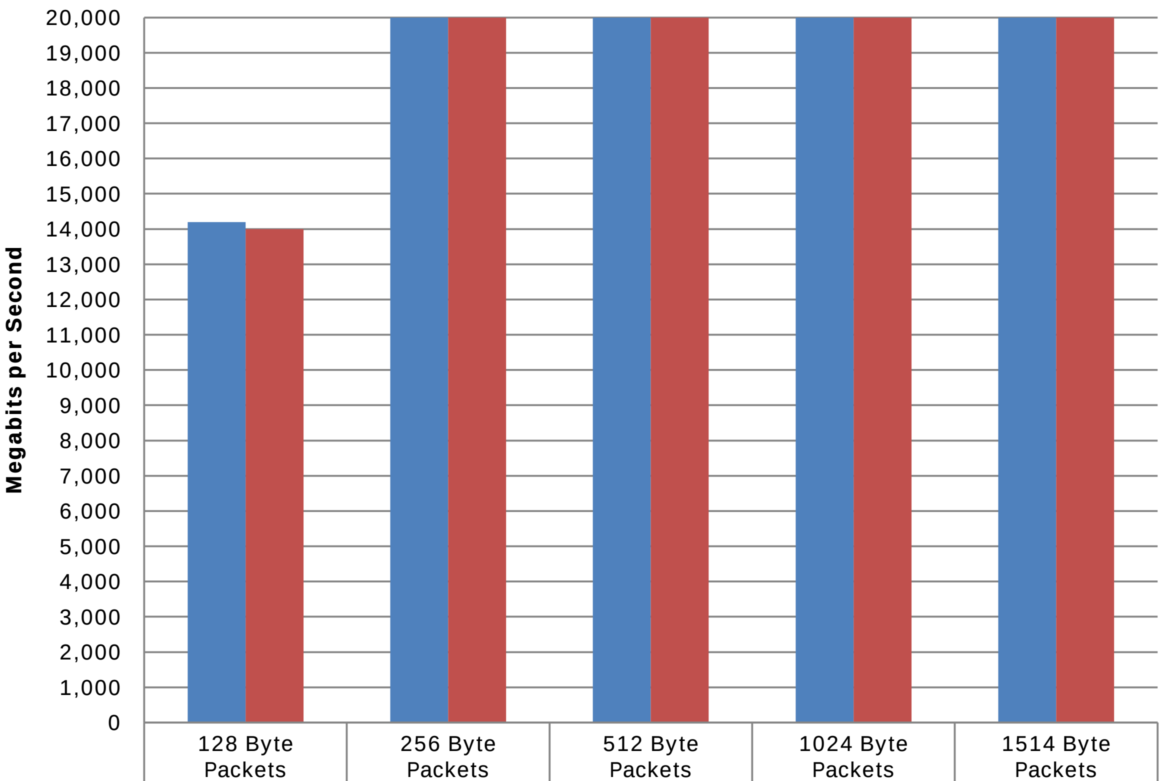
	21Kbyte Response	21 Kbyte Response With Delay	10Kbyte Response	10 Kbyte Response With Delay
Default	58,000	54,000	104,000	97,000
Tuned	56,000	45,500	102,000	84,500
Default Mbps	11,600	10,800	10,400	9,700
Tuned Mbps	11,200	9,100	10,200	8,450

Figure 6: HTTP Connections per Second and Capacity (with / without Delays)

3.5 UDP THROUGHPUT

The aim of this test is purely to determine the raw packet processing capability of each in-line port pair of the IPS. It is not real world, and can be misleading. It is included here primarily to enable comparison to legacy figures.

This traffic does not attempt to simulate any form of "real-world" network condition. No TCP sessions are created during this test, and there is very little for the detection engine to do in the way of protocol analysis (although each vendor will be required to write a signature to detect the test packets to ensure that they are being passed through the detection engine and not "fast-tracked" from the inbound to outbound port).



	128 Byte Packets	256 Byte Packets	512 Byte Packets	1024 Byte Packets	1514 Byte Packets
Default	14,200	20,000	20,000	20,000	20,000
Tuned	14,000	20,000	20,000	20,000	20,000

Figure 7: UDP Throughput – Default vs. Tuned Configurations

4 Total Cost of Ownership

IPS solutions can be complex projects with several factors affecting the overall cost of deployment, maintenance and upkeep. All of these should be considered over the course of the useful life of the solution.

- Product Purchase – the cost of acquisition.
- Product Maintenance – the fees paid to the vendor.
- Installation – the time required to take the device out of the box, configure it, put it into the network, apply updates and patches, initial tuning, and set up desired logging and reporting.
- Upkeep – the time required to apply periodic updates and patches from vendors, including hardware, software, and protection (signature/filter/rules) updates.
- Tuning – the time required to configure the policy such that the best possible protection is applied while reducing or eliminating false alarms and false positives.

4.1 Labor per Product (in Hours)

This table estimates the annual labor required to maintain each device. Since vendors sent their very best engineers to tune, NSS Labs' assumptions are based upon the time required by a highly experienced security engineer ($75 per hour fully loaded). This allowed us to hold the talent cost variable constant and measure only the difference in time required to tune.

Product	Installation (Hrs)	Upkeep / Year (Hrs)	Tuning / Year (Hrs)
McAfee M-8000	8	25	25

4.2 Purchase Price and Total Cost of Ownership

Each vendor provided pricing information. When possible, we selected the 24/7 maintenance and support option with 24-hour replacement as this is the option most organizations will select.

Product	Purchase	Maintenance / year	1 Year TCO	2 Year TCO	3 Year TCO
McAfee M-8000	$224,995	$41,395	$270,740	$315,885	$361,030

- Year One TCO was determined by multiplying the Labor Rate ($75 per hour fully loaded) x (Installation + Upkeep + Tuning) and then adding the Purchase Price + Maintenance.
- Year Two TCO was determined by multiplying the Labor Rate ($75 per hour fully loaded) x (Upkeep + Tuning) and then adding Year One TCO.
- Year Three TCO was determined by multiplying the Labor Rate ($75per hour fully loaded x (Upkeep + Tuning) and then adding Year Two TCO.

4.3 VALUE: COST PER MBPS AND EXPLOIT BLOCKED – TUNED POLICY

There is a clear difference between price and value. The least expensive product does not necessarily offer the greatest value if it blocks fewer exploits than competitors. The best value is a product with a low TCO and high level of secure throughput (security effectiveness x performance).

The following table illustrates the relative cost per unit of work performed: Mbps-Protected

Product	Protection	Throughput	3 Year TCO	Price / Mbps-Protected
McAfee M-8000	94.7%	11,533	$361,030	$33

Price per Protected Mbps was calculated by taking the Three-Year TCO and dividing it by the product of Protection x Throughput. Three-Year TCO/(Protection x Throughput) = Price/Mbps-Protected.

By increasing both protection and performance, McAfee was able cut their Price / Mbps Protected from $56 to $33 – a 41% improvement.

5 Detailed Product Scorecard

The following chart depicts the status of each test with quantitative results where applicable. A separate product Exposure Report details specific vulnerabilities that are not protected.

Test ID	Description	Default	Tuned
5.1	Detection Engine		
5.1.1	System Exposure	93%	95%
5.1.2	Service Exposure	90%	95%
5.1.3	System or Service Fault	81%	90%
5.2	Threat Vectors		
5.2.1	Attacker Initiated	89%	93%
5.2.2	Target Initiated	95%	96%
5.2.3	Network	91.9%	94.7%
5.2.4	Local	Not for NIPS	Not for NIPS
5.3	Target Type		
5.3.1	Web Server	* See Exposure Report	
5.3.2	Web Browser	*	*
5.3.3	ActiveX	*	*
5.3.4	JavaScript	*	*
5.3.5	Browser Plug-ins / Add-ons	*	*
5.4	Coverage by Result		
5.4.1	Arbitrary Code Execution	*	*
5.4.2	Buffer Overflow	*	*
5.4.3	Code Injection	*	*
5.4.4	Cross site script	*	*
5.4.5	Directory Traversal	*	*
5.4.6	Privilege Escalation	*	*
5.5	Coverage by Vendor		
5.5.1	3Com	*	*
5.5.2	Adobe	*	*
5.5.3	Alt-N	*	*
5.5.4	Apache	*	*
5.5.5	Apple	*	*
5.5.6	Atrium	*	*
5.5.7	Avast	*	*
5.5.8	BEA	*	*
5.5.9	BitDefender	*	*
5.5.10	Borland	*	*
5.5.11	CA	*	*
5.5.12	Cisco	*	*
5.5.13	Citrix	*	*

Test ID	Description	Default	Tuned
5.5.14	ClamAV	*	*
5.5.15	EMC	*	*
5.5.16	Facebook	*	*
5.5.17	GNU	*	*
5.5.18	Google	*	*
5.5.19	HP	*	*
5.5.20	IBM	*	*
5.5.21	IPSwitch	*	*
5.5.22	ISC	*	*
5.5.23	Kaspersky	*	*
5.5.24	LanDesk	*	*
5.5.25	lighttpd	*	*
5.5.26	Linux	*	*
5.5.27	Macromedia	*	*
5.5.28	MacroVision	*	*
5.5.29	Mailenable	*	*
5.5.30	McAfee	*	*
5.5.31	Mercury	*	*
5.5.32	Microsoft	*	*
5.5.33	MIT	*	*
5.5.34	Mozilla	*	*
5.5.35	Mplayer	*	*
5.5.36	Multiple Vendors	*	*
5.5.37	MySQL	*	*
5.5.38	NOD32	*	*
5.5.39	Novell	*	*
5.5.40	Nullsoft	*	*
5.5.41	OpenLDAP	*	*
5.5.42	OpenOffice	*	*
5.5.43	OpenSSH	*	*
5.5.44	OpenSSL	*	*
5.5.45	Oracle	*	*
5.5.46	Other Misc	*	*
5.5.47	Panda	*	*
5.5.48	RealNetworks	*	*
5.5.49	Samba	*	*
5.5.50	SAP	*	*
5.5.51	Snort	*	*
5.5.52	Sophos	*	*
5.5.53	SpamAssassin	*	*

Test ID	Description	Default	Tuned
5.5.54	Squid	*	*
5.5.55	Sun Microsystems	*	*
5.5.56	Symantec	*	*
5.5.57	Trend Micro	*	*
5.5.58	Trillian	*	*
5.5.59	UltraVNC	*	*
5.5.60	Veritas	*	*
5.5.61	VideoLan	*	*
5.5.62	VMWare	*	*
5.5.63	WinAmp	*	*
5.5.64	WinFTP	*	*
5.5.65	Winzip	*	*
5.5.66	Yahoo	*	*
5.6	Evasion		
5.6.1	Evasion	100%	100%
5.7	Packet Fragmentation		
5.7.1	Ordered 8 byte fragments	100%	100%
5.7.2	Ordered 24 byte fragments	100%	100%
5.7.3	Out of order 8 byte fragments	100%	100%
5.7.4	Ordered 8 byte fragments, duplicate last packet	100%	100%
5.7.5	Out of order 8 byte fragments, duplicate last packet	100%	100%
5.7.6	Ordered 8 byte fragments, reorder fragments in reverse	100%	100%
5.7.7	Ordered 16 byte frags, fragment overlap (favor new)	100%	100%
5.7.8	Ordered 16 byte frags, fragment overlap (favor old)	100%	100%
5.7.9	Out of order 8 byte fragments, interleaved duplicate packets scheduled for later delivery	100%	100%
5.8	Stream Segmentation		
5.8.1	Ordered 1 byte segments, interleaved duplicate segments with invalid TCP checksums	100%	100%
5.8.2	Ordered 1 byte segments, interleaved duplicate segments with null TCP control flags	100%	100%
5.8.3	Ordered 1 byte segs, interleaved duplicate segments with requests to resync sequence numbers mid-stream	100%	100%
5.8.4	Ordered 1 byte segments, duplicate last packet	100%	100%
5.8.5	Ordered 2 byte segments, segment overlap (favor new)	100%	100%
5.8.6	Ordered 1 byte segments, interleaved duplicate segments with out-of-window sequence numbers	100%	100%
5.8.7	Out of order 1 byte segments	100%	100%
5.8.8	Out of order 1 byte segments, interleaved duplicate segments with faked retransmits	100%	100%
5.8.9	Ordered 1 byte segments, segment overlap (favor new)	100%	100%
5.8.10	Out of order 1 byte segs, PAWS elimination (interleaved dup segs with older TCP timestamp options)	100%	100%
5.8.11	Ordered 16 byte segs, seg overlap (favor new (Unix))	100%	100%

Test ID	Description	Default	Tuned
5.9	RPC Fragmentation		
5.9.1	One-byte fragmentation (ONC)	100%	100%
5.9.2	Two-byte fragmentation (ONC)	100%	100%
5.9.3	All fragments, including Last Fragment (LF) will be sent in one TCP segment (ONC)	100%	100%
5.9.4	All frags except Last Fragment (LF) will be sent in one TCP segment. LF will be sent in separate TCP seg (ONC)	100%	100%
5.9.5	One RPC fragment will be sent per TCP segment (ONC)	100%	100%
5.9.6	One LF split over more than one TCP segment. In this case no RPC fragmentation is performed (ONC)	100%	100%
5.9.7	Canvas Reference Implementation Level 1 (MS)	100%	100%
5.9.8	Canvas Reference Implementation Level 2 (MS)	100%	100%
5.9.9	Canvas Reference Implementation Level 3 (MS)	100%	100%
5.9.10	Canvas Reference Implementation Level 4 (MS)	100%	100%
5.9.11	Canvas Reference Implementation Level 5 (MS)	100%	100%
5.9.12	Canvas Reference Implementation Level 6 (MS)	100%	100%
5.9.13	Canvas Reference Implementation Level 7 (MS)	100%	100%
5.9.14	Canvas Reference Implementation Level 8 (MS)	100%	100%
5.9.15	Canvas Reference Implementation Level 9 (MS)	100%	100%
5.9.16	Canvas Reference Implementation Level 10 (MS)	100%	100%
5.1	URL Obfuscation		
5.10.1	URL encoding - Level 1 (minimal)	100%	100%
5.10.2	URL encoding - Level 2	100%	100%
5.10.3	URL encoding - Level 3	100%	100%
5.10.4	URL encoding - Level 4	100%	100%
5.10.5	URL encoding - Level 5	100%	100%
5.10.6	URL encoding - Level 6	100%	100%
5.10.7	URL encoding - Level 7	100%	100%
5.10.8	URL encoding - Level 8 (extreme)	100%	100%
5.10.9	Premature URL ending	100%	100%
5.10.10	Long URL	100%	100%
5.10.11	Fake parameter	100%	100%
5.10.12	TAB separation	100%	100%
5.10.13	Case sensitivity	100%	100%
5.10.14	Windows \ delimiter	100%	100%
5.10.15	Session splicing	100%	100%
5.11	HTML Obfuscation		
5.11.1	UTF-16 character set encoding (big-endian)	100%	100%
5.11.2	UTF-16 character set encoding (little-endian)	100%	100%
5.11.3	UTF-32 character set encoding (big-endian)	100%	100%
5.11.4	UTF-32 character set encoding (little-endian)	100%	100%
5.11.5	UTF-7 character set encoding	100%	100%

Test ID	Description	Default	Tuned
5.11.6	Chunked encoding (random chunk size)	100%	100%
5.11.7	Chunked encoding (fixed chunk size)	100%	100%
5.11.8	Chunked encoding (chaffing)	100%	100%
5.11.9	Compression (Deflate)	100%	100%
5.11.10	Compression (Gzip)	100%	100%
5.11.11	Base-64 Encoding	100%	100%
5.11.12	Base-64 Encoding (shifting 1 bit)	100%	100%
5.11.13	Base-64 Encoding (shifting 2 bits)	100%	100%
5.11.14	Base-64 Encoding (chaffing)	100%	100%
5.11.15	Combination UTF-7 + Gzip	100%	100%
5.12	FTP Evasion		
5.12.1	Inserting spaces in FTP command lines	100%	100%
5.12.2	Inserting non-text Telnet opcodes - Level 1 (minimal)	100%	100%
5.12.3	Inserting non-text Telnet opcodes - Level 2	100%	100%
5.12.4	Inserting non-text Telnet opcodes - Level 3	100%	100%
5.12.5	Inserting non-text Telnet opcodes - Level 4	100%	100%
5.12.6	Inserting non-text Telnet opcodes - Level 5	100%	100%
5.12.7	Inserting non-text Telnet opcodes - Level 6	100%	100%
5.12.8	Inserting non-text Telnet opcodes - Level 7	100%	100%
5.12.9	Inserting non-text Telnet opcodes - Level 8 (extreme)	100%	100%
6	NIPS Performance		
6.1	Raw Packet Processing Performance (UDP Traffic)	Mbps	Mbps
6.1.1	128 Byte Packets	14,200	14,000
6.1.2	256 Byte Packets	20,000	20,000
6.1.3	512 Byte Packets	20,000	20,000
6.1.4	1024 Byte Packets	20,000	20,000
6.1.5	1514 Byte Packets	20,000	20,000
6.2	Maximum Capacity		
6.2.1	Concurrent TCP Connections	5,072,000	5,072,000
6.2.2	Concurrent TCP Conns w/Data	4,980,000	4,850,000
6.2.3	Stateful Protection at Max Concurrent Connections	PASS	PASS
6.2.4	TCP Connections/Second	358,000	352,000
6.2.5	HTTP Connections/Second	323,000	320,000
6.2.6	HTTP Transactions/Second	252,000	248,000
6.3	Behavior Of The State Engine Under Load		
6.3.1	Attack Detection/Blocking - Normal Load	100%	100%
6.3.2	State Preservation - Normal Load	100%	100%
6.3.3	Pass Legitimate Traffic - Normal Load	100%	100%
6.3.4	Attack Detection/Blocking - Maximum Exceeded	100%	100%
6.3.5	State Preservation - Maximum Exceeded	100%	100%

Test ID	Description	Default	Tuned
6.3.6	Pass Legitimate Traffic - Maximum Exceeded	100%	100%
6.4	HTTP Capacity With No Transaction Delays	CPS	CPS
6.4.1	44Kbyte Response	33,000	32,500
6.4.2	21Kbyte Response	58,000	56,000
6.4.3	10Kbyte Response	104,000	102,000
6.4.4	4.5Kbyte Response	194,000	190,000
6.4.5	1.7Kbyte Response	382,000	370,000
6.5	HTTP Capacity With Transaction Delays	CPS	CPS
6.5.1	21 Kbyte Response With Delay	54,000	45,500
6.5.2	10 Kbyte Response With Delay	97,000	84,500
6.6	"Real World" Traffic	Mbps	Mbps
6.6.1	Real World Protocol Mix (Perimeter)	13,200	13,000
6.6.2	Real World Protocol Mix (Core)	10,500	10,400
7	Management & Configuration Costs		
7.1	Ease of Use		
7.1.1	Initial Setup (Hours)	8	8
7.1.2	Time Required for Upkeep (Hours per Year)	25	25
7.1.3	Time Required to Tune (Hours per Year)	0	25
7.2	Expected Costs		
7.2.1	Initial Purchase	$224,995	$224,995
7.2.2	Ongoing Maintenance & Support (Annual)	$41,395	$41,395
7.2.3	Installation Labor Cost (@$75/hr)	$600	$600
7.2.4	Management Labor Cost (per Year @$75/hr)	$1,875	$1,875
7.2.5	Tuning Labor Cost (per Year @$75/hr)	$0	$1,875
7.3	Total Cost of Ownership		
7.3.1	Year 1	$268,865	$270,740
7.3.2	Year 2	$43,270	$45,145
7.3.3	Year 3	$43,270	$45,145
7.3.4	3 Year Total Cost of Ownership	$355,405	$361,030

6 Appendix A: Test Methodology

A copy of the test methodology is available on the NSS Labs website at www.nsslabs.com.

7 Appendix B: Special Thanks

Special thanks go to our test infrastructure partners who provide much of the equipment, software, and support that make this testing possible: