



NetSecOPEN Certification

Network Security Product Performance Testing

WatchGuard Firebox M5800

Testing Information

Vendor: WatchGuard Technologies INC.

Product name and Model: Firebox M5800

Product version: 12.6.2 (Build 628008)

Test Lab: University of New Hampshire Interoperability Lab

Test equipment: Spirent CyberFlood C100-S3

Test equipment version: Firmware: 5.13.0817 , Software: 20.5.4008

Test Date and Location: November 16, 2020 Durham, NH

Tested based on draft-ietf-bmwg-ngfw-performance-04 (<https://tools.ietf.org/html/draft-ietf-bmwg-ngfw-performance-04>)

Executive Summary

Introduction

The goal of NetSecOPEN is to provide performance testing standards developed by the membership, implemented on approved test tools and used by accredited test labs. These goals are intended to promote transparency and reproducibility. To achieve these goals the accredited labs freely provide access to their test reports, Device under Test (DUT) vendors provide the configuration of the DUT as it was tested and the test tool vendors provide the default configuration, while the lab documents changes to the test tool in the report.

All of these are provided at no charge to interested parties. Anyone interested in having access to the configuration files please e-mail the NetSecOPEN Certification Body at netsecopen-cert-body@netsecopen.org.

Summary of Findings

The NetSecOPEN Certification Body has reviewed the test report of the Firebox M5800 provided by University of New Hampshire InterOperability Lab. These results have been found to meet the NetSecOPEN certification requirements. Detailed results are provided below.

NetSecOPEN Certification is awarded to WatchGuard Technology's Firebox M5800 (version 12.6.2, Build 628008).

Note: this certification is product and version specific.

Results Summary

The tables 1 & 2 below highlight the measured values for the Key Performance indicators (KPIs). The values for individual object sizes and test scenarios are described in the section “Detailed Test Results”

HTTP Traffic Performance

Key Performance Indicator	Values
Connections Per Second (CPS)	19,766 CPS @ 1 KByte and 13, 409 CPS @ 64 KByte object sizes
Throughput	15.75 Gbit/s @ 256 KByte and 0.34 Gbit/s @ 1 KByte object sizes
Transactions Per Second (TPS)	27,532 TPS @ 1 KByte and 7,363 TPS @ 256 KByte object sizes
Time to First Byte (TTFB)	0.7 ms average TTFB @ 1 KByte and 1.3 ms average TTFB @ 64 KByte object sizes ¹ 1.0 ms average TTFB @ 1 KByte and 1.4 ms average TTFB @ 64 KByte object sizes ²
Time to Last Byte (TTLB)	200.6 ms average TTLB @ 1 KByte and 2.0 ms average TTLB @ 64 KByte object sizes ¹ 1.6 ms average TTLB @ 1 KByte and 2.7 ms average TTLB @ 64 KByte object sizes ²
Concurrent connection	119,997 average concurrent connection

Table 1: Results summary for HTTP tests

HTTPS Traffic Performance

Key Performance Indicator	Values
Connections Per Second (CPS)	1,653 CPS @ 1 KByte and 1,519 CPS @ 64 KByte object sizes
Throughput	5 Gbit/s @ 256 KByte and 0.21 Gbit/s @ 1 KByte object sizes
Transactions Per Second (TPS)	13,284 TPS @ 1 KByte and 2,332 TPS @ 256 KByte object sizes
Time to First Byte (TTFB)	10.7 ms average TTFB @ 1 KByte and 9.8 ms average TTFB @ 64 KByte object sizes ¹ 10.7 ms average TTFB @ 1 KByte and 10.2 ms average TTFB @ 64 KByte object sizes ²
Time to Last Byte (TTLB)	221.3 ms average TTLB @ 1 KByte and 29.9 ms average TTLB @ 64 KByte object sizes ¹ 196.4 ms average TTLB @ 1 KByte and 210.4 ms average TTLB @ 64 KByte object sizes ²
Concurrent connection	149,994 average concurrent connection

Table 2: Results summary for HTTPS tests

¹ Tested with 50% of max. throughput that the Firebox M5800 supported.

² Tested with 50% of max. CPS that the Firebox M5800 supported.

Test setup and configurations

All the tests were performed with test setup (option 2) defined in the draft in [section 4.1](#). Six 10GbE interfaces of the Firebox M5800 were directly connected with the test equipment.

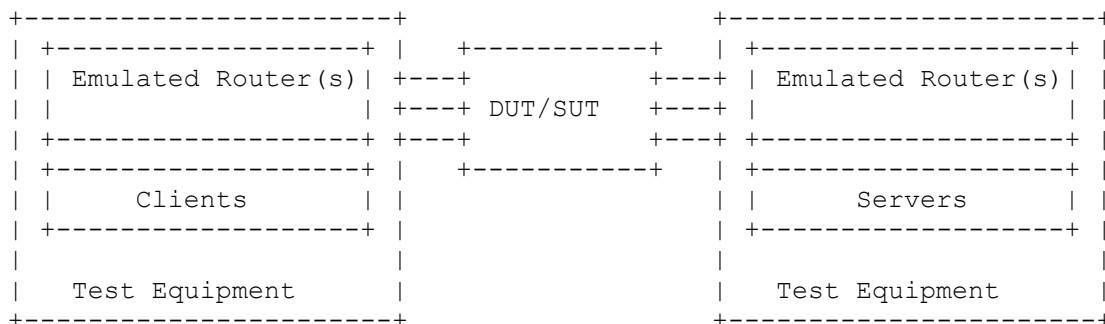


Figure 1: Testbed Setup

The table below shows the recommended and optional Next Generation Firewall (NGFW) features described in the draft that were enabled/disabled on the security device.

Features		Security device Status
SSL Inspection	Recommended	Enabled
IDS/IPS	Recommended	Enabled
Antivirus	Recommended	Enabled
Anti Spyware	Recommended	Enabled
Anti Botnet	Recommended	Enabled
Logging and Reporting	Recommended	Enabled
Application Identification	Recommended	Enabled
Web Filtering	Optional	Disabled
DLP	Optional	Disabled
DDoS	Optional	Disabled
Certificate Validation	Optional	Disabled

Table 3: NGFW security features

As defined in the draft ([section 4.2](#) table 3, DUT classification “M”) 236 ACL rules were configured on the Firebox M5800.

Before the performance tests were started, the Common Vulnerabilities and Exposures (CVE) tests were performed to ensure the security feature “Detection of Common Vulnerabilities and Exposures (CVE)” was enabled on the Firebox M5800 security device. The Firebox M5800 successfully detected and blocked attack attempts during this test, indicating that inspection/blocking capability was enabled and functioning.

All tests were performed with IPv4 traffic only. The ECDHE-RSA-AES128-GCM-SHA256 with RSA 2048 cipher suite was used for all the HTTPS performance tests. The latency values represent in the **Error! Reference source not found.** and **Error! Reference source not found.** measured with 50% of the maximum throughput supported by the Firebox M5800.

Detailed Test Results

TCP/HTTP Connections Per Second

Object Size [KByte]	Avg. TCP/HTTP Connections Per Second
1	19,766
2	19,358
4	19,020
16	17,536
64	13,409

Table 4: TCP/HTTP Connections per Second

HTTP Throughput and Transactions per Second

Object Size [KByte]	Avg. HTTP Throughput [Gbit/s]	Avg. HTTP Transaction Per Second
1	0.34	27,532
16	3.29	24,061
64	10.24	19,071
256	15.75	7,363
Mixed objects	8.75	19,807

Table 5: HTTP Throughput

TCP/HTTP Transaction Latency

The test was performed with two traffic load profile as defined in the draft. Table 6 below describes the latency results measured with 50% of the maximum connection per second supported by Firebox M5800.

Object Size [KByte]	Time to First Byte [ms]			Time to Last Byte [ms]		
	Min	avg	Max	Min	avg	Max
1	0.4	1.0	74.9	0.4	1.6	60.9
16	0.4	1.2	55.6	0.8	1.8	57.3
64	0.4	1.4	59.9	1.3	2.7	206.1

Table 6: TCP/HTTP TTFB and TTLB @ 50% of the maximum connection per second

Table 7 below describes latency results measured with 50% of the maximum throughput supported by Firebox M5800.

Object Size [KByte]	Time to First Byte [ms]			Time to Last Byte [ms]		
	Min	avg	Max	Min	avg	Max
1	0.4	0.7	49.5	0.8	200.6	256.5
16	0.4	0.9	48.9	0.5	1.1	77.4
64	0.4	1.3	66.9	0.9	2.0	207.5

Table 7: TCP/HTTP TTFB and TTLB @ 50% of the maximum Throughput

Figures 2-4 illustrate the distribution of maximum latency (TTFB and TTLB) values measured in approximately 76 measurement samples.

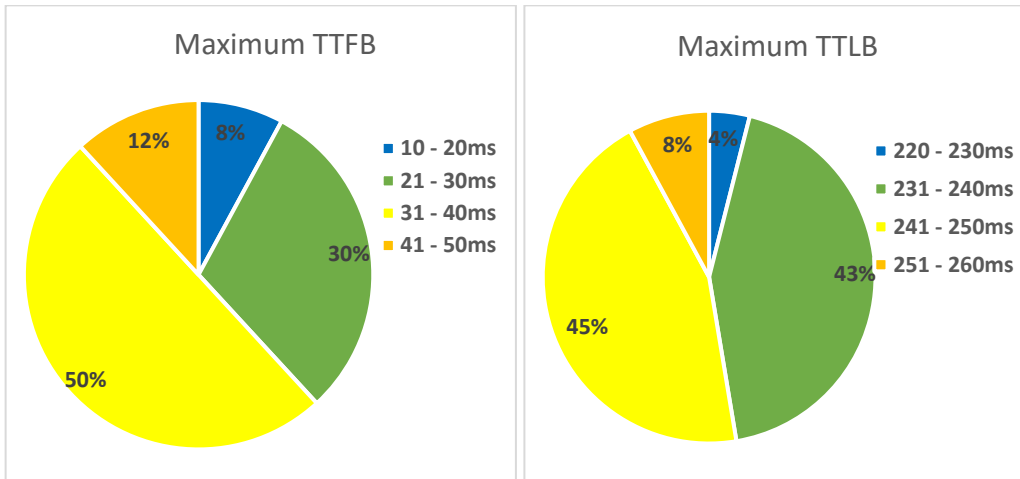


Figure 2: Latency distribution measured with 1KByte object size in Throughput test scenario

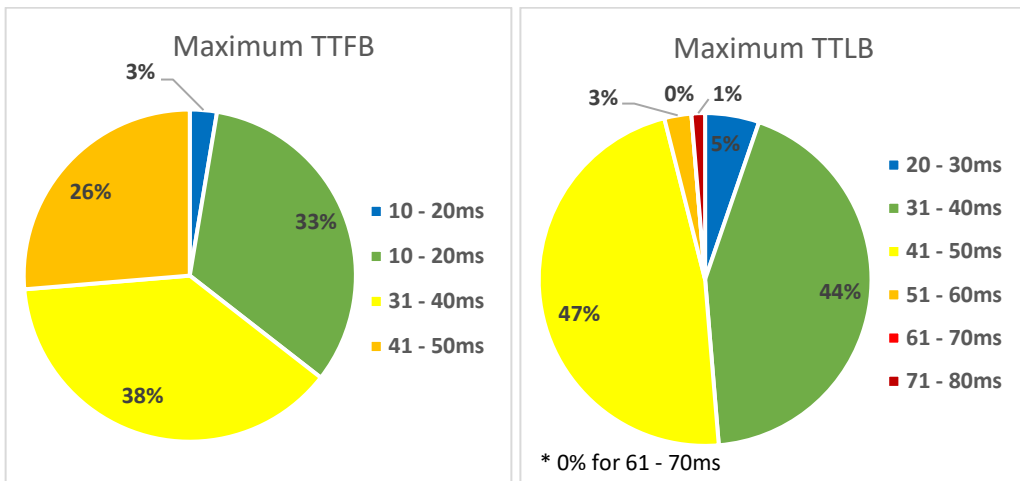


Figure 3: Latency distribution measured with 16KByte object size in Throughput test scenario

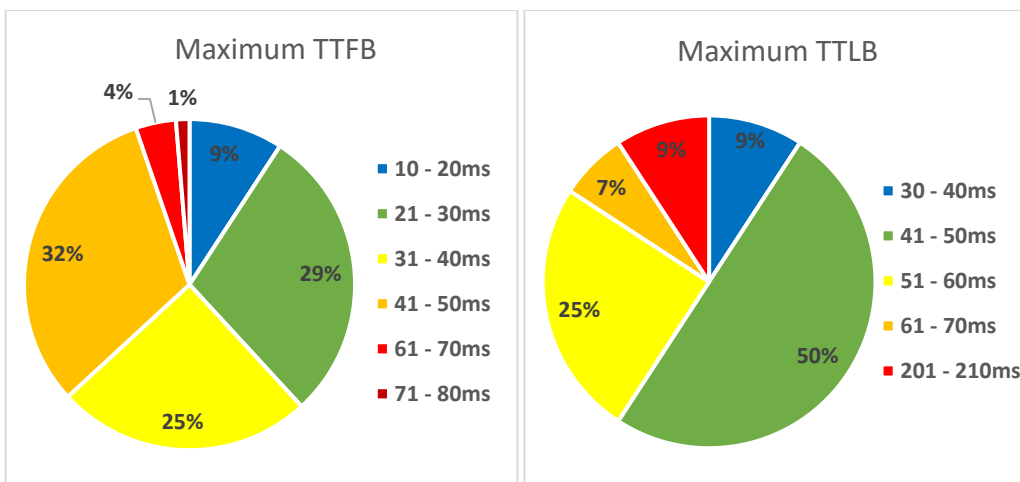


Figure 4: Latency distribution measured with 64KByte object size in Throughput test scenario

Concurrent TCP/HTTP Connection Capacity

The Firebox M5800 supported 119,997 concurrent TCP/HTTP connection in average. 1 KByte object size was used as HTTP GET request for each established TCP connection, which resulted an average throughput of 15.8 Mbit/s.

TCP/HTTPS Connections per second

Object Size [KByte]	Avg. TCP/HTTPS Connections Per Second
1	1,653
2	1,641
4	1,632
16	1,602
64	1,519

Table 8: TCP/HTTPS Connections per Second

HTTPS Throughput

Object Size [KByte]	Avg. HTTPS Throughput [Gbit/s]	Avg. HTTPS Transaction Per Second
1	0.21	13,284
16	1.51	10,805
64	3.60	6,654
256	5.00	2,332
Mixed objects	3.12	6,999

Table 9: HTTPS Throughput

HTTPS Transaction Latency

The test was performed with two traffic load profile as defined in the draft. Table 10 below describes the latency results measured with 50% of the maximum connection per second supported by FireBox M5800.

Object Size [KByte]	Time to First Byte [ms]			Time to Last Byte [ms]		
	Min	avg	Max	Min	avg	Max
1	5.2	10.7	77.2	0.8	196.4	249.8
16	7.0	10.8	72.9	142.3	196.9	249.8
64	4.9	10.2	68.7	4.1	210.4	1,533.7

Table 10: TCP/HTTPS TTFB and TTLB @ 50% of the maximum connection per second

Table 11 below describes latency results measured with 50% of the maximum throughput supported by FireBox M5800.

Object Size [KByte]	Time to First Byte [ms]			Time to Last Byte [ms]		
	Min	avg	Max	Min	avg	Max
1	7.1	10.7	70.4	200.5	221.3	451.0
16	7.1	9.9	83.6	0.8	21.4	248.6
64	7.1	9.8	123.6	1.8	29.9	1,117.1

Table11: TCP/HTTP TTFB and TTLB @ 50% of the maximum Throughput

Figures 5 -7 illustrate the distribution of maximum latency (TTFB and TTLB) values measured in approximately 76 measurement samples.

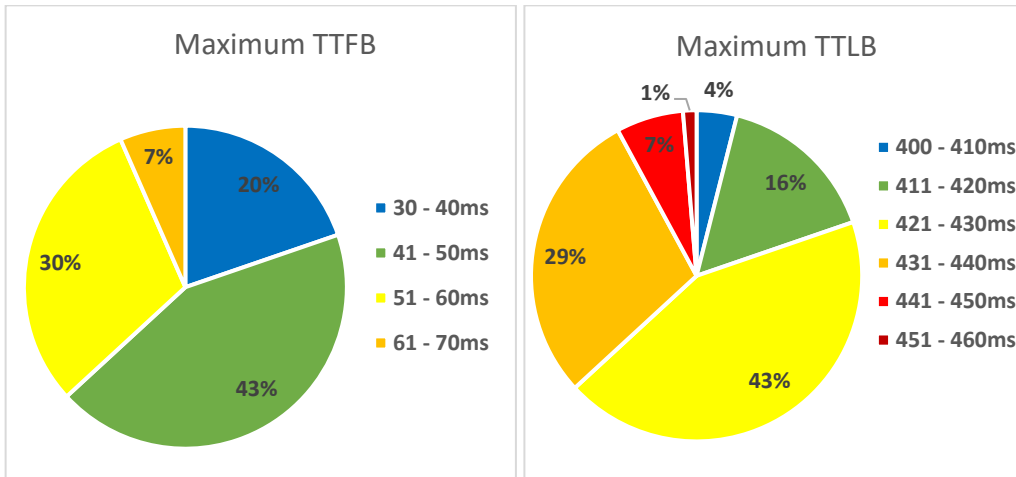


Figure 5: Latency distribution measured with 1KByte object size in Throughput test scenario

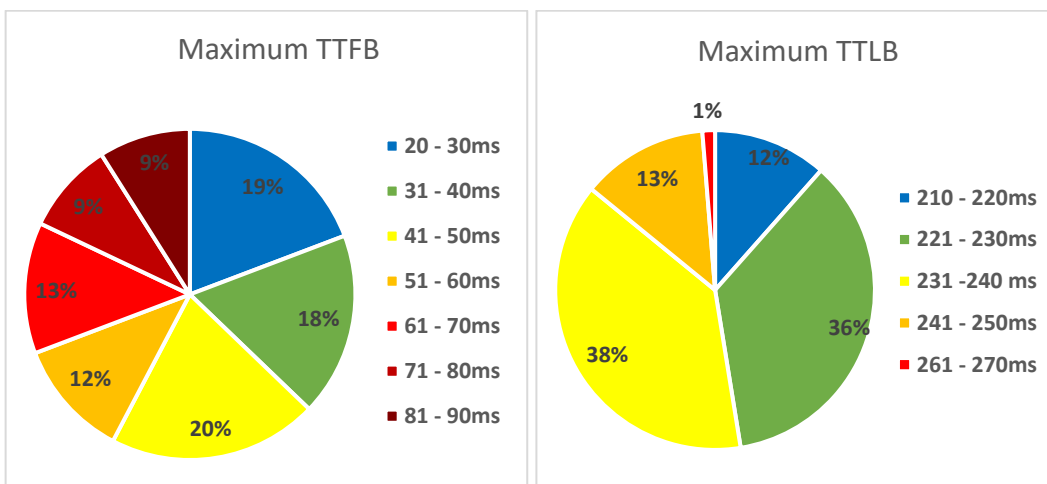


Figure 6: Latency distribution measured with 16KByte object size in Throughput test scenario

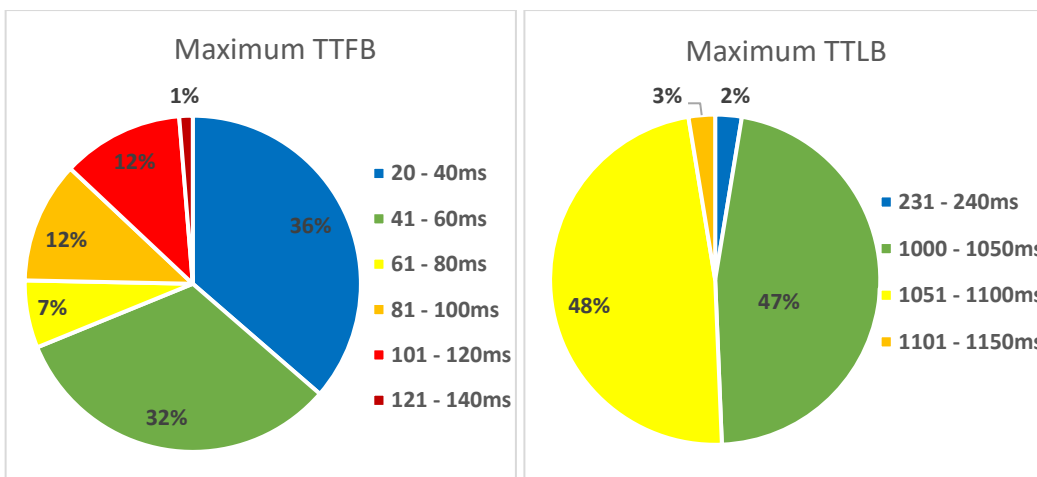


Figure 7: Latency distribution measured with 64KByte object size in Throughput test scenario

Concurrent TCP/HTTPS Connection Capacity

The WatchGuard's Firebox M5800 supported 149,994 concurrent TCP/HTTPS connection in average. 1 KByte object size was used as HTTPS GET request for each established TCP connection, which resulted an average throughput of 25.5 Mbit/s.