



NGFW Firewall Security Benchmark 2024

Firewall Security Efficacy Competitive Assessment Summary Lab Report

for

Check Point Software

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Table of Contents

1.0 Executive Summary	3
2.0 Testing Summary Results	5
2.1 Malware Prevention and Detection Summary	5
2.1.1 Malware Prevention vs Detection-Only Zero+1 Day Malware	5
2.1.2 Malware Prevention Efficacy Zero+1 Day Malware	6
2.2 Malicious Phishing URLs Prevention and Detection Summary	7
2.2.1 Phishing and Malicious URL Prevention	7
3.0 False Positive Detection	8
3.1 False Positive Testing Summary	8
3.1.1 False Positive Rate for Malware Detection	8
4.0 Products Tested	9
5.0 Test Setup	10
5.1 Miercom Advanced Offensive Threat Detection	10
5.2 VirusTotal	11
5.3 Testing Environment	12
6.0 About Miercom	13
7.0 Use of This Report	13

1.0 Executive Summary

Miercom was engaged by Check Point to conduct competitive security effectiveness testing of the Check Point Next Generation Firewalls (NGFW) as compared to products from Cisco, Fortinet, and Palo Alto Networks. Testing with Zscaler involved their SWG (Secure Web Gateway). Testing included verifying the effectiveness of anti-virus, anti-malware, Intrusion Prevention System (IPS), anti-bot, URL Filtering (URLF), sandboxing, machine learning, and phishing protection. We conducted tests with all security services enabled and challenged each solution's ability to detect and block modern-day malware.

Modern threats like web-based malware attacks, targeted phishing attacks, application-layer attacks, and others increase the threat level against organizations globally. The majority of new malware and intrusion attempts to exploit weaknesses in applications, as opposed to networking components and services. NGFWs with advanced threat prevention offer the best protection against the latest generation of cyberattacks.



Our testing specifically focused on the ability to detect and prevent new malware variants within the first 24 hours of their discovery as well as detecting and preventing new phishing sites.

In this report, **Zero+1 Day** Malware (one day past Zero-Day discovery) means newly discovered malware on the first day of discovery. These malware samples are less likely to be known by any vendor's signature detection mechanisms in the first 24 hours

Terms used in this report include **Prevent** vs. **Detect-Only**. Prevent means malware was blocked. Detect-Only means malware was identified but not blocked.

Key Findings

Critical Prevention Rate in the first 24 hours: Check Point led in the group test for immediate prevention of the total malware samples. The first 24 hours of a malware campaign are the most dangerous, and this is the critical time to stop an attack before it quickly spreads and creates widespread damage. A security system with a higher block rate in the first 24 hours means an enterprise will spend less time, money, and energy responding to and remediating infected servers and endpoints.

- **Zero+1 Day Malware Prevent vs. Detect Tests:** Check Point prevented over 99.8% of new malware from a comprehensive set of files and file types, including executables, documents, and archived files that were no more than one day old.

Check Point led with the highest score preventing 99.8% of malware downloads
Fortinet had 84.0% prevention and 9.4% detect-only

Zscaler had 75.4% prevention

Palo Alto Networks had 69.4% prevention and 8.7% detect-only

Cisco had 47.8% prevention and 37.2% detect-only

[2.1.1 Prevention vs Detection-Only for Zero+1 Day Malware](#)

- **Zero+1 Day Malware Prevent (First to Block) Results**

Check Point led with a 99.8% prevention rate

Fortinet had an 84.0% prevention rate

Zscaler had a 75.4% prevention rate

Palo Alto Networks had a 69.4% prevention rate

Cisco had a 47.8% prevention rate

[2.1.2 Prevention Efficacy for Zero+1 Day Malware](#)

- **Phishing Prevention:** Again, the first 24 hours are the most critical time to block attacks. Check Point proved to have the best overall prevention against phishing URLs, making use of (R81.20) advanced AI deep learning capabilities.

Check Point led with a 100.0% phishing and malicious URL prevention rate

Zscaler had a 97.2% prevention rate

Palo Alto Networks had a 96.5% prevention rate

Fortinet had a 95.9% prevention rate

Cisco had a 53.1% prevention rate

[2.2.1 Phishing and Malicious URL Prevention](#)

- **False Positive Malware Detection:** Content falsely reported as malicious creates unnecessary workload and stress on security teams. This, in turn, creates complacency and reduces an organization's overall security posture and security efficacy.

Check Point led the group with the lowest false positive detection rate of 0.13%

Zscaler had a 0.20% false positive rate

Fortinet had a 0.23% false positive rate

Cisco had a 0.27% false positive rate

Palo Alto Networks had a 0.30% false positive rate

[3.1.1 False Positive Detection Rate for Malware](#)

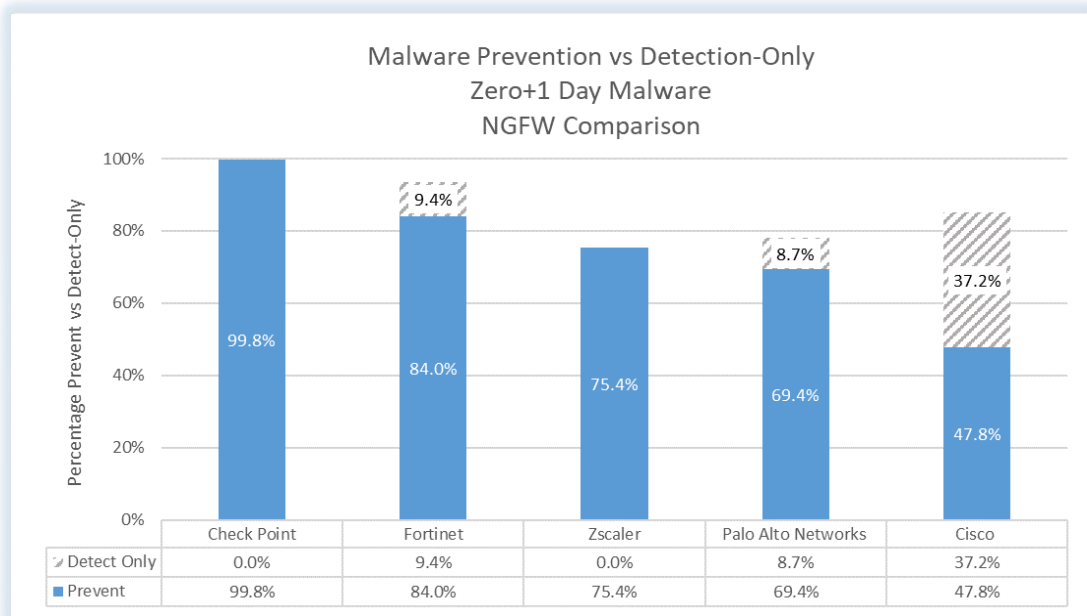
- **Integrated Machine Learning Technology:** We evaluated each vendor's product with the most aggressive detection settings and detection features available, including Machine Learning (ML). Check Point and Fortinet uniquely incorporate ML capabilities into the immediate detection and block response.

2.0 Testing Summary Results

2.1 Malware Prevention and Detection Summary

Summary of NGFW Test Results: Blocking and Detection Efficacy comparing test results from Zero+1 Day recently discovered malware between products.

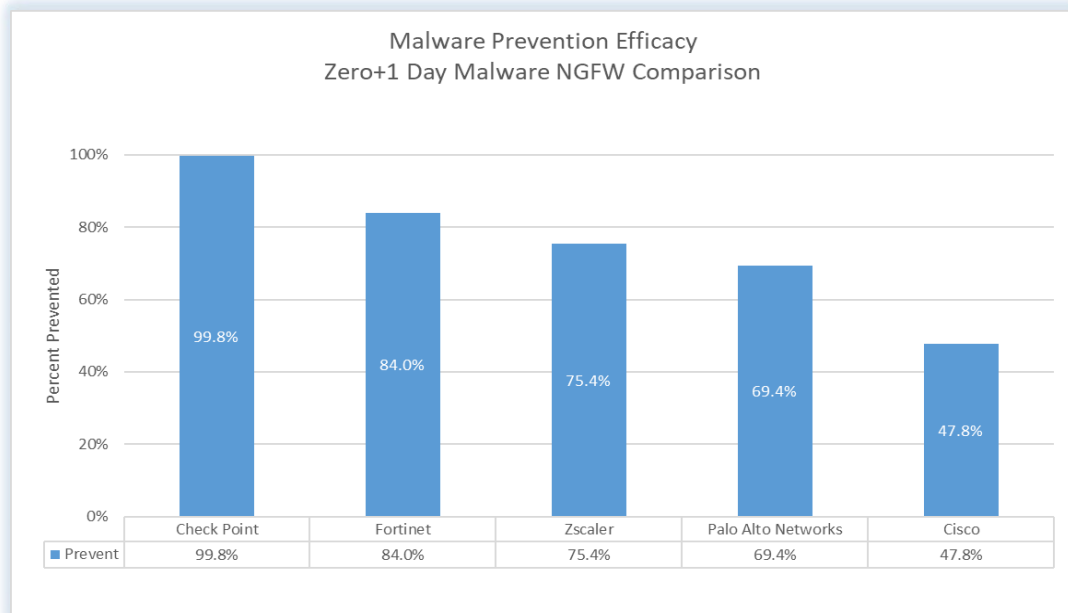
2.1.1 Malware Prevention vs Detection-Only Zero+1 Day Malware



The chart above reflects how each vendor's firewall performed in **Prevention** vs. **Detection-Only** in the first 24 hours of an attack. **Prevent** means the solution identified malware and immediately blocked it from entering the network. **Detect-Only** means the solution identified malware but did not prevent that malware from entering the network.

New Variant Malware Prevention success rate: In our Zero+1 Day Malware test, Check Point prevented over 99.8% of malware from a large set of files and file types including executables, documents, and archives. Palo Alto Networks, Fortinet, Cisco, and Zscaler had prevention rates of 69.4%, 84.0%, 47.8%, and 75.4% respectively.

2.1.2 Malware Prevention Efficacy Zero+1 Day Malware

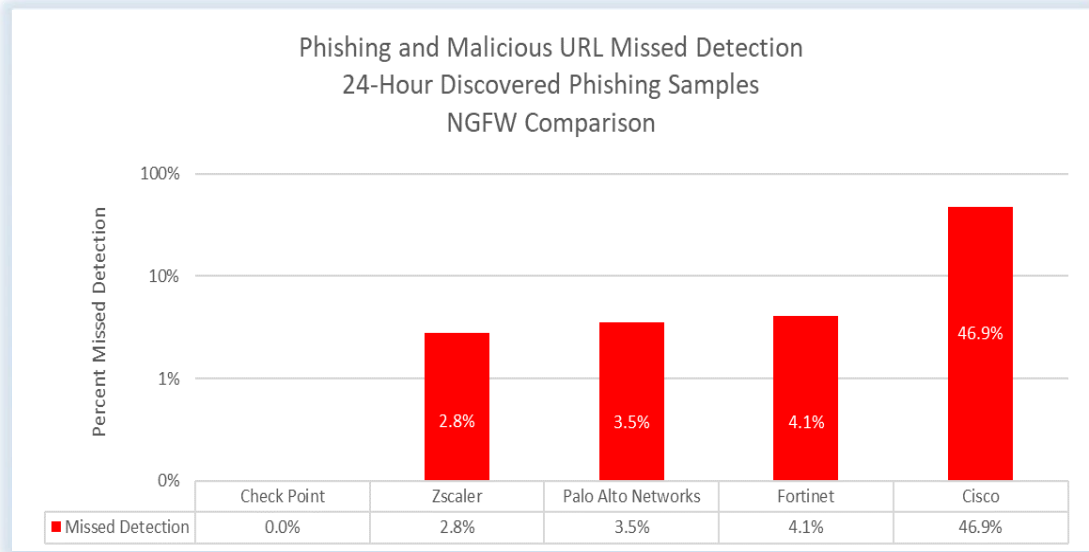


The chart above reflects how each vendor's firewall performed prevention in the first 24 hours of an attack. **Prevent** means the solution identified the malware and immediately blocked it from entering the network.

2.2 Malicious Phishing URLs Prevention and Detection Summary

Summary of NGFW Test Results: Blocking and Detection Efficacy comparing test results from recently discovered phishing and other malicious URLs.

2.2.1 Phishing and Malicious URL Prevention



Missed malicious URLs, less is better. The chart above shows how each vendor's NGFW product performs in Detecting and Preventing of newly discovered (less than 24-Hour known) phishing and other malicious URLs. Check Point demonstrated not only static detection ability but could also detect phishing websites dynamically with AI-based phishing protection, based on analysis of web page content such as corporate logos/icons, suspicious fields, irregular spellings, redirection, and many other obscured maleficent components of these websites. This double layer of protection (reputation-based and content analysis) for phishing detection is important as many phishing websites change their IP address locations and domain names to defeat static reputation-based forms of protection.

3.0 False Positive Detection

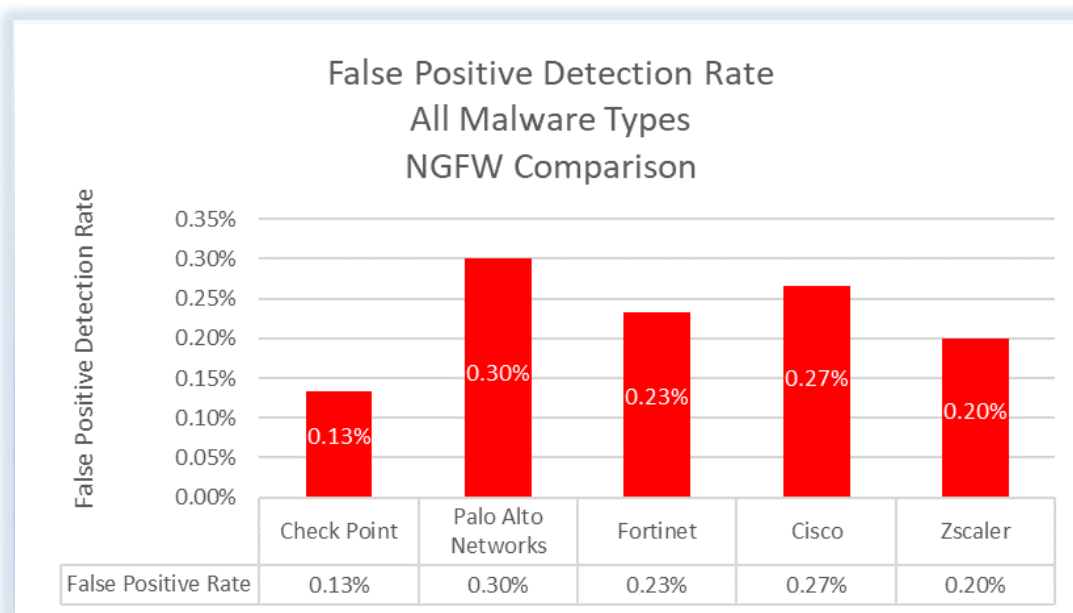
3.1 False Positive Testing Summary

False positive occurrences are non-malicious (or benign) files that are misidentified as malicious. Some files fall into a gray category due to their possible misuse on a network. An example of this is a password recovery tool, which, while not technically malicious, is often detected for its malicious potential.

Samples evaluated the granularity of the NGFWs AV engine. An intelligent AV engine flags only malicious files (true positive), so that users can continue clean file transactions. If the false positive detection is too high, the AV engine is considered overly aggressive, hindering network activity and productivity. An intelligent AV engine knows when to pass and not pass samples.

We sent a mixture of false positive samples (clean, suspicious files) and true positives (malware files) via HTTP. Of the clean files sent, we calculated the percentage of samples the NGFW mistakenly flagged as malicious.

3.1.1 False Positive Rate for Malware Detection



For false positive detection, less is better. We examined each of the NGFW products for incidents of false positive detection in the malware tests. These are sample files that may be challenging for the NGFW products to determine whether they are malicious or not when they are not actually malicious. Check Point scored the best, with lowest false positive detection compared to Palo Alto Networks, Fortinet, Cisco, and Zscaler. Testing included review of thousands of samples over the previous 90 days.

4.0 Products Tested

Check Point

Version: R82 and R81.20

Data sheet and specifications:

https://downloads.checkpoint.com/fileserver/SOURCE/direct/ID/103832/FILE/CP_R81_ReleaseNotes.pdf

Palo Alto Networks

Version: PAN-OS 11.1.1

Data sheet and specifications:

https://docs.paloaltonetworks.com/content/dam/techdocs/en_US/pdf/pan-os/11-1/pan-os-release-notes/pan-os-release-notes.pdf

Fortinet

Version: FortiGate/FortiOS 7.4.2

<https://docs.fortinet.com/document/fortigate/7.4.2/administration-guide/954635>

Cisco Systems

Version: 7.4.1

Data sheet and specifications:

<https://www.cisco.com/c/en/us/td/docs/security/secure-firewall/management-center/admin/740/management-center-admin-74/get-started-overview.html>

Zscaler

Platform version: 6.2

Client Version: 3.9.0.156

Data sheet and specifications:

<https://help.zscaler.com/zia/step-step-configuration-guide-zia>

5.0 Test Setup

The testing conducted was designed to determine the strengths and weaknesses of each NGFW product. In addition to generating traffic patterns and attacks from industry test tools, we use unique, verified malicious samples for a customized, open-source approach. High detection efficacy against this blend of malicious samples indicates well-rounded protection from multiple attack vectors.

Over the course of 90 days, we repeatedly downloaded sets of 500 malicious files from VirusTotal (most recently submitted) - with over 25 engines with verdict malicious (high probability of being valid malware). These malicious samples consisted of Office docx, Office xlsx, pdf, exe, and dll and archived files. We assessed each NGFW solution using AV + Anti-Malware, IPS, anti-bot, URLF, sandboxing, and machine learning inline detection mechanisms. Testing was run concurrently on each of the vendor's NGFW solutions.

To further challenge the signature detection mechanisms of the devices under test (DUTs) the malicious samples were also slightly modified to ensure a new hash would be determined for these samples. The modification was done without affecting the malicious payload execution. This allowed the known malware samples to be discovered as new variants, which better challenged the "signature" engines for the NGFWs.

5.1 Miercom Advanced Offensive Threat Detection


The threat landscape evolves each day and with more complexity, requiring not only more offensive security but also more dynamic methods of testing. Miercom's Advanced Offensive Security Testing incorporates scenario-driven methods to provide consumers with relevant data regarding their security. These tests assess the ability of the DUT to detect and prevent specific types of sensitive data from leaving the network without introducing performance degradation. Targeted traffic flows consist of emails that we generate to contain criteria such as user accounts, keywords, and randomized numeric strings formatted, like credit card numbers or tax identification numbers. Simulated targeted traffic is sent in simultaneously with real-world benign background traffic to evaluate detection efficacy and check for false positive detection.

5.2 VirusTotal

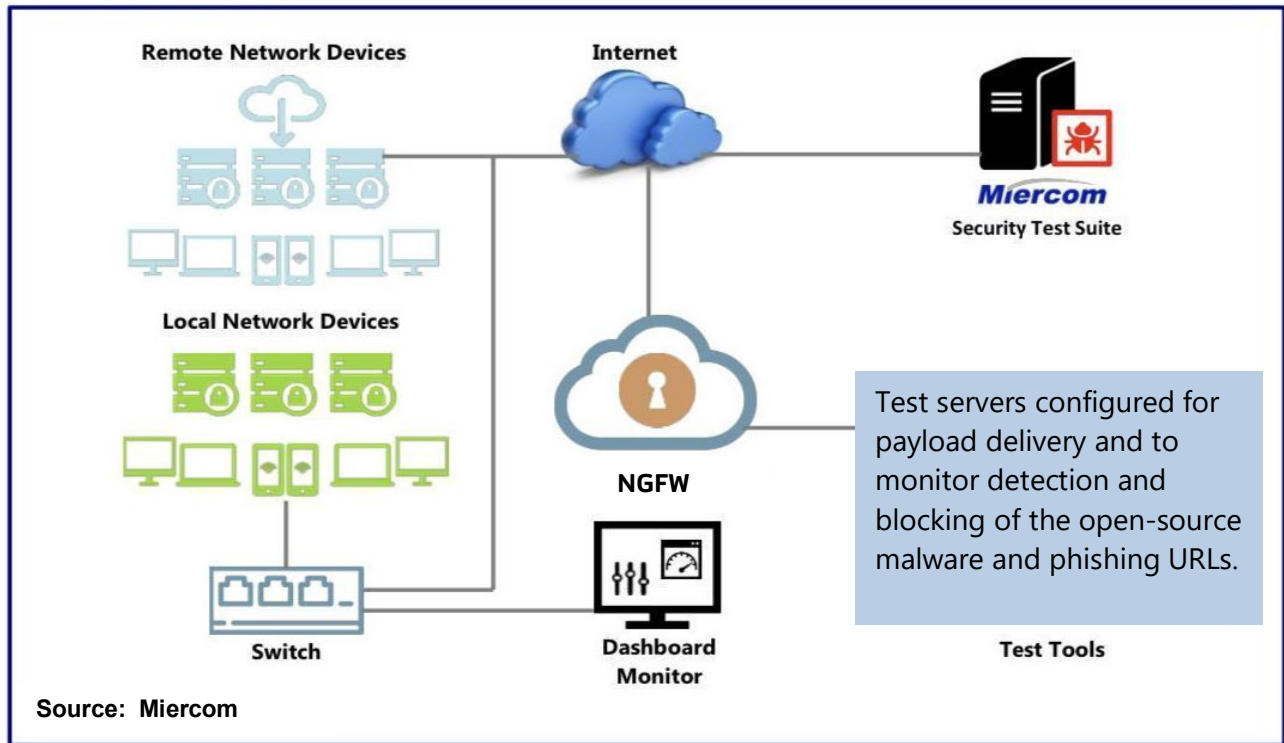
Malware samples from VirusTotal were downloaded and were later used for evaluating all the NGFW products. A user can select a file from their computer using a web browser and send it to VirusTotal. VirusTotal offers many file submission methods, including the primary public web interface, desktop uploaders, browser extensions, and a programmatic API. The web interface has the highest scanning priority among the publicly available submission methods. Submissions may be scripted in any programming language using the HTTP-based public API.

The rule set for selecting the VirusTotal samples features in testing is shown below. The sample set for Zero + 1 Malware consisted of sets of 500 randomly selected, freshly submitted samples within 24 hours with at least 25 of VirusTotal's ~80.

The rule set for selecting the VirusTotal samples is shown below:

	<code>type:executable p:25+ size:5mb- fs:2024-01-01+</code>
	<code>type:zip p:25+ size:5mb- fs:2024-01-01+</code>
	<code>type:document p:25+ size:5mb- fs:2024-01-01+</code>

5.3 Testing Environment



Vendor	Product	Version	Feature Bundles
Check Point	Quantum Cyber Security Platform	R82 and R81.20	SNBT
Cisco Systems	Cisco Firepower	7.4.1	TMC
Fortinet	FortiGate	FortiOS 7.4.2	Enterprise
Palo Alto Networks	PAN NGFW	PAN-OS 11.1.1	Core-Security Bundle
Zscaler	ZIA	6.2	Transformation Bundle

6.0 About Miercom

Miercom has published hundreds of network product analyzes in leading trade periodicals and other publications. Miercom's reputation as the leading, independent product test center is undisputed.

Private test services available from Miercom include competitive product analyzes, as well as individual product evaluations. Miercom features comprehensive certification and test programs, including Certified Interoperable™, Certified Reliable™, Certified Secure™, and Certified Green™. Products may also be evaluated under the Performance Verified™ program, the industry's most thorough and trusted assessment of product usability and performance.

7.0 Use of This Report

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