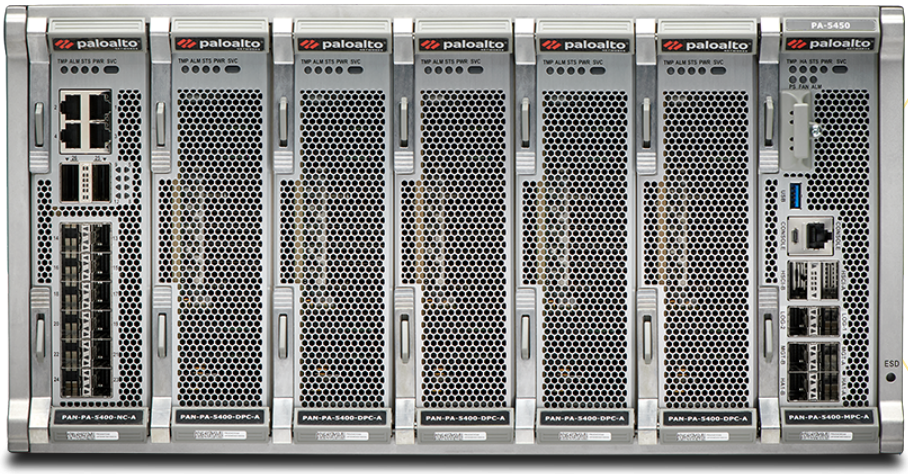


PA-5450

The Palo Alto Networks PA-5450 ML-Powered Next-Generation Firewall (NGFW) platform is designed for hyperscale data center, internet edge, and campus segmentation deployments. Delivering incredible performance—152 Gbps of Threat Prevention throughput with security services enabled—it is based on a scalable, modular design that enables you to increase performance as your needs increase. The PA-5450 offers simplicity defined by a single-system approach to management and licensing.

Highlights

- World's first ML-Powered NGFW
- Ten-time Leader in the Gartner® Magic Quadrant™ for Network Firewalls
- Leader in the Forrester Wave™: Enterprise Firewalls, Q3 2020
- Highest Security Effectiveness score in the 2019 NSS Labs NGFW Test Report, with 100% of evasions blocked
- Operates on a unified and scalable architecture
- Delivers 5G-native security built to safeguard service provider and enterprise 5G transformation and multi-access edge computing (MEC)
- Extends visibility and security to all devices, including unmanaged IoT devices, without the need to deploy additional sensors
- Supports high availability with active/active and active/passive modes
- Delivers predictable performance with security services

The world's first ML-Powered NGFW enables you to prevent unknown threats, see and secure everything—including the Internet of Things (IoT)—and reduce errors with automatic policy recommendations. The controlling element of the PA-5450 is PAN-OS®, the same software that runs all Palo Alto Networks NGFWs. PAN-OS natively classifies all traffic, inclusive of applications, threats, and content, and then ties that traffic to the user regardless of location or device type. The application, content, and user—in other words, the elements that run your business—then serve as the basis of your security policies, resulting in improved security posture and reduced incident response time.

Key Security and Connectivity Features

ML-Powered Next-Generation Firewall

- Embeds machine learning (ML) in the core of the firewall to provide inline signatureless attack prevention for file-based attacks while identifying and immediately stopping never-before-seen phishing attempts.
- Leverages cloud-based ML processes to push zero-delay signatures and instructions back to the NGFW.
- Uses behavioral analysis to detect IoT devices and make policy recommendations as part of a cloud-delivered and natively integrated service on the NGFW.
- Automates policy recommendations that save time and reduce the chance of human error.

Identifies and Categorizes All Applications, on All Ports, All the Time, with Full Layer 7 Inspection

- Identifies the applications traversing your network irrespective of port, protocol, evasive techniques, or encryption (TLS/SSL).
- Automatically discovers and controls new applications to keep pace with the SaaS explosion with SaaS Security subscription.
- Uses the application, not the port, as the basis for all your safe enablement policy decisions: allow, deny, schedule, inspect, and apply traffic-shaping.
- Offers the ability to create custom App-ID™ tags for proprietary applications or request App-ID development for new applications from Palo Alto Networks.
- Identifies all payload data (e.g., files and data patterns) within an application to block malicious files and thwart exfiltration attempts.
- Creates standard and customized application usage reports, including software-as-a-service (SaaS) reports that provide insight into all sanctioned and unsanctioned SaaS traffic on your network.
- Enables safe migration of legacy Layer 4 rule sets to App-ID-based rules with built-in Policy Optimizer, giving you a rule set that is more secure and easier to manage.
- Check out the App-ID tech brief for more information.

Enforces Security for Users at Any Location, on Any Device, While Adapting Policy Based on User Activity

- Enables visibility, security policies, reporting, and forensics based on users and groups—not just IP addresses.
- Easily integrates with a wide range of repositories to leverage user information: wireless LAN controllers, VPNs, directory servers, SIEMs, proxies, and more.
- Allows you to define Dynamic User Groups (DUGs) on the firewall to take time-bound security actions without waiting for changes to be applied to user directories.
- Applies consistent policies irrespective of users' locations (office, home, travel, etc.) and devices (iOS and Android® mobile devices, macOS®, Windows®, Linux desktops, laptops; Citrix and Microsoft VDI and Terminal Servers).
- Prevents corporate credentials from leaking to third-party websites and prevents reuse of stolen credentials by enabling multi-factor authentication (MFA) at the network layer for any application without any application changes.
- Provides dynamic security actions based on user behavior to restrict suspicious or malicious users.
- Consistently authenticates and authorizes your users, regardless of location and where user identity stores live, to quickly move towards a Zero Trust security posture with Cloud Identity Engine—an entirely new cloud-based architecture for identity-based security.
- Check out the Cloud Identity Engine solution brief for more information.

Prevents Malicious Activity Concealed in Encrypted Traffic

- Inspects and applies policy to TLS/SSL-encrypted traffic, both inbound and outbound, including for traffic that uses TLS 1.3 and HTTP/2.
- Offers rich visibility into TLS traffic, such as amount of encrypted traffic, TLS/SSL versions, cipher suites, and more, without decrypting.
- Enables control over use of legacy TLS protocols, insecure ciphers, and misconfigured certificates to mitigate risks.
- Facilitates easy deployment of decryption and lets you use built-in logs to troubleshoot issues, such as applications with pinned certificates.
- Lets you enable or disable decryption flexibly based on URL category, source and destination zone, address, user, user group, device, and port, for privacy and compliance purposes.
- Allows you to create a copy of decrypted traffic from the firewall (i.e., decryption mirroring) and send it to traffic collection tools for forensics, historical purposes, or data loss prevention (DLP).
- Allows you to intelligently forward all traffic (decrypted TLS, non-decrypted TLS, and non-TLS) to third-party security tools with Network Packet Broker and optimize your network performance and reduce operating expenses.
- Refer to this decryption white paper to learn where, when and how to decrypt to prevent threats and secure your business.

Offers Centralized Management and Visibility

- Benefits from centralized management, configuration, and visibility for multiple distributed Palo Alto Networks NGFWs (irrespective of location or scale) through Panorama™ network security management, in one unified user interface.
- Streamlines configuration sharing through Panorama with templates and device groups, and scales log collection as logging needs increase.
- Enables users, through the Application Command Center (ACC), to obtain deep visibility and comprehensive insights into network traffic and threats.

Maximize Your Security Investment and Prevent Business Disruption with AIOps

- AIOps for NGFW delivers continuous best practice recommendations customized to your unique deployment to strengthen your security posture and get the most out of your security investment.
- Intelligently predicts firewall health, performance and capacity problems based on ML powered by advanced telemetry data. It also provides actionable insights to resolve the predicted disruptions.

Detect and Prevent Advanced Threats with Cloud-Delivered Security Services

Today's sophisticated cyberattacks can spawn 45,000 variants in 30 minutes using multiple threat vectors and advanced techniques to deliver malicious payloads. Traditional siloed security causes challenges for organizations by introducing security gaps, increasing overhead for security teams, and hindering business productivity with inconsistent access and visibility.

Seamlessly integrated with our industry-leading NGFWs, our Cloud-Delivered Security Services use the network effect of 80,000 customers to instantly coordinate intelligence and protect against all threats across all vectors. Eliminate coverage gaps across your locations and take advantage of best-in-class security delivered consistently in a platform to stay safe from even the most advanced and evasive threats.

Services include:

- **Advanced Threat Prevention**: Stop known exploits, malware, malicious URLs, spyware, and command and control (C2) with 96% prevention of web-based Cobalt Strike C2 and 48% more unknown C2 detected than the industry's leading intrusion prevention (IPS) solution.
- **WildFire® malware prevention**: Ensure files are safe by automatically detecting and preventing unknown malware 180X faster with industry-largest threat intelligence and malware prevention engine.
- **Advanced URL Filtering**: Enable safe access to the internet with the industry's first real-time prevention of known and unknown websites, stopping 76% of malicious URLs 24 hours before other vendors.

- **DNS Security**: Gain 40% more DNS-attack coverage and disrupt the 80% of attacks that use DNS for command and control and data theft, without requiring any changes to your infrastructure.
- **Enterprise DLP**: Minimize risk of a data breach, stop out-of-policy data transfers, and enable compliance consistently across your enterprise, with 2X greater coverage of any cloud-delivered enterprise DLP.
- **SaaS Security**: Stay ahead of the SaaS explosion with the industry's only Next-Generation CASB to automatically see and secure all apps across all protocols.
- **IoT Security**: Safeguard every "thing" and implement Zero Trust device security 20X faster, with the industry's smartest security for smart devices.

Enables SD-WAN Functionality

- Allows you to easily adopt SD-WAN by simply enabling it on your existing firewalls.
- Enables you to safely implement SD-WAN, natively integrated with our industry-leading security.
- Delivers an exceptional end-user experience by minimizing latency, jitter, and packet loss.

Delivers a Unique Approach to Packet Processing with Single-Pass Architecture

- Performs networking, policy lookup, application and decoding, and signature matching—for all threats and content—in a single pass. This significantly reduces the amount of processing overhead required to perform multiple functions in one security device.
- Avoids introducing latency by scanning traffic for all signatures in a single pass, using stream-based, uniform signature matching.
- Enables consistent and predictable performance when security subscriptions are enabled. (In table 1, "Threat Prevention throughput" is measured with multiple subscriptions enabled.)

PA-5450 Architecture

The PA-5450 is powered by a scalable architecture for the purposes of applying the appropriate type and volume of processing power to the key functional tasks of networking, security, and management. The device is managed as a single unified system, enabling you to easily direct all available resources to protect your data. The PA-5450 intelligently distributes processing demands across three subsystems, each with massive amounts of computing power and dedicated memory: the Networking Card (NC), the Data Processing Card (DPC), and the Management Processing Card (MPC).

The PA-5450 offers a total of six slots for NCs and DPCs.

Networking Cards

For network connectivity, the PA-5450 requires at least one NC (PA-5400-NC-A). A second NC requires a minimum of two DPCs installed in the system. A maximum of two NCs can be installed. NCs are dedicated to executing packet ingress and egress tasks.

Each PA-5400-NC-A offers multiple connectivity ports as listed in table 3: 100/1000/10G Cu (4), 1G/10G SFP/SFP+ (12), and 40G/100G QSFP28 (2).

Data Processing Cards

For packet and security processing, the PA-5450 uses DPCs (PA-5400-DPC-A), with a minimum of one DPC and up to five DPCs that can be placed in the six slots.

Management Processing Cards

The MPC subsystem (PAN-PA-5400-MPC-A) acts as a dedicated point of contact for controlling all aspects of the PA-5450.

Table 1: PA-5450 Performance and Capacities		
	PA-5450 Configured System*	Single PA-5400-DPC-A
Firewall throughput (HTTP/appmix)***	200/200 Gbps	68.2/70 Gbps
Threat Prevention throughput (HTTP/appmix)†	123.6/152 Gbps	30.9/38 Gbps
IPsec VPN throughput‡	87 Gbps**	17.4 Gbps
Max sessions	100M**	20M
New sessions per second§	3.6M**	725,000
Virtual systems (base/max)||	25/225	—

Note: Results were measured on PAN-OS 10.2.

* All tests performed with 2 Networking Cards + 4 Data Processing Cards populated, unless otherwise noted.

** This test performed with 1 Networking Card + 5 Data Processing Cards populated.

*** Firewall throughput is measured with App-ID and logging enabled, utilizing 64 KB HTTP/appmix transactions.

† Threat Prevention throughput is measured with App-ID, IPS, antivirus, antispyware, WildFire, DNS Security, file blocking, and logging enabled, utilizing 64 KB HTTP/appmix transactions.

‡ IPsec VPN throughput is measured with 64 KB HTTP transactions and logging enabled.

§ New sessions per second is measured with application-override, utilizing 1 byte HTTP transactions.

|| Adding virtual systems over base quantity requires a separately purchased license.

Table 2: PA-5450 Networking Features
Interface Modes
L2, L3, tap, virtual wire (transparent mode)
Routing
OSPFv2/v3 with graceful restart, BGP with graceful restart, RIP, static routing
Policy-based forwarding
Point-to-point protocol over Ethernet (PPPoE) and DHCP supported for dynamic address assignment
Multicast: PIM-SM, PIM-SSM, IGMP v1, v2, and v3
Bidirectional Forwarding Detection (BFD)
SD-WAN
Path quality measurement (jitter, packet loss, latency)
Initial path selection (PBF)
Dynamic path change
IPv6
L2, L3, tap, virtual wire (transparent mode)
Features: App-ID, User-ID, Content-ID, WildFire, and SSL Decryption
SLAAC
IPsec VPN
Key exchange: manual key, IKEv1 and IKEv2 (pre-shared key, certificate-based authentication)
Encryption: 3DES, AES (128-bit, 192-bit, 256-bit)
Authentication: MD5, SHA-1, SHA-256, SHA-384, SHA-512
GlobalProtect large-scale VPN for simplified configuration and management

VLANs
802.1Q VLAN tags per device/per interface: 4,094/4,094
Aggregate interfaces (802.3ad), LACP
Network Address Translation
NAT modes (IPv4): static IP, dynamic IP, dynamic IP and port (port address translation)
NAT64, NPTv6
Additional NAT features: dynamic IP reservation, tunable dynamic IP and port oversubscription
High Availability
Modes: active/active, active/passive, HA clustering
Failure detection: path monitoring, interface monitoring
Mobile Network Infrastructure*
GTP Security
SCTP Security

*For additional information, refer to our ML-Powered NGFWs for 5G datasheet.

Table 3: PA-5450 Hardware Specifications
PA-5400-NC-A Networking I/O
100/1000/10G Cu (4), 1G/10G SFP/ SFP+ (12), 40G/100G QSFP28 (2); minimum 1 NC and maximum 2 NCs per system; 2 NCs require 2 or more DPCs installed
PAN-PA-5400-MPC-A Management I/O
SFP/SFP+ MGT (2), SFP/SFP+ HA1 (2), HSCI HA2/HA3 QSFP+/ QSFP28 (2), RJ45 serial console (1), Micro USB serial console (1)
Storage Capacity
480 GB SSD, RAID1, system storage 4 TB SSD, log storage (optional)
Max BTU/hr
8,828
Power Supplies (Base/Max)
2/4
AC Input Voltage (Input Frequency)
100–120 VAC & 200–240 VAC (50–60 Hz)
AC Power Supply Output
2,200 watts/power supply
Max Current Consumption
AC: 100–120 VAC, ~14 A max. per input 200–240 VAC, ~12.5 A max. per input
DC: 48–60 VDC, 52 A max. per input
Max Inrush Current
AC: 35 A @ 230 VAC, 35 A @ 120 VAC
DC: 50 A @ 72 VDC
Rack Mount (Dimensions)
5U, 19” standard rack 8.75” H x 30.25” D x 17.38” W

Maximum Time Between Failure (MTBF)
Configuration dependent; contact your Palo Alto Networks representative for MTBF details.
Safety
cTUVus, CB
EMI
FCC Class A, CE Class A, VCCI Class A, KCC Class A, BSMI Class A
Certifications
See paloaltonetworks.com/company/certifications.html
Environment
Operating temperature: 32° to 122° F, 0° to 50° C
Non-operating temperature: -4° to 158° F, -20° to 70° C

To view additional information about the features and associated capacities of the PA-5450, please visit paloaltonetworks.com/network-security/next-generation-firewall/pa-5450.

3000 Tannery Way
Santa Clara, CA 95054

Main: +1.408.753.4000
Sales: +1.866.320.4788
Support: +1.866.898.9087

www.paloaltonetworks.com

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