

NETSCOUT's Arbor Edge Defense (AED) and Arbor Enterprise Manager (AEM)

AI and ML powered DDoS Protection Solution that Can Stop All DDoS Attacks To Provide Effective First and Last Line of Automated Perimeter Defense

KEY FEATURES & BENEFITS

Adaptive DDoS Protection (ADP)

Effectively block ever-changing DDoS attacks without impacting legitimate services by automatically detecting and mitigating new attack techniques. ADP is enabled by AI and ML powered traffic analysis technology, global attack visibility, and decades of DDoS domain expertise.

Enterprise Scale and Multi-Layer Defense in-Depth

Centralized and scalable visibility for management of all deployed AEDs from a single pane of glass through Arbor Enterprise Manager. Intelligently integrates with NETSCOUT Arbor Cloud® for comprehensive, hybrid DDoS attack protection.

Protect Assets in Public Cloud

Deploy virtual AED in AWS and Azure to detect and mitigate attacks targeting assets both from outside of AWS and Azure cloud and inside the cloud between VPCs.

First & Last Line of Defense

Automatically and surgically block unwanted inbound and outbound malicious traffic including malware, scanning and phishing attempts at the network edge with unparalleled threat intelligence and embedded security analysis expertise.

Integration with Existing Security Stack and Process

NETSCOUT AED's REST API, support for Syslog (CEF, LEEF) and STIX/TAXII, enable NETSCOUT AED to be a fully integrated component of an organization's existing security stack and process.

DDoS attacks are evolving, the new preferred flavor of DDoS attack, is a direct path attack that adjusts vectors and methodologies to continually evade existing DDoS defenses. Add to this the ransomware, phishing attempts, and external communications from compromised internal IoT devices and you can see how organizations are under constant risk from all types of advanced cyber threats. To address these evolving threats, security teams need solutions that can dynamically adapt to the changing attacks - both entering or leaving their networks. Just as importantly, these solutions must also be able to automate adjustments to mitigation configurations to block new attacks, to reduce cost, complexity, and risk.

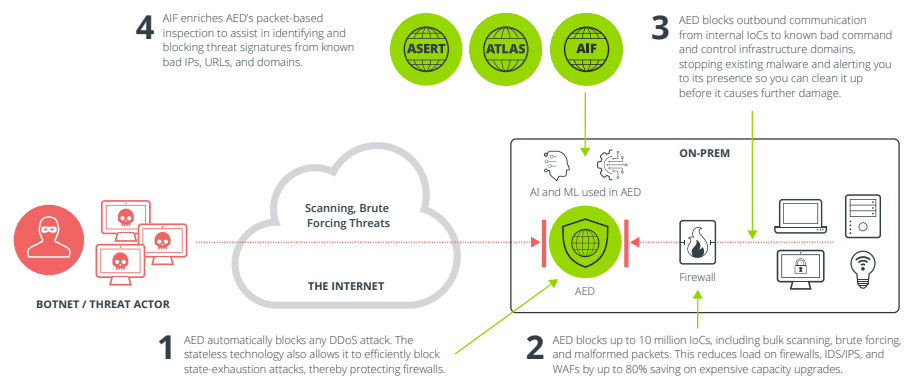


Figure 1: AED, the first and last line of perimeter defense.

NETSCOUT® Arbor Edge Defense (AED) is uniquely positioned on the network edge (i.e., between the internet router and the firewall) to provide an inline, always-on, first and last line of defense. Using stateless AI and ML powered packet processing, continuous global threat intelligence and decades of DDoS mitigation expertise, AED can automatically stop inbound, dynamic DDoS attacks and outbound communication from internal compromised devices communicating with threat actor command and control (C2) infrastructure. Arbor Enterprise Manager provides a centralized and scalable single-pane-of-glass console for managing all AEDs.

AI & ML-Powered Adaptive DDoS Protection



Figure 2: Arbor Adaptive DDoS Protection is driven by this simple efficient workflow.

NETSCOUT AED Appliances

Features	8100	8200	HD1000
Physical Dimensions	Chassis: 2RU rack height; Height: 3.45 inches (8.67 cm); Width: 17.14 inches (43.53 cm); Depth: 20 inches (50.8 cm); Weight: 36.95 lbs. (17.76 kg)	Chassis: 2RU; Height: 3.4 in (8.68 cm) Width: 17.1 in (43.4 cm); Depth: 30.39 in (77 cm); Weight: 65 lbs (29.5 kg)	Chassis: 2U rack height Weight: 45.2 lbs (20.5 kg) with 1 PPM, add 1.6 lb (.73 kg) per PPM (up to eight) Height: 3.5 in (8.89 cm) Width: 17.6 in (44.70 cm) Depth: 21 in (53.34 cm)
Power Options	DC: 2 x DC redundant, hot swap capable power supplies; DC Power Ratings: -40 to -72 Vdc, 28/14 A max (per DC input); AC: 2 x AC redundant, hot swap capable power supplies; AC Power Ratings: 100 to 240 VAC, 50 to 60 Hz, 12/6 A max; Both AC and DC power options are 850-watt.	Dual hot-swap, redundant (1+1) AC power supplies or DC power supplies: AC: 1100 W Platinum (derates to 1050 W @ 110 VAC) DC: 1100 W -48 VDC	AC: Two 1500-watt redundant power supplies; 100-240V AC, 15-10 A, 50-60 Hz (x2); DC: Two 1500-watt redundant power supplies; -48 to -60 Vdc, 44 A (x2)
Hard Drives	2 x 240GB SSD drives, RAID 1	2 x 480GB SSD drives, RAID 1	2 x 480GB SSD drives, RAID 1
Environmental	Operating: Temperature: 41°F to 104°F (5° to 40°C) Humidity: 5–85%; Non-Operating: Temperature -40° to 158°F (-40° to 70°C); Humidity 95%	Temperature, operating: 50°F to 95°F (10°C to 35°C) at altitudes less than 2953 ft (950 m) with no direct sunlight on the equipment; Humidity, operating: 10% to 80% relative humidity with 69.8°F (21°C) maximum dewpoint (non-condensing); Airflow direction: Front to back. For proper airflow, ensure that the air intake is positioned in a cold aisle and the air exhaust is positioned in a hot aisle.	Operating temperature: 39.2° to 104°F (-4° to 40°C) Relative humidity (operating): 5 to 93%, non-condensing
Operating System	Our proprietary ArbOS® operating system		
Management Interfaces	2 x 1G or 2 x 10G Copper, RJ-45 serial console support	2 x 1GE + 2 x 10GE copper management ports	4 x 1G Copper, RJ-45 serial console port
Protection Interfaces	• 4 x 1 GigE bypass ports (LX, SX or copper) • 8 x 1 GigE bypass ports (LX, SX, copper or mixed) • 12 x 1 GigE bypass ports (LX, SX, copper or mixed) • 4 x 10 GigE bypass ports (LR or SR) • 8 x 10 GigE bypass ports (LR, SR, or mixed) • 4 x 10 GigE bypass ports (LR or SR) plus 4 x 1GigE bypass ports (LX, SX or copper) • 4 x 10 GigE bypass ports (LR or SR) plus 8 x 1GigE bypass ports (LX, SX or copper) • 8 x 10 GigE bypass ports (LR or SR) plus 4 x 1GigE bypass ports (LX, SX or copper) • 2 x 40 GigE bypass ports (LR or SR) • 4 x 40 GigE bypass ports (LR or SR) • 2 x 40 GigE bypass ports (LR or SR) plus 4 x 10 GigE bypass ports (LR or SR) • 2 x 40 GigE bypass ports (LR or SR) plus 8 x 10 GigE bypass ports (LR or SR) • 4 x 100 GigE bypass ports (LR4 or SR4)	• 16 x 1 GigE bypass ports (LX, SX, or Copper) • 16 x 10 GigE bypass ports (LR or SR) • 4 x 40 GigE bypass ports (LR or SR) • 4 x 100 GigE bypass ports (LR4 or SR4)	4 x 100 GigE + 8 x 10 GigE = One to four 100 GbE QSFP28 (LR) optical transceivers + One or two 4 x 10 GbE QSFP+ (SR or LR Lite) optical transceivers with one 4 x 10 GbE breakout cable on each transceiver

Features	8100	8200	HD1000
Protection Interface & Connector Type Mapping	• 1GE Copper -> RJ45 • 1GE SX -> LC • 1GE LX -> LC • 10GE SR -> LC • 10GE LR -> LC • 40G LR4 -> LC • 40G SR4 -> MTP/MPO • 100G LR4 -> LC • 100G SR4 -> MTP	• 10GE SR -> LC • 10GE LR -> LC • 40G LR4 -> LC • 40G SR4 -> MTP/MPO • 100G LR4 -> LC • 100G SR4 -> MTP	
Traffic Bypass Options	Integrated hardware bypass; Internal "software" bypass to pass traffic without inspection	Integrated hardware bypass; Internal "software" bypass to pass traffic without inspection	External hardware bypass via 3296 Inline Bypass Switch
Latency	Less than 80 microseconds		
Availability	Inline bypass, dual power supplies, solid-state hard drive RAID cluster	Inline bypass, dual power supplies, solid-state hard drive RAID cluster	External bypass, dual power supplies
Regulatory Compliance	UL/cUL/EN/IEC 62368-1; EN 55032; EN 55035; CISPR 32, 35; ETSI EN 300 386; cULus Mark; IC ICES-003 Class A; EN 61000-3-2; EN 61000-3-3; EMC Directive 2014/30/EU; Low Voltage Directive 2014/35/EU; UL 60950-1 2nd edition/CSA C22.2 No.60950-1-07 2nd Edition; FCC 47 CFR Parts 15, Class A; CB Certificate & Report including all international deviations; RoHS 2011/65/EU; Moroccan Conformity Mark; VCCI (Japan); BIS (India); CCC (China); RCM (Australia/New Zealand); KCC (South Korea); EAC-R Approval (Russia); South Africa LoA; Mexico (UL-CoC for Mexico); NEBS-ready	Regulatory M/N: E82S, UL/cUL/EN/IEC 62368-1; CSA C22.2 No. 62368-1:19, 3rd Ed; EN 55032; EN 55035; CISPR 32, 35; IC ICES-003 Class A; FCC 47 CFR Parts 15, Class A; CE, CB Certificate & Report including all international deviations; RoHS, 2011/65/EU; Israel, Moroccan Conformity Mark; VCCI (Japan); RCM (Australia/New Zealand); KCC (South Korea); EAC-R Approval (Russia); South Africa LoA; Mexico.	RoHS 6/6, IEC/EN/UL/ CSA 60950-1, FCC Part 15 Subpart B Class A, ETSI EN 300 386, CE Mark, RCM Mark, KCC Mark, EAC Mark, BIS, CCC Mark, CB Certificate and Report to IEC62368-1 and IEC60950-1, 2nd edition and all international deviations, EMC Directive 2014/30/EU, Low Voltage Directive 2014/35/EU

DDoS & Advanced Cyber Threat Protection

Features	8100	8200	HD1000
Clean Traffic (Inbound & Outbound) Throughput	Up to 40 Gbps; Up to 22 Mpps (without decryption) or 16Mpps (with Decryption)	Up to 100 Gbps; Up to 81 Mpps (without decryption) or 42 Mpps (with decryption)	Up to 200 Gbps; Up to 8.7 Mpps per PPM
Maximum DDoS Flood Prevention Rate	Up to 77 Gbps; Up to 38.92 Mpps (without decryption) or 29Mpps (with Decryption)	Up to 189 Gbps; Up to 196 Mpps (without decryption) or 78 Mpps (with decryption)	Up to 200Gbps; Up to 289.17 Mpps
Licensed Capacities	AED is licensed based on clean traffic throughput (both inbound and outbound). AED 8100 supports the following licenses: 100 Mbps, 250 Mbps, 500 Mbps, 1 Gbps, 2 Gbps, 5 Gbps, 10 Gbps, 20 Gbps, 30 Gbps, and 40 Gbps. Licenses are software upgradeable.	AED is licensed based on clean traffic throughput (both inbound and outbound). AED 8200 supports the following licenses: 100 Mbps, 250 Mbps, 500 Mbps, 1 Gbps, 2 Gbps, 5 Gbps, 10 Gbps, 20 Gbps, 40 Gbps, 60 Gbps, 80 Gbps and 100 Gbps. Licenses are software upgradeable.	AED is licensed based on clean traffic throughput (both inbound and outbound). AED-HD1000 supports the following licenses: 25 Gbps, 50 Gbps, 75 Gbps, 100 Gbps, 125 Gbps, 150 Gbps, 175 Gbps and 200 Gbps; Hardware Mitigation Capacity: determined by the number of PPMs with 25G per PPM. Up to 8.7 Mpps per PPM. Note: Licensed Inspected Throughput should not go above the Hardware Mitigation Capacity.

Features	8100	8200	HD1000
DNS Query Flood Prevention Queries Per Second Rate	DNS Water Torture Prevention: up to 12M QPS during attack and peace time. DNS Amplification Prevention: up to 19M QPS during attack, and up to 13M QPS during peace time		
Protected Endpoints	Unlimited		
Authentication	On device, RADIUS; TACACS		
SSL/TLS Traffic Support Capabilities	TLS, and CAM support can be found in the Decryption Capabilities table on page 8		Not Supported
Management	SNMP gets v1, v2c; SNMP traps v1, v2c, v3; CLI; Web UI; HTTPS; SSH customizable, role-based management; Up to 50 AED (appliances and/or virtual AED running KVM hypervisor) can be managed by the AED Console; managed AED must at least be running v.6.0 (v AED), v6.4 (HD1000), or v.6.6 (8100).		
Protection Groups	100	200	200
Reporting and Forensics	Real-time and historical IPV4 and IPV6 traffic reporting, extensive drill-down by protection group and blocked host including total traffic, passed/blocked,top destination URLs/services/domains, attack types, blocked sources, top sources by IP location. Packet visibility in real-time.		
DDoS Protection	TCP/UDP/HTTP(S) flood attacks, botnet protection, hacktivist protection, host behavioral protection, anti-spoofing, payload expression-based filtering, permanent and dynamic blacklists/whitelists, traffic shaping, multiple protections for HTTP, DNS and SIP, TCP connection limiting, fragmentation attacks, connection attacks.		
Modes	Inline active; inline inactive (reporting, no blocking); SPAN port monitor		
Notifications	SNMP trap, Syslog (CEF,LEEF); email		
Cloud Signaling	Yes (collaborative DDoS attack mitigation with service provider or Arbor Cloud)		
Web-Based GUI	Supports multi-language translated user interfaces		
Supported Browsers	Google Chrome 83, Mozilla Firefox 77, Internet Explorer 11		
Maximum IoCs	3+ Million		
IoC Types & Formats	IP address, fully qualified domain names, URLs. Formats: Proprietary ATLAS Intelligence Feed format, STIX, and TAXII		

Virtual AED

Features	VMware	KVM	Nutanix
Virtual Network Function (VNF) Orchestration	Cloud-Init v0.7.6, Openstack Kilo and Mitaka series, OpenStack Heat, OpenStack Tacker, Ansible, Nokia Cloudband, Cisco NSO/ESC, Cisco NFVIS, Amdocs, Netcracker and other ONAP or ETSI NFV management and orchestration technologies		
Minimum Virtual Machine Requirements	4 vCPUs; 100 GB Storage; 12 GB RAM; 4 Interfaces (4 x virtio on KVM, 4 x E1000 on VMWare)		
Supported Hypervisors	VMware vSphere 5.5 or newer	KVM kernel 3.19 or newer, QEMU 2.0	
Maximum Inspected Throughput / Instance	1 Gbps	10 Gbps (with SR-IOV)	
Maximum DDoS Flood Rate / Instance	910 Kpps	12 Mpps	
Number of Protection Groups	50		

Note: To use Adaptive DDoS Protection with a vAED, the minimum requirements are: 6 vCPUs; 100 GB Storage; 48 GB RAM.

Virtual AED for AWS

The EC2 Instance Types listed below are for guidance only. Different EC2 Instance Types can be used, as long as the vCPU and Memory are of the equivalent capacity to the one being referenced.

Capacity Per vAED Instance	EC2 Instance Type Reference	CPU Cores
1 Gbps	c5n.2xlarge	8
5 Gbps	c5n.9xlarge	36
10 Gbps	c5n.18xlarge	72

Virtual AED for Azure

- Virtual AED can be deployed in Azure as network virtual appliance.
- Each vAED instance supports up to 10 Gbps of clean traffic (inbound and outbound).

Virtual Arbor Enterprise Manager (vAEM) for Azure

	Azure VM
Managing up to 5 AEDs	D4s_v5 with 512 GB
Managing up to 20 AEDs	D8s_v5 with 1TB disk
Managing over 20 AEDs	D16s_v5 with 2TB disk

Arbor Enterprise Manager

Supported Platforms	Arbor Appliance; Virtual Machine
Max Number AED / APS Managed	50
Supported Browsers	Google Chrome 80, Mozilla Firefox 74, Internet Explorer 11

Virtual Arbor Enterprise Manager (vAEM) Configurations

Configuration	Base vAEM with 2 Devices	Each Additional Device
Disk Space	250GB	70GB
Cores	4	0.25
Memory	16GB	1GB
Management Interface	1 management interface required; a second management interface is optional	
Hypervisor Requirements	VMware vSphere Hypervisor™ version 6.7 or later; VMware vSphere Client software, version 6.7 or later Nutanix Hypervisor version 7.0 or later	

Arbor Enterprise Manager 8000 Appliance

Features	8000
Power Requirements	Dual redundant, load-sharing, auto-sensing 850 Watt power supplies AC: 100-240 VAC, 50/60 Hz, 10/5 A DC: -40 Vdc to -72 Vdc, 25/12.5 A
Physical Dimensions	Chassis: 2U rack height; Height: 3.45 inches (8.67 cm); Width: 17.14 inches (43.53 cm); Depth: 20 inches (50.8 cm); Weight: 36.95 lbs. (17.76 kg); Standard 19 and 23 inches rack mountable
Processors	2 × Intel Xeon Gold 5218T 2.1GHz 16 cores
Hard Drives	Minimum: Six 480GB solid state drives configured for RAID 5
Network Interfaces	2 x 10G RJ45 onboard, 4 x 10G pluggable ports via installed PCI card
Environmental	Operating: 41° – 104°F (5° – 40°C), 5-85% humidity Non-Operating: -40°F – 158°F (-40°C – 70°C), 95% non-condensing humidity
Operating System	Our proprietary, embedded ArbOS operating system, based on Linux
Regulatory Compliance	UL 60950-1 2nd edition/CSA C22.2 No.60950-1-07 2nd Edition, EMC Directive 2014/30/EU, Low Voltage Directive 2014/35/EU, CB Certificate and Report to IEC62368-1 and IEC60950-1, 2nd edition and all international deviations, CE, FCC 47CFR Parts 15, Verified Class A limit, ICES-003 Class A Limit, VCCI Class A ITE, RoHS (recast) Directive 2011/65/ EU, Moroccan Conformity Mark, KC (Korea) Approval, RCM (Australia/New Zealand) Approval, EAC (Russia)

Decryption Capabilities

- Supports Perfect Forward Secrecy (PFS) through TLS Proxy.
- Performance data are measured with 2048-bit key.

Performance	TLS Proxy	Cryptographic Acceleration Module (CAM)
Connections/Sec.	• Each AED 8100 supports up to 19,000 connections/sec total, and up to 3400 connections/sec for encrypted application layer attack decryption. • Each AED 8200 supports up to 100,000 Total, and up to 22,000 connections/sec for encrypted application layer attack decryption.	• Each AED 8100 supports up to 97K connection/sec.
Inbound Inspected Throughput	• Each AED 8100 supports up to 1.8 Gbps. • Each AED 8200 supports up to 10 Gbps.	• Each AED provides up to 18 Gbps.

- ✓ Supported
- ✗ Unsupported
- ❶ Supported for TLS 1.3
- ❷ Supported for TLS 1.2
- ❸ Unsupported in FIPS mode

Supported Cipher Suites

IANA Name	TLS Proxy	CAM
TLS_AES_256_GCM_SHA384	✓ ❶	✗
TLS_AES_128_GCM_SHA256	✓ ❶	✗
TLS_CHACHA20_POLY1305_SHA256	✓ ❶	✗
TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256	✓	✗
TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	✓	✗
TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384	✓	✗
TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384	✓	✗
TLS_ECDHE_ECDSA_WITH_CHACHA20_POLY1305_SHA256	✓	✗
TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256	✓	✗
TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA	✓	✗
TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA	✓	✗
TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA	✓	✗
TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA	✓	✗
TLS_RSA_WITH_AES_128_GCM_SHA256	✓	✗
TLS_RSA_WITH_AES_256_GCM_SHA384	✓	✗
TLS_RSA_WITH_AES_128_CBC_SHA	✓	✓ ❷
TLS_RSA_WITH_AES_256_CBC_SHA	✓	✓ ❷
TLS_RSA_WITH_3DES_EDE_CBC_SHA	✓	✓ ❷
SSL_RSA_WITH_3DES_EDE_CBC_SHA	✗	✓ ❷
TLS_RSA_WITH_AES_128_CBC_SHA256	✗	✓

IANA Name	TLS Proxy	CAM
TLS_RSA_WITH_AES_256_CBC_SHA256	x	✓
TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA256	x	✓
TLS_ECDH_ECDSA_WITH_AES_128_GCM_SHA256	x	✓
TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA384	x	✓
TLS_ECDH_ECDSA_WITH_AES_256_GCM_SHA384	x	✓
TLS_ECDH_RSA_WITH_AES_128_CBC_SHA256	x	✓
TLS_ECDH_RSA_WITH_AES_128_GCM_SHA256	x	✓
TLS_ECDH_RSA_WITH_AES_256_CBC_SHA384	x	✓
TLS_ECDH_RSA_WITH_AES_256_GCM_SHA384	x	✓
TLS_ECDH_ECDSA_WITH_3DES_EDE_CBC_SHA	x	✓ ②
TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA	x	✓ ②
TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA	x	✓ ②
TLS_ECDH_RSA_WITH_3DES_EDE_CBC_SHA	x	✓ ②
TLS_ECDH_RSA_WITH_AES_128_CBC_SHA	x	✓ ②
TLS_ECDH_RSA_WITH_AES_256_CBC_SHA	x	✓ ②
TLS_RSA_WITH_RC4_128_SHA	x	x
TLS_RSA_WITH_RC4_128_MD5	x	x
TLS_RSA_WITH_DES_CBC_SHA	x	x
SSL_RSA_WITH_DES_CBC_SHA	x	x

Note: Unlike the passive decryption capabilities provided by CAM, the TLS proxy plays an active role in cipher suite negotiation. This active role allows the TLS proxy to select the most modern, secure cipher suites, which eliminates the need to support a larger set of older, less secure cipher suites.

If the client and server support a cipher suite that the TLS proxy supports, then the client can connect and the TLS proxy can decrypt traffic. In this case, the cipher suite that AED uses with the TLS proxy might be different than the cipher suite that AED uses when the TLS proxy is not present.

For more information about the cipher suites and their security efficacy, refer to the SSL Labs web site at <https://www.ssllabs.com/>



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