Internet Service Providers (ISPs), Cloud Providers and Enterprises face a common problem. Distributed Denial of Service (DDoS) attacks are a major risk to service availability. The power, sophistication and frequency of DDoS attacks are rising. Data center operators and network providers need a defense that is effective, cost-efficient and easily managed. Arbor Threat Mitigation System (TMS) is the acknowledged leader in DDoS protection. More Service Providers, Cloud Providers and large Enterprises use Arbor TMS for DDoS mitigation than any other solution.

The Arbor Solution for DDoS Protection

The Arbor solution integrates network-wide intelligence and anomaly detection with carrier-class threat management to help identify and stop volumetric, TCP state exhaustion and application-layer DDoS attacks.

Arbor TMS network appliances provide the vital, traffic-scrubbing component of the Arbor solution. Arbor TMS can be deployed inline to provide “always on” protection. Unlike other products, it also supports a mitigation architecture called “diversion/reinjection.” In this mode, only the traffic stream carrying the DDoS attack is redirected to Arbor TMS through routing updates issued by the Arbor solution. Arbor TMS removes only the malicious traffic from that stream and forwards the legitimate traffic to its intended destination.

This is highly advantageous for Service Providers, large Enterprises and large Hosting/Cloud providers. It enables a single, centrally located Arbor TMS to protect multiple links and multiple data centers. It results in much more efficient use of mitigation and fully non-intrusive security. Inline devices must inspect all traffic all the time on the links they monitor. Arbor TMS only needs to inspect traffic that is redirected to it in response to an attack on a specific target.

Arbor TMS comes in a variety of mitigation platforms and capacities including: 2U appliances (500 Mbps–400 Gbps), 6U chassis (10–100 Gbps); virtualized in Cisco ASR 9000 Router (10–60 Gbps) and KVM & VMware hypervisor (1–40 Gbps).

**KEY FEATURES & BENEFITS**

**Surgical Mitigation**
Automatically remove only the attack traffic without interrupting the flow of non-attack business traffic.

**Full Portfolio of Mitigation Platforms and Capacities**
Choose from a variety of mitigation platforms and capacities including: 2U appliances (500 Mbps–400 Gbps), 6U chassis (10–100 Gbps); virtualized in Cisco ASR 9000 Router (10–60 Gbps) and KVM & VMware hypervisor (1–40 Gbps).

**Unified Command and Control of Eight Tb of Mitigation**
Scale DDoS defenses to an unprecedented level. Deploy up to eight terabits of aggregate, centrally-managed mitigation capacity per deployment.

**Managed Services Enabler**
Meet rapidly growing demand for DDoS protection services. Use Arbor TMS to deliver profitable in-cloud DDoS protection services.

**Comprehensive List of Attack Countermeasures**
Protect your infrastructure and/or your customers from the largest and most complex volumetric, TCP-state exhaustion and application-layer DDoS attacks.

**Flexible Deployment**
Deploy application-layer intelligence, threat detection and surgical mitigation in different portions of your network for infrastructure protection and more profitable managed DDoS protection services.
Comprehensive Threat Detection

Data centers and public networks present multiple targets for DDoS attacks. These targets include infrastructure devices (e.g., routers, switches and load balancers), Domain Name Systems (DNS), bandwidth capacity and key applications such as web, eCommerce, voice and video. Even security devices such as Firewalls and Intrusion Prevention Systems are targets of attack. The Arbor solution provides the most comprehensive and adaptive suite of threat detection capabilities in the industry, designed to protect diverse resources from complex, blended attacks. These capabilities include statistical anomaly detection, protocol anomaly detection, fingerprint matching and profiled anomaly detection. Our solution continually learns and adapts in real-time, alerting operators to attacks, as well as to unusual changes in demand and service levels.

Surgical Mitigation in Seconds

Key to effective mitigation is the ability to identify and block attack traffic while allowing non-attack traffic to flow through to its intended destination. Large-scale DDoS attacks affect not only the intended victim, but also other unfortunate customers who may be using the same shared network service. To reduce this collateral damage, Service Providers and Hosting providers often shut down all traffic destined for the victim’s site, thus completing the DDoS attack. Whether it’s a high-volume flood attack designed to exhaust bandwidth capacity or a targeted attack looking to bring down a website, in some cases, Arbor TMS can isolate and remove the attack traffic, without affecting other users, in as fast as a few seconds. Methods include identifying and black-listing malicious hosts, IP location-based mitigation, protocol anomaly-based filtering, malformed packet removal and rate limiting (to gracefully manage non-malicious demand spikes). Mitigations can be automated or operator-initiated and countermeasures can be combined to address blended attacks.

Real-Time Mitigation Dashboard

Arbor TMS real-time mitigation dashboard is a single screen that shows operators exactly what is generating a DDoS alert and what effect the countermeasures are having on the attack. It provides the ability to modify countermeasures and delivers full packet capture and decode to get a detailed view of both normal and attack packet streams. This information is stored for future reference and management reporting — giving operators and managers full visibility and reporting into attacks on their business operations.

MULTIPLE METHODS OF THREAT DETECTION AND MITIGATION

Block known malicious hosts by using white and black lists

The white list contains authorized hosts, while the black list contains zombies or compromised hosts whose traffic will be blocked.

Block application-layer exploits by using complex filters

Arbor TMS provides payload visibility and filtering to better ensure cloaked attacks cannot bring down critical services.

Defend against web-based threats by detecting and mitigating HTTP-specific attacks

These mechanisms also help with managing flash-crowd scenarios.

Protect critical DNS services

from cache poisoning, resource exhaustion and amplification attacks. Add greater visibility into DNS services.

Protect VoIP services

from automated scripts or botnets that exploit packet-per-second and malformed request floods by employing VoIP/SIP-specific attack detection and mitigation capabilities.

Stop large reflection/amplification attacks

Such as NTP, DNS, Memcached, SNMP, SSDP, SQL RS or Chargen by leveraging up to 400 Gbps of attack mitigation in a single Arbor TMS chassis.

ATLAS INTELLIGENCE FEED

Leveraging a global network of traffic monitoring and sensors, Arbor researchers have developed ATLAS® Intelligence Feed, a library of targeted defenses providing automatic protection from the vast majority of botnet-based attacks. ATLAS Intelligence Feed automatically updates Arbor TMS with new protections as Arbor researchers find and neutralize emerging threats.
Scalable DDoS Attack Detection and Mitigation
Arbor SP scales on physical and virtual instances to provide comprehensive DDoS detection across an entire Service Provider network, from the customer edge to the peering edge to the data center edge (or cloud edge) to the mobile edge, including the backbone network in-between. With this unparalleled visibility, Arbor SP’s workflows enable quick effective mitigation of any DDoS attack via Arbor TMS or Cisco ASR 9000 vDDoS protection. Countermeasure based mitigations scale up to 400 Gbps per TMS HD1000 and up to 8 Tbps in a deployment. Blacklisting unlocks an additional layer of protection ahead of any countermeasure mitigations. The Cisco ASR 9000 vDDoS protection solution uses OpenFlow to blacklist at massive scale of up to tens of Tbps of protection at any edge of your network and thereby safeguarding your core links from attack.

Comprehensive Management and Reporting
Arbor TMS simplifies and streamlines operations by providing the ability to view and manage up to eight terabits of mitigation capacity from a single point of control. This provides the ability to thwart multiple, large-scale attacks and produce comprehensive reports that summarize the mitigation process for customers and/or management.

A Platform for Managed DDoS Services
The Arbor solution enables Service Providers and Hosting/Cloud providers to deliver DDoS protection services to their customers. Customized portal access, APIs and delegated management give Managed Service Providers (MSPs) the flexibility and control to tailor services to fit their customers’ needs. Arbor is the undisputed leader for managed DDoS protection. It is the solution of choice for the vast majority of leading DDoS managed services.

Arbor TMS DDoS Defense Specifications

<table>
<thead>
<tr>
<th>Simultaneous Sessions</th>
<th>Not session limited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deployment Modes</td>
<td>Inline Active, Inline Monitoring, SPAN port, Diversion/Reinjection</td>
</tr>
<tr>
<td>Block Actions</td>
<td>Source blocking/source suspend; per packet blocking; combination of source, header and rate based blocking; Automated BGP Flowspec Source/Destination Blocking</td>
</tr>
<tr>
<td>Attack Protections</td>
<td>Reflection Amplification Flood Attacks (TCP, UDP, ICMP, DNS, mDNS, Memcached, SSDP, NTP, NetBIOS, RIPv1, rpdbind, SNMP, SQL RS, Chargen, L2TP, Microsoft SQL Resolution Service); Fragmentation Attacks (Teardrop, Targa3, Jolt2, Nesta); TCP Stack Attacks (SYN, FIN, RST, ACK, SYN-ACK, URG-PSH, other combinations of TCP Flags, slow TCP attacks); Application Attacks (HTTP GET/POST Floods, slow HTTP Attacks, SIP Invite Floods, DNS Attacks, HTTPS Protocol Attacks); SSL/TLS Attacks (Malformed SSL Floods, SSL Renegotiation, SSL Session Floods); DNS Cache Poisoning; Vulnerability Attacks; Resource Exhaustion Attacks (Slowloris, Pyloris, LOIC, etc.); Flash Crowd Protection; Attacks on Gaming Protocols</td>
</tr>
<tr>
<td>Volumetric-Only</td>
<td>Full Set of Countermeasures</td>
</tr>
<tr>
<td>Countermeasures</td>
<td>HTTP Authentication, HTTP Malformed, HTTP Scoping, HTTP Rate Limiting, HTTP URL Regular Expression, DNS Authentication, DNS Malformed, DNS Scoping, DNS Rate Limiting, DNS Regular Expression, SIP Malformed, SIP Request Limiting, SSL Negotiation, ATLAS Intelligence Feed (AIF)</td>
</tr>
</tbody>
</table>

Arbor’s 13th annual “Worldwide Infrastructure Security Report” (WISR) covers a 12-month period from November, 2016 through October, 2017. For the report, Arbor collected 390 responses from a mix of Tier 1 and Tier 2/3 Service Providers, Hosting, Mobile, Enterprise and other types of network operators from around the world. It was designed to collect the experiences, observations and concerns of the operational security community. As in previous years, the survey addressed topics such as threats against infrastructure and customers, techniques employed to protect infrastructure and mechanisms used to managed, detect and response to security incidents.

Thirteen Years of DDoS Reporting:
- The largest DDoS attack reported in 2017 was 800 Gbps. That’s a 60X increase over last year. In March 2018, a 1.7Tbps Memcached attack was recorded. ATLAS data also shows that the frequency of extremely large attacks has increased dramatically this year, since one third of this year’s respondents reported peak attack sizes over 100 Gbps. Over 57% of Enterprise and Data Center respondents saw attacks that completely saturated their internet connectivity, up from 42% in 2016.
- Respondents continue to see an increase in the number of DDoS attacks; 45% of Service Provider respondents have seen more than 21 attacks/month; 29% of Enterprise respondents indicated they suffered more than 20 attacks/month.
- DDoS attacks continue to increase in complexity as 59% of Service Providers and 48% of Enterprise, Government and Education (EGE) reported seeing multi-vector attacks (i.e. volumetric, TCP-state exhaustion and application layer) on their networks.

LEARN MORE
To download the latest report, go to: arbornetworks.com/report
## Arbor TMS 2600, 2800, 5000, and HD1000 Specifications

<table>
<thead>
<tr>
<th>Throughput and Mitigation</th>
<th>Arbor TMS 2600</th>
<th>Arbor TMS 2800</th>
<th>Arbor TMS 5000</th>
<th>Arbor TMS HD1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>2600 and 2800 series are software license</td>
<td>Licenses for 1 Gbps, 2 Gbps, 5 Gbps, 10 Gbps (add-on to 20 Gbps) all up to 15 Mpps</td>
<td>Licenses for 10 Gbps, 20 Gbps, 30 Gbps, 40 Gbps, all up to 30 Mpps</td>
<td>1 x APM: Up to 25 Gbps, 10 Mpps</td>
<td>Up to eight Packet Processing Modules (PPMs); Any combination of 20 Gbps (14Mpps) or 50 Gbps (25 Mpps) of mitigation throughput, Maximum 400 Gbps, 198 Mpps</td>
</tr>
<tr>
<td>2800 series are software license</td>
<td></td>
<td></td>
<td>2 x APM: Up to 50 Gbps, 20 Mpps</td>
<td></td>
</tr>
<tr>
<td>5000 series are software license</td>
<td></td>
<td></td>
<td>3 x APM: Up to 75 Gbps, 30 Mpps</td>
<td></td>
</tr>
<tr>
<td>HD1000 series are software license</td>
<td></td>
<td></td>
<td>4 x APM: Up to 100 Gbps, 40 Mpps</td>
<td></td>
</tr>
</tbody>
</table>

### Throughput and Mitigation
- **Arbor TMS 2600**
  - Licenses for 1 Gbps, 2 Gbps, 5 Gbps, 10 Gbps (add-on to 20 Gbps) all up to 15 Mpps
- **Arbor TMS 2800**
  - Licenses for 10 Gbps, 20 Gbps, 30 Gbps, 40 Gbps, all up to 30 Mpps
- **Arbor TMS 5000**
  - 1 x APM: Up to 25 Gbps, 10 Mpps
- **Arbor TMS HD1000**
  - Up to eight Packet Processing Modules (PPMs); Any combination of 20 Gbps (14Mpps) or 50 Gbps (25 Mpps) of mitigation throughput, Maximum 400 Gbps, 198 Mpps

### Power Requirements
- **Arbor TMS 2600**
  - Redundant Power Supplies: AC: 100-240 VAC, 50/60 Hz, 12/6 A max.; DC: -40 to -72 Vdc, 28/14 A max.
  - 325 Watts (max.), 280 Watts (nom.): @ 280 Watts, 955 BTU/hr

### Power Requirements and Heat
- **Arbor TMS 5000**
  - Redundant Quad Power Supplies: AC: 100-240 VAC/ 200-240 VAC, 50 to 60Hz, 15A; DC: -48/-60 Vdc, 90A max
  - 325 Watts (max.), 280 Watts (nom.): @ 280 Watts, 955 BTU/hr

### Power Requirements and Heat
- **Arbor TMS HD1000**
  - 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)

### Dimensions
- **Arbor TMS 2600**
  - Chassis: 2U rack height
  - Weight: 36.95 lbs (17.76 kg)
  - Height: 3.45 in (8.76 cm)
  - Width: 17.14 in (43.53 cm)
  - Depth: 20 in (50.8 cm)
- **Arbor TMS 2800**
  - Chassis: 2U rack height
  - Weight: 39 lbs (17.7 kg)
  - Height: 3.45 in (8.76 cm)
  - Width: 17.14 in (43.53 cm)
  - Depth: 20 in (50.8 cm)
- **Arbor TMS 5000**
  - Chassis: 6U rack height
  - Weight: With AC: 77.15 lb (34.99 kg); With DC: 58.52 lb (26.54 kg); Add 6 lb (2.72 kg) per APM-E blade
  - Height: 10.463 in (26.58 cm)
  - Width: 19.00 in (48.26 cm)
  - Depth: 18.19 in (46.20 cm)
  - with handles
- **Arbor TMS HD1000**
  - 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)

### Network Interfaces
- **Arbor TMS 2600**
  - 4x10G (SFP+) + 8x1G (SFP) ports
  - 8 x 10 GigE (SFP+ for SR or LR or mixed fiber)
  - 32 x 10 GigE (QSFP+ with breakout cables, SR4 or 4LR); 8 x 40 GigE (QSFP+ SR4 or LR4); 4 x 100 GigE (LR4)

### Storage
- **Arbor TMS 2600**
  - 2x150GB SSD drives, RAID 1
- **Arbor TMS 2800**
  - 2x240GB SSD drives, RAID 1
- **Arbor TMS 5000**
  - 2x128GB SSD drives, RAID 1
- **Arbor TMS HD1000**
  - 2x480GB SSD drives, RAID 1

### Environmental
- **Arbor TMS 2600**
  - Operating temperature: 41º to 104ºF (5º to 40ºC)
  - Relative humidity (operating): 5 to 85% non-condensing
- **Arbor TMS 2800**
  - Operating temperature: 41º to 104ºF (5º to 40ºC)
  - Relative humidity (operating): 5 to 85%, (non-operating) 95% at 73º to 104ºF (23º to 40ºC)
- **Arbor TMS 5000**
  - Operating temperature: 23º to 104ºF (-5º to 40ºC)
  - Relative humidity (operating): 5% to 85% non-condensing
- **Arbor TMS HD1000**
  - Operating temperature: 39.2º to 104ºF (-4º to 40ºC)
## Arbor Threat Mitigation System (TMS)

<table>
<thead>
<tr>
<th>Regulatory</th>
<th>Arbor TMS 2600</th>
<th>Arbor TMS 2800</th>
<th>Arbor TMS 5000</th>
<th>Arbor TMS HD1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL60950-1/CSA 60950-1 (USA/Canada); EN60950-1 (Europe); IEC60950 (International), CB Certificate &amp; Report including all international deviations; GS Certificate (Germany); EAC-R Approval (Russia); CE – Low Voltage Directive 73/23/EE (Europe); BSMI CNS 13436 (Taiwan); KCC (South Korea); RoHS Directive 2002/95/EC (Europe)</td>
<td>UL 60950-1 2nd edition/CSA C22.2 No. 60950-1-07 2nd Edition, Low Voltage Directive 2006/95/EC, Safety Directive 2001/95/EC, CB Certificate and Report to IEC60950-1, 2nd edition and all international deviations, FCC 47 CFR Parts 15, Verified Class A limit, ICES-003 Class A Limit, EMC Directive, 2004/108/EC, EN55022, EN55024, EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-8, EN61000-4-11,EN61000-3-2, EN61000-3-3, VCCI Class A ITE (CISPR 22, Class A Limit), BSMI Approval, CNS 13438, Class A and CNS13436 Safety, KCC Approval, Gost Approval, CISPR 22 Class A Limit, CISPR 24 Immunity, RoHS (recast) Directive 2011/65/EU</td>
<td>RoHS 6/6, IEC/EN/UL/CSA 60950-1, FCC Part 15 Subpart B Class A, ETSI EN 300 386, UL Mark, CE Mark</td>
<td>RoHS 6/6, IEC/EN/UL/CSA 60950-1, FCC Part 15 Subpart B Class A, EN 55022, EN55024, ETSI EN 300 386, cCSAs Mark, CE Mark, KN22, KN24, RCM Mark, KCC Mark, EAC Mark, BIS, CCC Mark (pending).</td>
<td></td>
</tr>
<tr>
<td>Hardware Bypass</td>
<td>External</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Virtual TMS (vTMS)

<table>
<thead>
<tr>
<th>Supported Hypervisor</th>
<th>VMware or KVM running on any modern Linux distribution, x86_64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Machine Specifications</td>
<td><strong>Cores:</strong> 3-32, <strong>RAM:</strong> 9.5-56GB, <strong>Mitigation Interfaces:</strong> 1-8, <strong>Management Interfaces:</strong> 1-2</td>
</tr>
</tbody>
</table>
| Configuration Mitigation Throughput | **3 Core without hardware passthrough:** 3 vCPU, 9.5G RAM, 100GB of disk space, 2 virtio management interfaces, 2 virtio mitigation interfaces = 1 Gbps  
**3 Core with hardware passthrough:** 3 vCPU, 9.5G RAM, 100GB of disk space, 2 virtio management interfaces, 8 Intel 82599 PCI Passthrough mitigation interfaces = 6 Gbps  
**16 Core with hardware passthrough:** 16 vCPU, 29G RAM, 100GB of disk space, 2 virtio management interfaces, 8 Intel 82599 PCI Passthrough mitigation interfaces = 40 Gbps |
| Supported NFV Management and Orchestration | Openstack (Heat, Tracker), Ansible, Cisco NSO/ESC, Nokia CloudBand, AWS CloudFormation |

---

**NETSCOUT**

NETSCOUT offers sales, support, and services in over 32 countries. Global addresses, and international numbers are listed on the NETSCOUT website at: [www.netscout.com/company/contact-us](http://www.netscout.com/company/contact-us)

---

©2018 NETSCOUT SYSTEMS, INC. All rights reserved. NETSCOUT, the NETSCOUT logo, Guardians of the Connected World, Adaptive Service Intelligence, Arbor Networks, the Arbor Networks logo, ATLAS, InfinitStream, InfinitStreamNG, nGenius, and nGeniusONE are registered trademarks or trademarks of NETSCOUT SYSTEMS, INC., and/or its subsidiaries and/or affiliates in the USA and/or other countries. Third-party trademarks mentioned are the property of their respective owners.

SECPDS_004_EN-1804 12/2018