

Thunder ADC

Application Delivery Controller and Advanced Load Balancer

Offering a complete application solution, A10 Thunder® Application Delivery Controller (ADC) ensures server availability, protects vulnerable applications and accelerates content delivery. It masters multi-cloud and hybrid cloud deployments with a holistic approach that reduces complexity and cost for IT operations, providing better business outcomes.

Agile Application Delivery and Security

From SMBs and large enterprises to service providers and cloud operators, organizations are managing a large and rapidly growing set of mission-critical applications.

A purpose-built solution, A10 Thunder ADC ensures these applications are highly available, accelerated and secure. It helps reduce downtime, ensure business continuity and build highly available applications across global data centers and/or multiple clouds.

Thunder ADC delivers the capacity, scalability, multi-tenancy and programmability to adjust to an ever-changing environment. Consolidate point products, reduce network complexity and achieve a substantial reduction in TCO.

Thunder ADC delivers L4-7 load balancing and multiple layers of security via web and DNS app firewalls, single sign-on (SSO) authentication and in-depth support for advanced encryption, including high-performance PFS/ECC. Built upon A10's Advanced Core Operating System (ACOS®) platform, Thunder ADC delivers application performance and security for any environment.

Platforms



Cloud



Container



Virtual Appliance



Bare Metal



Physical and SPE Appliances

Related Products



Harmony Controller
Centralized Analytics
and Management



FlexPool
Capacity Pooling License

Benefits



Enhance

Application Availability

Organizations must guarantee their applications are constantly accessible. Thunder ADC utilizes multiple load balancing techniques to efficiently distribute workloads across all servers while constantly evaluating application health. Client requests are forwarded to servers that host the proper content and can best respond to ensure application and content delivery.



Secure

Communications

Internet sessions are rapidly adopting encryption to secure online data transport. Clients and servers, meanwhile, negotiate the most secure and complex methods mutually supported. Thunder ADC front-ends servers and offloads cumbersome, processing-intensive tasks associated with the latest cryptographic standards. This maximizes content protection, speeds delivery and lowers infrastructure expenses.



Ensure

Business Continuity

With data centers proliferating worldwide, administrators must maintain around-the-clock global operational integrity. To guarantee cohesion and optimize app delivery among diverse sites or clouds, Thunder ADC includes advanced global server load balancing (GSLB) working with other application delivery features. GSLB expands functionality across global data centers for high availability, fault tolerance, and the best user experience.



Protect

Vulnerable Applications

Software development and testing can catch most, but typically not all, coding flaws. The resulting applications are susceptible to attacks that cannot be blocked by intrusion prevention systems (IPS), next-generation firewalls or sandboxing. Businesses lose revenue, suffer damaged brand reputation and loss of confidential data. Thunder ADC provides protection against 'zero day' and other emerging application layer threats with DNS and web application firewalls.

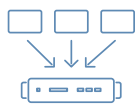


Accelerate

Content Delivery

Applications must be responsive – no matter the location – to ensure a superior end-user experience, enhance remote employee productivity and exceed SLA mandates. Thunder ADC overcomes the inherent WAN latencies, inefficient software programs and chatty protocols to provide fast and responsive service. End users receive a superior user experience while organizations gain a competitive advantage.

Reference Architectures



Optimize

Applications via Multi-Tenancy

To optimize the delivery and security for potentially hundreds of apps in a given data center, IT administrators need a multi-tenant methodology.

Thunder ADC provides the ability to granularly program more than 1,000 individual partitions on a single appliance for tailor-made policies by application, service, or user, while consolidating appliances.



Polynimbus

Operational Efficiency

In a multi-cloud, or hybrid cloud environment, it's essential for IT operations to have a standardized ADC and service visibility from a business and OPEX planning perspective. Thunder ADC can be deployed in a virtual and container environment with flexible and portable licensing, yet deliver feature parity regardless of the form factor. A10 Harmony® Controller enables effective operation by providing deeper secure application service analytics, easy troubleshooting tools and centralized policy enforcement control.



Consolidate

Access Control

Organizations must allow external clients access to web portals, internal resources and mobile/BYOD apps. At the same time, security must be maintained with authentication and be transparent to the user.

Thunder ADC centrally manages multiple facets of authentication, authorization and accounting (AAA) with a system-wide perspective, while eliminating separate authentication points, for a true single sign-on (SSO) experience.

Thunder 7655S ADC by the Numbers



370/340 Gbps

L4/L7 Application Throughput

100

GE Interfaces

12M

L4 Connections Per Second

1,023

Application Delivery Partitions (L3V)

145 Gbps

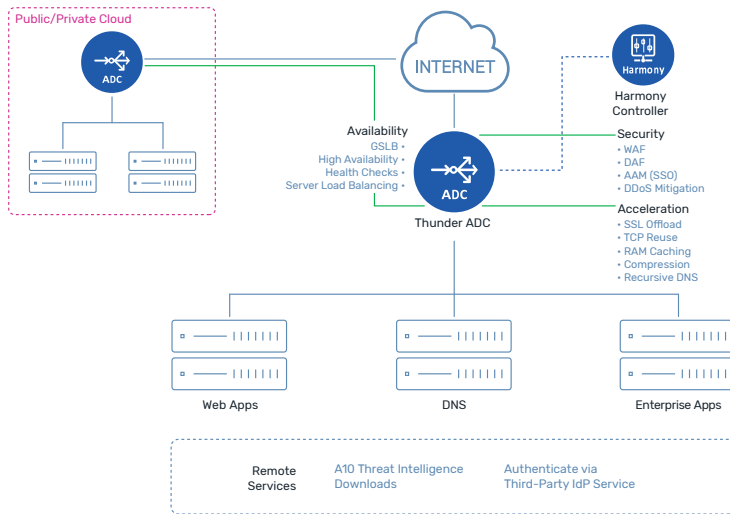
SSL Bulk

Industry-leading Performance

Thunder ADC delivers industry-leading performance – 370 Gbps of application throughput and 145 Gbps of TLS/SSL bulk throughput – in a single 1.5U appliance, rich ADC features (all-inclusive) in the broadest range of form factors, including physical, virtual, bare metal, containers for multi-tenancy and cloud.

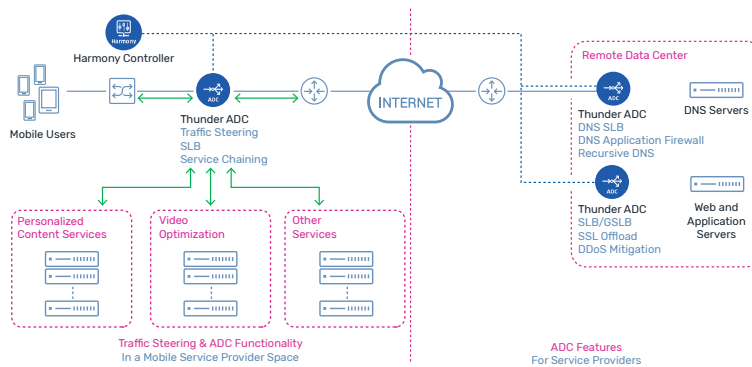
Reference Architectures

Enterprise Deployment



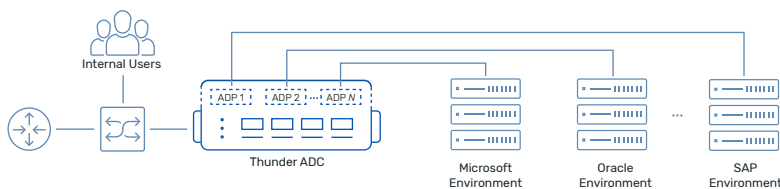
Offering industry-leading performance – up to 370 Gbps in a single hardware and 100 Gbps in a virtual appliance, Thunder ADC may be deployed at the core of an environment to deliver high-performance application delivery, load balancing and security. In multi-cloud environments, Thunder ADC can be deployed in any private or public cloud in a virtual or container form factor, with consistent features across clouds.

Service Provider Deployment



Proven in large-scale service provider environments, Thunder ADC may be deployed to optimize network efficiency and services via traffic steering and service chaining to multiple value-added services, such as video optimization. The solution includes carrier-grade networking (CGN) support for IPv4 address expansion and IPv6 migration.

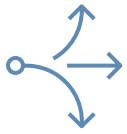
Application Delivery Partitions



A10 Thunder ADC supports multi-tenant environments with application delivery partitions (ADP). Configure more than 1,000 ADC tenant partitions on a single appliance that also enables Layer 3 virtualization. Each partition may be configured for a unique set of policies and offers sufficient resource isolation for most application-oriented use cases.

Features

Application Delivery and Performance



Advanced

Server Load Balancing

Thunder ADC is a full-proxy, load-balancing and content-switching solution. With aFleX® scripting, deep packet inspection, comprehensive load-balancing algorithms and persistence support, Thunder ADC enables application layer visibility to optimally route inbound requests.

Customizable server health checks ensure only fully functional servers are used to service client needs. The server best able to respond is selected and total servers required can be substantially reduced for lower TCO.



Broad

Acceleration Methodologies

Leverage numerous techniques to overcome inherent distance-related latency, inefficient internet protocols and application design limitations. Acceleration methods, including TCP connection multiplexing, RAM caching, GZIP compression and SSL-offload, expedite content transfer. The solution supports TCP optimization standards such as selective acknowledgment, client keep-alive and window scaling, to further speed delivery.



Ultra-low Latency

For Financial Applications

The Thunder ADC family also offers solutions for low latency applications, featuring specialized Thunder appliances with custom software, to meet the low latency and jitter requirements of financial applications. Featuring ultra-low latency hardware, these appliances offer near instantaneous execution times and provide granular program policies for efficient packet forwarding, while also consolidating multiple network functions, thus reducing hops.



Global

Server Load Balancing (GSLB)

Extend load balancing on a global basis. Thunder ADCs, distributed worldwide, continuously update each other on their respective individual nodes for optimal site selection and status to ensure disaster recovery.

Geographic and network proximity policy metrics optimize multi-site deployments. DNS proxy or DNS server methods further improve implementation flexibility and deployment simplicity.



High Density

Application Delivery Partitions

Provide support for multi-tenant environments with application delivery partitions (ADP). They allow the configuration of more than 1,000 partitions on a single Thunder ADC appliance, which enables Layer 3 virtualization. Each partition may be configured for a unique set of policies and offers resource isolation for most application-oriented use cases.



Recursive DNS

For Consolidation

Thunder ADC provides powerful recursive DNS capability enabling a one-stop DNS solution that leverages the high performance of ACOS DNS cache service, the scalability of DNS load balancing and the security of DNS application firewall (DAF). This makes the ADC recursive DNS feature a perfect solution for any enterprise or service provider seeking to consolidate DNS services and drive higher customer satisfaction.

Application Security



Extensive

Cipher Suite Support

Hardware-based SSL offload engines support advanced cryptographic methods at ultra-high capacity. Thunder ADC can manage session security, such as perfect forward secrecy (PFS), with an advanced cipher suite, including elliptic curve cryptography (ECC).

Appliances can process TLS/SSL encryption and decryption at rates 145 Gbps—and up to 140,000 connections per second—when using ECC with 256-bit keys.



Zero-day

Application Protection

An ICSA-certified web application firewall (WAF) guards vulnerable software from dozens of application layer attacks, including the Open Web Application Security Project (OWASP) Top 10 threats. These attacks include cross-site request forgery, SQL injection and buffer overflows that target coding flaws. Integrated into Thunder ADC, the WAF blocks these and other application behavior anomaly attacks, and prevents unauthorized data leakage.



SSO

and Application Authentication

The integrated application access management (AAM) module optimizes and enforces authentication and authorization to applications.

The module integrates with authentication servers, identity data stores, identity providers (IdPs) and applications to authenticate users and enforce access privileges. Common AAA and single sign-on (SSO) methods include LDAP, RADIUS, RSA SecurID, TDS SQL, SAML and Kerberos.

AAM interfaces to OCSP responders to validate client certificate status, as well as to Microsoft Active Directory for SharePoint and Outlook Web Access users.



Powerful

DNS LB and Firewall

Thunder ADC enables scalable DNS services by load-balancing multiple DNS servers and with cache DNS capabilities, while supporting recursive DNS lookup. To secure DNS services, the ADC incorporates a sophisticated DNS application firewall (DAF), DNS RPZ and integrated DDoS protection to filter unwanted and malformed requests, stop buffer overflows and head off DNS amplification-based DDoS attacks. It delivers validated DNSSEC pass-through support to prevent threats such as DNS cache-poisoning and spoofing.

Application Security (cont.)



DDoS Protection for App Services

DDoS protection is standard in all Thunder ADC appliances. With FTA-based hardware models, using field-programmable gate arrays (FPGA), protection may be enabled for high-volume attacks against application servers. FPGAs mitigate common volumetric attacks, while general-purpose CPUs mitigate more sophisticated low-and-slow and application attacks, such as Slowloris and HTTP floods. Additional methods to limit unwarranted data floods include connection rate limiting and bandwidth rate limiting per source IP.



Threat Intelligence Service

An optional subscription, the A10 Threat Intelligence Service provides data from more than three-dozen security sources, including DShield and Shadowserver. The service enables Thunder ADC to instantly recognize and block traffic to and from known malicious IP address sources. The service protects networks from future threats, blocks threats such as spam and phishing, and greatly increases Thunder ADC efficiency.

Certified By
ICSA Labs



The integrated Thunder ADC web application firewall has achieved WAF certification from ICSA Labs. ICSA Labs testing and certification ensures that Thunder ADC performs as intended to secure application services from exploitation and attack.

[SEE ALL CERTIFICATIONS](#)

Application Visibility and Management



Analytics

Visibility and Logging

When deployed in conjunction with the A10 Harmony Controller, Thunder ADC provides access to dozens of aggregate and per-request metrics in real time. These include end-to-end response times, latency, popular URLs, and error and health indicators. The data is analyzed to provide per-app reporting and alerts on availability, security and performance.

Detailed Layer 4 based analytics information is separately provided by individual clients, ADC (single appliance or as a cluster) and per server.



DevOps

Automation

Recognizing the need for effective operation for multi-cloud deployment, Thunder ADC has tight integration with many automation, cloud orchestration and DevOps tools.

- Supports various cloud platform and technologies including OpenStack, OpenShift, Kubernetes and more.
- Provides native integration with Infrastructure as Code (IaC) for provisioning and configuration automation, such as Terraform and Ansible.
- Automates network operation with dynamic ADC configuration update using Thunder Kubernetes Connector (TKC), HashiCorp Consul and network infrastructure automation (NIA).
- Monitors application network with common open-source tools such as Prometheus, Grafana and Fluentd.



API

Full Programmability

The Thunder ADC platform leverages A10's REST-based aXAPIs to configure all features with 100 percent API coverage. This interface is used to integrate with third-party or custom management consoles, such as SDN platforms (e.g., VMware) and cloud orchestration systems (e.g., OpenStack and Microsoft SCVMM). A software plug-in is available for private clouds leveraging vRealize Orchestrator from VMware.

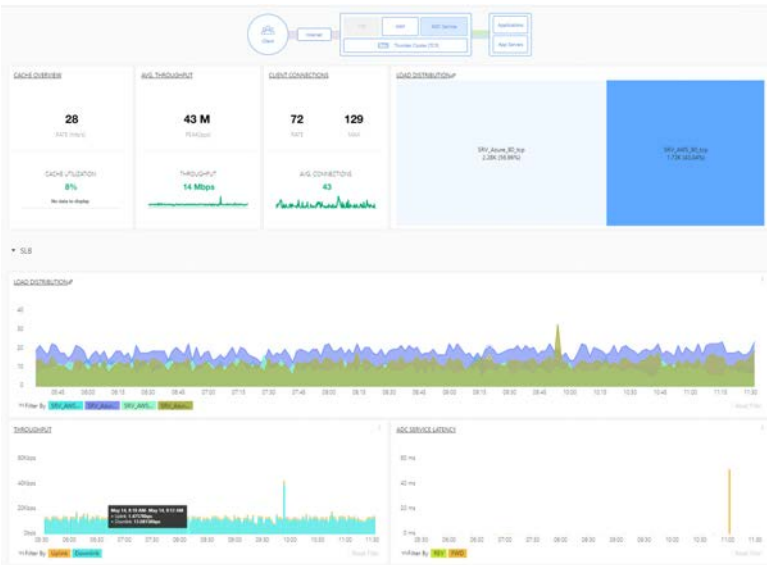


Comprehensive

Management Tools

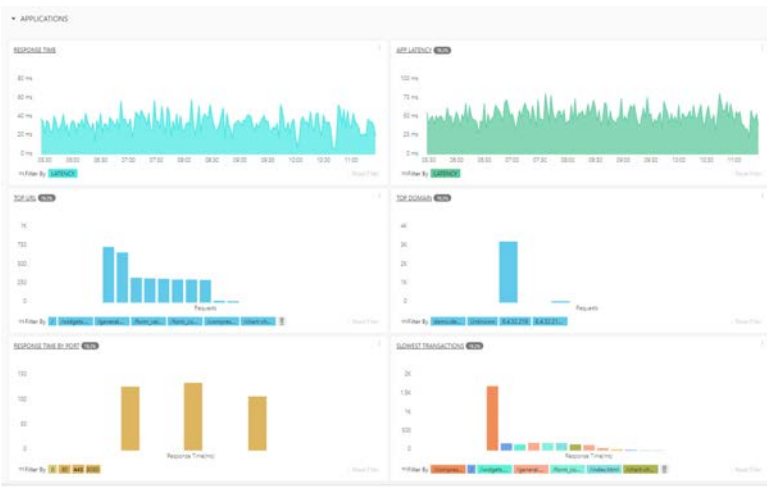
Thunder ADC is supported by the A10 Harmony Controller, which is available in software and software-as-a-service (SaaS). This controller is a centralized management platform that coordinates and distributes application-centric service policies and configuration files to hundreds of Thunder appliances and device cluster infrastructures across multi-cloud environments. Administrators can automatically discover, track and monitor each appliance including key operational metrics such as CPU and disk usage as well as device partitions and users. The controller performs configuration backup and restore operations and schedules software upgrades.

ADC Service View



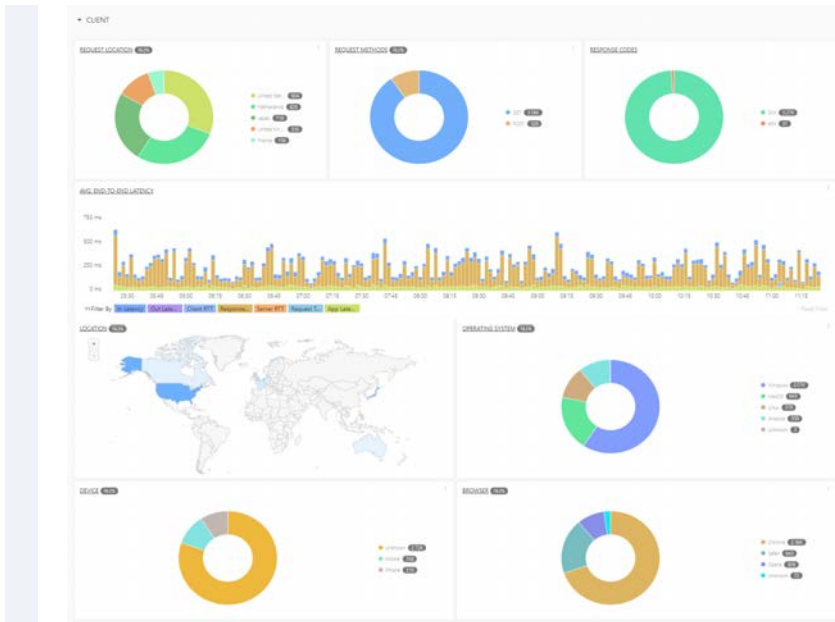
Thunder ADC with Harmony Controller provides granular real-time analytics of the ADC services. Information available for each application service port includes user traffic throughput and connection rate, load distribution, ADC service latency, RAM cache utilization, compression statistics, SSL connection rates and error traffic rate.

Applications View



Get a real-time status report of the application services, including application response time and latency, top URL analytics, top domains analytics for global usage visualization, response type analytics by port number and slow transaction analytics per page under the application.

Client and WAF View



This can help visualize end-user analytics including characteristics such as locations, device, OS and browser types and top clients per request and throughput. It also provides service quality analytics using request method, response code and granular end-to-end latency reporting. In addition, WAF security analytics provide real-time request handling and transaction for better and more secure operation.

Response Time Details



This information is useful for troubleshooting delayed application response times. The screen details the time taken in various portions of a HTTP transaction. These graphs also help distinguish application vs. infrastructure related issues.

Thunder ADC Physical Appliance Specifications

Performance	Thunder 940 ADC	Thunder 1040 ADC	Thunder 3350-E ADC	Thunder 3350 ADC
Application Throughput (L4/L7)	10 Gbps / 7.5 Gbps	20 Gbps / 20 Gbps	30 Gbps / 30 Gbps	40 Gbps / 40 Gbps
Layer 4 CPS	240k	500K	800K	1 Million
Layer 4 Concurrent Sessions	16 Million	32 Million	64 Million	96 Million
Layer 7 CPS (1:1) ¹	75k	180K	330K	500K
SSL Bulk Throughput ²	1 Gbps	9 Gbps	13 Gbps	18 Gbps
SSL CPS ²	RSA: 1K ECDSA: 800	RSA: 15K ECDSA: 8K	RSA: 28K ECDSA: 15K	RSA: 28K ECDSA: 15K
DDoS Protection (SYN Flood) SYN/sec	2 Million	4 Million	8 Million	8 Million
Application Delivery Partitions (ADP)	32	32	64	127
Network Interfaces				
	Model F			
1 GE (BASE-T)	5	5	5	6
1 GE Fiber (SFP)	0	0	4	2
1/10 GE Fiber (SFP+)	4 ¹⁸	4 ¹⁸	4 ¹⁸	8 + 4 ¹⁸
25 GE Fiber (SFP28)	0	0	0	4
40 GE Fiber (QSFP+)	0	0	0	4
100 GE Fiber (QSFP28)	0	0	0	0
Management Ports	Ethernet Mgmt Port, RJ-45 Console Port			
Hardware Specifications				
Processor	Intel Communications Processor	Intel Communications Processor	Intel Xeon 8-core	Intel Xeon 8-core
Memory (ECC RAM)	8 GB	8 GB / 16 GB ^{4/7}	16 GB	32 GB
Storage	SSD	SSD	SSD	SSD
Hardware Acceleration	Software	Software	Software	Software
TLS/SSL Security Acceleration	Software	Hardware on S models (2 options) ⁷	Hardware	Hardware
Dimensions (inches)	1.75 (H) x 17.5 (W) x 17.25 (D)	1.75 (H) x 17.5 (W) x 17.25 (D)	1.75 (H) x 17.5 (W) x 18(D)	1.75 (H) x 17.5 (W) x 18(D)
Rack Units (Mountable)	1U	1U	1U	1U
Unit Weight ³	14 lbs 16lbs (RPS)	14 lbs 16 lbs (RPS)	18 lbs	18 lbs
Power Supply (DC option available)	Single 750W ⁶	Single 750W ⁶	Dual 750W RPS	Dual 750W RPS
	80 Plus Platinum efficiency, 100 - 240 VAC, 50 - 60 Hz			
Power Consumption (Typical/Max) ³	60W / 80W	80W / 110W	151W / 205W	165W / 238W
Heat in BTU/hour (Typical/Max) ³	205 / 273	273 / 376	516 / 700	564 / 831
Cooling Fan (Front-to-Back airflow)	Removable Fans		Hot Swap Smart Fans	
Operating Ranges	Temperature 0° - 40° C Humidity 5% - 95%			
Regulatory Certifications	FCC Class A, UL, CE, GS, CB, VCCI, CCC, KCC, BSMI, RCM RoHS	FCC Class A, UL, CE, GS, CB, VCCI, CCC, KCC, BSMI, RCM RoHS	FCC Class A, UL, CE, GS, CB, VCCI, CCC, BSMI, RCM RoHS	FCC Class A, UL, CE, GS, CB, VCCI, CCC, KCC, BSMI, RCM RoHS
Standard Warranty	90-day Hardware and Software			

Thunder ADC Physical Appliance (cont.)

Performance	Thunder 3350S _{ADC}	Thunder 4440 _{ADC}	Thunder 5440 _{ADC}	Thunder 5840 _{ADC}
Application Throughput (L4/L7)	50 Gbps / 50 Gbps	78 Gbps / 70 Gbps	100 Gbps / 100 Gbps	115 Gbps / 113 Gbps
Layer 4 CPS	2 Million	2 Million	3.2 Million	4.5 Million
Layer 4 Concurrent Sessions	128 Million	128 Million	256 Million	256 Million
Layer 7 CPS (1:1) ¹	750K	750K	950K	1.5 Million
SSL Bulk Throughput ²	30 Gbps	25 Gbps	45 Gbps	55 Gbps
SSL CPS ²	RSA: 60K ECDSA: 35K	RSA: 70K ECDSA: 42K	RSA: 100K ECDSA: 60K	RSA: 150K ECDSA: 90K
DDoS Protection (SYN Flood) SYN/sec	16 Million	110 Million	166 Million	166 Million
Application Delivery Partitions (ADP)	1,023	127	1,023	1,023
Network Interfaces				
1 GE (BASE-T)	6	0	0	0
1 GE Fiber (SFP)	2	0	0	0
1/10 GE Fiber (SFP+)	8 + 4 ¹⁸	24	24	24
25 GE Fiber (SFP28)	0	0	0	0
40 GE Fiber (QSFP+)	0	4	4	4
100 GE Fiber (QSFP28)	0	0	0	0
Management Ports	Ethernet Mgmt Port, RJ-45 Console Port	Ethernet Mgmt Port, RJ-45 Console Port, Lights Out Management		
Hardware Specifications				
Processor	Intel Xeon 14-core	Intel Xeon 6-core	Intel Xeon 12-core	Intel Xeon 18-core
Memory (ECC RAM)	64 GB	32 GB	64 GB	64 GB
Storage	SSD	SSD	SSD	SSD
Hardware Acceleration	Software	2 x FTA-4	2 x FTA-4	2 x FTA-4
TLS/SSL Security Acceleration	Hardware	Hardware on S model	Hardware on S model	Hardware on S models
Dimensions (inches)	1.75 (H) x 17.5 (W) x 18(D)	1.75 (H) x 17.5 (W) x 30 (D)	1.75 (H) x 17.5 (W) x 30 (D)	1.75 (H) x 17.5 (W) x 30 (D)
Rack Units (Mountable)	1U	1U	1U	1U
Unit Weight ³	18 lbs	32.5 lbs	32.5 lbs	32.5 lbs
Power Supply (DC option available)	Dual 750W RPS	Dual 1100W RPS	Dual 1100W RPS	Dual 1100W RPS
	80 Plus Platinum efficiency, 100 - 240 VAC, 50 - 60 Hz			
Power Consumption (Typical/Max) ³	175W / 222W	360W / 445W	360W / 445W	375W / 470W
Heat in BTU/hour (Typical/Max) ³	598 / 758	1,229 / 1,519	1,229 / 1,519	1,280 / 1,604
Cooling Fan (Front-to-Back airflow)	Hot Swap Smart Fans			
Operating Ranges	Temperature 0° - 40° C Humidity 5% - 95%			
Regulatory Certifications	FCC Class A, UL, CE, GS, CB, VCCI, CCC, KCC, BSMI, RCM RoHS	FCC Class A, UL, CE, CB, VCCI, CCC, KCC, BSMI, RCM RoHS	FCC Class A, UL, CE, CB, VCCI, CCC, KCC, BSMI, RCM RoHS, FIPS 140-2 ¹⁵	FCC Class A, UL, CE, CB, VCCI, CCC, KCC, BSMI, RCM RoHS, FIPS 140-2 ¹⁵
Standard Warranty	90-day Hardware and Software			

Thunder ADC Physical Appliance (cont.)

Performance	Thunder 5840-11 ADC	Thunder 6440 ADC	Thunder 7440 ADC	Thunder 7440-11 ADC
Application Throughput (L4/L7)	115 Gbps / 113 Gbps	150 Gbps / 140 Gbps	220 Gbps / 200 Gbps	220 Gbps / 200 Gbps
Layer 4 CPS	4.5 Million	4.5 Million	8.3 Million	8.3 Million
Layer 4 Concurrent Sessions	256 Million	256 Million	256 Million	256 Million
Layer 7 CPS (1:1) ^{*1}	1.5 Million	1.4 Million	2.8 Million	2.8 Million
SSL Bulk Throughput ^{*2}	55 Gbps	60 Gbps	75 Gbps	75 Gbps
SSL CPS ^{*2}	RSA: 150K ECDSA: 90K	RSA: 150K ECDSA: 70K	RSA: 200K ECDSA: 70K	RSA: 200K ECDSA: 70K
DDoS Protection (SYN Flood) SYN/sec	166 Million	238 Million	332 Million	332 Million
Application Delivery Partitions (ADP)	1,023	1,023	1,023	1,023
Network Interfaces				
1 GE (BASE-T)	0	0	0	0
1 GE Fiber (SFP)	0	0	0	0
1/10 GE Fiber (SFP+)	48	48	48	48
25 GE Fiber (SFP28)	0	0	0	0
40 GE Fiber (QSFP+)	0	4	4	0
100 GE Fiber (QSFP28)	4	0	0	4
Management Ports	Ethernet Mgmt Port, RJ-45 Console Port, Lights Out Management			
Hardware Specifications				
Processor	Intel Xeon 18-core	2 x Intel Xeon 10-core	2 x Intel Xeon 18-core	2 x Intel Xeon 18-core
Memory (ECC RAM)	64 GB / 128 GB ^{*4}	128 GB	128 GB	128 GB
Storage	SSD	SSD	SSD	SSD
Hardware Acceleration	2 x FTA-4	3 x FTA-4	3 x FTA-4	3 x FTA-4
TLS/SSL Security Acceleration	Hardware on S models	Hardware on S model	Hardware on S model	Hardware on S model
Dimensions (inches)	1.75 (H) x 17.5 (W) x 30 (D)	1.75 (H) x 17.5 (W) x 30 (D)	1.75 (H) x 17.5 (W) x 30 (D)	1.75 (H) x 17.5 (W) x 30 (D)
Rack Units (Mountable)	1U	1U	1U	1U
Unit Weight ^{*5}	34.3 lbs	36 lbs	35.7 lbs	35.7 lbs
Power Supply (DC option available)	Dual 1500W RPS	Dual 1100W RPS	Dual 1100W RPS	Dual 1500W RPS
	80 Plus Platinum efficiency, 100 - 240 VAC, 50 - 60 Hz			
Power Consumption (Typical/Max) ^{*3}	550W / 760W	480W / 550W	690W / 820W	820W / 950W
Heat in BTU/hour (Typical/Max) ^{*3}	1,877 / 2,594	1,638 / 1,877	2,355 / 2,798	2,798 / 3,242
Cooling Fan (Front-to-Back airflow)	Hot Swap Smart Fans			
Operating Ranges	Temperature 0° - 40° C Humidity 5% - 95%			
Regulatory Certifications	FCC Class A, UL, CE, CB, VCCI, CCC, BSMI, RCM RoHS	FCC Class A, UL, CE, CB, VCCI, CCC, KCC, BSMI, RCM RoHS	FCC Class A, UL, CE, CB, VCCI, CCC, KCC, BSMI, RCM RoHS, FIPS 140-2 ^{*5}	FCC Class A, UL, CE, CB, VCCI, CCC, BSMI, RCM RoHS, FIPS 140-2 ^{*5}
Standard Warranty	90-day Hardware and Software			

Hardware specifications and performance numbers are subject to change without notice, and may vary depending on configuration and environmental conditions. As for network interfaces, it's highly recommended to use A10 Networks' qualified optics/transceivers to ensure network reliability and stability.

^{*1} Layer 7 connections per second - measures number of new HTTP connections (1 HTTP request per TCP connection, without TCP connection reuse) within 1 second | ^{*2} Tested with maximum SSL option. Cipher "TLS_RSA_WITH_AES_128_CBC_SHA256" with RSA 2K keys, unless noted, are used for RSA cases, "TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256" with EC P-256 are used for PFS cases. | ^{*3} With base model. Number varies by hardware options (e.g. SSL cards) | ^{*4} With maximum SSL option | ^{*5} For FIPS 140-2 Level 2 validated, FIPS models must be purchased | ^{*6} Optional RPS available | ^{*7} Thunder 1040-F comes with hardware TLS/SSL acceleration with 16GB RAM by default | ^{*8} 10Gbps speed only | ^ Certification in process

Thunder ADC SPE Physical Appliance Specifications

Performance	Thunder 4435 _{ADC}	Thunder 7655 _{ADC}
Application Throughput (L4/L7)	38 Gbps / 38 Gbps	370 Gbps / 340 Gbps
Layer 4 CPS	3.1 Million	12 Million
Layer 4 Concurrent Sessions	128 Million	384 Million
Layer 7 CPS (1:1) ^{*1}	660K	4.5 Million
SSL Bulk Throughput ^{*2}	26 Gbps	145 Gbps
SSL CPS ^{*2}	RSA: 65K	RSA: 200K ECDSA: 140K
DDoS Protection (SYN Flood) SYN/sec	55 Million	500 Million
Application Delivery Partitions (ADP)	1,023	1,023
Network Interfaces		
1/10 GE Fiber (SFP+)	16	0
100 GE Fiber (QSFP28)	0	16
Management Ports	Ethernet Mgmt Port, RJ-45 Console Port, Lights Out Management	
Hardware Specifications		
Processor (Intel Xeon)	10-core	2 x 28-core
Memory (ECC RAM)	64 GB	384 GB
Storage	SSD	SSD
Hardware Acceleration	FTA-3, SPE	2 x FTA-5, SPE
TLS/SSL Security Acceleration	Software	Hardware
Dimensions (Inches)	1.75 (H) x 17.5 (W) x 30 (D)	2.625 (H) x 17.5 (W) x 30 (D)
Rack Units (Mountable)	1U	1.5U
Unit Weight	34.5 lbs	44.2 lbs
Power Supply (DC Option Available)	Dual 1100W RPS	Dual 1500W RPS
	80 Plus Platinum Efficiency, 100 - 240 VAC, 50 - 60 Hz	
Power Consumption (Typical/Max) ^{*3}	350W / 420W	1,121W / 1,300W
Heat in BTU/hour (Typical/Max) ^{*3}	1,195 / 1,433	3,826 / 4,436
Cooling Fan (Front-to-Back Airflow)	Hot Swap Smart Fans	
Operating Ranges	Temperature 0° - 40° C Humidity 5% - 95%	
Regulatory Certifications	FCC Class A, UL, CE, TUV, CB, VCCI, CCC, MSIP, BSMI, RCM, EAC, NEBS RoHS	FCC Class A, UL, CE, GS, CB, VCCI, CCC, BSMI, RCM RoHS
Standard Warranty	90-day Hardware and Software	

Hardware specifications and performance numbers are subject to change without notice, and may vary depending on configuration and environmental conditions.

*1 Layer 7 connections per second - measures number of new HTTP connections (1 HTTP request per TCP connection, without TCP connection reuse) within 1 second |

*2 Tested with maximum SSL option, using cipher "TLS_RSA_WITH_AES_128_CBC_SHA" with RSA 2K keys | *3 With base model. Number varies by SSL model

Thunder ADC for Low-latency Appliance Specifications

Performance	Thunder 4435
Mean Latency L7	3.9 μ s
Max Latency L7	4.2 μ s
Jitter L7	0.4 μ s
Concurrent NAT Sessions	32,000
Network Interfaces	
1/10 GE Fiber (SFP+)	16
Management Ports	Ethernet Mgmt Port, RJ-45 Console Port, Lights Out Management
Hardware Specifications	
Processor (Intel Xeon)	10-core
Memory (ECC RAM)	64 GB
Storage	SSD
Hardware Acceleration	FTA-3, SPE
Dimensions (Inches)	1.75 (H) x 17.5 (W) x 30 (D)
Rack Units (Mountable)	1U
Unit Weight	34.5 lbs
Power Supply (DC Option Available)	Dual 1100W RPS 80 Plus Platinum Efficiency, 100 - 240 VAC, 50 - 60 Hz
Power Consumption (Typical/Max)	350W / 420W
Heat in BTU/hour (Typical/Max)	1,195 / 1,433
Cooling Fan (Front-to-Back Airflow)	Hot Swap Smart Fans
Operating Ranges	Temperature 0° - 40° C Humidity 5% - 95%
Regulatory Certifications	FCC Class A, UL, CE, TUV, CB, VCCI, CCC, MSIP, BSMI, RCM, EAC, NEBS RoHS
Standard Warranty	90-day Hardware and Software

Hardware specifications and performance numbers are subject to change without notice, and may vary depending on configuration and environmental conditions. Performance varies by number of virtual machines running and hardware resources assigned

A10 Thunder on Dell Technologies OEM Solution Bundle Specifications

Single Service Platform (SSP) Specifications

The SSP range consists of A10's cloud-ready software and purpose-built Dell Technologies hardware, with an inclusive license³ that has the capabilities of delivering Application Delivery Controller (ADC), SSL Insight (SSLi), and Carrier Grade Networking (CGN) solutions along with an expanded feature set of A10 capabilities.

Thunder ADC Performance	Dell Technologies VEP4600	Dell Technologies R640		Dell Technologies R740	
		10GE NIC Model	100GE NIC Model	10GE NIC Model	100GE NIC Model
Application Throughput (L4 / L7)	10 Gbps / 7.5 Gbps	40 Gbps / 40 Gbps	60 Gbps / 60 Gbps	75 Gbps / 75 Gbps	100 Gbps / 100 Gbps
Connections Per Second (L4 / L7) ^{*1}	350K / 175K	2 Million / 1 Million	2 Million / 1 Million	2 Million / 1 Million	3 Million / 1 Million
SSL Bulk Throughput	2 Gbps	32 Gbps	38 Gbps	45 Gbps	66 Gbps
SSL CPS (RSA / ECDSA) ^{*2}	3.5K / 7K	100K / 45K	107K / 72K	120K / 60K	131K / 85K
Network Interfaces					
1 GE (BASE-T)	6	2	2	2	2
1/10 GE Fiber (SFP+)	4	6	2	10	10
100 GE Fiber (QSFP28)	0	0	2	0	4
Hardware Specifications					
Processor	Intel Xeon 8-core	2 x Intel Xeon 20-core		2 x Intel Xeon 20-core	
Memory	16 GB	192 GB		192 GB	
Storage	SSD	2 x SSD		2 x SSD	
TLS/SSL Security Processor	Built-in	2 x Security Card (PCIe)		2 x Dual-chip Security Card (PCIe)	
Power Supply	Single 230W Power Supply	Dual 750W Power Supply		Dual 2000W Power Supply	

Multi-tenant Virtual Platform (MVP) Specifications

A10 Thunder Multi-tenant Virtual Platform (MVP) on Dell Technologies is an advanced platform enabling multiple virtual instances or services on a single platform, with inclusive license that has the capabilities of delivering Application Delivery Controller (ADC), SSL Insight (SSLi), and Carrier Grade Networking (CGN) solutions along with an expanded feature set of A10 capabilities.

Performance with ADC	Dell Technologies R640		Dell Technologies R740	
	10GE NIC Model	100GE NIC Model	10GE NIC Model	100GE NIC Model
Application Throughput (L4 / L7)	40 Gbps / 40 Gbps	43 Gbps / 36 Gbps	75 Gbps / 75 Gbps	93 Gbps / 72 Gbps
Connections Per Second (L4 / L7) ^{*1}	950K / 700K	1 Million / 850K	1.2 Million / 1 Million	1.7 Million / 1.7 Million
SSL Bulk Throughput	32 Gbps	37 Gbps	40 Gbps	63 Gbps
SSL CPS (RSA / ECDSA) ^{*2}	60K / 45K	98.6K / 75K	120K / 90K	164K / 116K
Network Interfaces				
1 GE (BASE-T)	2	2	2	2
1/10 GE Fiber (SFP+)	6	2	10	10
100 GE Fiber (QSFP28)	0	2	0	4
Hardware Specifications				
Processor	2 x Intel Xeon 20-core		2 x Intel Xeon 20-core	
Memory	192 GB		192 GB	
Storage	2 x SSD		2 x SSD	
TLS/SSL Security Processor	2 x Security Card (PCIe)		2 x Dual-chip Security Card (PCIe)	
Power Supply	Dual 750W Power Supply		Dual 2000W Power Supply	

*1 Layer 7 connections per second - measures number of new HTTP connections (1 HTTP request per TCP connection, without TCP connection reuse) within 1 second

*2 RSA (2K keys) cipher: "TLS_RSA_WITH_AES_128_CBC_SHA", ECDSA (EC P-256) cipher: "TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA"

*3 A10 Thunder on Dell Technologies OEM bundle solutions are licensed under the Convergent Firewall (CFW) license. Check with your A10 Networks sales representative for the latest information on full feature testing and validation.

All Thunder MVP performance specifications are aggregate number that use the following VM profiles:

- R640 10GE NIC model is tested with 4-VM profile (8 vCPUs, 16 GB memory, 30 GB storage, 16 SSL virtual functions (VFs) assigned on each vThunder)
- R640 100GE NIC model is tested with 4-VM profile (16 vCPUs, 32 GB memory, 30 GB storage, 8 SSL VFs assigned on each vThunder)
- R740 10GE and 100GE NIC model are tested with 8-VM profile (8 vCPUs, 16 GB memory, 30 GB storage, 16 SSL VFs assigned on each vThunder)

Thunder ADC Virtual Appliance Specifications

vThunder ADC	
Supported Hypervisors	VMware ESXi 5.5 or Higher (VMXNET3, SR-IOV, PCI Passthrough), KVM QEMU 1.0 or Higher (VirtIO, OvS with DPDK, SR-IOV, PCI Passthrough), Microsoft Hyper-V on Windows Server 2008 R2 or Higher
Hardware Requirements	See Installation Guide
Standard Warranty	90-day Software

Bandwidth Licenses	Lab	200 Mbps	1 Gbps	4 Gbps	8 Gbps	10 Gbps	20 Gbps	40 Gbps	100 Gbps	FlexPool
VMware ESXi	●	●	●	●	●	●	● ^{*1}	● ^{*1, *2}	● ^{*2}	●
KVM	●	●	●	●	●	●	● ^{*1}	● ^{*1, *2}	● ^{*2}	●
Microsoft Hyper-V	●	●	●	●	● ⁺					●

vThunder ADC for Cloud	AWS	Microsoft Azure	Oracle Cloud
Throughput	Up to 10 Gbps	Up to 10 Gbps	Up to 24 Gbps
Image Format	Amazon AMI	Microsoft VHD	QCOW2
Licenses (Per Instance)	30-day Trial License Pre-installed Bnadwidth License: • 200 Mbps, 500 Mbps, 1 Gbps BYOL Bandwidth License: • Lab/Developer, 200 Mbps, 1 Gbps, 4 Gbps, 10 Gbps FlexPool License: Up to 10 Gbps	30-day Trial License Pre-installed Bandwidth License: • 10 Mbps, 50 Mbps, 100 Mbps, 200 Mbps, 500 Mbps BYOL Bandwidth License: • Lab/Developer, 200 Mbps, 500 Mbps, 1 Gbps, 4 Gbps, 10 Gbps FlexPool License: Up to 10 Gbps	30-day Trial License Pre-installed OCPU based License: • 1 OCPU to 24 OCPU BYOL Bandwidth License: • Lab/Developer, 200 Mbps, 1 Gbps, 4 Gbps, 10 Gbps FlexPool License: Up to 24 Gbps

Thunder ADC Container	
Image Format	Docker
Operating System	Reference Operating System: • Ubuntu 16.04.3 LTS (Xenial Xerus) • RedHat Enterprise Linux version 7.6
System Requirements	Minimum Requirement: • 1 or More Data Interface • 1 vCPU and 4 GB Memory
Licenses (Per Instance)	BYOL Bandwidth License: Up to 100 Gbps FlexPool License: Up to 100 Gbps
Standard Warranty	90-day Software

Thunder ADC for Bare Metal	
System Requirements	Minimum Hardware Requirement: Intel x86-based CPUs with minimum of 4 cores, 16 GB RAM, 80 GB of free disk space, 2 Ethernet interfaces (3 or more are recommended), Intel Network Adapters and drivers including igb, ixgbe, and i40e. For more details, see Installation Guide.
Reference Platforms	Dell PowerEdge, Cisco UCS, Ericsson Hyperscale Datacenter System (HDS), HP ProLiant and more
Bandwidth Licenses*	10 Gbps (4 cores), 20 Gbps (8 cores), 40 Gbps (14 cores) and 60 Gbps (24 cores) FlexPool (Up to 60 Gbps per Thunder ADC)
Standard Warranty	90-day Software

*1 SR-IOV | *2 PCI Passthrough | +8 Gbps license not recommended for Microsoft Hyper-V
 * Licenses are tied to the maximum number of cores that can be allocated to ACOS

Detailed Feature List

Features may vary by appliance.

Application Delivery

- Comprehensive IPv4/IPv6 support
- Advanced Layer 4/Layer 7 server load balancing
 - Fast HTTP, Full HTTP proxy
 - High-performance, template-based Layer 7 switching with header/URL/domain manipulation
 - Comprehensive Layer 7 application persistence support
 - HTTP/2, FTP, FIX and more
- DNS load balancing
 - Layer 4 (UDP/TDP) and Layer 7 (DNS-UDP/DNS-TCP)
 - Recursive DNS lookup
 - DNS firewall/RPZ
 - DNS cache
- Comprehensive load balancing methods
 - Round robin, least connections, weighted RR, weighted LC, fastest response, and more
- aFlex – Deep packet inspection and transformation for customizable, application-aware switching
- Advanced health monitoring
 - Comprehensive protocol support – ICMP, TCP, UDP, HTTP, HTTPS, FTP, RTSP, SMTP, POP3, SNMP, DNS, RADIUS, LDAP and more
 - Scriptable health check support using TCL, Python, Perl, Bash
- High availability – active-active, active-standby configurations
- SIP load balancing for VoIP
- STARTTLS support for secure email and LDAP
- Network traffic filtering – high-speed processing of large black/white lists
- Firewall load balancing (FWLB)
- Global server load balancing (GSLB)
- Traffic steering/service chaining
- Transparent cache switching (TCS)
- Next hop load distribution (NHLD) for load balancing multiple links
- Diameter AAA load balancing
- Database load balancing
- Internet content adaptation protocol (ICAP) support

Application Acceleration

- HTTP acceleration and optimization
 - HTTP connection multiplexing (also called TCP connection reuse)
 - RAM caching
 - HTTP compression
- SSL offload
 - SSL termination, SSL bridging
 - SSL proxy
 - SSL session ID reuse
- TCP optimization support including selective acknowledgment, client keep-alive and window scaling
- HTTP pipelining
- HTTP/2, SPDY protocol

Application Security

- Web application firewall (WAF)
- DNS application firewall (DAF)
- Integrated DDoS protection for application services
- Hardware-based DDoS protection*
- Application Access Management (AAM) – SAML, WIA, Kerberos, NTLM, TDS SQL Logon, LDAP, RADIUS, Basic, OCSP stapling, HTML Form-based
- AAM RADIUS-based audit support
- Single sign-on (SSO) authentication relay
- Authentication for Microsoft SharePoint, Outlook Web Access, and other packaged and custom applications
- Comprehensive SSL/TLS support
 - TLS 1.2 and TLS 1.3 support
 - Perfect Forward Secrecy (PFS) with Elliptic Curve Diffie-Hellman Exchange (ECDHE) and other Elliptic Curve Cryptography (ECC) ciphers
 - AES-NI and GCM ciphers

- IP anomaly detection
- Connection rate limiting/connection limiting
- Bandwidth rate limiting per source IP
- Dynamically add IPs to black-white lists
- Support for Simple Certificate Enrollment Protocol (SCEP)
- Let's Encrypt ACME client support
- Hardware Security Module (HSM) support*

A10 Threat Intelligence Service**

- Dynamically updated threat intelligence feed

Scalable, High-performance Platform

- Advanced Core Operating System (ACOS)
 - Multi-core, multi-CPU support
 - Linear application scaling
 - ACOS on data plane
- Linux on control plane
- IPv6 feature parity
- ADC scale-out for “add-as-you-grow” capability

Networking

- Integrated Layer 2/Layer 3
- Transparent mode/gateway mode
- Virtual wire interface support
- Routing – static routes, IS-IS (v4/v6), RIPv2/ng, OSPF v2/v3, BGP4+
- L2 protocols (STP, RSTP, MSTP)
- VLAN (802.1Q)
- Link aggregation (802.1AX), LACP
- Access control lists (ACLs)
- Traditional IPv4 NAT/NAPT
- IPv6 NAPT
- Jumbo frame support*
- Hardware-accelerated VXLAN*
- NVGRE

IPv6 Migration/IPv4 Preservation

- Full native IPv6 management and feature support
- SLB-PT (Protocol Translation), SLB-64 (IPv4->IPv6, IPv6->IPv4)
- Carrier grade NAT (CGN/CGNAT), Large scale NAT (LSN), NAT444, NAT44, NAT46
 - Integrated DDoS protection for NAT pools
- NAT64/DNS64, DS-Lite, 6rd, LW4o6
- ALG protocol support for protocols with dynamic ports like SIP and FTP

Management

- Dedicated on-box management interface (GUI, CLI, SSH, Telnet)
- Web-based AppCentric templates (ACT) intuitive guided configuration tool
- SNMP, syslog, email alerts, NetFlow v9 and v10 (IPFIX), sFlow
- RESTful API (aXAPI)
- LDAP, TACACS+, RADIUS support
- Configurable control CPUs
- Interoperable with A10 Harmony Controller for centralized management, configuration and analytics
- Plug-in available for VMware vRealize Orchestrator deployments

Virtualization

- vThunder virtual appliance for VMware vSphere ESXi, Microsoft Hyper-V, KVM, Nutanix AHV, Amazon Web Services (AWS) AMI, Microsoft Azure VHD and QCOw2 for Oracle Cloud and others
- Thunder ADC for Bare Metal
- Thunder ADC for containers
- Networking acceleration (SR-IOV, DPDK) and management integration
- A10 Thunder on Dell Technologies OEM solution bundle

Extensibility

- aVCS (Virtual Chassis System)
- Multi-tenancy with Application Delivery Partitions (ADP)

Detailed Feature List (Cont.)

- Partition-based management
- L3 virtualization

Visibility and Analytics with Harmony Controller

Performance / Acceleration

- End-to-end response times
- Total bytes exchanged (BW)
- Average request-rate-per-second
- Worst-behaving URLs, services and domains
- Cache hits and misses as time series
- Compressed and uncompressed bytes sent as a time series
- Latency
 - Average end-to-end latency
 - App server latency
 - Client performance
 - Partition service latency

Traffic

- Popular URLs, services and domains
- Requests by response codes
- Geographical request distribution
- Secure versus open requests
- Most active clients
- Number of connections to application server
- Number of connections from clients

Errors and Health Indicators

- Time series of total bytes in and out from each server
- Time series of traffic rates (in Mbps) in and out from each server
- Percent of error traffic over range
- Number of good SSL connections
- Average application server latency by service
- Client-side latency SRTT, max, min and average as a time series

TCP-based Analytics

- Client
- Bytes and packets sent/received; connections
- Errors and failures
- Top clients by: bandwidth, connections, throughput
- Thunder ADC
 - Dropped traffic, errors/failures, anomalies
 - Load distribution by server
 - TCP SYN: received, rates
 - DSR received
- Thunder Cluster
 - Average cluster CPU by device and partition
 - Average cluster memory
 - Average and peak throughput
 - Connections
- Application Servers
 - Server health over time
 - Traffic by server: connections/rates, throughput, bytes and packets received/sent
 - Logs: normal, errors, anomalies with filters by protocol, client, VIP
 - Server response times

DevOps Tools and Integration

- Ansible modules and playbooks
- Terraform Thunder provider
- HashiCorp's Consul and Network Infrastructure Automation (NIA) integration
- Thunder Kubernetes Connector (TKC)
- OpenStack Octavia driver
- Cloud-init support for auto-configuration on
 - OpenStack
 - OCI
 - AWS
 - Azure
- Prometheus integration for visibility and analytics monitoring

Carrier-grade Hardware*

- Advanced hardware architecture
- Hardware-based SYN cookies
- Hot swap redundant power supplies (AC or DC)
- Smart fans (hot swap)
- Solid-state drive (SSD)
- Tamper detection
- Lights out management (LOM/IPMI)
- 25 GbE ports, 40 GbE ports, 100 GbE ports
- High-performance security processor option

Security and Capability Assurance Certifications*

- ICSA Labs WAF certification
- Common Criteria EAL 2+
- FIPS 140-2 Level 2
- Joint Interoperability Test Command (JITC)
- Network Equipment Building System (NEBS) compliance

* Features and certifications may vary by appliance.

** Additional paid service.

Learn More

About A10 Networks

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