A10 ADC Return On Investment

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Introduction

Making sure that your web infrastructure can reliably scale to run your business is a necessity. Ensuring that infrastructure can operate as efficiently as possible can be a true differentiator. One of the best ways to maximize the utility of your infrastructure is to deploy an Application Delivery Controller (ADC). ADCs optimize the performance of the network so that you get the most out of your technology investments.

While all ADCs can improve application performance and availability, not all ADCs deliver equal efficiencies and cost of ownership. The way an ADC is architected can impact the degree to which the solution can improve the performance, security and availability of your infrastructure and applications, but the architecture can also determine the relative efficiencies and, therefore, cost of ownership of the operations.

One of the best ways to understand the capabilities of a given ADC solution is to look at its potential impact on your bottom line and ongoing operations – a clear measurement of that impact is the solution's return on investment (ROI). This paper is designed to lay out the ROI for the A10 Thunder™ Series ADC product line. It attempts to explain and quantify how ADC solutions can be used to increase the efficiencies of your infrastructure to significantly reduce your expenses, and to increase your competitive advantage.

Streamline Operations to Maximize Efficiencies

If you are like most organizations, you expect a lot from your data center infrastructure. Trying to support the changing needs of your users and business is no small feat – not only do you need to make sure the content and apps required to conduct business are always available, you also need to anticipate and scale those apps to meet varying performance demands.

Keeping your infrastructure up and ensuring it can scale to support your current and future needs may be costing you more than you realize. Capital outlays are just one cost to consider; often more significant are the ongoing operational expenses associated with the space, power, cooling and administrative activities needed to keep the devices in your infrastructure running smoothly.

Gartner points out that the total cost of ownership (TCO) for a data center is more about the cost of operations than ownership – "hardware refreshes, maintenance and upgrades represent 35% of the total annual costs," with "personnel representing an average of 40% of data center TCO." [1]

Simplifying your operations will have a ripple effect on the overall TCO of your infrastructure. And one of the best ways to simplify operations is to optimize the utility of the devices that make up your infrastructure. The best place to start is with your servers, which, according to Gartner, make up 65% of the rack space used in an average data center.

Server Offload Is the Key

Servers are overtaxed – beyond serving up your applications, they are being asked to complete a lot of corollary functions to keep the infrastructure working.

For example, to meet the security and compliance demands of most enterprises, SSL is being added to websites, which means the servers have to do complex cryptographic functions that add significant overhead. In addition, it can be an operational nightmare to ensure that each and every device has the required software version level and is working as it should.

Ideally, what is needed is a way to maximize the utility of each server in your infrastructure to make sure it is running optimally and you are getting the most out of your investments. This can be accomplished by *offloading* some of the server processing that is not core to running the applications, and sending them to an external platform optimized to do these computationally intensive functions.

One way to potentially offload the servers is to use open source load-balancing products. These technologies can run on generic servers to accomplish basic load balancing. Unfortunately, there can be a cost. Generic servers are not optimized for performance and can create other operational issues – self-support, manual builds and the customization of generic configurations are all additional costs to consider.

Heartbleed – The Tale of Two Administrators

With a name like Heartbleed, it is not surprising that the OpenSSL software vulnerability, which allows anyone on the Internet "to eavesdrop on communications, and steal data directly from the services and users," gave many reason to pause. [2]

Admins Without an A10 ADC

Without A10 ADC, admins had to scramble to assess and patch each of their many web servers that used SSL. With many of these apps running different operating systems (OS) and with different SSL libraries, it was no small feat. These administrators spent countless hours testing, patching and retesting their apps to make sure they were secure and available.

Admins With an A10 ADC

Admins with A10 ADC didn't need to patch all their individual servers; instead, they could centrally assess and manage their SSL libraries and apply patches as needed. No fire drills, no wasted time.

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[1] Gartner, "Use a TCO Model to Estimate the Costs of Your Data Center," June 26, 2012.
[2] https://www.a10networks.com/vadc/index.php/avoiding-the-next-ssl-vulnerability-outbreak-a10s-investment-in-ssl-security/

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A10 Thunder ADC solutions are designed to offload processing that is typically done by the server or within the application in a way that increases the overall efficiency of the infrastructure. In general terms, the Thunder ADCs are able to offload the servers up to 70%[3] to enable server reduction and optimization that garners significant CAPEX and OPEX savings. The Thunder ADCs reduce the load on the servers by offloading:

- SSL encryption and decryption
- TCP connection management overhead
- Caching
- Compression

The following sections examine just how the Thunder ADCs are able to offload the servers to improve the overall efficiency of your infrastructure, as well as the performance and availability of your apps.

SSL Acceleration

A10 Thunder ADCs offload computationally intensive SSL traffic to eliminate the high SSL CPU overhead by up to 50%[3] on the server. As a result, servers are freed up to support many more transactions per second and the SSL certificate management is simplified.

Encrypting and decrypting SSL, which is used by most web traffic today to secure the exchange of data across public networks (Internet), is very CPU-intensive. Using A10's purpose-built security processing hardware, capable of handling 4096-, 2048- and 1024-bit keys, means the server can focus on responding to application requests, as depicted in the following deployment.

Size Matters

A 2x increase in the size of encryption keys typically results in a 3x to 7x drop in capacity on the servers, so A10's purpose-built hardware, which is capable of accelerating the computationally intensive encryption and decryption of up to 4096-bit keys, garners significant capacity and performance benefits.
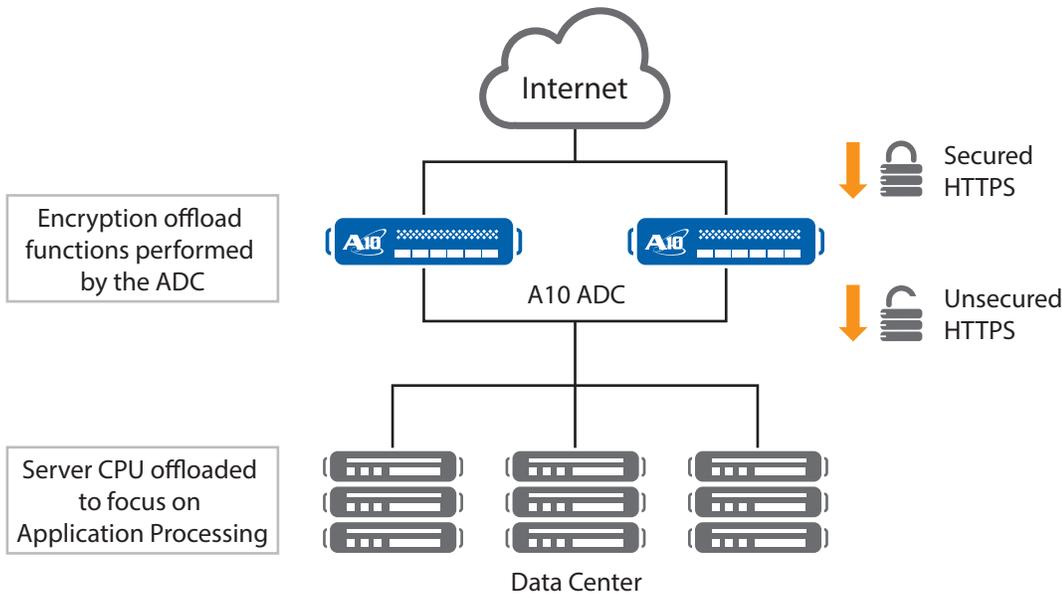

Figure 1. Typical A10 deployment to deliver SSL acceleration to secure applications

To deliver the most secure, tested and validated SSL encryption available, A10 applies security best practices at every step of the product design, development and testing processes. For those who require even more, A10 offers optional hardware security modules (HSMs), with FIPS 140-2 certification, to further guard against tampering and protect the SSL private keys.

In addition, A10 enables the certificates, which are used to verify the integrity of information, to be managed in one place, rather than distributed across tens or hundreds of servers. This reduces administrative overhead, and it generates savings on the cost of the SSL certificates for the organization because only one certificate per application is needed, regardless of how many servers are used to deliver that application (the certificate is central and not housed on a specific server).

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[3] https://www.a10networks.com/resources/files/WP-A10_Networks-SharePoint_Performance_Optimization.pdf

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TCP Optimization

The A10 Thunder ADCs reduce TCP connection management overhead to increase overall server capacity by up to 50%.[3] A10 offloads the server TCP connection setup and teardown to improve response times and overall application performance.

Using TCP multiplexing, A10 is able to consolidate and reduce the number of TCP connections to the server, which reduces the memory resources and CPU cycles used. Rather than opening up a new connection for every single client request, TCP multiplexing enables the ADC to reuse connections; the ADC brokers the TCP connection with the client and establishes a persistent connection to the server that can be "reused" for the duration of multiple user sessions. This significantly reduces the number of TCP connections and increases the overall capacity of the servers, as seen in the diagram below.
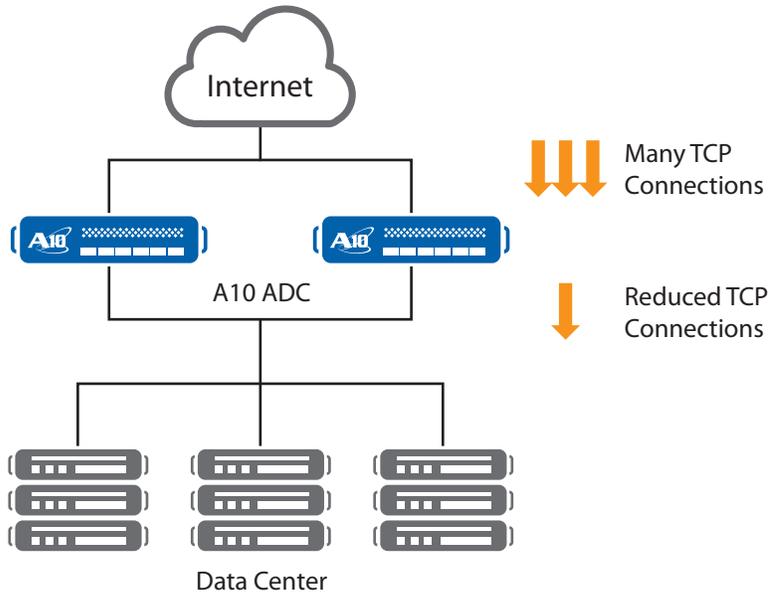

Figure 2. A10 TCP optimization to improve application performance

RAM Caching

The A10 Thunder ADCs eliminate repetitive fetches by the server for frequently requested content. Instead of having to go to the server for every single request, commonly accessed content can be stored and served from the Thunder ADC cache. By reducing the connections and server requests, A10 is able to reduce server processing requirements by up to 60%.[3]

Static and dynamic HTTP/HTTPS objects can be stored in the Thunder ADC's random access memory (RAM). These objects are cached during the initial HTTP request and then used to satisfy subsequent requests for that same content. As a result, the number of connections and object requests (with the associated CPU processing) to the server is reduced, as seen in the following diagram, enabling faster response times and a better overall user experience.

[3] https://www.a10networks.com/resources/files/WP-A10_Networks-SharePoint_Performance_Optimization.pdf
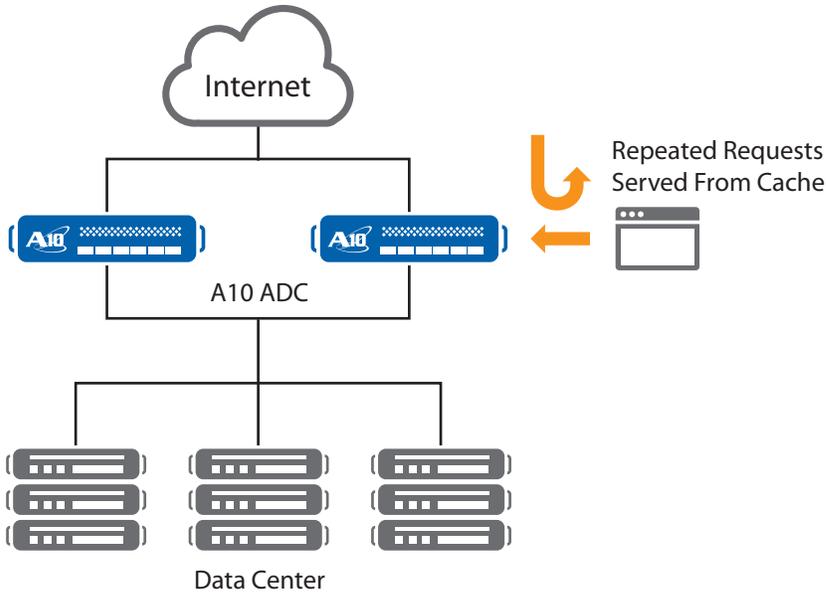
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Figure 3. A10 RAM caching for faster page loads

Compression

A10 Thunder ADCs reduce the transmission size for web (HTTP) traffic, offloading the computationally intensive processing typically expected of web servers. Compression can achieve a 3:1 reduction in data transmitted; however, it also can take up to 30 times more CPU than a server that doesn't use compression to serve the same content. By offloading that processing, the Thunder ADCs can reduce server processing by up to 60%.[3]

There are hardware and software options available for A10's compression, which provides compression for HTTP/HTTPS objects from web servers. Examples of objects that can be compressed are text-based formats such as CCS, HTML or JS, or application formats such as .ppt, .doc, .xls or .pdf.

A10 is able to reduce the bandwidth required to respond to user requests, as seen in the following image. A10 optimizes the traffic to reduce latency for long roundtrip requests and mobile devices with lesser connectivity rates, thus delivering faster response times for your users.
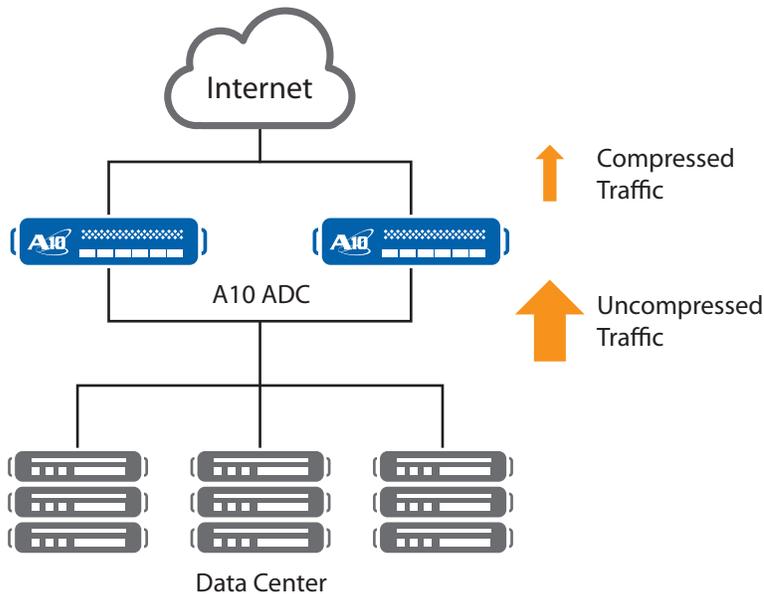

Figure 4. A10 compression to optimize bandwidth

[3] https://www.a10networks.com/resources/files/WP-A10_Networks-SharePoint_Performance_Optimization.pdf

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The Overall A10 Thunder ADC Value – By the Numbers

Using an A10 ADC optimizes your infrastructure for maximum efficiency and accelerated application delivery, and this results in a better user experience. Quantifying that efficiency can be done through the lens of your servers' utility.

If you assume a small (250 servers), medium (500 servers) or large (1,000 servers) data center growing at 5% a year, which correlates with the growth predictions by Gartner,[4] the benefit delivered by offloading servers with an A10 ADC is significant. As seen in the following graph, a small data center could save more than $74,000, a medium data center close to $152,000 and a large data center over $300,000, in the first year.

Note, although our internal tests show we can achieve much higher server offload benefits (up to 70%), we know varied application behaviors and customer environments can impact results, so we have chosen to take a conservative approach and focus on baseline benefits derived by the majority of customers.

As a result, the analysis in this paper is based on the conservative assumption that combined server offload techniques provide a benefit of around 30%. In addition, we are also being cautious in our assumption of how many new servers can be avoided, due to offloading, at only 30%; decommissioning old servers really depends on the customer environment, so we have kept it low.
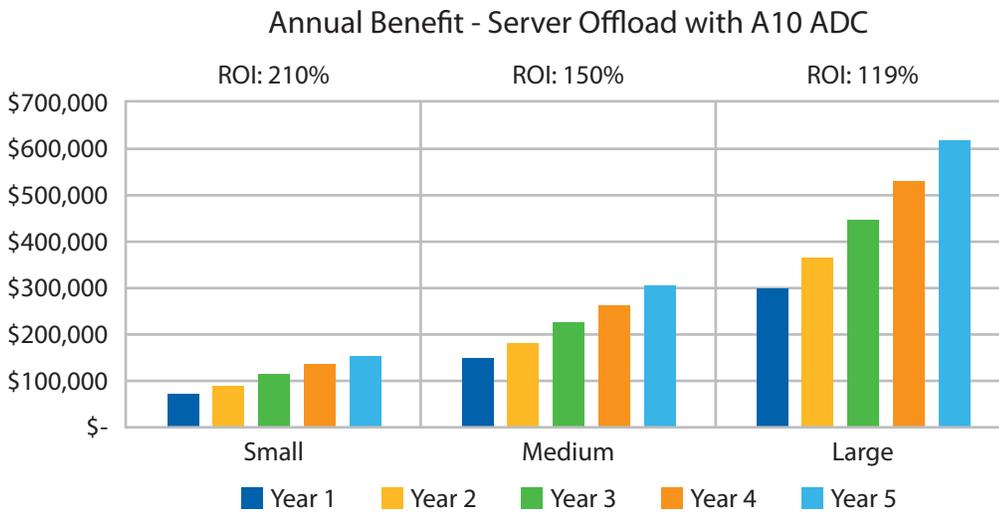

Figure 5. Annual benefit of server offload with A10 ADC

The A10 Difference

A10's Thunder ADC solutions, in particular, have been built from the ground up to meet your rapidly growing needs. The A10 Networks Advanced Core Operating System (ACOS®) is increasingly the platform of choice for enterprises, web giants, service providers and government organizations seeking to scale the performance and security of their data center applications and networks. With A10, you can improve your app performance and availability to reduce your CAPEX and OPEX.

With dedicated SSL ASICs, the Thunder ADC solutions are able to relieve server hardware of the burden of managing CPU-intensive SSL traffic, support the consolidation of SSL processing into a single platform and strengthen your application security. A10's TCP optimization, RAM caching and compression further offload server overhead as they accelerate response times and improve the overall scalability of your infrastructure, as seen in the following graph.

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[4] "Forecast Analysis: Servers, Worldwide, 2013-2017, 1Q13 Update," Gartner, April 8, 2013 – "Server market revenue is forecast to increase by 3.5% year over year in 2013, with shipments rising by 4.9%."
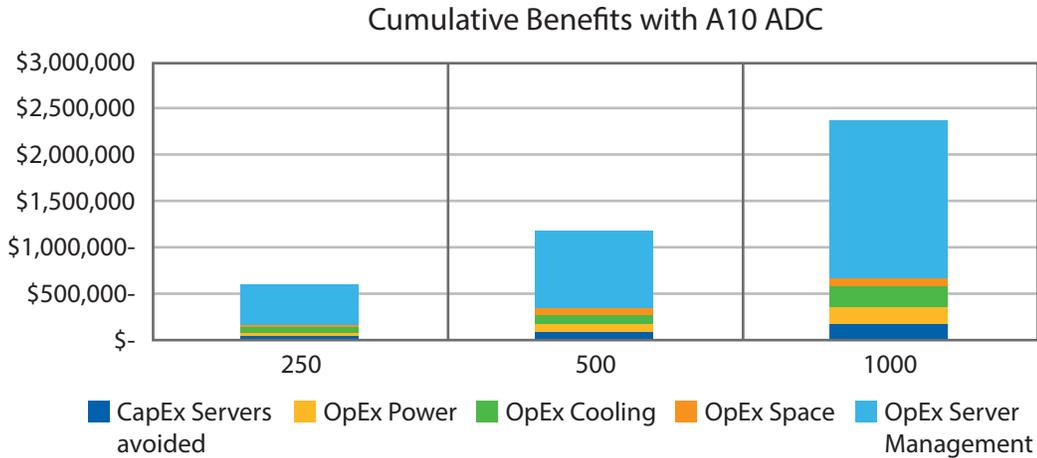
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Cumulative Benefits with A10 ADC

Figure 6. Cumulative benefits with A10 ADC

A10's ACOS gives customers seeking to optimize the performance and security of their data center applications and networks a clear advantage. ACOS provides customers with superior performance and scalability benefits. For example, it can deliver 2x to 5x more web transactions (per unit of computing and memory resources, power, rack space or list price) than other solutions on the market. With ACOS, customers can linearly scale up performance and future-proof their investments.

With A10, your data center applications and networks remain highly available, fast and secure. A10 customers typically achieve an ROI within six months.

Conclusion

ADCs enable server offloading, giving you a much more efficient way to process and manage the traffic in your network for enhanced performance and availability. A10's Thunder ADC solutions enable you to reduce the number of servers in your environment, or at least stall the deployment of new ones, while maintaining confidence in the overall performance and availability of your business critical applications.

With A10, you have the application security, scalability, availability and high performance you can rely on to run your business. With purpose-built solutions that deliver the utmost in both security and performance, you have the ability to efficiently scale your applications and maximize all of your infrastructure investments. By deploying the Thunder ADC solutions, you can offload your servers and optimize your infrastructure to improve application response times and drive down CAPEX and OPEX, all of which helps you drive your business and fuel your competitive advantage.

Tremor Video Uses A10 for Its High-Volume Video Advertising Demands

The leading provider of digital online advertising solutions allows advertisers and agencies to engage customers across all four Internet connected screens – desktops, mobile devices, tablets and connected TVs.

The company needed to consolidate disparate platforms that were the result of multiple acquisitions to meet its current and anticipated performance requirements.

Tremor Video uses A10 to terminate its SSL traffic, offloading encryption and decryption, so that servers can do what they are supposed to – serve ads and respond to ad requests.

Appendix

The differences between the costs associated with running servers without or with an ADC's offload capabilities are compelling, as is the ROI. This chart shows the results for 500 servers in medium sized deployments.

Annual Server Costs – Without Server Offload					
Cost Drivers	Year 1	Year 2	Year 3	Year 4	Year 5
OPEX					
Power	$55,188	$57,921	$60,759	$63,808	$66,961
Cooling	$66,226	$69,505	$72,911	$76,569	$80,354
Space	$31,076	$32,615	$34,213	$35,929	$37,705
Server Management Costs	$1,708,969	$1,793,604	$1,881,493	$1,975,894	$2,073,549
CAPEX					
New Servers	$56,250	$58,500	$60,750	$65,250	$67,500
Total Annual Costs	$1,917,708	$2,012,145	$2,110,127	$2,217,450	$2,326,069
Annual Server Costs - with ADC Server Offload					
Cost Drivers	Year 1	Year 2	Year 3	Year 4	Year 5
OPEX					
Power	$38,684	$40,576	$42,574	$44,676	$46,884
Reduced Cooling	$46,421	$48,692	$51,088	$53,611	$56,260
Reduced Space	$21,783	$22,848	$23,973	$25,156	$26,399
Reduced Server Management Costs	$1,604,803	$1,660,141	$1,708,969	$1,767,562	$1,826,155
CAPEX					
New Servers	$38,250	$40,500	$40,500	$45,000	$47,250
Total Annual Costs	$1,749,941	$1,812,757	$1,867,103	$1,936,006	$2,002,949
Annual Server Costs - with ADC Server Offload					
Benefit Drivers	Year 1	Year 2	Year 3	Year 4	Year 5
OPEX					
Power	$16,504	$17,345	$18,186	$19,132	$20,078
Cooling	$19,805	$20,814	$21,823	$22,958	$24,094
Space	$9,293	$9,767	$10,240	$10,773	$11,306
Server Management Costs	$104,166	$133,462	$172,524	$208,331	$247,394
CAPEX					
Avoided Servers	18,000	18,000	20,250	20,250	20,250
Total Annual Benefits	$167,767	$199,388	$243,023	$281,444	$323,121
Implementation Filter	100%	100%	100%	100%	100%
Total Benefits Realized	$167,767	$199,388	$243,023	$281,444	$323,121

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ROI Model Assumptions

The following are the assumptions made to create the ROI model presented in this paper:

1. Projected server annual growth rate: 4.9%
   Source: Forecast Analysis: Servers, Worldwide, 2013-2017, 1Q13 Update

2. Server Costs: $2,250
   Source: http://www.pcmag.com/category2/0,2806,2373,00.asp

3. ADC Benefits: 30%
   Source: A10 assumption based on internal testing. https://www.a10networks.com/resources/files/WP-A10_
   Networks-SharePoint_Performance_Optimization.pdf

4. Power cost/KWH: $0.12
   Cooling cost: $0.14
   Source: http://www.npr.org/blogs/money/2011/10/27/141766341/the-price-of-electricity-in-your-state

5. Space cost: $60.00/RU/Year
   Source: Based on Gartner, "Use a TCO Model to Estimate the Costs of Your Data Center"

6. Server Management costs – Server management and administration cost of $3,255 per year
   Source: Based on Gartner, "Use a TCO Model to Estimate the Costs of Your Data Center"

7. Server Power consumption (Watts): 100
   Source: http://www.energystar.gov/ia/partners/product_specs/program_reqs/computer_server_prog_req.pdf

8. A10 ADC platform TH3030-SSL (small) TH4430-SSL (medium) TH6430-SSL(large)

9. Cost of capital: 15%

10. CAPEX: 30% of new servers avoided due to server offload benefit

11. CAPEX: Decommissioning of old servers range from 15% (year 1) up to 35% (year 5)

About A10 Networks

A10 Networks is a leader in application networking, providing a range of high-performance application networking solutions that help organizations ensure that their data center applications and networks remain highly available, accelerated and secure. Founded in 2004, A10 Networks is based in San Jose, California, and serves customers globally with offices worldwide. For more information, visit: **www.a10networks.com**