



White Paper

Redefining ADCs for Software-as-a-Service

Application Delivery that's Scalable, Adaptable, Affordable & Simple

APV Series Application Delivery Controllers

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Introduction

Whether software-as-a-service (SaaS) providers rely on their network, application or DevOps group – or some combination thereof – to deploy and manage applications and application infrastructure, the goal is the same: to ensure that each new release functions properly over the Internet to a large and growing end-user community.

Due to the demands of Web-scale operations and the need to maintain competitive advantage through rapid release cycles, it is essential that SaaS providers select and deploy networking solutions that are scalable, adaptable, affordable and simple. This is especially true for application delivery solutions which play a critical role in ensuring high availability, application performance and security for Web and cloud-based applications and services.

This paper contrasts app delivery in the context of traditional enterprise applications with app delivery for SaaS applications in order to identify and define ADC characteristics and Array advantages that match the unique requirements of cloud-based application service providers.

Redefining ADCs for SaaS

Perhaps the best way to illustrate the need for new SaaS-oriented ADC selection criteria is to draw a comparison to a traditional enterprise use case.

	Enterprise	SaaS
# of Applications	Hundreds of applications from multiple 3rd-party vendors used internally as productivity tools	One proprietary application or suite built by a single company as a core external-facing product
Application Release Cycles	Every two years (or more)	Every two weeks (or less)
# of Users	Hundreds or thousands	Thousands or millions
User Growth Rate	Stable	Exponential
Network Management	IT staff and professional services	Cloud automation and orchestration
Return-on-Investment	Important	Essential

The two profiles are very different. Whereas an enterprise will value deployment guides and templates for a wide cross-section of common applications, a SaaS provider will only care about what networking products can do for their particular application. Where an enterprise may configure an application and not revisit it for a year, a SaaS provider will need new features and continuous tuning. For enterprises with a stable user base, scalability means picking a right-sized solution; for a SaaS provider with a user base that is expected to grow exponentially, scalability means selecting a solution that cost-effectively meets requirements both today and in the future. Importantly, SaaS providers are also leading the way in adopting cloud principles for the purpose of automating the management of network infrastructure.

In other words, SaaS providers will benefit from selecting an ADC that excels in the areas of scalability, adaptability, affordability and simplicity.

- **Scalable** – As a SaaS provider, the business plan calls for outsized growth. ADCs selected for SaaS environments need to take into account future requirements, especially as it pertains to demanding networking tasks such as SSL encryption.
- **Adaptable** – Developers sometimes operate in a vacuum, without consideration for whether existing infrastructure is capable of supporting their latest creation. SaaS-oriented ADCs must be able to rapidly bridge this gap and support new features at full performance. Furthermore, SaaS providers wish to avoid the bloated IT departments typical of large enterprises. SaaS-oriented ADCs must support management orchestration frameworks which are becoming essential to controlling costs and adapting to changing application requirements.
- **Affordable** – Supporting millions of users costs more than supporting thousands. ADCs that may be affordable at an enterprise scale may not be affordable in the Web-scale or hyper-scale world of SaaS providers.
- **Simple** – There are no preexisting deployment guides for SaaS applications. ADCs selected for SaaS environments must be capable of implementing application-level policies in an intuitive manner that minimizes the need for specialized skills and complex scripts.

Scalable

At the most basic level, the job of the ADC is to distribute Layer-7 application requests between a pool of servers to provide availability and to prevent any one server from becoming overloaded. However, in modern SaaS environments, ADCs are now relied upon to provide traffic management functions and to manipulate Layer-7 header content. The reasons range from optimizing application performance for an existing network infrastructure, creating delivery algorithms for geographically dispersed users, or even acting as a stopgap – providing features and functionality that will eventually make their way into the application itself.

Regardless of the nature or complexity of the Layer-7 functionality needed, the ADC needs to be able to operate at full performance and scale. Many ADCs rely heavily on scripting to enable custom Layer-7 policies. While scripting allows desired functionality to be created, it is not optimal in SaaS environments for several reasons. First, scripting is time-consuming, error-prone and requires either a resource that is highly skilled or professional services. For enterprise applications, where existing scripts can be found online in user communities, scripting poses less of a challenge; however, for SaaS applications, where there are no pre-existing scripts to leverage, this traditional approach becomes more problematic.

More importantly, custom scripts are compute-intensive. The more complex the policies are, the greater the burden on the ADC will be. This creates a dilemma for SaaS providers, who need both Layer-7 agility and the performance and scalability to support a large and growing end-user

community. Hence, a SaaS-oriented ADC needs to provide the traffic management functionality that the cloud provider needs in a manner that is simple and does not impact performance or scalability.

Array Networks' ADCs provide the best of both worlds through a combination of our SpeedCore[®] architecture and our SpeedPolicy[™] Layer-7 policy engine.

Linear Scalability Across Multiple Processors & Cores

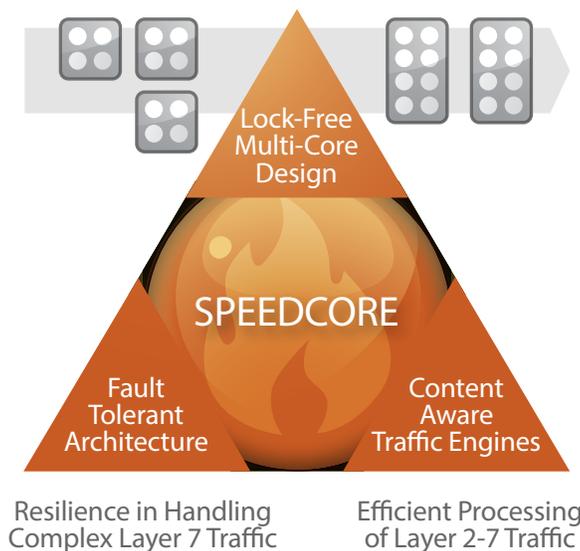


Figure 1: SpeedCore Architecture

SpeedCore

SpeedCore is Array's proprietary multi-processing architecture for application delivery networking. It is a pure software implementation, designed to take advantage of the latest in commercial off-the-shelf multi-core processors. SpeedCore's lock-free multi-core design enables Array ADCs to meet or exceed the performance and scalability of alternative ADCs, without the use of expensive, fixed-function ASICs.

Many ADC vendors publish Layer-4 performance specifications, rather than Layer-7 specifications. This is because they use ASICs to achieve Layer-4 performance, and their solutions fall short when it comes to performance and scalability for Layer-7 traffic. Keep in mind that as a provider of Web-based SaaS applications, Layer-7 performance and scalability are paramount.

In addition to providing industry-leading performance and scalability for Layer-7 traffic management, SpeedCore also provides a fault-tolerant architecture. Using service flow separation, SpeedCore is able to isolate abnormal traffic patterns to a specific process on the system to prevent system crashes and allow continued processing of normal user traffic with zero service interruption.

Most important, however, are SpeedCore's content-aware traffic engines which provide the foundation for Array SpeedPolicy and allow complex Layer-7 traffic management policies to run in the kernel and, as a result, deliver agility without impacting performance or scalability.

SpeedPolicy

For over 15 years, Array Networks has worked with Web businesses, Web properties, e-commerce, ASPs and many other Web-based organizations to stand up Webified applications. Through these efforts and through many successful deployments, Array has accumulated a robust library of commonly used Layer-7 policies. For Array, it has become standard practice to incorporate these Layer-7 policies into our OS in subsequent software releases. By building Layer-7 policies into the OS, they require only a click of a mouse or a single CLI command to implement; what's more, the policies are executed in the kernel in such a manner that they do not impact system performance or scalability.

Today, this library of hard-coded Layer-7 policies is branded SpeedPolicy, and gives SaaS providers the ability to combine or nest as many policies as needed in whatever manner is needed to achieve the desired traffic management functionality – without impacting performance or scalability.

SSL Encryption

In SaaS environments, scalable encryption is as critical as scalable Layer-7 performance. The reason is twofold: 1) the majority of cloud-based services are either business applications or consumer applications that incorporate personal account information. As such, HTTPS sessions will far outnumber HTTP sessions; and 2) the new 2048-bit standard is five times as compute-intensive as the previous standard, and future standards will be even more intensive. Combined with a growing user base, the need to select the most scalable and efficient solution for SSL becomes critical.

As a provider of SaaS-oriented ADCs, Array leads the way for SSL scalability with the highest levels of performance, security and feature-functionality.

Leveraging cutting edge SSL acceleration hardware and a proprietary SSL stack optimized to run on Array's SpeedCore architecture, Array ADCs meet or exceed the performance of any other ADC on the market. That being said, the devil is often in the details, and there are two considerations SaaS providers need to bear in mind when comparing SSL specifications and evaluating vendors:

- **Layer-7 performance** – Consider the case of an ADC vendor that boasts high-performance SSL and Layer-4 specifications. It is critical to ascertain that both Layer-4 and Layer-7 specifications are sufficient to support the required level of SSL performance. If Layer-7 specifications are not clear, there is risk of a bottleneck that may impact SSL scalability
- **SSL-related features** – Key exchange and bulk encryption are just one element of an overall SSL transaction. Most SaaS providers will want to implement more advanced SSL and certificate handling features such as in-flight certificate challenges, multi-level authentication or server name indication. If these features are not implemented and executed in the kernel, they have the capacity to dramatically reduce stated SSL performance.

For SaaS providers that rely on Array ADCs, SSL scalability is assured. Layer-7 performance is always aligned with SSL requirements and all SSL and certificate-handling features are implemented in the kernel.

Security vs. Performance

Commonly, security comes at the expense of performance and vice versa. With Array's SaaS-oriented ADCs, cloud-based application service providers get the best of both worlds: security that does not impact performance. In fact, the steps Array took to ensure maximum SSL performance and scalability actually improved security.

In order to achieve the highest levels of performance for SSL encryption, Array created a proprietary SSL stack capable of operating within our SpeedCore architecture. Through this process, Array's SSL stack was streamlined, removing extraneous protocols and functions that create the potential for bugs and vulnerabilities. The result is a buttoned-down SSL stack that not only improves performance, but also significantly reduces exposure to bugs and vulnerabilities common to open source SSL implementations such as OpenSSL. As an example, Array and its customers were completely unaffected by recent vulnerabilities including Heartbleed, Shellshock, POODLE and Man-in-the-Middle.

For SaaS providers, the need to plan ahead for rapid growth is critical. This means a focus on network planning and selecting networking solutions best qualified to meet demands both today and tomorrow. Because ADCs are essential to the availability and proper function of SaaS applications, selecting an appliance that delivers the highest level of Layer-7 and SSL scalability – without sacrificing security or performance – is critically important.

Adaptable

In addition to planning ahead for growth, SaaS providers must also be adaptable to changing requirements driven by application development. Because both networks and applications can be negatively affected by development teams that are unaware of what the infrastructure can support, there needs to be an adaptable element in the overall architecture capable of bridging this gap.

As previously stated, Array's SpeedPolicy Layer-7 policy engine can help to bridge the gap by providing an extensive library of hard-coded Layer-7 policies that may be combined and nested to create custom functionality. Where functionality is needed that cannot be enabled via SpeedPolicy, Array also provides support for ePolicy™ Layer-7 scripting. While not as simple or scalable as SpeedPolicy, ePolicy ensures that no matter what the requirement, Array's SaaS-oriented ADCs can assist in service enablement.

In the event that new functionality or features are required to support the delivery of SaaS applications, Array's SpeedCore architecture provides the fastest path to rolling out new ADC capabilities at full scale and performance. Because SpeedCore is a pure software implementation that does not rely on ASICs, new features can be rolled into future software releases and deployed with full performance and at full scale. In contrast, ADC solutions that rely on ASICs have no option than to implement new features at much lower levels of performance until such time as the functionality can be spun into a future ASIC.

Physical & Virtual Appliances

Another key aspect of adaptability is the ability to provide the right appliance for the right task. Closer to the edge of the network, it is desirable to utilize a hardware appliance to handle the sheer volume of traffic arriving at the data center, to meet the computational requirements of SSL and to provide a first line of defense for applications and servers. Closer to the applications, however, it may be desirable to deploy additional Layer-7 traffic management functionality to service more granular requirements. In this case, it is beneficial to be able to use multiple virtual (software) ADCs that can be fine-tuned to meet the needs of smaller, more specific workloads.

As a provider of SaaS-oriented ADCs, Array supports the broadest possible range of platform options – including dedicated, virtualized and virtual appliances – each supporting the same ADC features and each within the same management framework functionality to provide the right tool for the job at each point in the application delivery architecture.

Affordable

For SaaS providers, reducing capital and operational expenditures is always an underlying objective. Whether you are an early stage SaaS provider or a full-blown Web-scale provider of cloud software services, or whether you need physical, virtual or cloud-based application delivery, no other vendor matches the price-performance afforded by Array application delivery solutions.

- **Physical appliances** – From the perspective of reducing capital expenditures, Array ADCs are up to 50% less expensive than alternative service provider- and enterprise-class ADCs. The savings are attributable to Array's SpeedCore architecture; because Array is able to achieve industry-leading performance and scalability using commercial off-the-shelf components, the savings are passed directly to customers.
- **SSL transactions per second** – In the case of SaaS providers that rely heavily on SSL sessions, savings achieved with Array appliances are even more pronounced. Leveraging Array's proprietary SSL stack, far greater levels of performance and scalability are achievable without a corresponding increase in hardware costs; as a result, Array appliances tasked with offloading SSL encryption cost up to 75% less per SSL transaction per second as compared to alternative ADCs.
- **Virtual appliances** – Where software (virtual) application traffic management is required, Array has the ability to support pay-as-you grow and pay-per-use pricing. By using subscription licensing, or generating reports based on the number of connections used each month, SaaS providers can pay Array in proportion to demand for their cloud-based Web applications.
- **ADC as a service** – Because Array Networks is the exclusive supplier to SoftLayer/IBM for load balancing-as-a-service offerings, SaaS providers seeking to deploy applications using IaaS can benefit from dedicated or shared Array load balancing on a pay-as-you-grow basis.

Simple

As mentioned earlier, SaaS providers care about only one application or suite of applications: theirs. If features are not required to support the SaaS application, or in any way compromise performance, scalability or reliability, they are not wanted.

Array's SaaS-oriented ADCs eschew complex management and the distraction of irrelevant legacy features for a streamlined approach that best meets the demands of cloud-based application service providers.

In addition, using Array's SpeedPolicy Layer-7 policy engine, SaaS providers can gain significant advantages in terms of simplicity, including:

- **Speed** – Scripting takes time, lots of it. By using SpeedPolicy's point-and-click WebUI or familiar CLI commands, policies can be combined and nested with minimal time and effort
- **Accuracy** – Scripting is error-prone. SpeedPolicy's hard-coded functions are the same, each time every time
- **Shared Knowledge** – There are no canned scripts for SaaS applications. What happens when the one individual or professional services organization that wrote the script is unavailable? With SpeedPolicy, simple configurations may be easily shared and understood among many members of the IT team.
- **Performance** – Simple, hard-coded policies are executed in the kernel, providing adaptability without compromising performance or scalability
- **Automation** – Each and every hard-coded WebUI or CLI command is directly controllable via Array's XML-RPC or eCloud RESTful APIs, greatly simplifying the process of bringing Array ADCs under the command of cloud management systems

Orchestration

Cloud computing SaaS providers manage thousands of servers and many different networking elements at the same time; as a result, there is a growing need for APIs capable of managing individual networking elements and the overall application delivery architecture. Using Array's XML-RPC or eCloud APIs, SaaS providers can easily bring dedicated, virtualized or virtual ADCs under the control of almost any cloud management, automation or orchestration system.

- **Proprietary management systems** – Integration may be achieved either using XML-RPC or Array's eCloud API
- **OpenStack** – Integration may be achieved using Array's eCloud API, which provides support for the OpenStack Neutron Load-Balancing-as-a-Service (LBaaS) API
- **VMware vRO & Microsoft System Center** – Integration may be achieved using Array's eCloud API, which supports the creation of workflows that include any dedicated, multi-tenant or virtual Array ADC

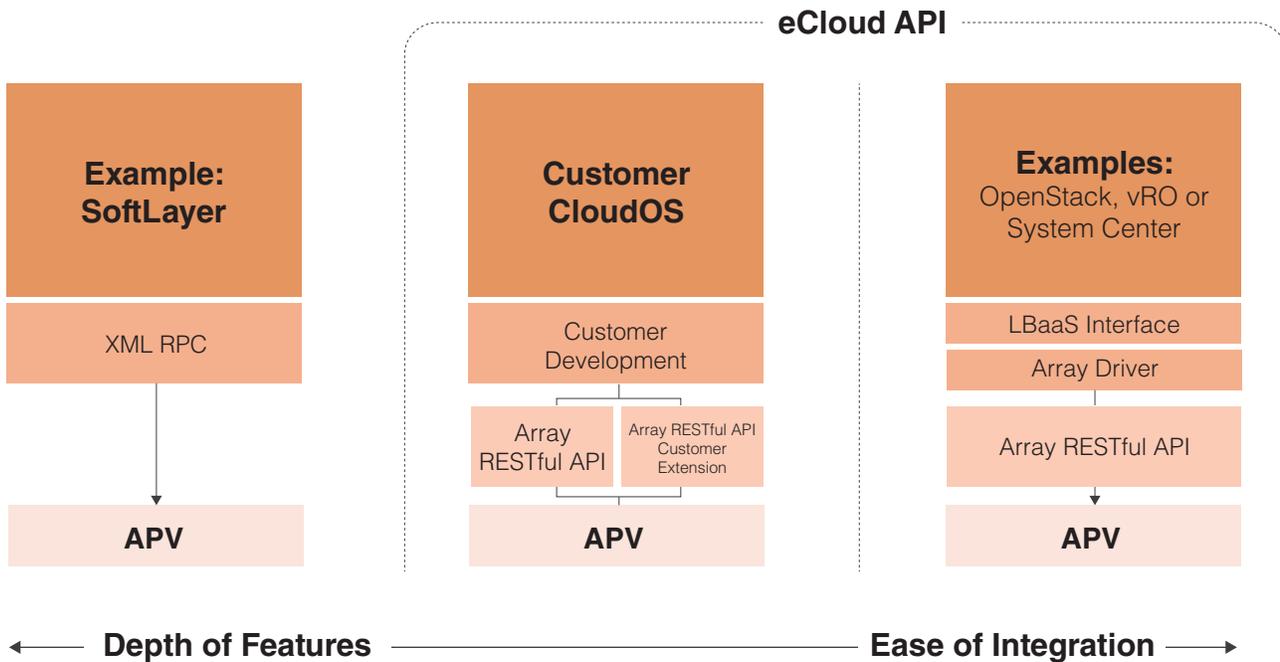


Figure 2: Array Cloud Management Integration

Leveraging Array ADCs, SaaS providers gain not only the flexibility to integrate with almost any cloud management system, but also the ability to integrate in a manner optimized for either time-to-market or depth-of-control. For instance, using XML-RPC to integrate with Array appliances takes longer to implement, but provides full control of every command in the system; alternately, using the OpenStack LBaaS API will significantly speed integration, but will limit control of the Array appliances to features and capabilities currently supported by the OpenStack Forum.

Summary

Providing availability, performance, security and advanced application traffic management in SaaS environments is fundamentally different as compared to traditional enterprise application delivery. Because SaaS business objectives center on achieving a large and rapidly growing user community, and because maintaining a competitive advantage depends on continuous service improvement, now is the time for SaaS providers to reevaluate networking solutions, and application delivery networking solutions in particular, to ensure that the best possible choices are being made to support the business going forward.

To this end, Array Networks leads the way – redefining the ADC value proposition for SaaS providers by providing a streamlined platform that is more scalable and adaptable to application requirements and at the same time simpler and more affordable.



About Array Networks

Array Networks is a global leader in application delivery networking with over 5000 worldwide customer deployments. Powered by award-winning SpeedCore® software, Array application delivery, WAN optimization and secure access solutions are recognized by leading enterprise, service provider and public sector organizations for unmatched performance and total value of ownership. Array is poised to capitalize on explosive growth in the areas of mobile and cloud computing, analysts and thought leaders including Deloitte, IDC and Frost & Sullivan have recognized Array Networks for its technical innovation, operational excellence and market opportunity.

