SOLUTION BRIEF

Communications Service Providers
Network Functions Platforms

Array Networks Delivers Deterministic Edge Networking

Array Networks' AVX Network Functions Platform capitalizes on Intel® technology to deliver NFV platforms with deterministic application performance.

Introduction

Virtual appliances (VA) and virtual network functions (VNF) on general-purpose servers continue to attract attention from communications service providers (CommSPs) and enterprises for network edge deployments. Early adopters have begun to replace physical appliances with their virtual equivalents to create more agile service deployment capabilities and capture economic and management advantages that come with network functions virtualization (NFV).

Many of the cost benefits of virtual appliances come from the ability to leverage the performance of a single server utilizing an Intel® Xeon® processor or processors across many applications. But applications have varying processing and network needs, and it can be hard to properly load a VA so that each application gets the resources it needs. Network architects need to be absolutely sure that they won't degrade service in any way when they go virtual. This is especially true for compute-intensive network and security functions.

Array Networks provides high-performance networking appliances for load balancing and secure sockets layer (SSL) VPNs. While the virtual equivalents of these products run well in environments where workloads are smaller and performance is less of a concern, the company perceived a need for a product that would not only provide deterministic performance for these critical applications, but also provide a stepping stone to NFV deployment for enterprises, CommSPs and others. Its AVX Network Functions Platform (NFP), built on high-performance Intel Xeon processors and network interfaces, is able to reserve processing power for VNFs, providing highly deterministic performance for virtual networking and security applications as well as service chaining to develop new services.

The Challenge

The typical edge network needs many networking and security functions, including load balancing, SSL VPNs, traffic management, web application firewall (WAF), distributed denial of service (DDoS) protection, authentication-authorization-accounting (AAA), and more. Traditionally, most of these functions required a dedicated hardware appliance—often a pair for redundancy.

Virtualizing these functions means replacing all of the separate appliances with one or more Intel processor-powered servers. Service providers are adopting this technology because the use of Intel processor-based servers, rather than fixed function appliances, has the potential to reduce the cost of hardware as well as the cost of service deployment. Remote application deployment allows CommSPs to sell new services and deploy them onto the hardware remotely and very quickly. The remaining challenge is to deploy these services while balancing the resources available in the virtual environment with the needs of VNFs. In some cases, applications (known as "noisy neighbors") can consume more CPU cycles, network

bandwidth, memory, or other resources than anticipated, thus impacting the performance of other VNFs on the system.

What Array Networks set out to build is a virtualized platform that provides deterministic performance for each and every application while offering service scalability.

The Solution

The Array AVX Series network functions platforms offer efficiency, agility, and performance in several models. AVX platforms are purpose-built to run network and security VAs and VNFs, offering the agility of virtualization with the performance of dedicated appliances. For example, an Array Networks virtual ADC running on AVX platforms exhibits the same throughput and latency performance as equivalent Array dedicated ADC appliances.[1] Array accomplishes this by dedicating resources to each VA/VNF, including CPU cores, memory, network interfaces, and SSL hardware. Management and hypervisor overhead are allocated their own resources so as not to interfere with network functions. To ensure multitenant security, each VA/VNF instance is fully independent. This is particularly valuable for regulatory compliance and in high-security environments.

The AVX Series supports several Array Networks VAs that are functionally equivalent to their line of physical appliances, including:

- **vAPV Virtual Application Delivery Controller** performs layer 4 and layer 7 server load balancing, link load balancing, and global server load balancing as well as SSL acceleration and offloading.
- **vxAG Virtual Secure Access Gateway** provides security-enabled remote and mobile access with 2048- and 4096-bit SSL encryption. Remote usage is controlled with multiple access methods, advanced AAA, multifactor authentication, and host checking. An integrated web firewall, SSL acceleration, and support for HTML5 are included.

AVX platforms support third-party VAs/VNFs as well, including WAFs, next-generation firewalls, and WAN optimization. Third-party VAs receive the same performance consideration as Array VAs and VNFs. Examples include Fortinet's* FortiGate* next-gen firewall and Positive Technologies'* PT AF virtual WAF.

Not all VA/VNFs have the same requirements. Each VA/VNF, referred to as an instance or tenant, is categorized as shared-entry, entry, small, medium, or large based on the processing, volume of network traffic, and memory required. Shared-entry VNFs share their resources across all instances as opposed to a per-instance basis. Tenant sizes can be mixed and matched, up to system capacity.

Three AVX models provide a wide range of functionality:

- **AVX5800** processes 40 Gbps through four 10 GbE SFP+ ports. Maximum capacity is one large tenant, two medium tenants, four small tenants, eight entry tenants, or 16 shared-entry tenants.
- **AVX7800** processes 80 Gbps through eight 10 GbE SFP+ ports and an optional two 40 GbE QSFP+ ports. Maximum capacity is two large tenants, four medium tenants, eight small tenants, or 16 entry tenants.
- **AVX9800** processes 160 Gbps through sixteen 10 GbE SFP+ ports and an optional four 40 GbE QSFP+ ports. Maximum capacity is four large tenants, eight medium tenants, 16 small tenants, or 32 entry tenants.

All models support SSL performance ranging from 40,000 to 110,000 SSL transactions per second depending on the model. Platforms come with high availability features including redundancy and failover and include system monitoring and management functions. Service chaining is easily set up through a web interface, and OpenStack* or Array's own eCloud™ RESTful API provides an extensible interface for cloud management.

Figure 1 explains the most common AVX use cases:

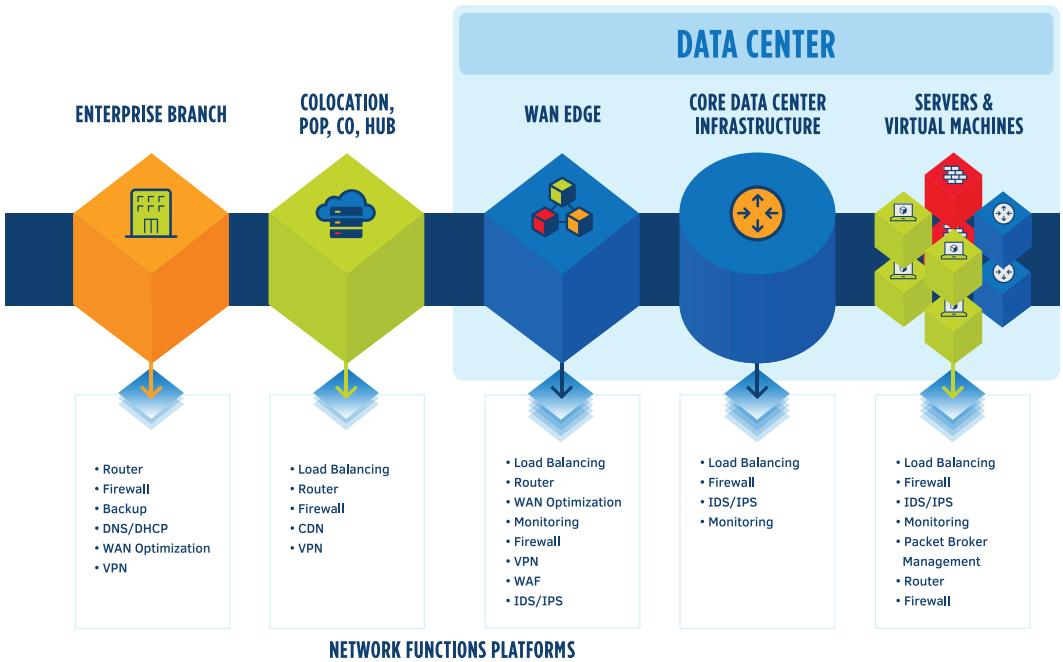

Figure 1. AVX Series Network Platform Architecture[2]

Intel Components

Intel processors are used for all AVX models. Intel® Xeon® processors E3-1240 v6 are used for the AVX5800, while Intel Xeon Gold 5115 processors are used for the AVX7800 and AVX9800.

In addition, the AVX platforms use Intel Ethernet Converged Network Adapter XL710-QDA2 Ethernet interfaces and Intel® Virtualization Technology (Intel® VT). Open vSwitch* 2.8 and the Data Plane Development Kit (DPDK), which is an open standard originally developed by Intel, are used in the platforms as well.

Key Features

- Deterministic performance through reserved resources
- Supports virtual appliances for load balancing, secure access, and other functions available from Array
- Compatible with third-party VAs and VNFs
- Support for high availability
- System monitoring and management
- Three AVX models cover a range of needs
- OpenStack plug-in and eCloud RESTful API for integration with cloud management, orchestration, and automation

Conclusion

Network functions virtualization is developing into the basis for the next generation of networking platforms. In virtualizing operations, however, it is important to deliver the consistent performance provided by dedicated appliances. Array Networks has addressed this issue with the AVX Network Functions Platform, ensuring that virtualized functions provide equal or better performance[1] than their hardware counterparts.

About Array Networks

Array Networks, the network functions platform company, solves performance and complexity challenges for businesses moving toward virtualized networking, security and application delivery. Headquartered in Silicon Valley, Array addresses the growing market demand for network functions virtualization (NFV), cloud computing, and software-centric networking. Proven at over 5,000 worldwide customer deployments, Array is recognized by leading analysts, enterprises, service providers, and partners for pioneering next-generation technology that delivers agility at scale. To learn more, visit **https://www.arraynetworks.com**.

About Intel® Network Builders

Intel® Network Builders is an ecosystem of infrastructure, software, and technology vendors coming together with communications service providers and end users to accelerate the adoption of solutions based on network functions virtualization (NFV) and software defined networking (SDN) in telecommunications and data center networks. The program offers technical support, matchmaking, and co-marketing opportunities to help facilitate joint collaboration through to the trial and deployment of NFV and SDN solutions. Learn more at **https://networkbuilders.intel.com**.

[1] Tests conducted by Array Networks. Example configuration, Array APV3600 v5 dedicated ADC appliance, including Intel Xeon processors E3-1240 v5: L4 Throughput (FastStack): 37.5G; L4 Concurrent Connections: 8M; SSL Concurrent Connections: 1M. Example configuration, Array AVX7600 large instance, including Intel Xeon processors E5-1240 v5, Intel® Ethernet Converged Network Adapter XL710, Intel Virtualization Technology (Intel® VT), Open vSwitch 2.8, and DPDK version 16.11.1: L4 Throughput (FastStack): 34.1G; L4 Concurrent Connections: 8M; SSL Concurrent Connections: 1M . Complete details are available at this link (PDF download): **https://www.arraynetworks.com/search-offers/AVX-Series-Performance.pdf**

[2] Figure provided courtesy of Array Networks.

0818/DO/H09/PDF ♻ Please Recycle 337308-002US