Arista Solution for VMware EVO

Hyper-Converged Infrastructure Appliance and Rack

What is VMware EVO?

- VMware EVO is a new and disruptive software stack for the Hyper-converged Infra-structure (HCIA) market from VMware
- Pre-specified building blocks include VMware software for all compute and storage needs
- EVO:RAIL™: Single SKU easy to buy platform -- available NOW
- EVO: RACK™: scaled-up rack-level solutions -- available later

Why Design-In Arista?

- HCIA favors an incremental modular building block approach to building a SDDC
- EVO does not specify a network design, but successful plug-and-play deployment depends upon a robust and capable network
- Arista Unified Cloud Network architecture provides the best scale & features for EVO
- Key features of Arista EOS for VMware make Arista the hands-down choice for supporting EVO beyond the initial sandbox phase

EVO is a compelling appliance solution and on-ramp to the software defined data center from VMware. Arista provides the ideal network scalability and manageability for EVO solutions. Arista EOS provides maximized monitoring and visibility capabilities for EVO, while choosing Arista for interconnecting EVO appliances ensures that the network solution that you deploy will provide investment protection and scale to larger storage and compute requirements.

Arista CloudVision and OpenStack Integration

VMware EVO is a new family of 'EVOlutionary' Hyper-Converged Infrastructure Appliance solutions from VMware and its hardware partners. VMware EVO:RAIL™ is the introductory product within the EVO family. EVO:RACK™ represents a configurable rack-scale family of solutions.

- EVO:RAIL™ is VMware's first design, a 2-rack-unit appliance blueprint that's like a starter kit for Hyper-converged Infrastructure (HCIA). EVO:RAIL can be deployed in clusters of up to four appliances, each providing four discrete EVO compute/storage nodes.
- Current EVO:RAIL products, available from VMware's EVO hardware partners (at left), are pre-configured software/hardware kits with bundled licenses to provide unified compute and storage on dedicated hardware platforms. EVO:RAIL kits are NOT purchasable directly from VMware and do NOT contain a network component.

As the first deliverable under the EVO program, EVO:RAIL will leverage VDI as the key driver for early adoption of cluster appliances, followed by applications in remote offices — as it was in the case for early adopters of prior HCIA solutions.

- EVO:RACK™ is a scaled-up solution that can scale to tens of racks, meeting the increasing demands of private clouds at medium-to-large enterprises. It can run on a range of pre-integrated hardware configurations ranging from Open Compute Project based hardware designs to industry-standard OEM servers and converged infrastructure.
- EVO's configuration engine is an HTML5 (no JAVA required) web-based management front-end that provides streamlined and automated lifecycle management of all EVO components, including non-disruptive patching and upgrading of software, hardware management, and workload visibility.

Understanding EVO - Use Cases

As the first deliverable under the EVO program, EVO:RAIL will leverage VDI as the key driver for early adoption of cluster appliances, followed by applications in remote offices — as it was in the case for early adopters of prior HCIA solutions. In addition, there will be EVO:RACK and EVO:RAIL variants that have the hardware and software tuned to support scale-out storage and analytics for big data workloads (Hadoop, NoSQL and Cassandra), and to run other general purpose applications and cloud frameworks (IaaS/PaaS) atop the converged EVO cloud.

Figure 1: VMware EVO:RAIL Primary Use Cases

A key example of expected EVO:RAIL deployment is for remote offices with zero IT staffing. An EVO:RAIL appliance can be shipped to the remote office, wired by a non-IT employee and then configured from a remote location. Besides using the setup wizard, the appliance can also be configured using a JSON configuration file. Just load the file and it's ready. This ensures a consistent configuration across multiple remote offices.

Approaches to Building your SDDC

EVO is as much a transformation in business models as it is a technology packaging strategy from VMware, very much in line with the transformation of IT practices to the cloud. By embracing a hyper-converged approach to building the Software Defined Data Center, enabled through a broad list of qualified system suppliers, VMware is driving inflexibility, single-sourcing, complex procurement, and gratuitous vendor differentiation out of the equation.

VMware EVO promises to make procurement of SDDC components more open, flexible, modular, and simpler while providing a support ecosystem that can provide a single point of resolution for any problems encountered.

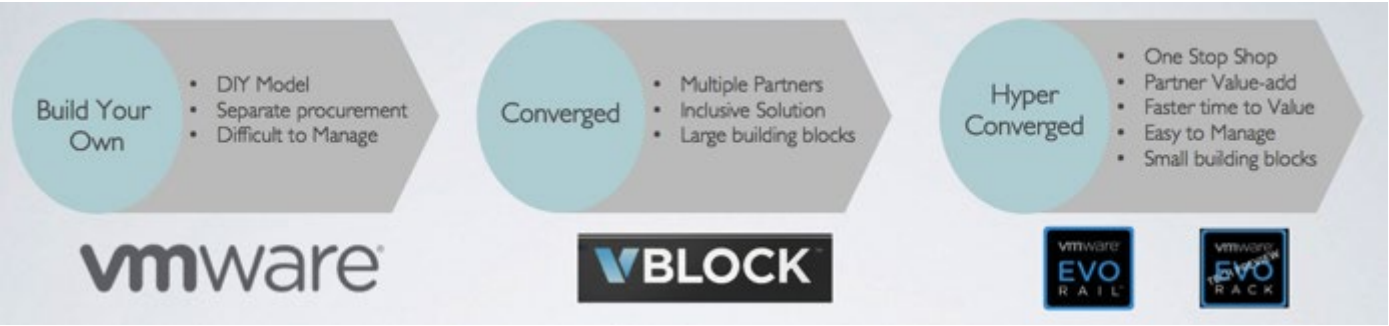

Figure 2: Three Approaches to Building the SDDC

EVO Systems Design & Scale

EVO:RAIL system scale initially spans from four to sixteen physical server nodes to offer from 100 to 400 virtual machines running applications, or from 250 to 1,000 virtual desktops for VDI. All nodes run vSphere ESXi with a single vCenter instance, some additional EVO:RAIL management software, vRealize Operations Insight for cluster performance management and troubleshooting, and VMware Virtual SANTM for storage.

Each of the servers in an EVO:RAIL cluster have two 10GbE links connected to a Top-of-Rack switch, and one BMC/IPMI GbE interface for remote management. EVO:RAIL software handles all of the deployment, configuration and management — so you can grow compute and storage automatically as additional appliances are added and discovered. Currently you can increase the size of an individual EVO:RAIL cluster to as many as 16 physical nodes, though larger scales are expected to be supported in the future.

Note: ToR network switches and other networking infrastructure are not part of an EVO:RAIL SKU. These may be sold as add-ons by VMware partners or their resellers, or they may be purchased separately by the customer.

EVO Systems Design & Scale

Today's EVO:RAIL discovery and automation features require a robust network infrastructure supporting IPv6 and IP Multicast. For example, during setup and for on-going management EVO clusters utilize IGMP, IGMP snooping (layer-2 multicast), multicast DNS (mDNS), and IPv6 neighbor discovery to provide a plug-and-play environment for the cluster. There is also a requirement for layer-2 multicast connectivity to be enabled in the network in order for each RAIL appliance to discover the Virtual SAN storage cluster to which it belongs.

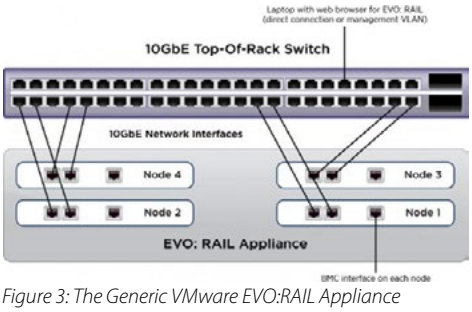

Figure 3: The Generic VMware EVO:RAIL Appliance

While best practices in network segmentation, security and redundancy call for scaling the network connectivity of these clusters across a routed layer-3 network design, all hosts participating in Virtual SAN must be provided with multicast connectivity to all other nodes in the cluster. For this reason it is recommended that the network switches used for EVO be of a robust design that supports proven support for IP multicast at scale, IPv6 routing and discovery protocols, and good diagnostic and visibility capabilities.

Further, in extension of the EVO solutions with EVO:RACK there will be additional requirements to support integration with the VMware NSX network virtualization

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Arista Positioning and Product Support for VMware EVO

Arista switches and our Unified Cloud Networking (UCN) architecture provide the ideal scalability and integrated services model for EVO solutions, especially as they scale beyond early single-appliance 'sandbox' deployments. Both Arista and VMware understand that many virtualization projects, like VDI and big data (and other greenfield workloads), are often a scale-up deployment, starting very small and growing over time. General computing use cases are likely to start with a single application and grow likewise, once the initial economies are realized.

Small initial deployments of EVO:RAIL may be offered with a low-end commodity ToR switch. However, bundled network switches from EVO system partners may not provide the cloud scale and integrated features required to make EVO perform optimally. Challenges such as manual provisioning, packet loss due to poor network design, lack of a robust and proven IP multicast stack, and management difficulty with dynamic workloads can be avoided by selecting Arista networking platforms to interconnect EVO clusters.

Arista is working closely with VMware and select EVO partners to validate and extend Arista solutions for EVO:RAIL and EVO:RACK to provide faster, easier to manage, more automated, and more reliable HCIA clusters.

Arista Support for VMware Software Environment

The configuration of the EVO HCIA appliances is simple and automated with the included EVO software, but the configuration and monitoring of the network component remains a manual task. Customers will need to initially configure various VLANs for virtual machine traffic, vMotion traffic, Virtual SAN traffic, VXLAN

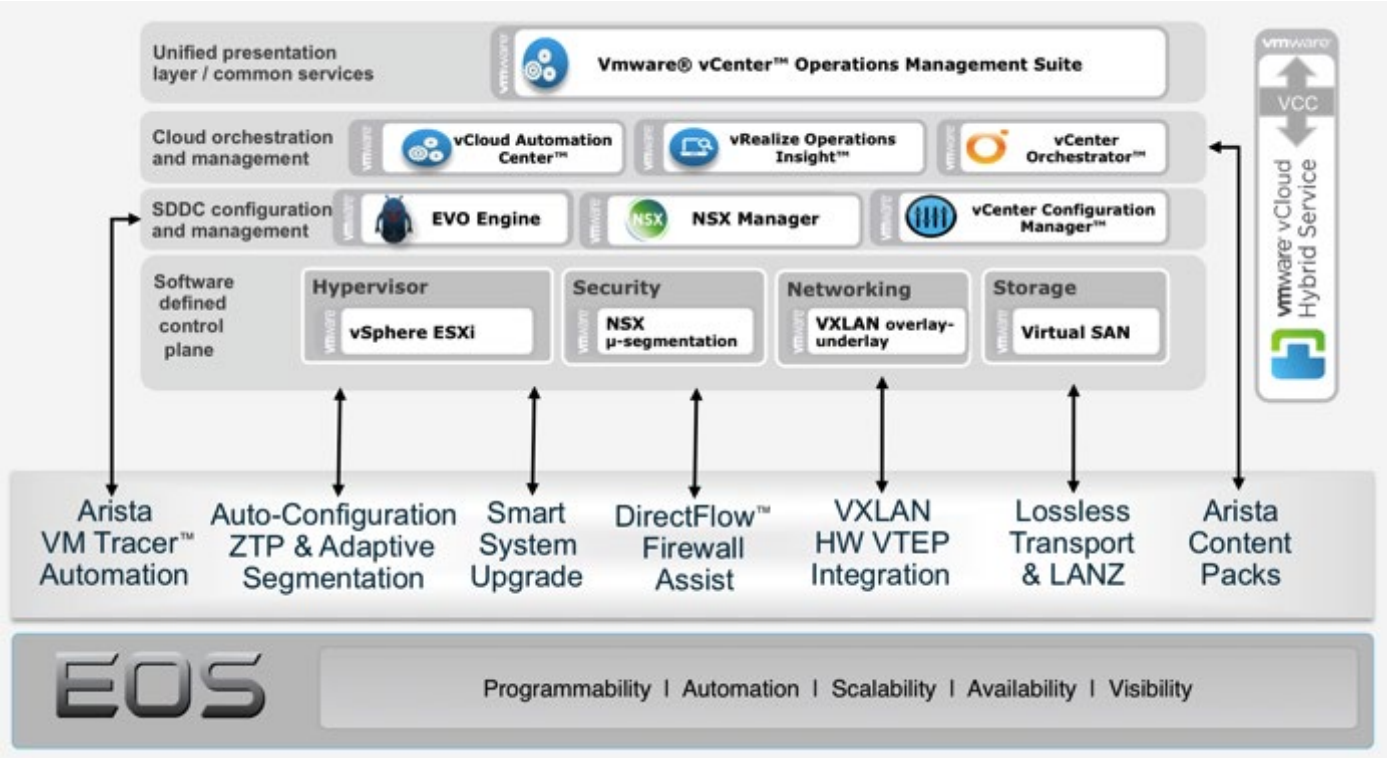

Figure 4: Arista Connects with VMware Software Stack for the SDDC

Arista EOS supports a robust IP multicast stack that assures automation features of EVO will perform effectively and can be supported over any layer-2 or layer-3 topology.

segmentation, any network virtualization and routing configuration, provisioning for out of band management with IPMI control, additional security services, end-to-end IP multicast, and monitoring.

Arista has worked closely with VMware on the evolution of the vCenter infrastructure for many years to provide better automation, management and visibility — resulting in multiple integration points at every meaningful level of the VMware product line.

In fact, Arista established a heritage many years ago of solving real world operational problems that enhance our customers ability to deliver massively scalable data center networks efficiently with automation. Throughout the process of delivering these capabilities, Arista EOS software has provided innovations that have expounded on the principles of not reinventing technology or creating uncalled for and closed proprietary interfaces.

Robust IP Multicast Stack

Arista switches have been the platform of choice for most of the worlds most intense mission-critical trading floor applications where market data feeds and trade data utilize extensive IP multicast and ultra low latency transaction handlers. Arista EOS supports a robust IP multicast stack that assures automation features of EVO will perform effectively and can be supported over any layer-2 or layer-3 topology.

Lossless Switching and Advanced Congestion Detection

In addition, all Arista switches provide superior traffic management with deep buffers, intelligent buffer management, and congestion visibility at the microburst level using Latency Analyzer (LANZ). The combination of these features allows optimal support for bursty Virtual SAN and vMotion traffic, and prevents packet loss for maximum efficiency, reliability and performance.

With Arista ultra-deep buffering in switches from the Arista E-series (i.e., 7280SE or 7500E), network designs become virtually lossless while providing maximum throughput and consistent low latency for storage and highly dynamic workloads such as in a private cloud environment.

Network Visibility

Arista Data Analyzer (DANZ) provides visibility into detailed performance of the cluster through any:any advanced port mirroring with advanced filtering and ability to forward key raw packet-capture and telemetry data to external monitors such as vRealize Log Insight or third party network analyzers. In combination with VM TracerTM, DANZ Persistent Monitoring Architecture provides automatic persistent monitoring of mobile workloads allowing standard performance, troubleshooting, and security tools to monitor virtualized workloads anywhere in the cluster with pinpoint accuracy and precision — even during live migration of virtual machines.

Automating Configuration and Provisioning

Arista Smart System Upgrade (SSU) is a key feature of Arista switches that allows hitless upgrades and servicing of network components with minimal interruption in service. This capability works in conjunction with event-driven programmability,

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telemetry and instrumentation in Arista EOS software to allow complete clusters to be upgraded and serviced without affecting end-user service delivery.

Arista EOS also provides automated adaptive provisioning for dynamic VLANs and VXLAN VNIs with VM Tracer, with automatic tracking of dynamic workloads in the case of vMotion traffic. For automation of initial network provisioning, Arista EOS supports an open* solution to pre-load required configurations in the ToR switch at startup, called Zero Touch Provisioning (ZTP). With VM Tracer and ZTP the network can be automatically provisioned at initial startup and can adaptively re-provision the dynamic network configurations required to support vMotion of workloads within and across clusters in real time, thus dramatically simplifying system maintenance and expansion with minimal human intervention and fewer errors.

Security Augmentation

Arista DirectFlow, a programmability feature of Arista EOS, and active security mitigation extensions can provide assistance to intelligent security solutions such as VMware NSX distributed firewalls with micro-segmentation support or third-party next generation firewalls. These features can be applied to bypass firewalls for trusted flows and to forward suspect flows to intelligent security tools for further analysis. By allowing more effective inspection of traffic within the private cloud, these solutions promise to eradicate many of the potential penetration attacks at both the north-south boundary into the cluster as well as any east-west threats that may exists within the cluster.

With the addition of hardware based flooding attack detection, Arista EOS is able to notify security platforms of data and events related to denial of service such as NTP, DNS, SYN, ACK, FIN, and RST packets that exceed normal volumes from specific sources, so that security tools can mitigate problems more efficiently without having to inspect every flow. Further, active mitigation utilizing the power of the programmable switching fabric can dramatically improve the performance and efficiency of next generation firewalls.

Integrated Operations Management

With the introduction of EVO and with the latest VMware Operations Management Suite, Arista is providing Content Packs (CP) for key aspects of the VMware vCenter Operations Management Suite through the VMware solutions exchange. The latest content pack provides visibility within vRealize Operations Log Insight, a component of both EVO:RAIL and EVO:RACK solutions, to track network condition, performance, inventory, and dynamic changes such as vMotion detections by VM Tracer. Arista EOS also supports a wide range of popular operations and management platforms including integration with Splunk Enterprise and many others.

Arista Unified Cloud Network Architecture

In order to simplify customer design choices as highly virtualized data center networks scale-out, Arista has pioneered a Unified Cloud Network (UCN)

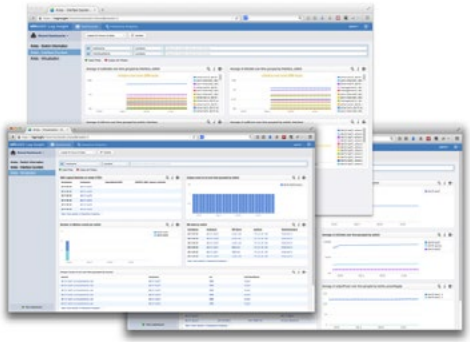

Figure 5: Arista EOS Integration with vCenter Operations Log Insight

*Arista EOS extended features such as SSU, ZTP and VM Tracer use standard interfaces and protocols such as OVSDB, LLDP, DHCP, DNS, and HTTP URIs. These mechanisms are open and well documented, are not gratuitously extended to make them proprietary, and they can be replicated and reapplied with simple scripting.

Any Arista switch can be part of a UCN design, to be used to interconnect the EVO:RAIL appliances during initial deployment, while EVO:RACK will use VMware NSX for multi-tenancy and security. Therefore, EVO:RACK may benefit from Arista switches supporting advanced cloud networking features including advanced VXLAN services and gateways.

architecture for designs based on open standard routing and switching protocols and all-links-active redundancy. With Equal Cost Multi-Path (ECMP) and Multi-chassis Link Aggregation (MLAG) support for efficient bandwidth utilization and hit-less recovery from failures, Arista UCN maximizes the value of customer investments in the network and allows networks to scale without costly redesign.

In addition, VMware and Arista have led the industry in defining a network virtualization framework that defines the separation of network overlays and underlays, combining Virtual eXtensible LAN (VXLAN) technology with an integrated approach to physical and virtual network design based on the capabilities of VMware NSX. Together with superior designs for open and efficient physical networks using UCN, these innovations have helped to eliminate vendor proprietary fabric designs from cloud data center networks and provide the ability to substitute any standards based platform for any node in the network, thus eliminating the potential for vendor lock-in.

Any Arista switch can be part of a UCN design, to be used to interconnect the EVO:RAIL appliances during initial deployment, while EVO:RACK will use VMware NSX for multi-tenancy and security. Therefore, EVO:RACK may benefit from Arista switches supporting advanced cloud networking features including advanced VXLAN services and gateways. All EVO deployments will gain more stability and better performance if the ToR switch has integrated VTEP L2GW service, VM Tracer for visibility, LANZ for congestion detection and better buffer design for heavy workloads. The later are advanced services that are currently available from the Arista 7150S-series, X- series and E-series switches.

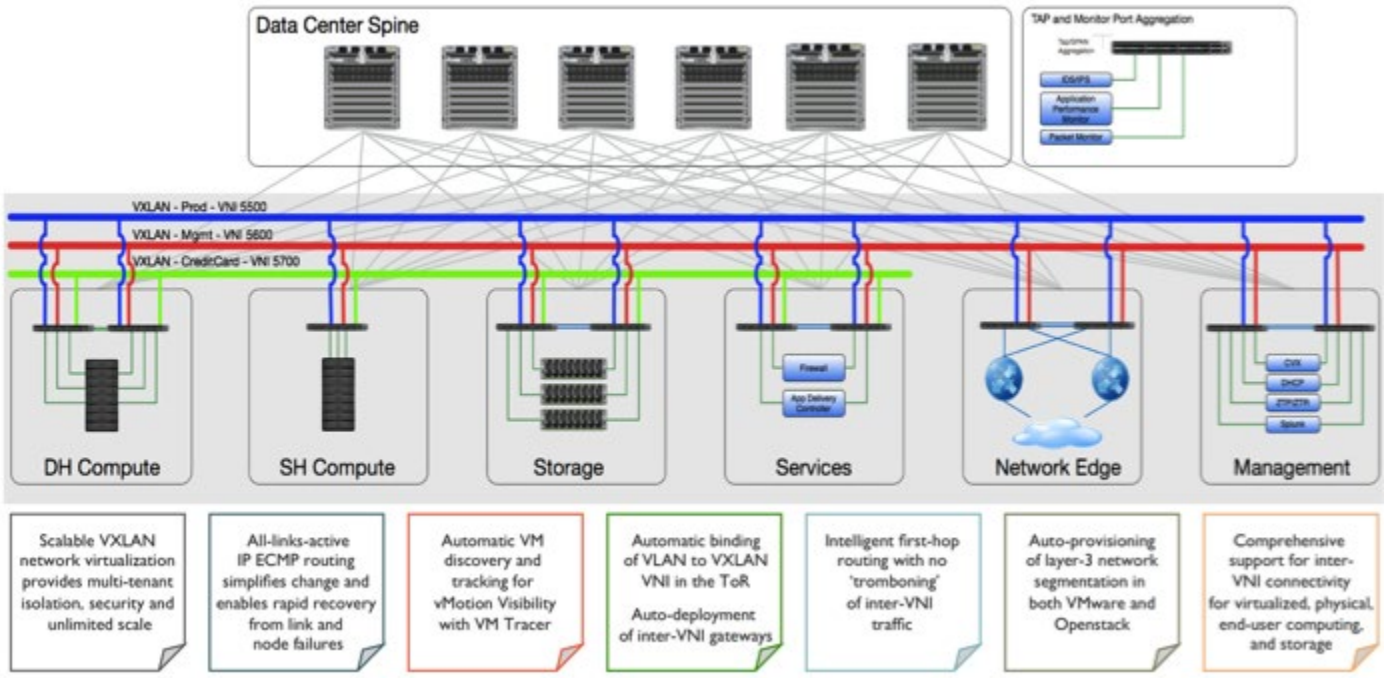

Figure 6: Arista Unified Cloud Network Architecture & Services for the SDDC

With EVO, customers can reduce operating costs with efficiency and ease, providing Time-To-Value (TTV) to first VM in minutes, zero-downtime updates of all VMware software, automatic scale-out, global settings, and VM lifecycle management.

Conclusion

Hyper-converged Infrastructure is a rapidly growing segment that offers many benefits to IT organizations such as simpler selection of components, rapid deployment, and a consistent all-in-one offering that is available from multiple suppliers. VMware EVO solutions provided an HCIA solution on a trusted foundation of proven technology including VMware vSphere®, vCenter ServerTM with Operations Management and VMware Virtual SANTM. EVO:RAIL delivers the first hyper-converged infrastructure 100 percent powered by VMware software.

With EVO, customers can reduce operating costs with efficiency and ease, providing Time-To-Value (TTV) to first VM in minutes, zero-downtime updates of all VMware software, automatic scale-out, global settings, and VM lifecycle management. VMware EVO solutions are ideal solutions to be deployed as building blocks in private cloud infrastructures, in remote/branch offices, where IT staff are limited, and in R&D and test environments.

The key differentiating features of the Arista solution for interconnecting VMware EVO platforms are:

- Support for VMware software environment at every meaningful layer of the software stack for the SDDC
- Robust IP multicast and multi-layer switching architecture proven in demanding customer environments
- Security augmentation with Arista DirectFlow assist and hardware based flooding attack detection
- Simplified and automated network provisioning of EVO workloads with Arista's VM Tracer and ZTP, including dynamic network VLAN and VXLAN provisioning and real-time vMotion tracking
- Application to infrastructure monitoring with physical/virtual networking visibility using Arista's LANZ, DANZ, and Arista's content packs for VMware's vRealize Operations and Splunk Enterprise
- Arista's high-performance lossless networking delivers optimal network performance for Virtual SAN workloads and bursty vMotion traffic, while LANZ pinpoints storage network hot spots and points of congestion, and avoids storage latency and failed vMotions due to packet loss
- Arista UCN architecture provides a consistent and open IP fabric for interconnecting the SDDC at any scale. No requirement for replacement of the native VMware Distributed Virtual Switch or OpenStack OVS and no proprietary fabrics — UCN preserves customer choice and maximizes value of investment in the network

In summary, Arista's strong partnership with VMware will ensure that the Arista EOS based platforms will continue to provide the best network for hyper-converged virtualized infrastructure platforms regardless of source.

In summary, Arista's strong partnership with VMware will ensure that the Arista EOS based platforms will continue to provide the best network for hyper-converged virtualized infrastructure platforms regardless of source, and will provide a significant end-customer value for EVO solutions that ship with Arista switches, hands down the best switches for EVO.

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