The Arista Advantage

The world is moving to the cloud to achieve better agility and economy, following the lead of the cloud titans who have redefined the economics of application delivery during the last decade. Arista's innovations in cloud networking are making this possible. New, modern applications such as social media and Big Data, new architectures such as dense server virtualization and IP Storage, and the imperative of mobile access to all applications have placed enormous demands on the network infrastructure in data centers.

- Applications have been decomposed into multiple tiers of interoperable subsystems leveraging new standards. These applications are deployed in scalable pods or clusters that make scaling and supporting them easier.

- Traffic patterns that once centered on the use of lightly utilized links in and out of the data center (north-south) for mainframe and client-server applications such as email have been supplanted by highly distributed applications that drive heavily utilized links for server-to-server and server-to-storage (east-west) traffic within the data center.

- Data centers that once consisted of hundreds of servers are now built on a scale of more than 100,000 physical servers and more than one million Virtual Machines (VMs) or Containers.

- Availability requirements for the new data center network are also higher -- now 24x7x365 -- with no time for maintenance windows or planned downtime.

Network architectures, and the network operating systems that make the cloud possible, need to be fundamentally different from the highly over-subscribed, hierarchical, multi-tiered and costly legacy solutions of the past.

Arista Networks was founded to deliver software-driven cloud networking solutions for these large data center and cloud computing environments. Arista is focused on building 10/40/100 Gigabit Ethernet (GbE) switches that redefine network architectures, bring extensibility to networking and dramatically change the price/performance of data center networks. The market that we serve is projected to grow from $5.9B in 2013 to $13B in 2019 – a CAGR of 14% - and we are currently the number two, and the fastest growing, supplier of products to this market.[1]

Arista's products, based on a transformational new approach to building high-speed network switches, were first used in high frequency trading applications for their wire speed performance, ultra-low latency and high reliability. Arista's solutions were subsequently adopted by 7 of the 8 largest hyperscale cloud computing companies for their scalability, low-latency, programmability and resiliency. As enterprises have aimed at replicating the efficiency and agility of cloud architectures, and as they seek the agility and cost structure of the hyperscale cloud providers, they are also discovering the benefits of breaking from the status quo and are applying the Arista advantage to their business.

The Arista Advantage

Arista has disrupted the market for high-speed data center switches with two principal innovations. Our core innovation has been to build a better network operating system, Arista EOS® (Extensible Operating System), which we have built from the ground up using innovations in core technologies since our founding in 2004. We now have more than 10 million lines of code and several thousand man-years of advanced distributed systems software engineering in our operating system. EOS is built to be open and standards-based, and its modern architecture delivers better reliability and is uniquely programmable at all system levels. EOS provides an ideal platform for our customers to automate their IT workflows, while integrating with 3rd parties to achieve best-of-breed solutions in multi-vendor networks. EOS also enables our customers to gain improved visibility, faster problem isolation and correction, and greater visibility of network performance over time across their physical and virtual networks.

The other key innovation that Arista has brought to the industry is our use of merchant silicon. Legacy approaches have relied on building teams of ASIC engineers who laboriously release proprietary ASICs that are tightly coupled to proprietary software – creating vendor lock-in, increasing product cost, and limiting customer choice. Elimination of these gratuitous interdependencies and the associated vendor lock-in that they create are the roots of the movement toward software defined networking, and the basis for the Universal Cloud Network architecture outlined in Arista's Software Driven Cloud Networking.

Arista has chosen to leverage an approach that uses merchant silicon and open-source software, which has delivered a more significant pace of innovation for networking gear. In addition, our merchant silicon approach delivers state-of-the-art platforms with increasing bandwidth and density, and lower price points enabled by technology advances associated with Moore's Law.

In particular, Arista has championed non-blocking network performance, constant cross-sectional bandwidth availability through the use of open, standards-based network fabrics, and increases in density, power efficiency and support for new networking standards such as VXLAN without the need for wholesale replacements of network investments or commitment to a single vendor path for future purchases. Merchant silicon has enabled these new capabilities and improved price/performance to be delivered in a market that had previously been constrained and limited by legacy approaches and vendor lock-in for over two decades. Arista has built EOS so that we can support multiple families of merchant silicon – which enables rapid and comprehensive innovation to the benefit of customers across our entire data center portfolio of products, both today and in the future.

Arista Software Architectural Innovation

When we began to build EOS, we wanted to address two fundamental issues that exist in cloud networks: the need for non-stop availability and the need for high feature velocity coupled to high quality software. Drawing on our engineers experience in building networking products over more than 30 years, and on the state-of-the-art in open systems technology and distributed systems, Arista started from a clean sheet of paper to build an operating system suitable for the cloud era.

We built a fundamentally new architecture for the cloud, which has as its foundation a unique multi-process state-sharing architecture that separates state information and packet forwarding from protocol processing and application logic. In EOS, system state and data is stored and maintained in a highly efficient, centralized System Database (SysDB). The data stored in SysDB is accessed using an automated publish/subscribe/notify model. This architecturally distinct design principle supports self-healing resiliency in our software, easier software maintenance and module independence, higher software quality overall, and faster time-to-market for new features that customers require.

Arista EOS contrasts with the legacy approach to building network operating systems developed in the 1980's that relied upon embedding system state held within each independent process, extensive use of inter-process communications (IPC) mechanisms to maintain state across the system, and manual integration of subsystems without an automated structured core like SysDB. In legacy network operating systems, as dynamic events occur in large networks or in the face of a system process failure and restart, recovery can be difficult if not impossible.

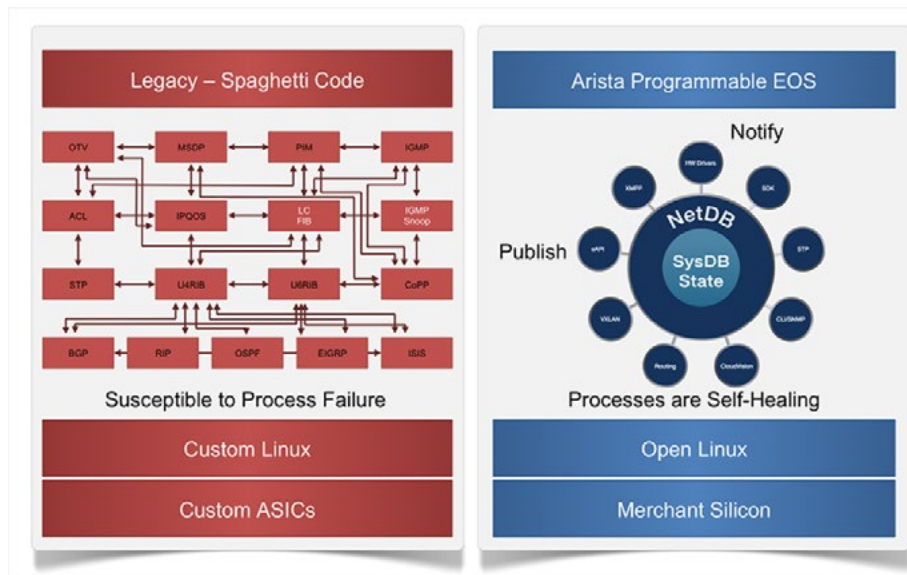[1]Crehan Research, 2015 Data Center Switching Long Range Forecast

Figure 1: Arista's Cloud Scale Software Architecture

The ability to realize cloud economics and agility depends on being able to implement automation and orchestration on a network-wide basis. Arista's CloudVision® makes this possible simply and directly by extending the SysDB concept of per switch state on an aggregated network-wide basis. This unique architectural concept combined with the use of a portal enables turnkey workflow automation and visibility for cloud networks.

The deployment of new features and changes to production networks are a major source of network downtime. Arista has built a Smart System Upgrade (SSU) capability, which in conjunction with Arista's Zero Touch Provisioning feature utilizes automation to create a smooth and non-disruptive software upgrade process that accomplishes this through the intelligent insertion and removal of network elements from the network topology. CloudVision extends these features on a network-wide basis and also makes it simple to rollback network-wide changes.

As well, Arista took to heart the lessons of the open source world and built EOS on top of an unmodified Linux kernel. We have also maintained full, secured access to the Linux shell and utilities. This allows EOS to preserve the security, feature development and tools of the Linux community on an on-going basis, unlike legacy approaches where the original OS kernel is modified or based on older and less well-maintained versions of Unix. This has made it possible for EOS to natively support Docker Containers to simplify the development and deployment of applications on Arista switches. Arista EOS represents a simple but powerful architectural approach that results in a higher quality platform on which Arista is faster to deliver significant new features to customers.

Arista Enables the Cloud Powered World

Figure 2: Arista EOS – Built for the Cloud

Hyperscale cloud providers are driven by the need to cost-effectively and rapidly roll out new services and features to their customers. Microsoft, for example, stated at a Cloud "State of the Union" event in October of 2014 that they deployed 300 major new features and services on Azure in the preceding 12 months – an average of 6 per week. This level of innovation requires not only rapid new feature velocity from network infrastructure vendors, which Arista EOS provides, but also the ability to customize IT workflows and program the infrastructure directly.

While our EOS architecture is state of the art today, we are constantly investing in our core infrastructure to provide the capabilities required for building modern cloud networks. New use cases in Cloud and Service Provider networks and hybrid cloud deployments in Enterprises require on-going upgrades and extensions to our state oriented architecture. Arista has evolved EOS forward by extending SysDB into NetDB™, enhancing scalability, visibility and control on a network-wide basis, all while staying true to our core values of reliability, open standards and programmability.

EOS Evolution from SysDB to NetDB

While our EOS architecture is state of the art today, we are constantly investing in our core infrastructure to provide the capabilities required for building modern cloud networks. New use cases in Cloud and Service Provider networks and hybrid cloud deployments in Enterprises require on-going upgrades and extensions to our state oriented architecture. Arista has evolved EOS forward by extending SysDB into NetDB™, enhancing scalability, visibility and control on a network-wide basis, all while staying true to our core values of reliability, open standards and programmability.

Figure 3: Ongoing investment in EOS infrastructure

There are three major extensions that make up the NetDB architecture:

1. NetDB Network Central is the ability to store a large amount of data, including historical data, in a central repository such as CloudVision, HBase or other third party systems. This ability to take all of the network state and bring it to one point is crucial for scalable network analysis, debugging, monitoring, forensics and capacity planning. It simplifies workload orchestration and provides a single touch point for third party controllers. By collecting every state change on the network, Arista customers will have access to both real-time and historic telemetry views of the network in one place and at a level of granularity never before achievable.

2. NetDB NetTable is a mechanism to hold network state that allows EOS to scale to new limits. It scales the routing stack to hold more than a million routes or tunnels with millisecond convergence. This is critical, as the spine is becoming the new center of the network, the point of transition between the data center and the rest of the world. We are extending the spine switch to incorporate this new functionality by extending SysDB into NetDB.

3. NetDB Replication enables an Arista switch to stream its state to other interested systems in a way that automatically tolerates failures, and adapts the rate of update propagation to match the capability of the receiver to process those updates. NetDB state streaming provides a modern and granular approach for capturing the state of each network device.

These software infrastructure enhancements extend the core SysDB architecture. And they build on the same core principles that have been the foundation of the success of EOS: the openness, the programmability, the quality, and the way that a single build of EOS runs across all of our products. With this phase of EOS development the network has become that much more responsive and agile to the needs of hybrid clouds across Cloud Provider, Service Provider and Enterprise networks.
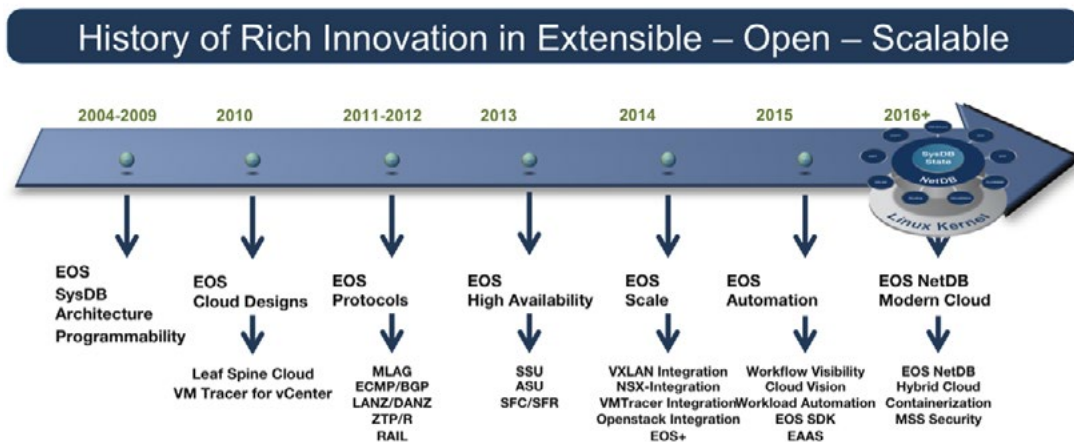
Summary: EOS Evolution

Figure 4: Ongoing software driven innovation

Programmability at Granular Levels

Arista offers six types of extensibility for EOS as shown in the following figure:
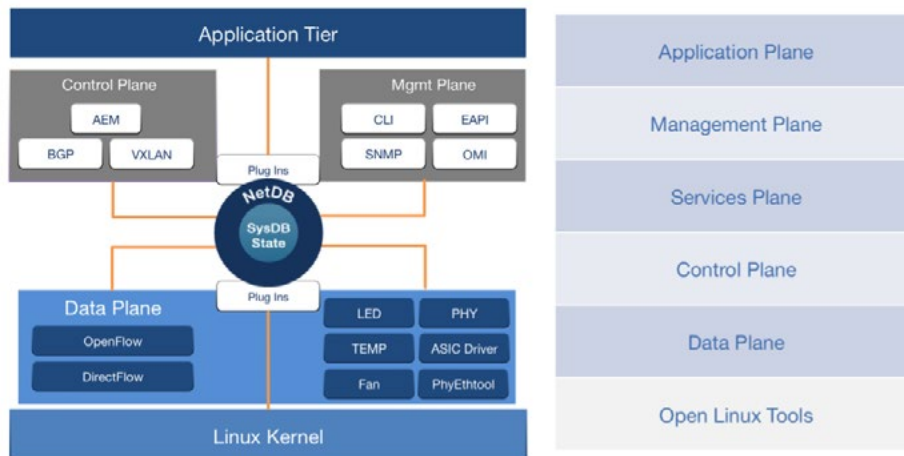

Figure 5: Extensibility at all levels

1. Management plane extensibility via APIs, such as EOS API (eAPI), OpenConfig and SNMP. Using simple, well-documented and widely used programming models such as Java-Script Object Notation (JSON), eXtensible Markup Language (XML), Python, Go, Ruby and Extensible Messaging and Presence Protocol (XMPP) to interact with the EOS management plane, Arista's APIs provide direct programmatic access to management systems such as HP OneView, EMC Smarts, VMware vCenter/vRealize, IBM Tivoli and Splunk. CloudVision provides a single integration point for partner management systems into EOS on a network-wide basis.

2. Control plane extensibility via open Linux and advanced event management (AEM), a complete event handler subsystem to allow real-time and event-driven programming of the Control plane. Interacting with EOS state-driven NetDB, Arista EOS can enable network switch actions on any state change in the system through a set of pre-defined triggers. Our customers also have direct access to the full set of Linux tools such as tcpdump through our full binary Fedora compatibility.

3. Data plane extensibility with in-line programmability. Customers looking to tune their application performance on the network can customize traffic flows by filtering and redirecting traffic using industry-standard OpenFlow or controller-less Arista DirectFlow constructs. A good example of this is Arista's Macro Segmentation Services (MSS), which can be used to provide security between physical, virtual and cloud networks by incorporating firewalls with defined policies and rules.

4. Services extensibility using Arista vEOS and Tracers for workloads, containers and big data analytics. Additionally the Arista vEOS control plane provides the ability to run the same EOS software as a VM inside any virtualized environment. This provides customers the virtual machine flexibility for lab certification efforts or for development purposes.

5. Application level extensibility for third-party development. The Arista EOS applications portal opens up Arista EOS to third-party development via SDK tool kits, scripting and APIs, making possible new types of applications as well as off-the-shelf integration with best-of-breed solutions.

6. Access to all Linux operating system facilities, including shell-level access. Arista EOS can be extended with unmodified Linux applications and a growing number of open-source management tools to meet the needs of network engineering and operations.

Organizations are attacking their OPEX costs by automating their IT workflows. This requires the ability to systematically program the network infrastructure – something that legacy approaches deliberately avoided for many years, and consequently those vendors are now attempting to band-aid limited functionality into 20+-year-old software architectures that were never designed to be fully programmable. The distributed systems concepts built into EOS and embodied in the multi-process state sharing architecture of SysDB make it possible to program EOS at all levels needed by our customers to automate their IT workflows.

Public Cloud Providers have leveraged tools such as the Arista EOS SDK and eAPI to implement fully customized infrastructure automation solutions, while Service Providers and large enterprises have typically used Arista's EOS integration with DevOps frameworks such as Puppet, Chef and Ansible to build-in workflow automation. The Arista EOS CloudVision solution makes it possible for mainstream enterprises to deploy workflow automation and workload orchestration on a turnkey basis across the network.

The Power of Open Standards Combined with Programmability

Arista has been committed to open standards and the open source community from the inception of the company. We believe that innovation within these frameworks drives customer success and permits our customers to build true multivendor networks. Our customers want choices, and our support for open APIs, open standard protocols and open programmability that is both accessible and secure makes it possible for our customers to build best of breed multivendor solutions with partners such as VMware, Palo Alto Networks, F5, Riverbed, Aruba, Infinera, Dell, HP and Microsoft. Additionally, Arista enables the use of standard DevOps provisioning and automation systems such as Chef, Puppet and Ansible through our open Linux approach.

Workload Mobility and Network Virtualization

The movement to better utilize physical server assets in the data center through virtualization, whether hypervisor-based or container-based, continues to drive the need for increased network I/O out of the physical servers, requiring higher speed network connections. As these workloads migrate dynamically, they have been constrained by the limits of traditional VLANs and IP addressing. Network virtualization in the form of the VXLAN specification co-authored by Arista and VMware, and in a similar vein the NVGRE specification co-authored by Arista and Microsoft, were key turning points in enabling seamless workload mobility regardless of the underlying network addressing and protocol choices. Arista is capable of bringing any combination of physical

servers, storage, load balancers, firewalls, and network monitors into any virtual network segment with all of the provisioning happening seamlessly in software natively or via central controllers. These capabilities are based on hardware-accelerated virtual tunnel end-point technologies and the mapping of these between physical and virtual networking technologies.

SDN and Network Orchestration

SDN has had many definitions since its original conception. Originally described as a way to separate the network control and data planes, it has increasingly come to represent a framework for network automation that encompasses both the virtual and physical network, often referred to as the network overlay and network underlay, respectively. The network overlay and underlay are then orchestrated by an SDN system or controller such as VMware's NSX, an OpenStack-based controller, an OpenFlow-based controller, or another orchestration solution. There are many options available, and Arista's approach is to support all open, standards-based controllers in order to preserve customer choices. This means that customers can deploy their physical network today with confidence, knowing that they can change their network overlay as needed in the future – we preserve their ability to choose without single vendor lock-in, unlike legacy vendor approaches.

Telemetry and Analytics

Arista EOS provides unprecedented, cost-effective visibility for rapidly identifying and troubleshooting application and performance problems with a suite of tools and features designed to optimize network performance and reliability without the addition of proprietary out-of-band monitoring infrastructure or backhaul networks. The key components of Arista's workflow telemetry and analytics suite are summarized in Figure 6:
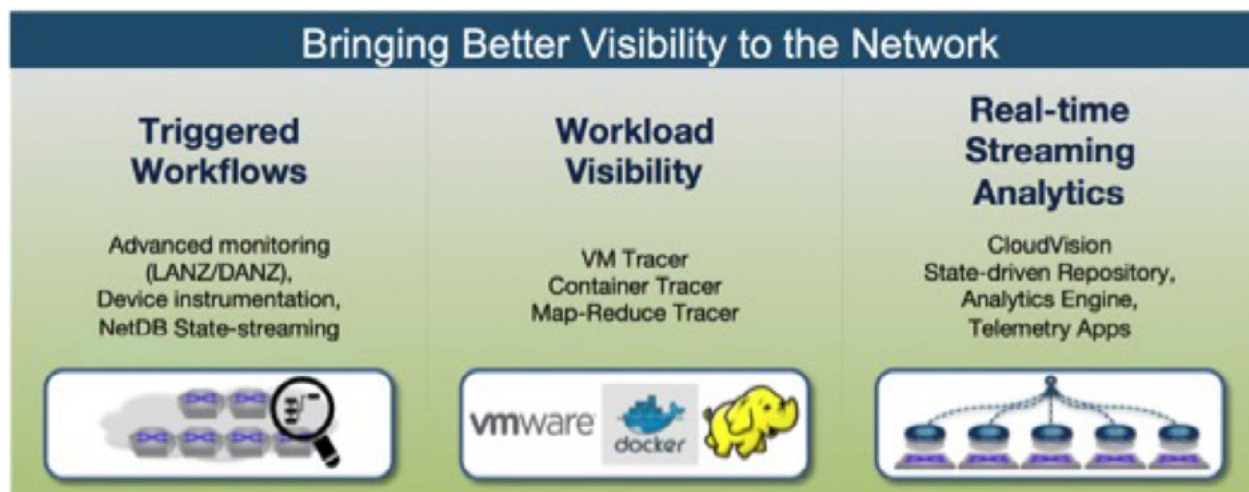

Figure 6: Next generation network visibility

Triggered Workflows

Arista's EOS offers an advanced set of tools for proactive monitoring and device instrumentation that provides deeper insight into network operations.

- With Arista DANZ, organizations that have requirements to perform critical analytical and monitoring functions with increasingly higher data volumes and higher network bandwidths can maintain security, compliance and reporting for all traffic.

- Arista Latency Analyzer (LANZ) tracks sources of congestion and latency with real time reporting in microseconds. LANZ enables the application layer to make intelligent traffic routing decisions by giving unique visibility into the network layer.

- Health Tracer: EOS Health Tracer enables infrastructure resiliency at the hardware and software layer to increase overall service availability across all EOS platforms.

- Path Tracer: EOS Path Tracer is a network monitoring and analysis tool that monitors all paths in the active-active Layer 2 as well as ECMP networks.

- Network Telemetry provides a linkage between the network infrastructure and applications. Streaming Telemetry is a modern approach that streams all network state data off of EOS devices for further analytics, including to Arista CloudVision or other cloud management suites.

Workload Visibility

Arista's Telemetry Tracers bring deeper workload-level visibility by integrating with distributed applications like big data, cloud, container and virtualized environments. The tracers provide visibility into the following workloads:

- VM Tracer: EOS VM Tracer allows the network engineer to have visibility into the virtual infrastructure associated with the physical switch.

- Container Tracer: EOS Container Tracer delivers advanced placement and monitoring capabilities for container-based applications and their associated switches.

- MapReduce Tracer: EOS MapReduce Tracer tracks and interacts with Hadoop workloads directly connected to Arista switches in a cluster, ensuring faster rebalancing and recovery in case of a node failure or congested link.

Real-Time Streaming and Analytics

Arista EOS and CloudVision bring a modern approach to network telemetry and a replacement for legacy polling mechanisms. CloudVision Analytics Engines and CloudVision Telemetry Apps take full advantage of the state streaming infrastructure of EOS and NetDB to give Arista customers an unprecedented level of visibility into their network operations.

Legacy network visibility approaches have been based on inefficient polling mechanisms, which only provide insight into a limited subset of what is actually going on with the network. Infrequent polling intervals completely miss many network events that take place on a sub-second basis. Inconsistent and inflexible MIBs gather only a limited amount of actual network state. The net effect is that network operators have essentially been left in the dark. With NetDB, EOS-based devices are able to stream every state change from every device into an aggregated network-wide view.

The CloudVision platform includes a built-in storage infrastructure to serve as the state repository for the entire network. On top of this storage infrastructure, CloudVision also now includes an Analytics Engine for processing the raw streamed data into actionable information. This analytics engine digs through the captured state data to track trends, correlate data across devices and layers, and detect anomalies. The Analytics Engine also includes easy access to the streamed state via open, RESTful APIs, as a point for integration into a variety of partner solutions and customer-specific infrastructure.

The CloudVision Portal Workstream Analytics Viewer provides simplified visualization of network-wide state for faster time to resolution. With access to every statistic across the network in both a real-time and a historic view, the Analytics Viewer provides the network operator the ability to correlate events, devices, metrics and other views with a network-wide perspective. CloudVision also provides an extensible infrastructure for building customer-specific visibility apps directly into the portal. Monitoring and troubleshooting are dramatically simplified, reducing costs and service times.

The Arista Telemetry approach combines Triggered Workflow tools, Workload Visibility, and Real-time Streaming Analytics to enable tight linkages between the network infrastructure and the applications that result in considerable savings and operational expenditures. For a greater impact on today's cloud network, new CloudVision Analytics engines and CloudVision Telemetry Apps take full advantage of the state streaming infrastructure of EOS and NetDB to give Arista customers improved visibility, faster problem isolation and correction, and greater visibility of network performance over time.

Open, Standards-Based Scalability

Arista has pioneered building cost-effective networks that scale with simple, repeatable designs to over 100,000 physical servers and more than one million VMs. Scalability begins with the network design, where Arista has innovated with two-tier Leaf-Spine concepts for horizontal scale-out with significantly less cost and lower latency than legacy multi-tier architectures, and then with Spline designs that handle the needs of mid-size data centers with a single network tier. With NetDB enhancements, EOS now supports in excess of one million routes and 100,000 tunnels for increased cloud scale.

Open standards play a critical role in building scalable networks that preserve customer's choice of vendors. Arista supports standards-based technologies to build scalable Layer 2 and Layer 3 networks, such as Multi-Chassis Link Aggregation (MLAG) at Layer 2 and 64-way ECMP at Layer 3. Arista is a leader in delivering VXLAN, which extends Layer 2 domains across Layer 3 boundaries, while supporting up to 16 million virtual networks.

CloudVision uses open, standards-based protocols for integration, including OVSDB, the OpenStack ML2 plug-in and eAPI. The CloudVision architecture enables a central integration point for all controllers (such as NSX), which makes for a more scalable solution with up to a 10 times performance improvement for controller-based actions such as re-convergence, as it does not require the controller to communicate with every single network device.

Platform Innovation

Arista's EOS platform is uniquely suited to supporting multiple families of merchant silicon to optimize switch family price/performance and feature innovation – all with a single, binary software image that runs across all of Arista's products. This is possible because of the layer of abstraction that Arista has built between EOS and the drivers for the merchant silicon families that we use. This contrasts with the legacy approach of tightly coupling software to proprietary ASICs, resulting in multiple software images across families of switches. The Arista single image advantage results in simplified data center operations and an order of magnitude faster software release qualification. It also delivers higher quality software with a consistent feature set across the data center.

Arista's Switching Portfolio

Figure 7: Cloud-Class Platform Portfolio

Arista's EOS platform is equally unique in that it was designed from the beginning to function as a standalone software offering. As discussed earlier in this paper, Arista EOS is available today as a vEOS image, providing the ability to run EOS software as a VM. This same technology could also be used to run the EOS control plane on third-party hardware. Extending from Arista's tradition of

product and technology innovation, Arista also offers the ability to license our EOS software as a subscription service, meeting the needs of cloud providers to more closely align their revenue and cost streams over time.

Arista has been a leader in developing 25/50GbE as a founding member of the 25 Gigabit Ethernet consortium to enable the cost-efficient scaling of network bandwidth delivered to server and storage endpoints in next-generation cloud infrastructure, where workloads are expected to surpass the capacity of existing 10 or 40GbE connections.

Arista has also led in providing investment protection to customers with our award-winning modular platforms that have had three interoperable generations of industry leading performance and density over the past 6 years in the same system. A similar focus is evident in our approach to optics, which protect customer investments in optical cabling infrastructure while supporting industry standards.

Arista's Universal Spine platforms, the 7500R Series of products, are uniquely positioned to meet the needs of data centers where Spine Switching and Core Routing are converging. With Arista's ability to support Data Center Interconnect (DCI) with integrated DWDM optics and MACsec encryption, Arista supports the extension of the Spine layer of the Data Center to metro or regional buildouts that can span to 3000+km of amplified reach.

The Arista Universal Leaf platforms, the 7280R Series of products, are designed for next generation IP storage, Routing and Digital Media use cases. These switches combine dynamic and deep buffering for lossless forwarding with high density, internet scale table sizes and comprehensive L2 and L3 features.

Arista has also innovated in the areas of power efficiency, space utilization, port density and reversible airflow for our switches, with true front-rear cooling. These features are all key factors in efficient data center operations.

Total Cost of Ownership

Arista's innovations mean real savings in total cost of ownership (TCO) for our customers, who are trying to achieve cloud scale economics. The Arista product line offers dramatically lower data center capex compared to prior generation equipment. Leveraging merchant silicon, Arista switches offer high 10 GbE port density and power efficiency, with up to 96 ports per RU at under 2.5W per port. The two-tier, leaf-spine network architectures that Arista brought to market eliminate the cost and complexity of traditional three-tier designs. Reducing the footprint and power utilization of network switches means that every rack can support more servers and more storage.

The Arista EOS advantage of a modern architecture, better network visibility and open programmability on a network-wide basis makes it possible to simplify data center network operations. The single EOS image across the product line means that new release certification in typical networks can be reduced from several man-years down to two months. Most data center network vendors have a unique image per switch model; for three-tier networks, this can easily result in six images or more to certify per release cycle.

The programmability of EOS makes it possible to automate provisioning and upgrades. Automation takes the legacy requirement of multi-hour processes per switch and reduces it to minutes and even seconds. With Arista's network rollback capability, it is simple to restore a previous configuration or software version across the network, when needed. The visibility toolset of EOS accelerates the time to resolution for network issues such as performance troubleshooting, virtual machine misconfigurations and cluster management for big data. Additionally, with the turnkey approach of CloudVision, customers can more easily and rapidly realize the gains from automation of their workflows and orchestration of their workloads for migration between private and public clouds facilitating hybrid cloud solutions.

Arista customers today are realizing operational savings of tens of thousands of man-hours annually. 10,000+ man-hours of savings for 10,000 servers translates to yearly OPEX savings of $300 per server. The key cost savings from Arista's innovations are shown in Table 1.

Table 1: Total Cost of Ownership Advantages		
Cost Factor	Arista Advantage	Cost Impact
Large scale data center design	Two-Tier Leaf and Spine network designs, combined with Arista's port density, reduces the number of devices, cabling interconnections, and rack space.	Reduces cost for switches, cabling and rack hardware. Reduces the cost for software licenses and maintenance contracts. OPEX costs decrease with fewer devices to manage, power and cool.
Power efficiency	Arista switches feature the latest in energy-efficient technology, i.e., the Arista 7500 modular switch family uses less than 10W/10GbE wire speed port.	Reduces cost for switches, cabling and rack hardware. Reduces the cost for software licenses and maintenance contracts. OPEX costs decrease with fewer devices to manage, power and cool.
Software release certification	Arista uses a single image of EOS for all products. Customers only have to test and qualify once compared to legacy vendors with multiple OS images and disjointed software releases.	Reduces the time needed to qualify software prior to the network being installed or upgraded.
APIs	APIs are consistent across Arista's switch product line and are compatible from release to release.	Preserves the customer and partner's investment made in programming APIs as new products are added and new software is released.
Advanced System Engineering support	Reduction in architectural complexity and a comprehensive visibility toolset results in reduced support requirements.	Reduces the number of engineers required by a customer to support the network.
Provisioning new switches	Automated provisioning with ZTP and support for Chef, Puppet, CFEngine, Ansible.	Reduces the number of engineers required by a customer to support the network.
Network upgrades	Automated, zero downtime upgrades through Smart System Upgrade (SSU), automated configuration management and backup.	Reduces the downtime from multiple hours per switch for manual upgrade from a legacy vendor to seconds for Arista.
Problem resolution	Visibility into VMs (VM Tracer), Hadoop environments (MapReduce Tracer), network infrastructure and applications (LANZ, DANZ, Path Tracer, AEM).	Reduces the downtime from multiple hours per switch for manual upgrade from a legacy vendor to seconds for Arista.

Based on customer data

Summary

Arista provides highly technical products to technically sophisticated customers. We build products for engineers that contain the most advanced technologies available that support the broadest tool sets for engineering highly available, scalable, manageable and cost-effective networks for our customers. We invest significantly in R&D to continue the pace of innovation to sustain our ability to meet our customer's business requirements as they increasingly cloudify their IT infrastructure.

The Arista advantage has resulted in a fast-growing company that has emerged to become the second leading player in the high-speed 10/40/100GbE switching market in the data center. Arista has achieved this by focusing solely on building the best products for the needs of high performance cloud data centers, and by building an organizational strategy and supporting structure that enables our customers to interact directly with our engineering team to explore and develop new products and features. We have

a deep pool of executive talent that has successfully built innovative organizations and products across the industry over the past several decades, and who have brought innovation and dynamism back to networking.

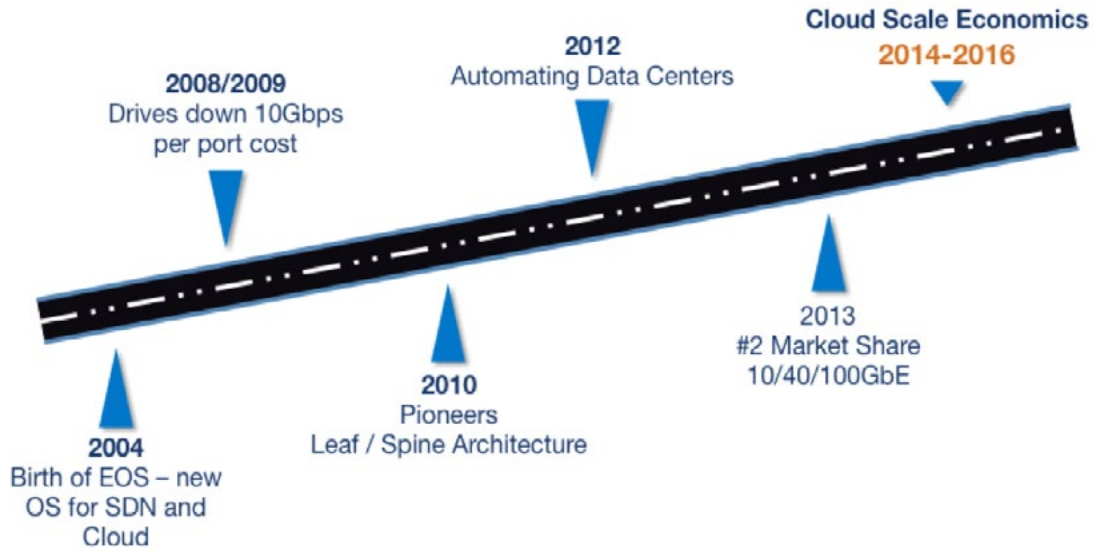**Arista's Ongoing Innovation Path**

Figure 8: Innovation leadership

For further reading:

Data Center Scaling

- Facebook Blog - Introducing data center fabric, the next-generation Facebook data center network code.facebook.com/posts/360346274145943/introducing-data-center-fabric-the-next-generation-facebook-data-center-network/

- Arista, Cloud Scale Architecture www.arista.com/en/products/eos/cloud-scale-architecture

- Arista 7500 Series Scalable Cloud Network www.arista.com/en/products/7500-series

Big Data

- Arista's Solutions for Big Data www.arista.com/en/solutions/big-data

Workload Mobility and Virtualization

- Arista & VMware Network Virtualization Guide www.arista.com/assets/data/pdf/White_Paper_Design_VMware_Arista.pdf

Arista's EOS

- EOS General www.arista.com/en/products/eos

- EOS White Paper www.arista.com/assets/data/pdf/EOSWhitepaper.pdf

- EOS Availability www.arista.com/en/products/eos/availability

EOS Extensibility and Programmability

- Open and Programmable www.arista.com/en/products/eos/open-and-programmable

- EOS+ www.arista.com/en/solutions/eos-platform

Software Defined Cloud Networking Provisioning, Automation and Partner Integration

- SDCN www.arista.com/en/products/software-driven-cloud-networking

- Automation/Partner Integration www.arista.com/en/products/eos/automation

Network Visibility

- Network Visibility Tools www.arista.com/en/products/eos/visibility

arista.com