REPORT REPRINT

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Arista Containerized EOS lets service providers have their DevOps cake and eat EOS, too

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The company took software architecture seriously from the get-go, and tried to leverage Linux to the degree possible, a good choice that keeps bearing fruit, especially in the Linux-centric world of the cloud.

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Arista Networks has unveiled Containerized EOS (cEOS), a packaging option for Arista's standard EOS software image, shared by all products. It's packaged to run in a Linux container rather than as a Linux application, targeted at Arista's cloud service provider use cases.

Container packaging enables those customers to run their own Linux variant as the top of rack switch operating system (typically an Arista TOR switch) so that it can be managed by the customer's existing server provisioning infrastructure, while still running standard Arista EOS. Having a containerized version of EOS also enables these large customers to simulate large network configurations to validate configuration changes prior to deploying them.

THE 451 TAKE

Arista's key differentiation has always been EOS software, and how it how it has enabled it to build a high-performance switch system while leveraging Linux. Arista cEOS continues to demonstrate the value of Arista's strong utilization of modern system and software technology because of the flexibility provided to Arista's largest customers, enabling them to leverage their extensive server provisioning automation and DevOps processes, and at the same time run Arista's mature and functionally rich switches. Arista continues to demonstrate that careful attention to the software architecture of a network device is a gift that keeps on giving.

CONTEXT

There are two important elements of context here: (1) the DevOps practices of the large-scale cloud service providers and (2) the software structure of Arista's switch products (EOS) and what it means to 'containerize' it. Large-scale web service providers run datacenters with tens of thousands of servers and continuous deployment of new software features and fixes. This is only possible with a DevOps operational methodology, where everything that can be automated is automated, rather than left to any possibility of human error.

The software that runs on these servers is provisioned as needed, and then maintained and functionally improved, with sophisticated internal infrastructure management systems. Containerized EOS enables such customers to use these same infrastructure provisioning systems to deploy EOS to Arista TOR switches, rather than having a separate network provisioning system, and by doing so, being able to better integrate network management into their broader DevOps methodologies and processes.

Arista is the most successful new networking company of the last decade, having built a $1bn/year switch business by betting that merchant packet-forwarding chips were competitive with the incumbent vendors' custom ASICs, and that by using merchant parts, Arista could invest more aggressively in switch software.

Arista created EOS, its switch software, to run as a standard Linux application and leverage all the system and tool technology built on Linux, paying special attention to how state was shared among the hundred odd separate tasks that collectively form EOS (the feature called SysDb).

Over the last 10 years, Arista has built switches based on four different packet-forwarding architectures (most recently, the Xpliant parts from Cavium) and sold both fixed and chassis format switches, but always maintained a single binary version of EOS used by all Arista products (some specific switch features depend on a specific chip architecture, but there are no variant versions of the software). It continued to build out its whole product line leveraging Linux (e.g., the NetDB and CloudVision instrumentation and management tools).

A container is a Linux operating system structure that enables more efficient use of hardware virtualization than does a virtual machine. The use of containers also simplifies the task of deploying software for a specific platform. An application packaged as a Linux container will run on any platform based on the Linux kernel without regard to the specific Linux distribution, which is exactly how Arista leverages container packaging here.

The use of containerization can be thought of as a new variant on the idea of switch software 'disaggregation.' In the past, switches were designed as appliances, with the software married to the hardware during the manufacturing process. Alternatively, you can view many switches as a commodity server running a server operating system of some form, and a networking application, with packet-forwarding hardware, as part of the hardware configuration.

'Switch disaggregation' typically refers to enabling different switch software to be loaded on 'white box' switches along the lines of server 'open system' initiatives in the distant past. Arisa's cEOS provides a path for supporting and selling EOS on third-party hardware platforms although the company has not chosen to do that yet.

Also, cEOS can be seen as a way of disaggregating the network stack from the rest of the operating system (Linux, which includes its own networking stack). Because Arista made an early bet on merchant silicon, it is an expert at making the most out of a specific packet-forwarding chip at the device level. The ability of EOS to take full advantage of specific packet-forwarding ASICs is not impeded if EOS is packaged as a container.

Arista has built its business by focusing initially on a new segment – 'cloud' computing – and found cloud providers as important early customers. Over time, the choice of cloud networking has looked better and better. Driven by demand for cloud networking, Arista in 2016 exceeded $1bn in annual sales within two years of becoming a public company. Fourth quarter revenue was up 33.6%, and full year sales climbed 34.8%, to $1.1bn.

PRODUCTS

Arista cEOS introduces the containerized packaging of EOS software for deployment in large-scale cloud infrastructure. Arista says it is the same exact EOS software image that runs on all Arista switches. The EOS software suite – including a network wide state-driven NetDB architecture, CloudVision automation and analytics, and any cloud workflow, workload and work stream – is fully supported on cEOS.

The containerized packaging and deployment option for EOS enables large-scale service providers to integrate networking into their sophisticated internal server infrastructure provisioning and management systems, rather than needing a second system for network provisioning. Having EOS packaged as a container also enables these large providers to simulate and validate new network configurations before they are deployed into production.

Arista introduced cEOS at the Open Compute Project Summit, where it showed how cEOS could coexist with various other open networking initiatives as a demonstration of the value of this kind of network disintegration – cEOS is available now for selected customer trials, and pricing is on a per-customer basis.

COMPETITION

Arista's direct competitor is Cisco, the switch industry leader. Cisco is the market leader in networking, and a formidable competitor by any measure. Despite that, Arista has demonstrated continuing revenue growth well beyond the industry segment growth, increasingly at the loss of Cisco.

In part, this is because of Arista's early focus on cloud networking, and in part because of the value of Arista's software EOS, especially when it comes to integration with broader IT systems. None of the other major switch vendors has a single image software system for all products that is based on Linux; therefore, none could create a comparably elegant containerized version of their software.

The cloud market is the most rapidly growing part of the switch market, with more than half of the opportunity found with the seven largest service providers. The largest providers are very self-sufficient, and increasingly use commodity or custom-built switches (leveraging the same merchant silicon parts that Arista uses).

So all the legacy network equipment vendors are at risk of losing more of the business to internal hardware and software efforts, or to a new breed of network software vendors (e.g., Big Switch or Cumulus Networks). These sell software products that run on commodity ('white box') switches enhanced by partnerships with Dell and HP, providing global logistics and support for 'open' switches that run these software products.

SWOT ANALYSIS

STRENGTHS

Arista cEOS is an ingenious way of letting large-scale cloud service providers integrate Arista networking into their server software provisioning infrastructure, and by doing that simplifying network integration into their broad DevOps processes and workflows. EOS networking is functionally richer than the homegrown networking stacks derived from open source, reflecting a decade of development, and typically makes the most possible from the merchant forwarding chips by direct integration.

WEAKNESSES

These large-scale providers are very competent and focused on datacenter cost efficacy. Although networking costs are a small part of their overall costs, Arista, despite its growth and success, will always be at risk for being further displaced by internal hardware and software efforts.

OPPORTUNITIES

The cloud market that Arista has emphasized for years continues to be the bright spot and growth area of IT and infrastructure.

THREATS

Arista's business model is based on integrated hardware (innovative but based on merchant parts) and software (the core of Arista commercial value) – cEOS is a good demonstration of how Arista could be run on some commodity platforms (the ones that run chip architectures that Arista supports). However, it leaves open the question of what such a business model change would do to Arista revenue and market capitalization.