REPORT REPRINT

Arista details the capabilities and uses of its CloudVision management platform

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19 JAN 2016

The company continues to show how software leadership translates into increased hardware sales as its software footprint extends beyond the switch. The next 12-18 months will speak volumes as cloud evolution and the role of traditional IT suppliers in the cloud ecology become clearer.

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Arista broke ranks with network tradition by announcing new software platform capabilities instead of new switch hardware or features, an entirely appropriate action given Arista's long-standing belief that its fundamental differentiation is software, not hardware, and that its EOS software architecture is a big part of that.

Specifically, Arista described further developments in the evolution of NetDB, a server-based multi-switch aggregation of the EOS switch state pub/sub mechanism SysDB, with features in CloudVision that provide a hosted application access to that state, including a means to subscribe to an ongoing stream of NetDB updates. As applications of these capabilities, Arista highlighted how these features can be used to implement the joint management of the multiple distinct network domains that collectively form a hybrid cloud architecture, the support of Docker Container execution on EOS, the support of Go language programming, and additional support of OpenConfig (a cloud community initiative).

THE 451 TAKE

Arista continues to believe that software and software architecture are its key differentiators. In the last year, with the introduction of server-based CloudVision, it has extended the scope of its software footprint from the switch to the datacenter and beyond, and continued to facilitate the integration of Arista switches into cloud infrastructure. The commercial success of Arista's software-centric strategy speaks for itself. Ironically perhaps, the weakness in this approach that has been so successful to date is that most receptive customers are the leading-edge cloud providers that are capable of building and programming their own switches should they choose. The next 12-18 months will speak volumes as cloud evolution and the role of traditional IT suppliers in the cloud ecology become clearer.

CONTEXT

Arista is the most successful switch market entrant in the last decade, having successfully executed a strategy that bet early on the viability of merchant switch ASICs and used the money not spent on proprietary ASIC development to accelerate software development. Arista designed and implemented an advanced software architecture – EOS – that incorporated Linux programming and standards within a software 'component' framework that isolated switch software functions from one another, and from the kernel switch operation through the use of a 'pub/sub' state sharing mechanism dubbed SysDB. Ironically (or perhaps prophetically) a lot of the need for modern SDN extensions derives from the fact that the network community never chose to standardize how state is stored or accessed within switches – just what SysDB does.

A software function that wants to be informed of the changing state of the switch can formally subscribe to those changes without in any way becoming entwined with the core switch software and without embedding any knowledge of how switch data is structured internally (and might subsequently change).

Arista could have chosen to invent an entirely new switch operating system but instead chose to preserve Linux compatibility within the larger component architecture enabled by SysDB. By doing so, Arista was able to leverage all of the networking and system development within the Linux community as well as facilitate integration with technical ecosystems based largely on Linux, such as in much modern cloud computing.

SYSDB, CLOUDVISION AND NETDB

As noted, SysDB provides a mechanism by which the various switch functions can be functionally isolated (required to communicate with one another through SysDB). Using SysDB makes it easier for a broad community to develop software that runs on EOS because the chances of new software disrupting switch operation is greatly reduced. The componentization that SysDB enables makes it possible to break the switch software functionality into smaller independent pieces that are each easier to develop, debug and evolve than if they were larger or one intertwined mass. Arista says that this enables it to bring new releases of the software to market in roughly half the time of vendors without this attention to software architecture.

Technically, Arista describes SysDB as a transactional, in-memory database. The 'transactional' part means that multiple related elements of state can be changed at the same time without the possibility that a subscriber to those elements will ever see them in a mutually inconsistent state. The 'in-memory' part means that SysDB is very fast compared with the performance of disk-based schemes. SysDB was derived from work first done at Stanford University under Professor David Cheriton, an early investor in Arista, and is the source of the IP litigation between Arista and Cheriton.

In June 2015, Arista introduced CloudVision, a new set of capabilities for managing multiple switches based on a server-hosted version of EOS and on the multi-switch aggregation of SysDB state – the distributed state database at the core of what is now being formalized as NetDB. Arista provided additional details about the functions in CloudVision that will enable use of the aggregated state, including a means to subscribe to a stream of updates at the aggregated level. Arista said that the uses of these features in Arista products and partner and customer integrations will be detailed as those new offerings are brought to market. Because NetDB is a network-integrated, distributed database, whereas SysDB is an in-memory database, there is a large gulf in the performance and not all the dynamic state coordination within a switch is possible across a network. That notwithstanding, just being able to synchronize lower frequency state is extremely valuable for configuration management and for the collection of datacenter-scale network performance and traffic information. Arista provides APIs on CloudVision to access NetDB state and has developed additional interfaces so that selected NetDB state changes can be streamed to another system for live analysis or to enable historical forensic troubleshooting.

Arista says that NetDB is also being used to implement routing functionality. A cloud-scale router is significantly more expensive than a switch with comparable throughput because of the need to implement much larger hardware packet-forwarding tables. Similarly, participation in cloud-scale routing requires a significant computation because of the complexity of the routing tables. Arista says that NetDB can be used (along with some necessary changes to increase the table sizes within the database) to process the external cloud route information and distribute it selectively within a large datacenter; for example, by understanding the relatively few next hop destinations at any time and distributing just that routing information broadly within the datacenter and acted on by Arista switches. By adopting such schemes, large cloud services can sometimes save significantly by being able to use high-performance switches (with smaller hardware forwarding tables) than full Internet routers. These routing features are a good example where adding modern distributed system technology (providing additional integration between the various switches in a datacenter network) to the legacy autonomous-system network architecture (where each switch operates largely on its own) can help solve important networking problems.

ADDITIONAL CAPABILITIES

Arista noted that as an application platform, CloudVision provides a vehicle for the collective management of the various networks involved in a hybrid cloud architecture. Earlier, Arista had developed 'EOS tracers' – functions that track the network activities caused by a specific virtual machine workload, for example. Building on the CloudVision platform, Arista says the same kind of instrumentation can now extend across a hybrid cloud, providing comparable value across this larger-scale network environment.

Arista also announced the support for Docker containers on EOS and said it was the first switch vendor to do so, citing it as a clear benefit of being based on standard Linux. Containers are being rapidly adopted by developers within the cloud ecology because of the deployment simplification they enable as well as the execution efficiency improvements possible. Container support on Arista enables the EOS platform to be another deployment target. By enabling the selective incorporation of operating system functions, containers are also a more efficient way of implementing network-related functionality that might previously have been packaged as a VM. Arista's support of container execution lets Arista participate in execution improvement as well. Arista announced Container Tracer functionality comparable to the Tracer capabilities introduced for VMs earlier.

Arista also introduced what it called 'programmability' enhancements for EOS use in the cloud including the support of the Go programming language, a systems development language created at Google, and specifically the use of Go within OpenConfig, a vendor-neutral network configuration design driven by network operators including Google, ATT and Comcast.

COMPETITION

Commercially, Arista competes directly with Cisco. Within cloud networking, Arista's original beachhead, Arista also competes with HP, Juniper and Dell, with a growing set of ODMs that manufacture the switches, and increasingly with the switches developed and supplied by the large cloud operators themselves.

Although Cisco is less public about its software architecture, it's fair to guess that Cisco has the wherewithal to create comparable offerings. The greatest commercial differentiation that Arista derives from EOS is probably development agility (quicker releases) and the value provided to its cloud customers of using standard Linux.

As essentially a software vendor, Arista also competes with the Open Networking vendors – Big Switch, Cumulus Networks and Pluribus Networks – that make their software available on separately purchased Open Networking switches that are provided by Dell, HP and a set of ODMs. Dell recently introduced its own version of a software offering, architected in many ways like Arista and built within an open framework. To date, Arista has discussed the unbundling of hardware and software purchases, but not execution of Arista software on other vendors' hardware.

SWOT ANALYSIS

STRENGTHS

Arista is approaching a $1bn annual run rate with 40% Y/Y growth – stellar performance in a brutally competitive market that as a whole is growing slowly at best.

WEAKNESSES

Although Arista is at heart a software vendor, it has chosen a business model dependent on the larger revenue possible with integrated hardware and software sales. Arista is a publicly traded company now subject to the perils of ongoing financial reporting and scrutiny. Although Arista has grown fabulously, it is still small compared with the network giants.

OPPORTUNITIES

Arista's greatest strength is well aligned to the growing parts of the network market. We are just at the beginning of the development and commercial exploitation of cloud computing.

THREATS

Arista has to compete with Cisco, a much larger vendor and a formidable opponent, and with the emerging Open Networking vendors that disaggregate hardware from software. Cisco has sued Arista over a set of alleged IP and patent violation issues.