

# Arista Networks' CloudVision Streamlines Cloud and SDN Programmability

## Event

On June 23, 2015, Arista Networks announced CloudVision, software that serves as a single point of management, programmability, and visibility for a network composed of Arista switches. CloudVision also serves as a broker between Arista switched infrastructure and software-defined networking (SDN) controllers, infrastructure orchestration platforms, and other high-level management systems. CloudVision is not a management interface; instead, it is an instance of the Extensible Operating System (EOS), the network software that runs on all of Arista's switches. It runs as a virtual appliance in a data center and collects, analyzes, and programs network state across hundreds of Arista switches. Network engineers can use CloudVision to manage an entire Arista-based network like a single device. CloudVision also makes the process of integrating Arista switches into SDN controllers, management tools, and orchestration platforms far more scalable and streamlined. The southbound interface on an SDN controller, for instance, needs to connect only to CloudVision. CloudVision takes care of translating SDN programming to the rest of the network.

CloudVision is available now starting at \$295 per month for each Arista switch managed by the system.

## Context

The networking industry is still reckoning with the disruptions brought about by SDN. Several camps have emerged around different technologies and architectures. Many networking vendors have built their strategies around OpenFlow, where most of the value is delivered via software in a centralized controller. Others have built hardware-centric solutions. Still others have built pure software solutions that theoretically provide value on top of any legacy network without switch upgrades. It is unclear which vision of SDN will prevail, but one thing is certain: every SDN strategy is trying to reduce network complexity and streamline operations by abstracting network infrastructure into programmable resources that can be dynamically allocated to applications and services.

CloudVision is not an SDN controller, in fact it is not an SDN product at all. However, it makes the job of realizing the benefits of SDN far more achievable. As mentioned above, CloudVision is a virtual instance of Arista's EOS software. It contains a component of EOS called SysDB, which is essentially a communications bus or miniature database that operates inside of every instance of EOS. Within EOS, SysDB is a publish and subscribe element that manages the state of every other process operating inside an instance of EOS on a switch. It is basically the point of control for the operating system.

In CloudVision, that SysDB element is expanded upward to operate on a network-wide scale. Instead of brokering the different operations within a switch, it is collecting, analyzing, and programming the state of every Arista switch on the network via the individual instances of SysDB that live on those switches. CloudVision becomes a single network state management point that abstracts away all of the individual switches.

In an SDN and cloud context, CloudVision becomes a broker for network resources. If an engineer wants to program the network with an SDN controller, he can connect it with the application programming interface (API) on CloudVision. If he wants to program the network with OpenStack, he does the same thing. CloudVision ships today with integrations into OpenStack's Neutron networking driver and two

SDN controllers: VMware's NSX and Nuage Networks' Virtualized Services Platform. VMware and Nuage's network virtualization overlays typically use the OVSDB protocol to interact with physical switches. Arista claims OVSDB does not scale. With CloudVision, a controller has just a single network element to communicate with, and CloudVision takes care of the rest. Arista claims this results in a tenfold improvement in controller scalability.

CloudVision also enables enhanced visibility across network overlays and underlays. For instance, as an overlay controller provisions a new virtual network using the VXLAN protocol, CloudVision collects that information from the controller and maps it to physical VLANs for an end-to-end view of overlay-based network traffic.

Network engineers who are not leveraging SDN will also find value in CloudVision. The software still abstracts the network and provides a single, nimble point of programmability, management, and visibility. As mentioned earlier, the SysDB element gives CloudVision the ability to collect, analyze and program network state across hundreds of switches. These capabilities make CloudVision a central point of management and visibility for an Arista network. An engineer can make network-wide configuration changes through CloudVision, which SysDB will push out to every Arista switch in the network. This capability powers near zero-touch provisioning of a network and change management controls that allow an engineer to test configuration changes on the production network without committing them. CloudVision can also store previous configurations and power a network-wide configuration rollback to a previous network state if necessary.

## EMA Perspective

Arista has established EOS as one of the most programmable network operating systems on the market, with open APIs, a software development kit, professional services aimed at leveraging those APIs, and support for DevOps tools. However, the company has recognized that many mainstream enterprises lack the internal resources needed to take advantage of this programmability. Just as manual management of individual switches is a cumbersome process, switch-by-switch programming is also an operation that ought to be consolidated and streamlined.

CloudVision addresses that potential for consolidated programmability and much, much more. In a way, it turns an entire network of Arista switches into a single instance of its operating systems running across hundreds of switches. Each individual switch is still running its own distinct image of EOS, but Arista has taken SysDB, the core software component that orchestrates the processes of an EOS image, and made it a network-wide resource for stateful management. This architectural innovation seems so simple, but it is also revolutionary.

No longer does an engineer need to perform device-by-device management. He can go into the command line interface on CloudVision and configure the entire network. No longer does OpenStack or an SDN controller need to integrate with and communicate with hundreds of switches. It connects with a single network software image that brokers communication to an entire network at scale. CloudVision has the potential to simplify network provisioning and programmability.

These are major areas of research and debate in the networking industry. For instance, the Open Networking User Group (ONUG), a collective of IT executives from Fortune 100 companies, created a working group that is specifying a reference architecture and technology requirements for an open and vendor-agnostic approach to network state collection, correlation, and analysis. Another group of network engineers from Google, Facebook, and several large network service providers has created an informal collaboration known as OpenConfig, a project aimed at creating open source software that provides a vendor-agnostic way to model and manage configuration of large-scale networks. Clearly, network operators are struggling with managing network state at scale.

Arista's CloudVision does not program a multi-vendor network, but it does provide a single point of integration that addresses the problems these organizations are trying to solve. It is essentially a centralized database for an entire Arista network and a centralized orchestration point that enables integration with Arista's ecosystem of partners, which includes Dell, HP, F5 Networks, Nuage Networks, Splunk, ServiceNow, Microsoft, Palo Alto Networks and VMware. The possibilities are limited only by an engineer's imagination. Arista could add any number of features on top of CloudVision, and any number of management vendors could integrate into the software. One could imagine a network performance and availability platform making an API call to CloudVision to gather the data it might otherwise acquire via Simple Network Management Protocol (SNMP) polling across hundreds of switches. The possibilities for streamlined network operations are clearly evident. Network operators should engage Arista and find out what the limitations of the platform truly are.

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