

REPORT REPRINT

Arista CloudVision Telemetry eliminates the network instrumentation poll(ing) tax

PETER CHRISTY, JIM DUFFY

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Arista EOS, the software-architecture gift that seems to keep on giving, enables a new model for network instrumentation and analysis, and signals the end of polling and sampling.

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Arista announced CloudVision Telemetry – a set of real-time operational-network instrumentation and streaming analysis software capabilities. CloudVision Telemetry is the next tranche in its CloudVision offerings and builds on the already announced ability for a set of Arista switches to stream state changes to CloudVision, a server application that runs on the same entrepreneurial operating system (EOS) platform as the switches. Arista leverages open source and Hadoop elements in this offering for data storage and analysis (HDFS, Hbase and Kafka). The company says that other data updates can also be streamed to, stored and analyzed in CloudVision Telemetry. The company has provided additional open CloudVision APIs for the programmatic access to the data and analysis.

THE 451 TAKE

Arista Telemetry is a valuable new datacenter network management tool because it provides a simple and effective way to capture, stream, log and analyze a comprehensive set of switch states (anything from internal temperature to network traffic) to identify trends and correlate any changes with problems. Telemetry was relatively straightforward for Arista to develop because it builds directly on EOS features that already exist and leverages distributed system capabilities that don't exist in network standards. Telemetry is one more demonstration of the soundness and power of Arista having a software-focused strategy from the beginning.

CONTEXT

Arista started as a software venture, but quickly changed to a hardware-device business model in order to have a larger margin stream to invest in development, choosing to forgo custom application-specific integrated circuits (ASICs) in order to focus development investment on software. Arista found early acceptance in cloud networking and has successfully parlayed that into becoming a significant industry player.

Focusing on software, and an advanced internal software architecture, has enabled Arista to rapidly add features as needed to expand its technology acceptance model (TAM), including the development of management capabilities (CloudVision, built on a version of EOS that runs on a server,) and now instrumentation and analysis (Telemetry). Telemetry builds on the fact that EOS carefully manages switch state via its system database (SysDB) functions. Arista extended SysDB so that selected state updates could be streamed out without any changes required to existing EOS application software.

PRODUCTS

CloudVision Telemetry is a set of services that enable diverse switch state information to be logged, analyzed and made available for other partner or customer applications. The basic functions are provided as part of the EOS software that runs the switch, and on CloudVision – an EOS instance running on a server. The historical data repository is provided by an external HDFS (Hadoop) data store.

The concept of switch 'state' is central to the design of EOS (and fundamental to Telemetry as well as a result). EOS explicitly manages the sharing of state among the 100-plus software components that collectively form the switch system rather than permitting the tacit sharing of state between components. This formalization, enabled by a high-speed, in-memory database system (SysDB), greatly reduces the complexity of the system by partitioning the code and enforcing formal interfaces between the components, and that in turn makes the software more reliable and software development more agile. (These concepts are broadly understood and used in modern computer systems, not just by Arista.) The state can be a physical machine state (voltages, temperature, fan speed, etc.), configuration data defined by a network engineer, network topology information from the current network, network traffic data and more. Any Arista switch or network state that is broadly useful is already stored in, and accessed through SysDB.

In June 2015, Arista introduced CloudVision and extended the capabilities of SysDB (part of a new set of capabilities that Arista calls NetDB), such that changes in specified SysDB-managed states can be streamed to the CloudVision server. This required no changes to any other Arista partner or customer-created software because the state was already managed in SysDB. Arista says that for typical use (a typical set of selected state) the streaming requires 100-200Kbps of traffic per switch, which is a small load on the switch software and a small increment in network traffic.

Arista has added analysis functionality to CloudVision. The CloudVision system maintains a current view of the shared-network state, and is designed to work with third-party or partner HDFS (Hadoop) stores to maintain a time-sequenced history of that state information. CloudVision builds on Hadoop analytics technology, such as Hbase, to provide for the querying of current and historical data. It also provides APIs to access data and the analysis, as well as interactive analysis tools.

Arista emphasizes that the direct analysis of historical switch state information is a more direct path to understanding network operational issues compared to log analysis or MIB-based polled data analysis. When the right data infrastructure is in place doing so is not complex and doesn't impose a burden on the switch control processor or the network.

COMPETITION AND MARKETS

This has been a big year for advanced network instrumentation and analytics with the introduction of Cisco's Tetration, which we think has legitimized the topic and will increase the market opportunity for all. Arista's goals are quite different from Cisco's. Tetration focuses on understanding and analyzing the traffic flows on a network, while Arista focuses on the operational management of the network devices and network as a whole. Tetration, in its initial phase, derives flow metadata from the data center servers, not the switches. Arista's Telemetry accumulates both network traffic, device and forwarding ASIC information. (Arista has argued for some time that packet forwarding buffering signals are a perfect way of detecting microburst packet loss).

Tetration primarily serves the security team; comprehensive analysis of flow data is an invaluable tool for seeing and directing the mitigation of slow and persistent attacks. Telemetry intends to provide an invaluable tool for the network operations team that will enable unprecedented analysis of network activity and trends, and correlate observed problems with items, such as configuration changes and device or link issues.

Cisco is Arista's primary market competitor in switching and its instrumentation, and in datacenter network instrumentation and analysis. Although Cisco doesn't have the benefit of a single software image that Arista does, or a built-in streaming update architecture, over the years Cisco has worked with customers and partners to provide useful (if not as comprehensive) instrumentation and analysis capabilities. Cisco ACI includes a controller that coordinates network configuration and performance information.

Apstra is a new network orchestration vendor that was founded by David Cheriton, the Stanford CS Professor who also co-funded Arista, and whose software company provided technology that is incorporated in EOS and presumably the Apstra offering as well. Apstra adds an agent to the managed switch, which we assume implements NetDB-like streaming and synchronization mechanisms. Non-Arista switches lack a SysDB state management system and won't be able to provide comparable instrumentation, even if Apstra can stream changes to the state that the agent can see.

Pluribus also promotes the capabilities of its switch software as a tool for network instrumentation and analysis. Like Arista, the Pluribus switch software leverages modern distributed-server infrastructure. Unlike Arista, Pluribus more directly exposes the network packet forwarding hardware to system and application code, and as a result is probably capable of more intense dynamic analysis of network traffic. Unlike Arista, Pluribus has not yet achieved a broad acceptance in the marketplace and doesn't yet have Arista's problem/opportunity to provide broader network management tools.

Arista also competes with legacy network instrumentation systems that are based on polled access to (often sampled) MIB status. Compared to these solutions Telemetry provides much more complete data (not polled) and more granular data (not sampled) much more efficiently. Telemetry only works with Arista switches, which is still a small part of the overall datacenter-installed switch base. However, the availability of Telemetry strengthens Arista's value proposition in this brutally competitive switch market.

SWOT ANALYSIS

STRENGTHS

Arista is the most rapidly growing switch vendor of significance, a remarkable accomplishment given the low growth of the market as a whole and the presence of a large incumbent. Arista made strategic choices to emphasize software and use merchant-switching parts early on that have held up well over time.

WEAKNESSES

Arista is still a small vendor compared to the market leader. Telemetry today works only with Arista switches, although Arista has provided open APIs for broader integration.

OPPORTUNITIES

The kind of instrumentation and analysis tasks that Telemetry addresses are important today and continue to grow in importance. Arista and its partners have only scratched the surface in terms of the useful applications and control systems that can be built on the infrastructure now in place.

THREATS

The Telemetry capabilities are likely to create competitive offerings over time, especially in heterogeneous networks (not just Arista).