Cisco ACI Enhancements Address SDN Management Gaps

Event
In a recent software update, Cisco added new capacity management and troubleshooting capabilities to Application Centric Infrastructure (ACI), its flagship software-defined networking (SDN) solution for data centers. The new ACI capacity management dashboard gives network operators real-time insight into the overall capacity of the network, in addition to node-by-node capacity utilization. ACI's new troubleshooting tool takes a wizard-based approach to root-cause analysis, giving administrators the ability to create troubleshooting sessions that examine all aspects of communications between two endpoints and can be used both for forensic analysis and for real-time visibility. These new management features will enhance the entire management lifecycle of a Cisco ACI fabric.

Context
In its early days, SDN research and development was focused on the control plane and the data plane. The management layer of SDN was pushed down the road. To many, the northbound API on top of SDN controllers was viewed as an integration point for SDN applications to add management functionality on top of SDN architectures. An ecosystem of applications could plug into the northbound API and provide all of the management functions a network operator might need. While some SDN vendors are adding management applications to their solutions, many network operators want more of a turnkey approach to managing SDN. A tremendous management gap still remains, particularly around planning, monitoring, and troubleshooting SDN infrastructure. Last year, ENTERPRISE MANAGEMENT ASSOCIATES® (EMA™) research highlighted some of those gaps. EMA asked enterprises to evaluate their existing network planning, monitoring, and troubleshooting tools in terms of their ability to support SDN. Less than half of the respondents said their tools fully support these technologies. More than a third said they would need separate management tools for SDN, and another third were unsure if their existing tools were up to the task.¹

The same survey asked enterprises to identify their top SDN concerns from a management and operations perspective. Forty-two percent doubted they could perform proper capacity planning for SDN technology, and 24% were concerned that SDN would be too difficult to troubleshoot.

In its June 2015 software update to ACI, Cisco addressed both of these concerns. First, it added a new capacity dashboard to the ACI management interface. By providing visibility into the utilization of an ACI network, the dashboard allows network operators a range of viewing options, from a fabric-wide view down to visibility of a single network node. Network operators can set their own capacity thresholds for their network or use the ones certified and tested by Cisco.

The capacity dashboard displays overall utilization and capacity of fabric-wide resources, such as bridge domains, Layer 3 contexts, endpoint groups, and Layer 4–7 services. In the same interface, the network operator can also scroll through capacity statistics for individual nodes on the fabric. The dashboard displays utilization of a number of resources on each switch, including MAC addresses learned, IPv4 and IPv6 addresses learned, VLANs, and content addressable memory (CAM) for policies. Cisco allows

users to customize these per-node views to display other utilization statistics that are of interest. This dashboard will help network operators monitor utilization and plan for fabric upgrades and expansions.

The second ACI management enhancement is the visibility and troubleshooting tool. This update is a wizard-based workflow tool that gathers all the information engineers need to perform root-cause analysis. The tool allows the engineers to create troubleshooting sessions that are defined by first entering the two endpoints that are experiencing connectivity problems and then entering the period of time the session should cover. They can focus the session on real-time events or use it to perform forensic analysis. For instance, they can have the session cover the time frame when a problem occurred.

The troubleshooting tool collects a broad range of metadata about communication between the endpoints, including faults, drops, contracts, event and audit logs, and traceroutes. The tool captures metadata for every point on the network that is involved in communication between the two endpoints. With this consolidated visibility, an engineer can quickly diagnose and repair problems on the network.

And if the troubleshooting tool isn't able to solve the problem, there is another option. From the same interface, an engineer can create a SPAN session from any switch in the fabric and mirror traffic from that switch to a third-party packet analysis tool.

**EMA Perspective**

EMA's conversations with the industry have revealed that management will be a major focus for the software-defined network in the coming year. Enterprises have made it clear that many management tool vendors have work to do in this area. For SDN vendors, manageability can be a real differentiator.

Cisco has already demonstrated leadership in this area with ACI. Previously the company introduced a health score dashboard, which gave network operators visibility into overall service health across a variety of parameters, from an overall fabric perspective to a per-tenant view and all the way down to an individual switch interface view. Cisco also offers an open REST API on the APIC controller that allows third-party management vendors to integrate their products with ACI to export a rich set of monitoring metrics to their systems.

Now Cisco has introduced two more management features that add tremendous value to ACI. The addition of both the capacity management dashboard and the troubleshooting tool directly addresses two major management concerns that enterprises have with SDN. With this focus on manageability and visibility, Cisco is delivering real value to enterprises that adopt ACI.

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