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Thought Leadership Discussion on

Does OpenFlow Make Sense in Enterprise Networks?

With Arista, Avaya, Brocade, Cisco, Extreme Networks and HP
The Data Center LAN Evolution Series

Summary - October 2011

- ## Summary

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This is a summary of an online discussion that took place during October 2011. The discussion was about the viability of using OpenFlow in enterprise networks and it involved Avaya, Brocade, Cisco, Extreme and HP. A full copy of the discussion can be found at http://www.webtorials.com/content/tls.html.

The first question that panelists were asked was **"What potential benefits does OpenFlow offer for the typical enterprise network?"** Avaya pointed out that OpenFlow involves a separation of the control and data planes and that this separation has been tried before; e.g., ATM LAN emulation. Avaya expressed a general concern about whether or not OpenFlow was the right model to optimize performance and provide the agility required for the dynamic data center and true virtualization. Avaya raised questions such as **"Is routing really broken?"** and **"Do we gain something [by implementing OpenFlow] that we genuinely need?"** Avaya suggested that if one were to apply the "so what" test to OpenFlow, it's quite probable that it would be difficult to find the clear benefit of this technology, when taking all of the additional complexity into consideration.

Both Avaya and Cisco made the link between OpenFlow and software defined networks (SDN). Avaya stated that while OpenFlow has yet to reach the point where deployment into real-world environments could be envisioned, the concept of Software Defined Networking (SDN) is a logical development for the industry. Cisco stated that SDN will play a key role in the ongoing evolution of networking because it offers a way for customers to take advantage of the sophisticated features of their infrastructure.

Brocade stated that similar to how virtual machines can be deployed on servers, virtual networks can be supported on top of the physical enterprise network and that this allows the management of virtual networks to be independent of the management of the physical network. Brocade added that network virtualization using OpenFlow can simplify the operation of such

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networks by creating virtual networking layers to manage authentication, security and mobility separately from the physical layer.

The HP response was somewhat similar to Brocade's in that HP stated that currently networks are deployed and managed physically, using device-level management tools. HP added that innovations that require different policies and configurations can take a long time to adopt. HP also said that OpenFlow provides a centralized way to manage the network, and as a result, the network can be both more dynamic and responsive to business needs and less costly to administer.

Based on a comment submitted by Kyle Forster of Big Switch, I asked the panelists "***If OpenFlow becomes successful, what kind of switch architecture is going to be right for OpenFlow?"***

HP stated that OpenFlow needs a switch architecture that is optimized for classification of traffic and flexibility for actions taken on the traffic. Extreme stated that a high performance, Layer 2/3 non-blocking data center Ethernet switch is required to support flattened network designs. Extreme added that the most important characteristic needed to support OpenFlow is the capability to quickly add, remove and/or re-order flow entries in the hardware.

Joanie Wexler then asked "***Why is it necessary to separate the control and data planes and place them in different pieces of equipment?"*** In my response I stated that one way to look at OpenFlow is that it is like a hypervisor on a virtualized server. Hypervisors provide a lot of powerful management functionality and have APIs to hundreds, if not thousands of other applications. That is one potential advantage for OpenFlow – open up networks to a wide range of innovation and integration.

Steve Taylor asked "***Is OpenFlow better, worse, or the same as proprietary solutions for providing excellent data center operations in a virtualized environment?"*** Extreme stated that today's data centers are very complex and that the challenges are particularly severe in large scale-out data center networks, such as cloud data centers, where issues such as multi-tenancy, virtual machine and service provisioning, security and traffic isolation are all very real challenges. Extreme added that OpenFlow offers the potential to address at least some of these problems in a standardized manner with broad industry participation.

I then made the observation that in theory if OpenFlow were to be successful, switches and routers could become just relatively dumb forwarding engines and all of the requisite intelligence would reside in a controller. I then asked the panelists ***"What is wrong with that view, or put another way, what intelligence is best left in the switches and routers and why?"***

Extreme stated that when discussing OpenFlow, it is important to first identify what problem you are trying to solve. Extreme pointed out that networks exhibit significant differences and hence a blanket approach of moving all intelligence out of the switches and routers may not be the most pragmatic one. Extreme used as a reference service providers who have built complex provisioning systems which centralize a lot of intelligence, but this has not relegated their switches to being dumb forwarding engines.

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Cisco stated that OpenFlow allows you to do some very cool things in the control plane, but at some point, something still needs to handle the duties of the data plane and there will continue to be differentiation in data plane hardware.

Cisco closed the month's discussion by stating that one of the primary benefits of OpenFlow is breaking down the wall between applications and their underlying infrastructure and providing a programmatic interface to the data center infrastructure. OpenFlow is but one component of the broader concept of software defined networks (SDN) which Cisco believes will help reshape the evolution of networking by providing the programmability/extensibility and closer coupling of application and infrastructure.

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