Fifty Shades of Open Networking

How can one compete in the cloud era with last century's networks?

Executive Summary

Most networking vendors are getting on the "open networking" bandwagon, but unfortunately many appear to be approaching it defensively with a foot in both the proprietary and open camps. They see open networking as a hedge against a market that is pushing towards more openness, while they hope to keep selling proprietary products. The continuum of offerings being pitched as "open" networking spans from vaguely open to fully open. And while most customers are still in the investigative phase of open networking, the disparity of offerings is confusing and in some cases lackluster.

Customers Are Looking for a Change

Today's networking situation is the product of 25 years of vendors' benign neglect, as vendors focused on acquiring customers that they could lock into proprietary environments and tools. While the industry prides itself on "standards", far too often the real secret sauce, the proprietary technology that brought value to customers, was layered on top of the standards to create a lock-in. With today's emphasis on cloud computing and virtualization, East-West traffic is on the rise; **the infrastructures of the last two decades simply cannot keep pace**. This scenario has left customers craving more flexibility, agility, value, and a more open overall system.

Flexibility and agility are rarely associated with networking, which is the epitome of hard-wired. A general lack of flexibility lengthens the time for deploying, provisioning, and changing resources into weeks and months, while virtualized server resources can be deployed in hours or even minutes. While technologies like virtualization and cloud have increased IT value by cutting the time to deploy or change, networking remains the bottleneck. This disparity in deployment times is putting more pressure on the networking side. If businesses need to be more agile in order to take advantage of new opportunities, they will need more flexible networking. Additionally, changing traffic patterns, increasingly demanding workloads, and shifting user requirements (like BYOD) are putting more emphasis on the need for businesses to be flexible.

Server and storage costs have dropped dramatically in the last 10 years, yet networking CAPEX has not. Legacy, proprietary networking solutions have become increasingly complex and harder to manage, pushing up the OPEX as well. Standardization helped drive down server acquisition costs and technologies like virtualization helped drive down server operational costs. Server admins can manage 50-75 physical servers or 185-450 VMs[1], showing that introducing virtualization into an environment can boost productivity by 3-6X. Open networking, which helps usher in network virtualization, hopes to see the same kind of productivity boost—with the savings helping businesses fund a variety of other projects that currently fall below the budget line today.

[1] http://blog.thehigheredcio.com/2012/11/01/it-budget-benchmarks-and-more-it-staffing-benchmarks/

But most of all, IT is becoming uncomfortable with the amount of lock-in that they experience in networking. Too many decisions are being forced by the existing infrastructure, leaving customers in an endless treadmill of rip-and-replace that is impossible to escape. The inflection point of these new technologies gives customers a rare opportunity to take a deeper look at the openness of proposed solutions in order to keep from being locked in for another generation or more.

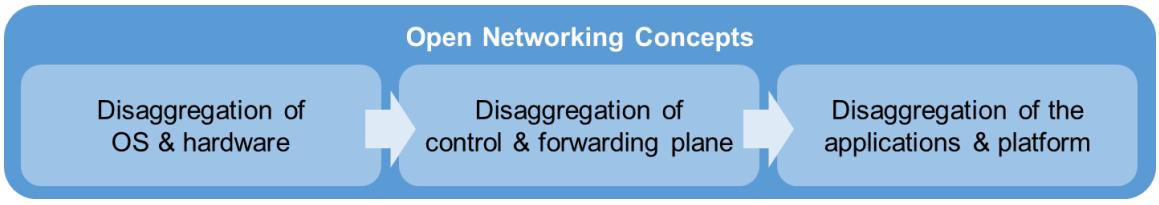
Open Networking Changes the Game

Open networking removes many of the obstacles of proprietary networks, allowing businesses to maximize their network investments. The concepts of open networking disaggregate all of the vertical structures and allow the network to expand from simply physical, adding a virtual layer on top, just as servers and storage have. The underlying hardware remains very similar, but the overlay, from the operating system up through the applications, becomes very different. Choice and flexibility come in, as the "black box" of networking is split apart and customers take control of the components, allowing for best-of-breed solutions to be built up based on business needs.

Software-defined networking (SDN) is the key enabler for disaggregation, network virtualization, and orchestration. SDN relies on open networking to break apart the tightly coupled network devices. Open networking enables two of the three key strategies by creating a break between the control plane and the forwarding plane. This break allows applications to run virtualized, anywhere. The third element, disaggregation of the OS and hardware, does not require SDN, but once customers begin to implement SDN, control over a device's vertical stack is important.

The trend towards open networking has grown specifically because it addresses unmet customer needs. History tells us that proprietary solutions rarely scale to meet rapidly changing markets, opening the door for standards-based solutions. While vendors had resisted the call for open networking in the past, they cannot resist much longer. To set a baseline, we view open networking as the three concepts in the figure below.

Figure 1: Open Networking Concepts



Breaking the linkage between the switching hardware and OS opens up flexibility and choice to the customer. Applications can now be run at the edge more easily, reducing network traffic. There have been a number of companies who have developed network operating systems for an open networking environment, all with different approaches to various problems. Companies like Cumulus Networks, IP Infusion, Big Switch Networks, and Pluribus have developed operating systems that are portable and open.

Then, breaking the connection of the control plane and forwarding plane allows applications to have a centralized view, providing access to the forwarding plane and

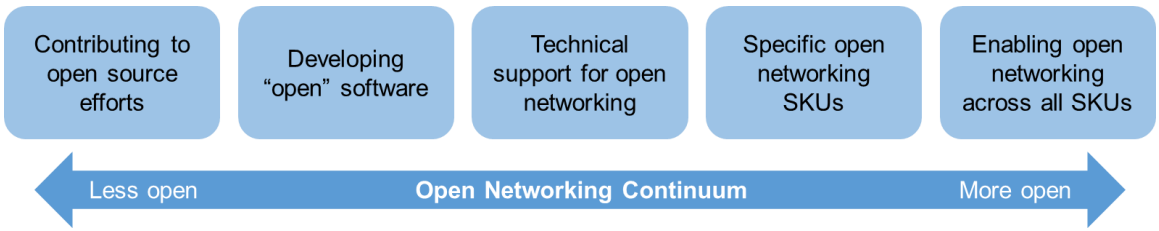
bringing new capabilities. This breaks the proprietary lock of the forwarding plane previously only open to the hardware manufacturer. With generalized access to the forwarding plane, protocols like OpenFlow allow more open applications to be created.

Finally, decoupling the virtual layer from the physical layer means network functions no longer need to run on the physical equipment. They can run on servers for the tightest linkage with the virtual machines, applications, and data. Some choices in this arena include Microsoft, Midokura, Nuage Networks, and VMware.

Together, these functional changes to networking bring choice, agility, and flexibility that drive lower costs by removing much of the proprietary network baggage of the past. But open networking is starting to feel like potato salad, everyone has their own recipe, and unfortunately, for many vendors, it is falling short of customer expectations.

Networking hardware vendor participation in open networking can come in many forms.

Figure 2: Open Networking Continuum



The range of activities above is by no means an exhaustive list, but it represents how vendors can choose to embrace or distance themselves from open networking. Most in the industry are taking an "arm's length" approach to the space. They are doing what they can to ensure that they are not left behind, but they are not going all-in, because they still have a proprietary business to protect. In assessing how open the different vendors approach the market, we see a varying degree of openness.

- **Cisco** is supporting open networking through their contributions to projects like OpenDaylight and ONOS, but their primary focus is on their own ACI, which is actually more hardware-defined than SDN (and tied to Cisco's hardware). Some customers see ACI as too much rip-and-replace.[2]
- **Juniper Networks** brought OpenContrail to market as an open networking option that can run on a variety of vendors' products. Their new OCX series of switches allows for different OSes to be installed (aftermarket), but buyers still have to pay for a stripped down version of Juniper's proprietary Junos OS.
- **Alcatel-Lucent** has SDN-enabled switches (OmniSwitch) which ship with their proprietary AOS. Most of their open networking effort revolves around their joint venture with Nuage Networks.
- **HP** supports open networking as an aftermarket choice on most of their equipment. However, HP is reselling Accton branded switches with Cumulus OS as a product for the cloud market instead of competing as an HP offering.

[2] http://searchnetworking.techtarget.com/news/4500244591/Cisco-customers-wrestle-with-ACI-challenges

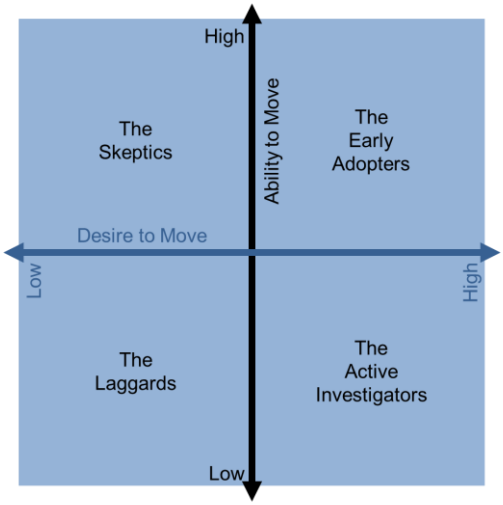
- **Dell** offers the broadest portfolio of open products that bring choice for SDN implementation. On all new products customers can choose multiple operating systems including Dell's (factory installed) or other choices that can be installed via ONIE. Dell is also a participant and contributor in multiple open networking projects. Dell's OS, with more than 13 years and web scale customer deployments also serves as a safety net, allowing customers to take advantage of the fast moving segment while still having assurances of reliability.

Clearly every vendor is taking a different approach. Market share leaders with the most at stake are taking a more conservative approach, as expected, to protect their installed base. Smaller share vendors are trying more aggressive tactics to align themselves with customers looking for a better option than the status quo.

The View from the Customer

Customers have an expectation that the "open" in open networking means that they will have more flexibility and choice, less vendor lock-in, and lower (acquisition and operating) costs. But as we see, not every vendor is aligned around a common definition of open networking nor making all of their products truly open. While not every customer is in a position to begin implementing open networking today, almost all are actively analyzing the offerings.

Figure 3: Open Networking Adoption Matrix



The Early Adopters have both the desire to move and the ability to move. Scale out datacenters like Amazon, Facebook, and Google have already implemented open networking. As more businesses try to emulate their compute model, open networking will start to take hold outside of these hyperscale giants. Additionally many universities have moved from research into implementation, because they have the knowledge and personnel to make the change. Their graduates will begin to drive these concepts back into the rest of the market as they move on to careers in the private sector.

The largest part of the market is the two groups investigating how open networking will impact them, regardless of whether they plan to move or whether they are taking a wait-

and-see attitude. Chief among the Active Investigators are those in the financial services, technology fields and service providers, where increasing agility by reducing the deployment/provisioning times can pay big dividends. Additionally, most businesses with any scale of datacenter are investigating how open networking can help their business, even if they are holding off—which means that vendor strategies are under scrutiny just as much as the technology itself. **Now may be one of the few inflection points in networking where customers are making decisions about potentially changing vendors.** The next major change may not happen for another 10-20 years, so it behooves a vendor to have a well-articulated strategy today.

Most SDN deployments will be project-based or revolve around deployment of new datacenters or enterprise networks. Rarely will a customer retrofit existing infrastructure, and this makes coexistence with existing infrastructure critical. Based on the fact that most core routing has not been fully amortized and disruption at the core is high, change for customers will instead begin at the edge and work its way in towards the core. Strategies like Cisco's ACI are in an awkward position, because they focus closer to the core and require a rip-and-replace of existing infrastructure. Customers would prefer to migrate to SDN and open networking than perform a forklift upgrade that merely locks them into one vendor again.

Open Networking Continues to Gain Momentum

For almost two years we have been speaking positively about open networking while the movement continues to grow. Obviously there is a long way to go before it is the *de facto* standard, but the lid is clearly off of this Pandora's Box. It will be difficult, if not impossible, for the market to remain stagnant much longer.

Through our exposure to the Open Networking User Group, there is clearly a desire for more open networking among the members. These were the same customers who were among the first to jump at virtualization, cloud computing, Big Data, and analytics, which are now all mainstays across most businesses today. It took virtualization roughly 8-10 years to go from science project to market leadership; cloud computing appears to be ramping as quickly, driven by many SMBs who eschew hosting their own servers and would rather purchase IT as a service. With this backdrop, we feel confident that open networking will follow a similar path and that in a few short years the concept will be ingrained in most larger datacenters.

Just 10 years ago, x86 virtualization was an almost foreign concept, and many vendors flocked to the space. There was actually a time when servers and storage were marketed as "virtualization ready" (or not). Now support is so integrated that all are assumed to be virtualization capable by default. As vendors brought their own solutions to market, we saw the proprietary virtualization implementations gave way to two camps: the giants (Microsoft, VMware) and the open challengers (Xen, KVM, and now Docker). The giants will maintain some share, but open products are slowly eroding that share and continuing to gain a footprint, especially in new deployments.

The same trends are unfolding in the networking space. Today many network devices have "open networking support" via support for OpenFlow or special SKUs specifically

targeted for open networking that are sold alongside their proprietary counterparts. But as open networking continues to gain momentum, eventually support will become "table stakes" for products, and open networking will be the default for the market (regardless of the rate of adoption). In the future, network virtualization will just be "networking". It will be the standard, and the faster vendors get there, the better off they will be.

But too many vendors pay lip service to open networking while pushing their proprietary products as a wedge to lock in customers. We see that customers are questioning where vendors' priorities lie. Those vendors who stand the best chance of capturing customers in transition are the ones who are offering a truly open, non-biased future. For example, 6-8 years ago, while IBM offered support for VMware and other x86 virtualization, it was common to hear them tell customers that if they wanted to "do virtualization right", they really needed to be looking at POWER systems or System Z mainframes. Customers didn't bite, and IBM's x86 server share did not grow in pace with a market that was moving towards a more standardized virtualization on x86 servers. The same scenario is expected to play out in networking. Those who embrace a full open networking strategy stand the best chance of moving forward; this is where the challengers have the advantage to move quickly with their products.

Call to Action

History has shown that when the industry is undergoing a change, the vendors who embrace that change early are best positioned to guide customers through the choices they will need to make. Vendors who try to fight the inevitable will end up costing their customers in failed strategies and orphaned products.

Moor Insights & Strategy recommends that customers follow the path to open networking (and network virtualization) just as they have with virtualization for compute and storage. Most customers who we engage with have already started this journey, and the rest of the market seems to be moving quickly into the investigation mode—regardless of the time horizon to deployment. It is critical that customers speak to the different vendors today in order to understand each strategy.

While all vendors are trying to establish their open networking strategies and hone their offerings, Dell appears to be the furthest along in enabling their products and aligning a clear marketing message. This is an area where being a challenger with a smaller market share actually works to their advantage. With less of a networking installed base to protect, Dell has the opportunity to move quickly in the open networking land-grab and establish a beachhead. While others are trying to use careful, measured, and conservative steps to try to not shake up their existing share, they risk losing more by not being as established during this time of evaluation and transition. This is similar to the wave of standardization that hit the server market in the late 1990's. Dell was in a good position as the market standardized, leveraging their supply chain and manufacturing to drive their share as servers became less differentiated through the standardization. Because SDN will shift some of the network control to VMs running on x86 servers, Dell is also in a good position to be that platform as they have a healthy share of the x86 server business based on those changes that happened in the 1990s.

We recommend that companies take a look at how Dell is positioning open networking as a critical part of their portfolio offering, because this is how we see the market operating in the future. Disaggregation is going to happen across multiple levels in the world of networking, and customers need to be prepared to take advantage of it. The benefits of lower cost with flexibility and agility are simply too good to pass up.

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