

Data Center and Enterprise SDN Goes Big in 2016: Lessons Learned

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TABLE OF CONTENTS

SDN Roadmap, from University Lab to Main Street	2
Data Center and Enterprise Network SDN Deployment Drivers	2
Data Center and Enterprise SDN Market.....	4
Data Center and Enterprise SDN Market Crosses the Chasm in 2017	5
SDN Case Study: Rapid Service Provisioning for the Enterprise LAN.....	5
Bottom Line	6
To Learn More.....	7

LIST OF EXHIBITS

Exhibit 1: Data Center and Enterprise SDN Market Roadmap.....	2
Exhibit 2: SDN Deployment Drivers	3
Exhibit 3: In-use SDN Switch and Controller Revenue	4
Exhibit 4: Enterprise LAN Use Case.....	6

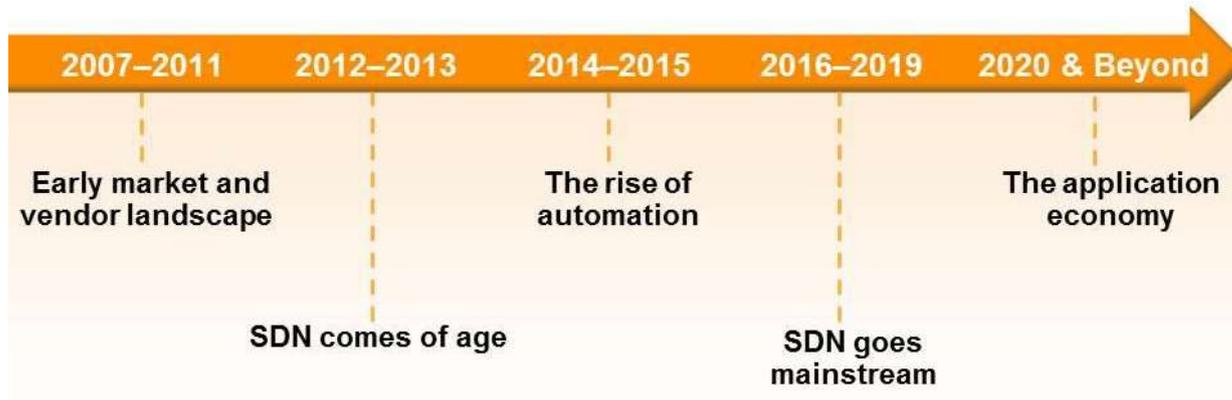
SDN Roadmap, from University Lab to Main Street

We can trace software-defined networking (SDN) back to Stanford University, where NEC and Deutsche Telecom co-founded the Clean Slate Lab.¹ Since then, we have seen SDN go through a classic market adoption cycle with an early market phase dominated by new entrants to the market working quietly in stealth mode. We even saw a significant change in the expected use case for early deployments of SDN, going from a completely new way to deliver networks using low-cost white box switch hardware to representing a new network architecture enabling increased network programmability and integration with data center orchestration platforms.

In 2012, VMware acquired Nicira for \$1.2 billion, and SDN came of age. No longer could the traditional network vendors ignore this market. Over the last 2 years, we have seen much of the SDN market line up under the message of bringing automation to the data center network and enabling automation of the entire data center.

In 2014 and 2015, automation will become a reality in the DC and spread to the entire enterprise network, driving new opportunities for networked (L4-L7) application and security vendors. From 2016-2019, we see SDN moving from the hands of early adopters to more mainstream buyers. Past 2020, SDN-enabled applications become the most significant driver in the market, and they become the most significant generator of profit for the vendors in the SDN market.

Exhibit 1: Data Center and Enterprise SDN Market Roadmap



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Data Center and Enterprise Network SDN Deployment Drivers

Using a panel of qualified IT decision-makers, we conducted a web survey in February 2015 with 198 North American organizations that have at least 101 employees. Respondents must have detailed knowledge of and influence in their organizations' SDN strategies, plans, and purchase decisions.

Respondents rated factors in deploying an SDN solution as *not a driver*, *somewhat of a driver*, or a *strong driver*. Top drivers include security (74% of respondents), improving management capabilities (73%), and improving application performance (73%).

¹ http://cleanslate.stanford.edu/csdlab-pressrelease-finalcandidate-11-19_djo.php

SDN offers a way to enforce security policies at the server and at any point in the network rather than backhauling traffic to a security appliance. Security vendors are on the forefront of this, with a head start on any of the other network application vendors. Most had hypervisor-aware solutions years ago and started building SDN-capable solutions as soon as SDN started to emerge as it generally requires just minor tweaks to the interfaces built for the hypervisors. Some key SDN controller vendors are also security technology/appliance vendors and came out of the gate with SDN solutions that integrated controllers and virtual appliances.

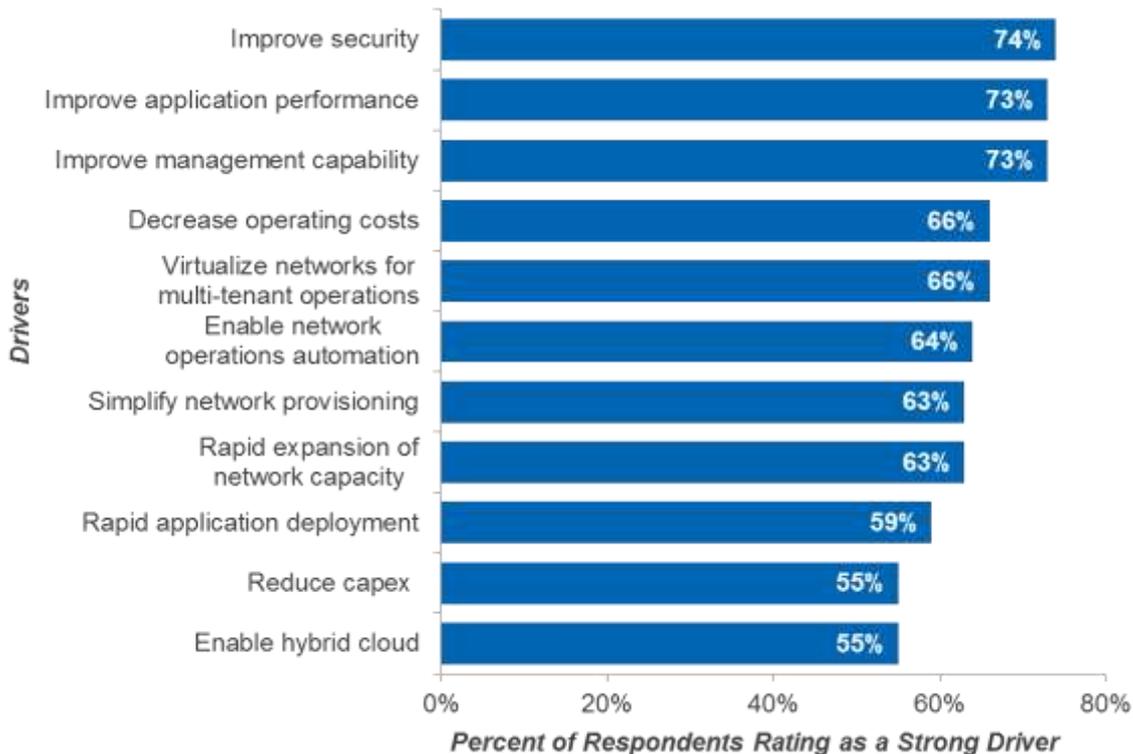
Improving management capability helps make operations more efficient. We believe that the results underscore the frustration respondents have with network management, and they're looking at SDN to help them provide an overall management and operational framework that runs across multivendor equipment.

There is opportunity for SDN to help improve application performance with automated adjustment of network QoS. SDN offers the possibility of comprehensive and fine-grained understanding of application flows and the ability to adjust treatment of traffic at all points in the network.

Virtualizing networks for multi-tenant operations (66% of respondents), enabling network operations automation (64%), rapid expansion of network capacity (63%), and simplifying network provisioning (63%) all go hand-in-hand for respondents looking to SDN to decrease operating costs (66%), achieve a faster time-to-market for their products, or better customer engagement.

Reducing capex was initially thought to be one of the top benefits of SDN. However, to the enterprises evaluating or implementing SDN by 2017, it is the lowest driver—but 55% of respondents consider it a driver for SDN.

Exhibit 2: SDN Deployment Drivers

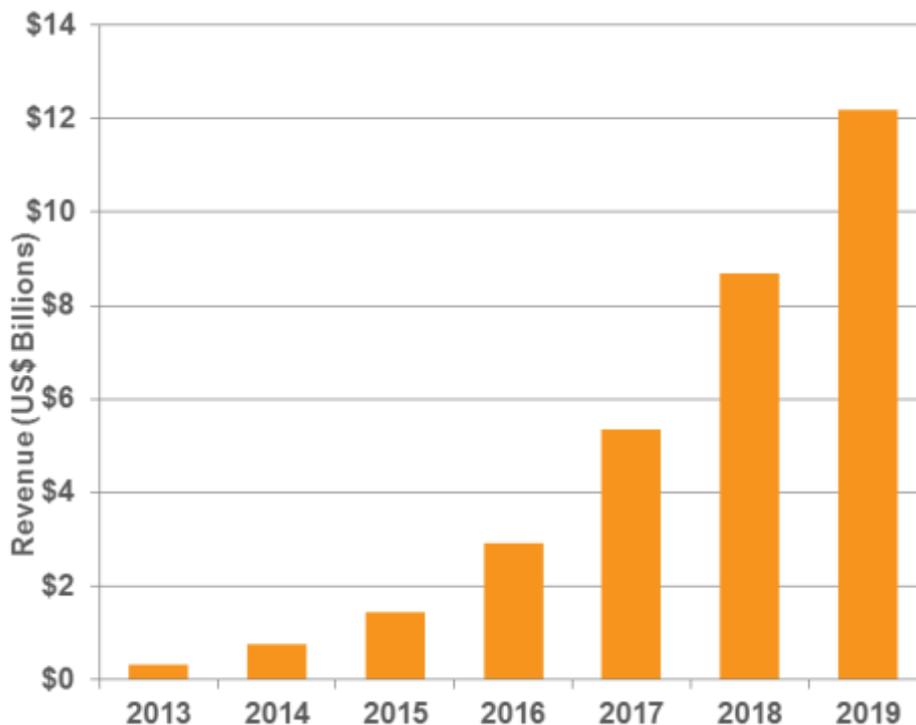


Data Center and Enterprise SDN Market

Data Center and enterprise LAN SDN deployments began to ramp up in the first half of 2015 (1H15). New SDN use cases continue to emerge and 1H15 was no exception with the establishment of the software-defined enterprise WAN (SD-WAN) market. The SD-WAN market is still small, but many startups, traditional WAN optimization appliance vendors, and traditional network vendors (arming service providers to offer SD-WAN) have jumped in.

The revenue from in-use SDN Ethernet switch revenue, including branded Ethernet switches, vSwitches, and bare metal switches, for 1H15 was \$434 million and is on track to reach \$1.1 billion for 2015. In 1H15 we saw early players, pure-play SDN startups, and traditional switch vendors gaining traction as customer deployments grew. We can expect 2H15 to bring new customer deployments and existing deployments scaling up. We continue to see vendors add to their SDN-capable products and organize new open source projects, adjusting their business to be part of the SDN driven transformation.

Exhibit 3: In-use SDN Switch and Controller Revenue



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Data Center and Enterprise SDN Market Crosses the Chasm in 2017

We forecast SDN in-use physical Ethernet switch (branded Ethernet switches and bare metal Ethernet switches) revenue to make up 31% of revenue for the Ethernet switch market by 2019. SDN will “cross the chasm” in 2017, with SDN in-use physical Ethernet switches accounting for 15% of Ethernet switch market revenue. Bare metal switches are the top in-use for SDN-capable switch use cases in 1H15, and SDN network virtualization overlays (NVOs) went mainstream in 2015.

We are however, still in an early stage of the SDN market, with SDN in-use physical Ethernet switches accounting for only 4% of revenue for the Ethernet switch market in 1H15, up from 3% for all of 2014.

SDN-capable physical switches (branded Ethernet switches and bare metal Ethernet switches) accounted for 28% of 1H15 Ethernet switch market revenue, up from 17% in 2014. By 2019, SDN-capable physical switches will account for 72% of Ethernet switch market revenue, passing 50% in 2018, an important market “tipping point” where we are shipping more SDN-capable switches than non-SDN-capable switches. Beyond 2019, the SDN market will be positioned for continued growth due to the large number of SDN-capable switches deployed in data center and enterprise networks.

SDN Case Study

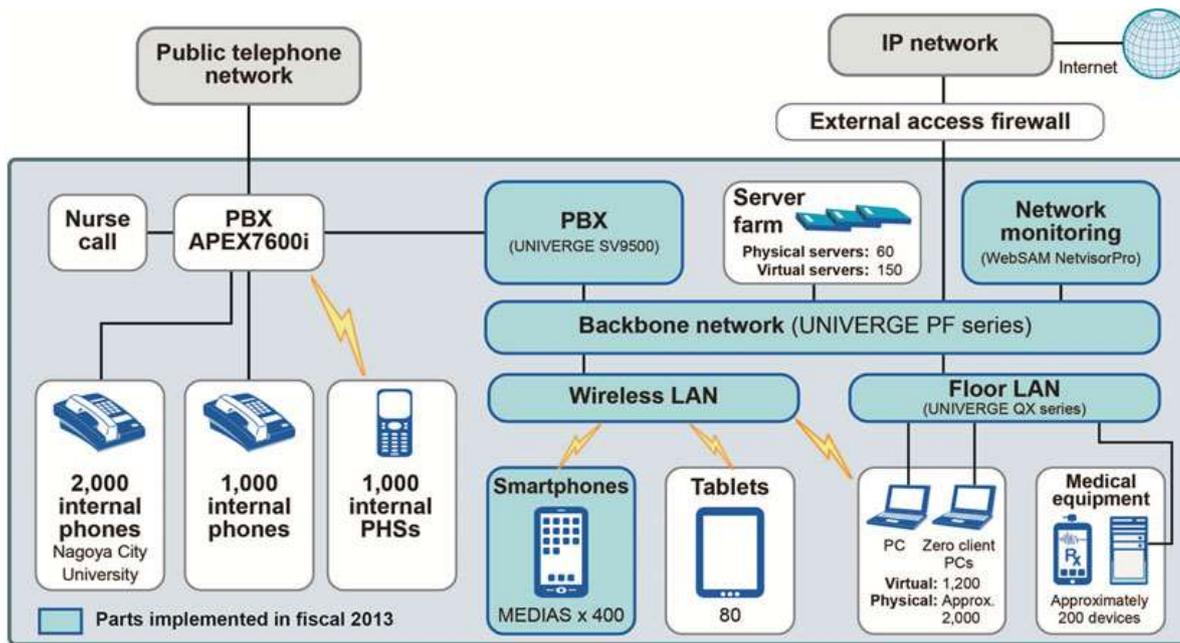
Rapid Service Provisioning for the Enterprise LAN

A Major University Hospital urgently needed to integrate their networks to support the speedy implementation of new technologies to support advanced medical services. Each clinical department had a network that was constructed and run by departmental staff, and that was dedicated to that department's equipment. This proved to be very inefficient because each network's topologies were not visible to all IT staff, and network changes often required a network reboot, causing long service introduction cycles.

The hospital adopted NEC's SDN controller and branded SDN-capable Ethernet switches to build an integrated network infrastructure providing visibility and automated network provisioning without needing to interrupt network services. NEC's programmable flow controller and SDN-capable switches provided a virtualized multi-tenant network with 4 tenants (a network for electronic medical records, one for medical equipment, one for smartphone and other mobile devices, and one for external connectivity such as the Internet and university Labs).

The University Hospital benefited from >50% reduction in physical equipment. The entire network infrastructure can now be visualized in a single GUI and equipment can be easily added to the network and new virtual networks can be constructed under programmatic control. Advanced medical services using the latest technology are rapidly deployed, improving medical outcomes.

Exhibit 4: Enterprise LAN Use Case



© 2014 NEC, Case Study Nagoya City University Hospital

Bottom Line

As SDN grows legs, thought leadership in this market will give way to market share leaders with measurable revenue. Expectations for SDN in the data center and enterprise network are clear: they want better security, application performance, and simplified management.

Priority use cases are focused on automation, provisioning, and application deployment as well as enabling a shift to hybrid cloud. Top concerns encompass technology and business issues including potential to interrupt critical network operations, interoperability with existing networks, and no clear demonstration of ROI.

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LIVE: Thursday, January 21, 2016
9:00 AM PT, 12:00 PM ET, 17:00 UTC

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