Beyond the Hype: SDN Delivers Real-World Benefits in Mainstream Enterprises

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VIEW SUMMARY

Network decision makers must strategize for the networking paradigm shift represented by SDN. This research identifies mainstream organizations that have achieved increased agility, cost savings and/or improved security using SDN-based technologies.

Overview

Key Challenges

- There is limited mainstream enterprise experience with software-defined networking (SDN); thus, it can be difficult to grasp why and/or how to start with the technology.
- Manual network provisioning is common, often delays private cloud initiatives within IT organizations and increases operating expenditure (opex).
- Deploying network services such as firewalls and network packet brokers (NPBs) can be cost-prohibitive in many environments, leading to underdeployment of these solutions.

Recommendations

- Network decision makers should use these case studies to identify whether their organizations can derive similar value from SDN:
  - U.S. government agency reduces network provisioning times by 99%
  - Large enterprise extends monitoring network and reduces associated capex by 50%
  - Logistics company increases agility, reduces opex and enables multitenancy
  - Regional U.S. bank improves security posture while reducing firewalling costs
- IT architects should adopt SDN in an evolutionary manner, starting small and deploying in nonproduction environments initially.

STRATEGIC PLANNING ASSUMPTION

By the end of 2016, more than 10,000 enterprises worldwide will have deployed SDN in their networks, compared to less than 1,000 as of September 2014.

EVIDENCE

[1] This is based on discussions with networking and virtualization vendors, including established players and startups.

[2] Over 1,500 client interactions regarding networking over the past 12 months.

[3] Discussions with mainstream end-user clients running SDN in their environments, including vendor-provided references.

[4] "Case Study: Nippon Express."

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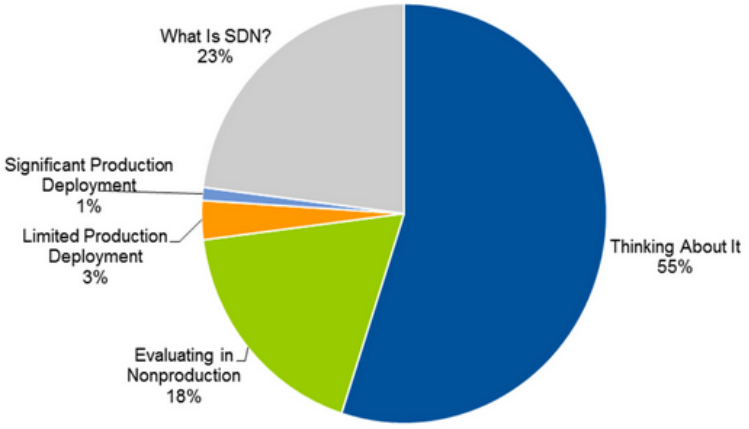
Introduction

Due to a large degree of industry buzz and hype, many mainstream organizations are now familiar

with software-defined networking (SDN) concepts. However, many Gartner clients are looking beyond the hype and theory associated with SDN to find specific tangible examples of how it can deliver business value within their organizations (see Figure 1).

Figure 1. Gartner Audience Responses to the Question: *Where Are You With Respect to SDN?*



Note: Based on audience polling at Gartner conferences
n = 113

Source: Gartner (October 2014)

Gartner's Definition of SDN

Gartner defines SDN as a new approach to designing, building and operating networks that support business agility. SDN brings a degree of agility to networks similar to what abstraction, virtualization and orchestration have brought to server infrastructure (see "Ending the Confusion About Software-Defined Networking: A Taxonomy").

The State of SDN Adoption

Gartner recommends that organizations should prepare for SDN now (see "Mainstream Organizations Should Prepare for SDN Now"). However, enterprise adoption is still very limited. Much of the SDN adoption to date has been in hyperscale environments and/or organizations with very large data center networks such as service providers. Today, we estimate there are between 500 and 1,000 mainstream deployments of SDN globally.[1] With regard to early SDN deployments, there are some interesting commonalities:

- Nearly all successful deployments have started small and been opportunistic.
- Roughly half of today's SDN deployments are from vendors that are not in the top five in switching revenue, including NEC and VMware.
- SDN-based overlays are quickly emerging as the fastest growing SDN deployment method because they offer a relatively easy insertion point (see Gartner's "Three Key Challenges to Resolve Before Deploying SDN Overlays").

Real-World Benefits and Challenges

In speaking with early enterprise SDN adopters, Gartner has observed the following key benefits and challenges (see Table 1).[2, 3]

Table 1. Key Benefits and Challenges With Mainstream SDN Early Adopters

Key Benefits	Key Challenges
■ SDN achieves capital expenditure (capex) savings of 50% and higher in certain portions of the network. ■ SDN enables network-related opex savings up to 50%. ■ SDN substantially reduces the time to deliver network services — by more than 90% in most instances. ■ SDN allows improved network security via enabling multitenancy support and increased intra-data-center firewalling.	■ SDN blurs responsibilities that were traditionally well-delineated between networking, server virtualization and application teams. ■ SDN initiatives are often led by cloud, virtualization and/or highly skilled architecture personnel. Thus, handover to traditional operations teams is particularly challenging due to cultural, process and skill set shortcomings. ■ Early SDN adopters are often being supported directly by vendors' engineering and development teams, versus traditional channel and support teams. Although this is great for the early adopters, as SDN moves to the mainstream, direct vendor engineering and development support will decrease.

Source: Gartner (October 2014)

SDN Applicability

For this research, Gartner interviewed and/or reviewed more than two dozen organizations running SDN in their production environments. These deployments were observed in multiple portions of the network, including the data center, user access layer and WAN. In this research, we are highlighting the four use cases that carry the most relevance to mainstream Gartner clients.

Analysis

Network Decision Makers Should Use These Case Studies to Identify Whether Their Organizations Can Derive Similar Value From SDN

U.S. Government Agency Reduces Network Provisioning Times by 99%

A large U.S. government organization with over 7,500 employees was building a private cloud to better serve its user community via catalog-based IT services. In particular, turning up new virtual servers for software developers usually took from two to five or more days, largely due to manual network changes.

After evaluating options from incumbent networking vendors, the agency decided to implement VMware's NSX, which is an SDN-based overlay (see "VMware's NSX Could Be a Small Step or Giant Leap for SDN"). NSX was selected on the basis of its maturity versus other competitors. NSX runs on top of the organizations' existing Cisco switches and HP servers and was first implemented in a nonproduction lab environment. Initial deployment took one week and then was quickly moved to support internal software development use cases. The system has been deployed for more than nine months and now has more than 100 live VMs. The agency's software developers can now provision their VMs via self-service, eliminating the requirement for manual network changes.

The biggest challenge the agency faced was operationalizing support for NSX, as the pilot was run by the cloud engineering team. Traditional network/server teams were unfamiliar with this technology and were initially hesitant to embrace it. Moving forward, the agency is in the process of increasing the NSX deployment to include quality assurance (QA) and eventually production, and also to incorporate load balancing and firewall functionality into the solution.

Summary: Network provisioning times were reduced by 99%, and network opex was reduced by over 150 hours per year.

Alternative Solutions and Prices

While this use case references VMware's NSX, alternative overlay-based SDN vendors exist, including Microsoft, Nuage Networks, HP (VCN), PLUMgrid and Juniper Networks. The cost associated with these overlay deployments varies widely (depending on vendor and licensing model), but for planning purposes, organizations can budget $100 to $250 per VM per year as a rough guideline.

Large Enterprise Extends Monitoring Network and Reduces Associated Capex by 50%

A large publicly traded company with operations in more than 100 countries and with more than 10,000 employees was upgrading its network infrastructure to 10GbE/40GbE and needed an NPB solution that could support higher speeds. The organization selected Big Switch's Big Tap NPB solution. Big Tap is an SDN-based application that runs on the Big Switch SDN controller and white-label network switches. The company has now been running Big Tap for more than five months, and it saved approximately 50% over alternative NPB solutions that were evaluated. This allowed the company to extend its monitoring network to every rack in its data center, which encompasses more than 50 Cisco switches supporting several hundred Dell/HP servers. Gartner has observed similar results from other Big Switch customers, including a municipal power/utility company that deployed Big Tap to extend its monitoring capabilities to multiple substations in support of more than 50,000 subscribers.

Summary: NPB costs were reduced by more than 50% while increasing monitoring network capacity 5X.

Alternative Solutions

Although this use case references Big Switch's Big Tap SDN application, Cisco also has an SDN-based NPB solution via its Extensible Network Controller (XNC) and Monitor Manager application. Refer to Gartner's "Market Guide for Network Packet Brokers" for representative NPB vendors.

Logistics Company Increases Agility, Reduces Opex and Enables Multitenancy

A multinational logistics company was looking to build a multitenant cloud-based infrastructure in order to better handle its more than 250 subsidiaries while reducing costs.[4] The company decided to implement SDN for 144 servers in its disaster recovery (DR) data center. It selected and deployed NEC's device-based SDN solution, which includes ProgrammableFlow SDN controllers, four 5240 NEC network switches, and a management console. The solution was deployed within six months and allowed the company to "rightsize" its network with fixed-form-factor switches versus chassis-based switches (see "Rightsizing the Enterprise Data Center Network"), which reduced rack utilization by greater than 65%.

This solution has been in place for a year, and as a result, the company has reduced data center network deployment times from two months to 10 days, and reduced more than $75,000 in opex associated with these changes. Based on the success of this initiative, the company plans to further deploy device-based SDN in its primary data center.

Alternative Solutions

Although this use case references NEC, other device-based SDN offerings are on the market including controllers from HP and Extreme and OpenFlow-capable switches available from many network switching vendors.

Summary: Deployment time was reduced by more than 80%, which reduced network opex by $75,000.

Regional U.S.-Based Bank Improves Security Posture While Reducing Firewalling Costs

Network traffic patterns are shifting from predominantly user-to-application (north/south) to both user-to-application and application-to-application (north/south and east/west). (See "Magic Quadrant for Data Center Networking.") This shift, particularly in light of widely publicized security breaches in the retail industry, places an increased importance on intra-data-center security.

A bank based in the Western U.S. with more than 175 remote branches began an initiative in late 2013 to insource its public-facing applications. The purpose of this effort was to gain control, increase visibility and reduce overall costs. The bank decided to use its existing Cisco physical firewalls to secure the user-facing presentation tier of the application, but required additional firewalling capacity to secure internal application tiers (i.e., database and middleware).

The bank ultimately selected VMware NSX to support this use case. VMware's NSX provides firewalling capability that includes traffic steering and distributed firewalling, which allows firewall policy to be enforced at the vSwitch, versus a centralized firewall appliance. The bank found that this approach scaled better, was easier to manage operationally and was far less expensive than traditional hardware-based firewall appliances.

Gartner estimates this approach can save 70% and potentially more versus traditional physical appliance-based firewall approaches. However, this approach increases the number of firewall solutions that an organization has to manage, which can increase configuration complexity and opex (see "One Brand of Firewall Is a Best Practice for Most Enterprises"). The bank ultimately determined that the benefits of NSX firewalling substantially outweighed the challenges associated with managing multiple firewalls in its environment.

The biggest challenge the bank faced was operational handoff of NSX. The bank's cloud/virtualization team architected and deployed the solution with assistance from VMware's professional services, but traditional networking and security teams were initially reluctant to take operational responsibility.

After six to eight weeks of testing, the first application went live, running on a NetApp FlexPod, and has been in production for nearly four months. The bank is now in the process of insourcing additional applications based on the success of the project.

Summary: Intra-data-center firewalling capacity increased, and expenditure on firewalls decreased.

Alternative Solutions

Alternative SDN overlay vendors are identified earlier in this research. In addition, VMware has integrated its NSX firewalling capability with Palo Alto Networks firewalls, and we anticipate additional integrations between overlay vendors and firewall vendors. Refer to Gartner's "Magic Quadrant for Enterprise Network Firewalls" for representative firewall vendors.

IT Architects Should Adopt SDN in an Evolutionary Manner, Starting Small and Deploying in Nonproduction Environments Initially

The case studies above identify improved networking agility, cost savings and increased security. These organizations approached SDN opportunistically and started small. For example:

- The government agency initially deployed SDN to support its development environments only, versus starting in production.
- The logistics company started with its DR data center, not its primary location.
- The bank started with one application and is expanding to support additional apps.

This is aligned with nearly all of the successful SDN deployments that Gartner has observed. Moving forward, organizations should not attempt to *boil the ocean* — SDN is not something that can be implemented networkwide in the weekend maintenance window. Instead, organizations should consider deploying SDN in accordance with new drivers or use cases (see "Mainstream Organizations Should Prepare for SDN Now").

Despite the substantial long-term benefits of SDN, taking this small and opportunistic approach will serve mainstream SDN adopters well. This approach will help to overcome some of the issues identified above, including the deployment challenges as vendors scale back the high levels of early support, in addition to operational handoffs.

Organizations that approach SDN small and opportunistically will have more time to gain experience and comfort with these new technologies, which will ultimately help to address these challenges in a manner that doesn't impact the availability of customer-facing production networks. In addition, this opportunistic approach to SDN is complementary to application "pace layering" strategies that organizations are evaluating/undertaking (see "CFO Advisory: Pace Layering, Overview").

Looking Ahead

Today, SDN can address real-world challenges such as network provisioning and multitenancy. However, these use cases also demonstrate the value of hardware/software decoupling, which fosters simpler and lower-cost services (i.e., firewalling and NPB). Over the next one to three years, as the technology matures, there is opportunity for additional innovation in the networking market, delivered via the abstraction and open interfaces that SDN provides.