



IDC SOLUTION BRIEF

Assessing the Business Value of Network Virtualization

Sponsored by: Hewlett Packard Enterprise

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IDC OPINION

IDC believes the 3rd Platform – comprising cloud, mobile, big data and analytics (BDA), and social business – will redefine both business processes and business outcomes on a major scale. Organizations that adapt successfully to the 3rd Platform will prosper, while those that fail to adjust adequately will struggle to remain relevant as their competitors gain agility and beat them to new markets and business opportunities.

Networking is an integral element of the 3rd Platform; it is a key infrastructure component of – along with compute and storage – software-defined infrastructure (SDI) and the software-defined datacenter (SDDC). While an obvious truism, networks exist to support and deliver the applications and data that run over them. As application workloads change and evolve, the underlying network infrastructure must evolve with them. And, from a networking perspective, what sufficed for a previous generation of applications is proving to be inadequate to support current and future applications.

This IDC Solution Brief quantifies the business value associated with emerging network technologies – namely network virtualization – in terms of business productivity, IT staff efficiencies, risk mitigation/user productivity benefits, and IT infrastructure cost reductions. In addition, this document provides an overview of two network virtualization solutions offered by Hewlett Packard Enterprise (HPE).

SITUATION OVERVIEW

The Network Evolves

Indeed, networking *is* evolving to accommodate 3rd Platform workloads. Software-defined networking (SDN) and network virtualization have emerged to provide the automation, programmability, and orchestration that networks require to support increased server virtualization, cloud, data analytics, and mobility.

At the same time, the datacenter is undergoing a broader metamorphosis as the vision of the SDDC – encompassing virtualized compute, storage, and networking – moves toward fruition. Server virtualization emerged first, bringing tremendous efficiencies and operational agility to the sphere of compute. Storage virtualization followed, bringing further efficiency gains and operational benefits to storage. Finally, network virtualization emerged to complete the SDDC vision, entering the frame in the past few years as a primary means of realizing SDN in the datacenter.

Network Virtualization Becomes a Game Changer

One of the primary benefits of network virtualization is the agility it brings to application provisioning. While virtualized applications could be spun up in minutes, the traditional datacenter network remained inflexible, requiring days or even weeks to provision. Most organizations' traditional networks became known for impeding progress, not just from an operational standpoint but also from a business standpoint, slowing the speed at which the enterprise could move. Network virtualization removes that bottleneck, allowing enterprises and service providers to roll out innovative applications more quickly and to achieve faster time to revenue.

Not surprisingly, the primary use cases for network virtualization are business agility, through automated network provisioning and programmability; improved east-west security, through greater visibility into virtual and physical application traffic; and business continuity. As a result of automation, network virtualization also lowers the risk of downtime by mitigating network complexity and removing the need for time-consuming, often error-prone manual configuration processes. In automating and simplifying burdensome network administration tasks, network virtualization liberates IT personnel to focus on higher-value application requirements and to better manage and scale the business.

SDN has emerged as a key pillar of the SDDC and as networking's belated reply to the challenges posed by the 3rd Platform. IDC forecasts that the worldwide SDN market will be worth more than \$8 billion in 2018, with about \$3 billion of that total constituted by sales of network software, including network virtualization overlays.

In an IDC SDN survey, more than 30% of enterprise respondents identified their primary motivation for considering or deploying SDN as the need for the network to have greater agility to support virtualized applications and private cloud. Another 27% of enterprise respondents cited the need for the network to expedite delivery of new applications as the primary motivation for considering or deploying SDN.

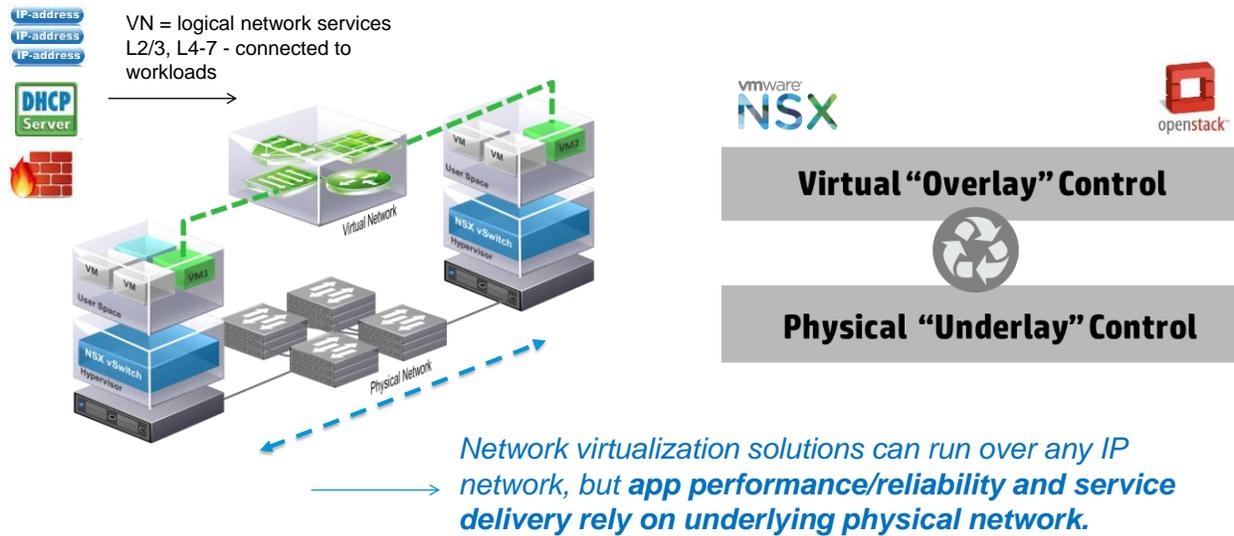
The Underlying Physical Network Matters

Despite the capabilities of network virtualization, there still needs to be coordination, visibility, and integration between the virtual and physical networks. Network overlays tend to assume that the underlying network is working perfectly, which often is not the case. Without the requisite coordination, integration, and visibility, overlay networks would fail to properly adapt to underlay network conditions and meet customers' business requirements.

In the end, the underlay network should be reliable, provide low latency, and offer high bandwidth. Switches deployed in the underlay network should be able to constitute spine-leaf architectures (Layer 2 or Layer 3), support encapsulation protocols such as VXLAN and NVGRE that are essential to overlays, and support SDN protocols such as OpenFlow and Open vSwitch Database (OVSDB) (see Figure 1).

FIGURE 1

Network Virtualization Provides the Underpinning



Source: HPE, 2015

BUSINESS VALUE OF NETWORK VIRTUALIZATION

Methodology

To inform the quantitative results of this study, IDC leveraged interviews conducted in the past several years with nine organizations that have undertaken network virtualization initiatives. The network-related efforts of these organizations have ranged from network virtualization executed in the context of converging network hardware with server and storage resources to software-defined networking rollouts. These United States-based organizations have 500-75,000 employees, with an average base of 38,200 employees, and represent experiences in the technology, food and drink, financial services, public sector, healthcare, manufacturing, and consumer goods industries.

IDC asked IT managers from these organizations a variety of quantitative and qualitative questions designed to understand the impact of their network-related initiatives on areas such as datacenter infrastructure costs, IT staff efficiencies, network and application availability, and business agility in terms of time needed to deploy new applications and equipment.

In addition, IDC has drawn from extensive discussions with organizations pursuing network virtualization initiatives to gain a qualitative understanding of their strategies and objectives, particularly as they relate to the organizations' migration to the cloud.

Business Value Benefits

IDC's research with organizations that have undertaken network virtualization initiatives demonstrates that they are achieving strong value by making their IT services more efficient and more responsive to business demands. Specifically, network virtualization has helped these organizations support their

lines of business with agility and scalability while increasing the efficiency of IT staff and holding down IT-related costs. Table 1 shows that these organizations have achieved efficiencies and benefits in the following ways:

- **Becoming more agile:** These organizations needed 67% less time to deploy business applications and 65% less time to deploy new networking equipment.
- **Making networking staffs more efficient:** IT staff members responsible for maintaining and supporting their networks were 37% more efficient.
- **Ensuring application availability:** These organizations reduced the impact of unplanned network-related downtime by 84%.
- **Realizing cost savings:** On average, these organizations consolidated their network port/switch base and cable base by 52% and 58%, respectively.

TABLE 1

Improvements Related to Undertaking Network Virtualization Initiatives

	%
Business productivity benefits	
Time to deploy business applications	67
Time to deploy new networking equipment	65
IT staff efficiencies	
Networking team IT staff efficiency	37
Risk mitigation — user productivity benefits	
Number of unplanned downtime instances	60
Mean time to repair	68
Productive time lost to unplanned downtime	84
IT infrastructure cost reductions	
Number of ports/switches	52
Number of cables	58
Power/cooling	51

Source: IDC, 2015

Business Productivity Benefits

Organizations that virtualize their networks gain business agility by minimizing the extent to which the network impedes IT's ability to support evolving business demand. Lines of business need business applications and features to be delivered faster than ever, and the provisioning of network resources to support the delivery of applications and features can be time consuming and can delay delivery. However, with network virtualization, IT teams are able to automate configuration of network resources without having to engage in box-by-box manual configuration of the abstracted physical network (or underlay). Further, virtualization enables the use of policy for preparing the network to run workloads, which can save significant amounts of time compared with needing to manually prepare the underlying physical network. By reducing the time to market for applications, IT teams can support the business on an as-needed basis, and faster delivery of applications and services can lead to higher revenue and increased user productivity. IDC's research shows that interviewed organizations can deliver new applications in about two-thirds less time (i.e., 67% on average) with network virtualization. For example, a United States-based organization that has virtualized all of its core datacenter networks reported that it has sped up application delivery to the extent that it now sometimes delivers applications before its users are ready to use them. This results in dramatically faster user adoption of applications that enable more effective support of the business.

In addition, as organizations move deeper into network virtualization initiatives, including SDN, they can realize similar efficiencies for the deployment of firewalls and load balancers. This greater agility gives IT teams the nimbleness and elasticity they need to support their lines of business as deployment of these types of software and equipment can be quite time consuming. IDC's research indicates that network virtualization helps organizations deploy new networking equipment in 65% less time.

Beyond quantifiable IT operational and business improvements, IDC's research has also shown that organizations regard virtualization, including network virtualization, as a prerequisite to successful cloud migrations. By moving away from a physical-only infrastructure with virtualization, organizations make their datacenter architecture more agile and increase IT staff comfort with running workloads a step removed from the underlying network or hardware. As a result, organizations interviewed for this study told IDC that virtualization enables them to reduce the amount of resources and staff time required to undertake cloud migrations.

IT Staff Efficiencies

Network virtualization makes IT staff responsible for deploying, maintaining, and supporting datacenter networks more efficient and productive. IDC's research shows that on average, network-related staff are 37% more productive because virtualized networks are easier to manage and maintain. These staff members are able to leverage management consoles to make their day-to-day network-related efforts more efficient, while automation and reusable templates with virtualization software mean that less time is needed to prepare for extending network reach or upgrading network capabilities. In addition, IT staff responsible for networks benefit from policy applied across the network, which helps save time in managing the network and moving workloads around within the network. Further, SDN offers time savings for staff responsible for security (including firewall deployment) and for maintaining network integrity (including load balancer deployment). These staff-related benefits save IT staff time that organizations can reinvest in ensuring that their networks and IT services are ready to support the business with agility, speed, and flexibility. For example, a United States-based organization that has deployed an SDN solution has achieved up to 70% IT staff efficiencies in network operations and engineering with policy-driven automation.

Risk Mitigation – User Productivity Benefits

Network virtualization helps organizations minimize the operational and business impact of network-related outages by reducing the frequency with which such outages occur and the time needed for resolution when they do occur. IDC's research found that on average, organizations that undertook network virtualization initiatives reduced the impact of unplanned downtime by 84%. Automation and templates with virtualization reduce the likelihood of human errors impacting operations, and streamlined infrastructure means that there are fewer points of failure. Meanwhile, when problems do occur, the abstracted nature of virtualized networks allows for repositioning of workloads away from problem areas. As a result, organizations can reduce the impact of network-related problems, users benefit from higher reliability of business applications, and there is reduced likelihood of losing revenue because of outages of customer-facing applications, portals, and services.

IT Infrastructure Cost Reductions

Network virtualization enables organizations to save on network-related hardware by reducing the number of switches, ports, and cables needed. It creates these efficiencies, often in combination with server and storage virtualization, by using software to make better use of hardware through multitenancy and being able to more efficiently distribute data across the network. For organizations migrating from a traditional three-tier datacenter infrastructure, savings from reducing the number of network ports and switches (52% lower on average according to IDC's research), and cables (58% lower) can be substantial. In addition, organizations that migrate to SDN report that they are able to realize savings by minimizing the number of firewalls and load balancers that they must deploy. Savings from efficiencies with these more costly resources can be especially substantial.

HPE NETWORK VIRTUALIZATION SOLUTIONS

HPE offers two primary approaches to realizing network virtualization for the SDDC, one for OpenStack environments and the other for VMware environments.

HPE Network Virtualization for OpenStack Environments

A founding platinum member of the OpenStack Foundation, HPE has contributed to and developed a range of cloud solutions for enterprise customers. In the realm of datacenter networking, HPE is a leading contributor to the OpenStack Neutron project to deliver networking as a service for cloud environments.

HPE's network virtualization solution for OpenStack comprises physical and virtual switching infrastructure under the control of the HPE Virtual Cloud Networking (VCN) SDN application, which is bundled with HPE Helion OpenStack Neutron. In addition, the HPE Virtual Application Networks (VAN) SDN Controller provides a centralized point of control for applications and network intelligence abstracted and decoupled from the underlying network. HPE VAN integrates with HPE VCN and provides the foundation for HPE virtual networking in OpenStack cloud environments.

HPE VAN facilitates centralized control over and visibility into virtual and physical network infrastructure, automating and simplifying network provisioning and management. HPE provides programming capabilities for VAN with support for RESTful APIs as well as a full developer SDK, enabling developers to build applications that can run on the controller.

HPE Support for VMware Environments

HPE recently announced an extension of its 15-year strategic partnership with VMware to deliver solutions that accelerate the adoption of the software-defined datacenter through VMware's NSX network virtualization overlay.

Well before that extended OEM announcement, however, HPE and VMware had partnered to deliver a federated SDN datacenter solution that comprised VMware's NSX network virtualization overlay and several key HPE software and hardware networking products.

The components of the federated offering included VMware's NSX network virtualization overlay, the HPE VAN SDN Controller, the HPE Converged Control SDN Application, and the HPE FlexFabric 5930 top-of-rack (ToR) switch.

The HPE VAN SDN Controller federates with VMware NSX through APIs, while NSX communicates with the HPE VAN Controller using the OVSDB management protocol, which manages Open vSwitch (OVS) instances and manipulates table-based switch configuration data. The federated solution integrates with VMware cloud orchestration tools, including VMware's vRealize and vCAC. Meanwhile, the HPE Intelligent Management Center (IMC), along with the SDN Manager, provides unified management of both virtual networks and physical networks.

The HPE/VMware integration also enables VMware NSX to share virtual tunnel state information with HPE's Converged Control SDN application and to deliver virtual network tunnel endpoints on physical network devices, such as the HPE FlexFabric 5930 switch, that support VXLAN. In application environments that include bare metal and virtual workloads, the HPE FlexFabric 5930 switch can be provisioned through the HPE VAN SDN Controller to perform VXLAN/VLAN translation and function as a gateway. In fact, HPE's FlexFabric 5930 ToR switch now has the OVSDB certification and can interoperate directly with VMware NSX to provide critical underlay support and federation.

Indeed, even with the advent of network virtualization overlays such as NSX, enterprise and service provider customers still need a best-of-breed network underlay to provide high-performance, reliable, scalable, and secure packet forwarding. It's also critical that the underlay and the overlay work together to provide unified automation and visibility across physical and virtual networks, thus enabling and ensuring business agility and continuity.

In addition, HPE has introduced new Network Virtualization Services for HPE/VMware NSX. These services are designed to drive the network transformation process, which entails combining hardware and software network resources to enable network functionality and management for a virtualized cloud, an NFV environment, or an SDI-ready network.

Every NSX license purchased through HPE comes with HPE Foundation Care Software Support for VMware NSX, which provides customers with 24 x 7 x 365 access to thousands of HPE experts with decades of experience in both networking and virtualization, including certified VMware NSX experts within the HPE SDN Center of Excellence (CoE).

CONCLUSION

Until recently, network virtualization has generally been less pervasive than server and storage virtualization at most organizations. As a result, the network has remained an obstacle to business and IT agility, requiring organizations to manually provision and manage the network in a time-consuming,

box-by-box process. However, with approaches to network virtualization becoming increasingly mainstream, in both OpenStack and VMware environments, more organizations are undertaking network virtualization initiatives to ensure that their networks can move at the speed of their businesses, enabling rather than obstructing application delivery and business outcomes.

IDC's research shows that organizations can achieve substantial value with network virtualization initiatives, including supporting their business with agility and scalability while increasing the efficiency of IT staff and reducing IT-related costs. As a result, IDC expects the pace of network virtualization to increase, enabled by solutions and approaches offered by HPE and discussed in this study.

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