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Modernizing Your IT Environment with Software Defined Networking

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EXECUTIVE SUMMARY

Software defined networking is an emerging technology solution with a lot of potential, but many IT environments out there today will be unable to fully leverage its capabilities. There is a disconnect between the cutting-edge solutions on the market and the state of the average data center. In this white paper, we outline the condition of a common, outdated data center and identify why an SDN solution would not be effective under those circumstances. From there, we update the environment in two phases. The first upgrade is just enough to leverage some limited capabilities of SDN, while the second upgrade showcases the long-term goal of a growing company's IT environment. At this last level, we show just how beneficial SDN can be for a larger environment. The paper concludes with a discussion of VMware NSX and Cisco Application Centric Infrastructure (ACI). We describe how these two seemingly competing products can be used in tandem in a single environment.

PREFACE AND INTRODUCTION

Technology innovation and adoption are two very different things. While the industry giants, like Cisco, Microsoft, and VMware, are constantly developing, refining, and creating new technologies every day, these products can slowly and unevenly trickle down to the actual environments that will make use of these solutions.

As technology consultants who work with IT departments across the Chicago metropolitan area and beyond, we have learned that the latest and the greatest technology can often be beyond the reach of the average IT department.

Technology environments operate as living, breathing entities. They grow and evolve over time as the administrators add new equipment, download patches, and address emerging problems as they arise. After ten or more years, the environments can often become a complex combination of new and old hardware and applications.

These IT departments then find that their environments limit their options for new applications because their infrastructure is too outdated to support them. Worse yet, they may not even be able to update to the latest version of a line of business application. This creates a terrible roadblock to progress because the market demands that companies continue to refine and improve to stay competitive. In the business world, it's either sink or swim, and the waters keep rising. To that point, a 2015 PiperJaffray Survey of over 100 CIOs found that only 12% of respondents had a plan to implement a software defined networking (SDN) solution in the next year.[1]

VMware NSX, an SDN solution, is a perfect technology to illustrate this scenario. While NSX can be applied to any existing network infrastructure, it won't be able to correct existing network and data center deficiencies. For example, NSX can effectively create firewalls around each virtual machine on the network through microsegmentation. If, however, those applications are still running on bare metal servers, microsegmentation will not be effective.

[1] https://piper2.bluematrix.com/sellside/EmailDocViewer?encrypt=7856c68e-3f1a-4ce9-a7e7-99fe25145cd9&mime=pdf

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To actually make use of the incredible innovations in the technology industry, clients must first make adjustments across the entire breadth of their systems. Taking the first step can be a difficult endeavor.

In this white paper, we will chart a roadmap that leads from a common, yet outdated IT operation to one prepared to fully leverage the benefits of software defined networking. To do so, we have constructed an IT environment that, though fictional, represents elements of IT deployments we see in businesses ranging from small companies to sizable operations. This paper proceeds to analyze the hypothetical environment and outlines the challenges this IT structure creates.

Modernizing Your IT Environment with Software Defined Networking will take the fictional IT environment and update it to leverage cutting-edge technology solutions from VMware, Cisco, and other manufacturers. With its systems refined, refreshed, and reconstructed, a second analysis is performed to exemplify how the updates we made directly impact the previous challenges. From there, the paper will go on to discuss how this third phase can integrate Cisco ACI with its NSX application to gain even greater control of the network.

Yet, if money were not an obstacle, every IT department would use the latest and greatest solutions without much thought. To keep our roadmap relevant, we will break up our transformation into two stages. The first will only be the minimal changes necessary to prepare the environment to adopt a software defined networking approach. The second phase will be further along in the development of the data center. Several years down the road when the environment has grown and expanded, we outline what an environment that can make the full use of software defined networking might look like. In both of these phases, the focus is placed on practicality and ultimate value.

COMMON TERMS AND THEMES

Before beginning our roadmap to SDN, it is important to have a firm understanding of the goal.

At one time, server virtualization seemed like a dangerous prospect. Administrators were hesitant to layer all of their applications onto just a handful of servers. It felt like placing all of your eggs in one proverbial basket. Should that server fail, half the environment could go with it. Today, many environments are 80% or even 100% virtualized. IT department fears abated and operational costs drastically reduced, virtualization has become an attractive solution for environments of all kinds.

In October 2013 at VMworld in Barcelona, VMware announced general availability of NSX, and the same principles of sever virtualization were brought to the network. Elsewhere in the industry that same year, Cisco unveiled their Application Centric Infrastructure—another software defined networking/network virtualization solution.

Software Defined Networking vs. Network Virtualization

There is a lot of ambiguity between two similar terms in networking: software defined networking and network virtualization. Though different organizations may have slightly different definitions, in this paper, we draw this distinction between these two overlapping terms.

Network Virtualization: Network virtualization operates much like server virtualization. Instead of depending on physical switches, routers, and other networking equipment, the hypervisor removes the intelligence from these devices and replaces it with the software versions of these items.

Software Defined Networking: With SDN, the network administrators gain the ability to program customized logic into the network for greater control of the flow of data.

Layer Over Existing Networking Equipment

One of the key benefits of VMware NSX is its compatibility with existing networking systems. Aside from the caveat described in the preface, NSX does not require any specific networking hardware to function. You can take the existing network and layer NSX over it as a software.

Microsegmentation

Microsegmentation gives an administrator the ability to prevent east-west traffic in the network. In effect, it places a small firewall around each virtual machine, so that in the event of a network breach, the malicious activity will remain confined to the single infected VM. Administrators can now leverage the security settings of the NSX firewall to block unwanted ports on the internal data center and easily report on the current security posture of the network.

But that is only one benefit of microsegmentation. Microsegementation can also be thought of as "pods of workloads." Take a couple web servers and a couple backend database servers and create a set of virtual network capabilities for them. These include:

- A logical switch
- A logical router
- Distributed stateful firewall
- Load balancing

Wherever these virtual machines are moved, the network pod follows because the hypervisors are updating the network settings and the VMs that are applied to each network configuration.

Network Provisioning

How long does it take to set up a new network for the business? Weeks? Days? In a traditional data center, admins would need to coordinate between the network, security, and virtualization teams to set up and test the appropriate configurations. With NSX, network provisioning can happen in minutes. Copy a current network or create a new network group from a template. The whole process feels similar to spinning up a virtual machine. Simply assign the appropriate settings and provision to a group of VMs.

Workload Mobility

By decoupling the physical network from the virtual network, workloads (web server/database) can be moved within the data center or across data centers, leveraging the virtualized extensible LAN (VXLAN). The VXLAN ID is similar to a VLAN on a traditional network but can be stretched across physical data centers.

With the general benefits of software defined networking outlined, we can now move on to our fictional scenario which focuses on the IT environment of Intelligent Supplies.

INTELLIGENT SUPPLIES: A CHICAGO MANUFACTURING COMPANY

General Information:

Intelligent Supplies has been in business for just over twenty-five years. Founded by the father of the current president, Intelligent Supplies employs a staff of 100 professionals. Located in the Chicago suburbs, the company's manufacturing facility and headquarters houses both the administration offices and the data center.

Additionally, the company owns and staffs ten remote manufacturing centers throughout the US.

Business Views of IT:

At Intelligent Supplies, one of the largest challenges for the IT department is the company culture. IT is seen merely as an expense with little or no ROI attached to it. Budgets are tight and capabilities are limited. These constraints force the IT department to regularly turn down requests and suggestions from other business units. The IT team simply does not have the time or resources. The repeated refusals and rejections then cause the rest of the company to perceive the IT department as more of an obstacle instead of an asset. This is a self-feeding cycle and creates a "just keep it breathing" mentality in the department.

Furthermore, the company officers rarely inform the IT department of upcoming changes to line of business applications, and IT is not involved in those decisions. When consideration is given to the company's technology, the focus is always on the end-user application. Infrastructure requirements or concerns about supporting these applications are never front and center in the conversation.

IT Staff:

Intelligent Supplies has a very small IT department consisting of two administrators who report directly to the Chief Financial Officer (CFO). Both administrators have been with Intelligent Supplies for nearly ten years and together have built their environment using whatever technologies were available to them given the shortage of resources.

Today, the team faces increasingly difficult challenges. Their CFO is non-technical and does not consider the infrastructure requirements when making requests. New applications are asked to be run on old systems ill-equipped to support them, and performance suffers for it. The applications are always advancing, but Intelligent Supplies is not updating the infrastructure along the way. Furthermore, a lack of on-going training for the team has led to several best practices not being followed. Finally, to maintain performance service level agreements (SLAs), resources are often manually shifted from application to application.

Data Center:

The data center of the enterprise consists of a single room on-premise and contains all of the company's servers, storage, and networking equipment. The room was not designed to be a data center, and therefore, suffers from inefficiencies in heating and cooling.

Compute:
The server infrastructure at Intelligent Supplies consists of approximately 40% virtualized servers with the majority of applications still running on physical servers. These bare metal servers in particular are hosting Tier 1 applications. The hypervisor is several years out of date but capable of running the small collection of virtual machines in the environment.

Network:
The Intelligent Supplies network is a patchwork of hardware from different manufacturers, and at times, the conflicting brands can make the network unstable. This issue is made worse because the team is so small. The two IT administrators are too busy handling end-user requests to provide any meaningful monitoring services.

At the hardware level, the firmware and software on switches, routers, and firewalls are outdated. The firewalls themselves are not maintained properly and contain access control lists (ACLs) that are no longer in use. Finally, the IT team has not established a de-militarized zone (DMZ) for public-facing resources.

Storage
The storage arrays of this environment are primarily local storage on older Microsoft bare metal servers. The shared storage that does exist takes the form of older, out-of-support Network Attached Storage (NAS) with some Network File System capabilities.

Business Continuity and Disaster Recovery:

There is an existing business continuity solution at Intelligent Supplies, but it is antiquated. The current solution backs up the system onto tape. Though it may work, tape-based backup is usually difficult to recover. In addition, the tape libraries are a challenge to maintain.

That is the extent of the business continuity strategy. Should one of the manufacturing facilities suffer a disaster powerful enough to deactivate the data center, there is no disaster recovery plan in place and no secondary data center to divert to. The data center resources would be inaccessible. In many verticals, particularly manufacturing, there is a known cost for loss of computing capabilities over a certain period of time.

Environment Challenges:

A data center, like Intelligent Supplies', constructed with dated technologies encounters numerous recurring challenges.

- Applications (client/server) are loaded directly onto endpoints, and issues can cause a particular endpoint to be inoperable until the IT team can personally address it.

- System performance slows down during certain business-critical times (i.e. account and payroll applications perform worse at the end of the month). This is at times due to anti-virus scans inexplicably running during business hours.

- When seeking new line of business solutions, application choices are limited by what the company's hardware can support.

- The administration of IT systems is inefficient. The small team spends a majority of their time troubleshooting. The team has no time left for preventative maintenance of their systems. As a result, equipment is only replaced or inspected in emergency situations. In addition, the firmware and software are out of date.

- The line of business applications are out of date, and the current versions are often too advanced to be supported by the hardware already in place.

ROADBLOCKS TO SOFTWARE DEFINED NETWORKING

This environment as-is will be unable to deploy a software defined networking solution. Whether VMware NSX, Cisco ACI, or another manufacturer, the equipment in the existing data center is simply too old to run the new software.

This is especially true for Cisco ACI. ACI requires the IT department to purchase and deploy specifically ACI-enabled networking equipment, but even NSX, which can work on any modern networking equipment, would be incompatible with the hypervisor in use here. The hypervisor is simply too old to integrate with NSX.

Steps must be taken to modernize this environment if Intelligent Supplies is to make use of any SDN solution.

PHASE 2: A CONSOLIDATED NETWORK

Budget is always a concern in any IT department. If we could snap our fingers and expand the budget, preparing a data center for software defined networking would not be a challenge at all. That being said, taking an outdated data center and refining it just enough to deploy a software defined networking solution can be done. Better yet, it can be done cost-effectively with only a small investment from the company.

In this phase, we've taken the same Intelligent Supplies environment in Phase 1 and consolidated the network. Overall, the environment operates under many of the same principles, but an updated, consolidated network both alleviates some of the environment's challenges and enables the company to use NSX in a limited capacity.

Essentially, the consolidated network is going to streamline the architecture and equipment required to run the environment. The aggregate layer of the network has been completely removed and now the network runs from the core directly to compute resources.

Cost Considerations

In designing this network, the cost of the overhaul was taken into consideration. While this upgrade does not solve every issue in the environment, it addresses some of the most pressing for a minimal investment. According to the IT Spending & Staffing Benchmark's Report for 2015/2016, a small IT department generally has an operational IT budget of less than $5 million.[2] Even in those constraints, it is possible to achieve this upgrade.

The overall cost to maintain the environment will be drastically lower in the long run. There is less equipment in the data center to heat and cool, thereby mitigating the inefficiencies of the ad hoc data center location. According to the Department of Energy (DOE), data centers consumes 10 to 50 times more power per floor space of a typical office building.[3] Any reduction that can be made here will save significant resources. Furthermore, less equipment in the data center means less equipment to maintain. Installing patches and updates is now a simpler and streamlined process.

This upgrade also avoids some of the other unexpected costs that tend to affect other data center upgrade projects. There are no new employees needed to run the consolidated environment. The existing team with their current skills can still effectively administer the Intelligent Supplies data center.

Business Views of IT

Unfortunately, consolidating the network in this fashion will not yield much of a shift in company culture. The budget will still be limited and still force the IT team to turn down requests from other business units.

Staff

One of the key advantages for Intelligent Supplies is that the new consolidated network will not require changes in the IT team to operate. There are no new employees and no new skillsets needed. The small team can still support, monitor, and maintain the entire environment and do so more easily. Plus, with less hardware in operation overall, the team will spend less time maintaining the physical equipment and can focus their efforts on other high priority items.

Data Center

Networking
The outdated network switches and routers have been replaced with two Nexus 9000 series switches. This change now allows for 160 Gb per second possible throughput and the network bandwidth overall has been increased from 1 Gb to 10 Gb.

[2] http://www.computereconomics.com/page.cfm?name=it%20spending%20and%20staffing%20study
[3] http://energy.gov/eere/buildings/data-centers-and-servers

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The Nexus switches were selected for this environment for two reasons. The first was to create a unified vendor strategy between compute and networking. The second was to leave the door open for the future adoption of Cisco Application Centric Infrastructure (ACI). See the Discussions section at the end of the white paper for why this is advantageous.

Compute
The old bare metal servers have been replaced by a handful of Cisco Unified Computing System (UCS) Minis. These few servers can provide all the compute resources necessary for the entire environment. Furthermore, we are able to condense the environment even more by virtualizing the remaining 55-60% of the applications. It is still possible, however, that old versions of the line of business applications will still need to run on a bare metal server if they cannot be virtualized.

Over a period of five years, Cisco UCS grew to become the most widely adopted x86 server on the market and even consisted of 42.5% of server sales in Q2 2014.[4] We selected UCS here for its overall cost savings, exceptional performance, and widespread adoption from the rest of the industry.

Storage
The storage array has been replaced with Nimble hybrid flash storage. The combination of hard disk drives (HDD) and solid state drives (SSD) provide this environment with a performance boost without limiting the capacity or inflating the price tag.

Nimble storage was selected both for its cost effectiveness and its success in the market. Nimble continues to grow and impress with an 81% year over year increase in revenue in 2015.[5] Nimble's offer of a hybrid storage solution along with the staying power of a growing company makes this a solid long-term storage solution.

Business Continuity, Disaster Recovery, and Data Protection

The inclusion of the Nimble storage array opens up a new opportunity for disaster recovery, business continuity, and data protection solutions. The software on the Nimble array (and many other contemporary storage solutions) enables the team to auto-replicate data to a duplicate array. That redundancy can prove crucial in the event of a storage failure.

End-User Experience

By consolidating the network, the IT director has cured some of the recurring end-user issues.

- The system performance issues due to AV scans can now be prevented using the network virtualization tools in NSX.

- With modern hardware in operation, the team can now expand their search for new line of business applications and cutting-edge tools.

- The administration of IT systems is now more efficient. The small team spends less time troubleshooting. The team now can free up some time for preventative maintenance of their systems.

- The IT team still does not have a unified management portal for their network. The team is still regularly switching between applications and portals to properly support their environment.

[4] http://www.cisco.com/c/dam/en/us/solutions/collateral/data-center-virtualization/
unified-computing/cisco_ucs_market_share_infographic_final.pdf

[5] http://investors.nimblestorage.com/company/investor-relations/press-releases/
press-release-details/2015/Nimble-Storage-Reports-Financial-Results-for-Fourth-Quarter
-and-Fiscal-Year-2015/default.aspx

LIMITED FUNCTIONALITY FOR SDN

The consolidated network environment can absolutely make use of software defined networking solutions like VMware NSX. As a software overlay, NSX is compatible with the equipment in use. However, a simplified network like the one we have detailed here will not often require some of the features and capabilities of NSX.

One of the most valuable capabilities of NSX is the option to spin up networks as you would virtual machines. With such a small network in this environment, that function will be largely unnecessary aside from the rare occurrence.

For the consolidated network, NSX will be mostly used for security purposes. Now that almost the entire suite of applications is virtualized, microsegmentation will prove to be a major benefit. Each VM in the hypervisor will now effectively have a firewall surrounding it. This will prevent east-west traffic of malicious files on the network and lockdown a threat.

PHASE 3: AN UPDATED, CUTTING-EDGE IT ENVIRONMENT

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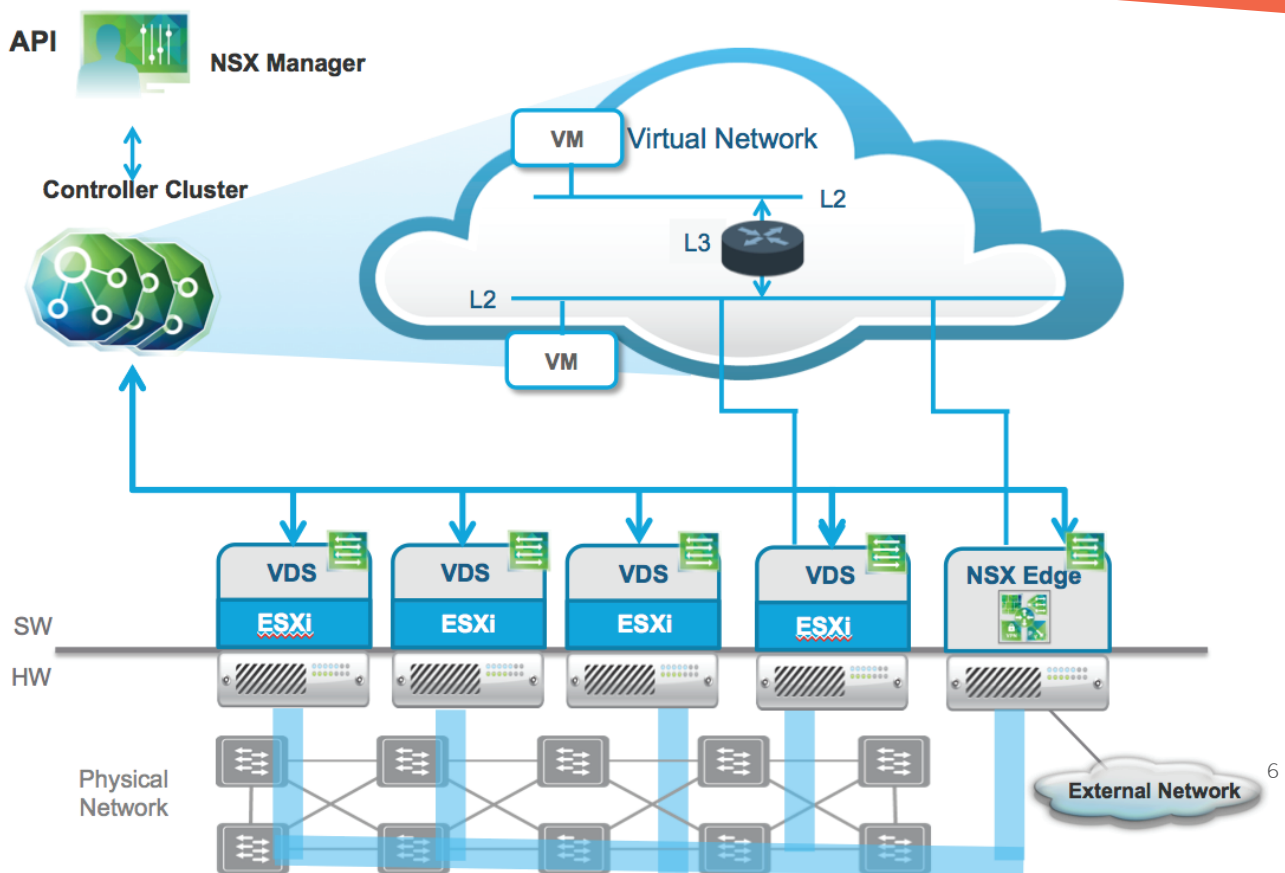
A consolidated network is only a step in the right direction for Intelligent Supplies. If the company continues down this path, continues to grow, and continues to refine their environment, their end goal will look something like what we have compiled here in Phase 3. This environment combines cutting-edge equipment and a modern IT strategy to empower the business.

Software defined networking, specifically VMware NSX, is the capstone to this environment and ties it all together. When IT environments reach this size and complexity, SDN becomes extremely valuable in extending the network to multiple sites, keeping VMs secure with microsegmentation, and spinning up networks on demand.

Cost Considerations

As stated in our Preface, we recognize that technology can be a significant investment for a company, and if budgetary concerns were the main handcuff in the previous environment, cost must be considered in any update. To that end, we have identified areas where operational costs are drastically lower in this new environment, and the expanded business capabilities and improved workforce efficiency will compensate for the capital expenses required to make this shift.

Still, this phase represents a significant shift in both company culture and expenses. It represents a long-term goal for which to strive.

Business Views of IT

In order for the new environment to be a success, the company culture must eventually change along with the infrastructure. Here, the IT department is now included in business decisions, because IT has repositioned itself as a driver of business as opposed to an obstacle. The technology presented below is aligned with the business unit strategy and the company's overall vision for the future.

The Impact of SDN

With NSX fully established, the impression of the IT department as an obstacle for the rest of the company is long gone. Even in Phase 2, a request from another business unit might be met with weeks of delay as the network team constructs an independent network. Requests from other departments can now be met immediately. The network team can provision a network in moments and enable the rest of the company to pursue their initiatives.

All in all, the IT team is much more responsive to business agility and requests. This is sure to bring about a shift in the company culture.

Staff

The personnel required to operate this environment is drastically different than the one-to-two person team keeping the ship afloat in the initial inventory. Now, the roster has expanded to consist of the following team members:

- 2-5 IT Generalist Administrators
- Network or Storage Specialists
- Service Desk Team
- 1-3 Specialist Application Administrators: Select advanced applications may require a dedicated specialist to ensure their proper performance.
- 3rd Party IT Consultants: Intelligent Supplies now leverages the experience of 3rd party IT consultants to assist with special projects. This enables the company to pursue extremely specialized initiatives without hiring full-time experts to develop and support them.
- IT Director: An IT director position still exists and helps to oversee the IT teams.

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- CIO: A new C-level position has been added to steer the direction of technology within the organization. Following his/her vision, this executive position is expected to research new technologies and devise a roadmap moving forward.

Impact of SDN

The network administrators will save a significant amount of time in maintaining their network. This frees the IT team's time to devote to higher-level initiatives.

Data Center

Across the board, the data center has experienced a drastic overhaul.

Compute

In the previous phases, the IT team consolidated their data center onto fewer pieces of hardware while improving performance. That element is continued here as resource needs have expanded.

Furthermore, the IT department has continued to implement their unified vendor strategy. In the original environment, the data center had been assembled piecemeal over time and led to difficulties in compatibility and integration when adopting new applications. There were too many vendors with too many products that may or may not have been designed to integrate together. Now, the data center is unified under one technology manufacturer, and the IT team can make alterations to the hardware and software with confidence.

> **Impact of SDN**
>
> Because the entire network is running on the hypervisor, making changes to the network becomes far easier. When making a network change in NSX, it automatically propagates to the other compute nodes and maintains network consistency. The entire process is completed from a centralized management portal.
>
> Without NSX, the network administration team would need to travel to every single network switch and configure the hardware. In a network of this size, this could mean 15-20 switches and hours of labor.

Network

Like the data center, the network hardware is still under a single vendor and additional Nexus 9000 switches have been added as needed. The largest improvements in the network, however, have been made to its security.

An outdated firewall was replaced by a new enterprise-class next generation firewall security system with additional firewalls installed for redundancy. Additionally, a proper DMZ was established and an advanced network monitoring system was installed to grant visibility into network traffic.

Impact of SDN

One of the main selling propositions of a virtualized network is that it no longer requires interaction with the physical hardware. Much like the Compute section above, adding more layers to the network is far easier. When adding networking, nothing needs to be brought down and no controls need to be changed.

Storage:

Storage has been expanded from a small Nimble array to a high performance SAN. The SAN is running either fibre channel (FC) or iSCSI and providing block-based or a unified block/file architecture.

Impact of SDN

Though storage for a manufacturing company like Intelligent Supplies may not be directly benefitted by NSX, other industries would find this solution extremely attractive.

If part of a company's operation involves their clients making use of space in their data center, NSX can be used to segment network traffic. The company could create completely independent and isolated SAN networks for their tenants to access without interfering with either the main network or another client's assigned network. This will keep every client's data separate even though the raw data may occupy the same disk or flash card.

Business Continuity, Disaster Recovery, and Data Protection

With an extended investment into technology resources, the impetus placed on a modern and effective business continuity solution rose dramatically. While the data storage redundancy strategy is still in operation, the IT team can now begin the discussion and develop a full disaster recovery strategy utilizing the cloud.

Impact of SDN
A large part of business continuity involves network backups, and NSX can be valuable in this area. NSX enables the IT department to easily make templates and copies of the network, and by doing so, eliminates the possibility of human error. The company achieves speed, security, and the peace of mind in knowing that the core network is safe.

End-User Experience

The enhanced IT environment of Intelligent Supplies can now overcome many of the challenges experienced by the old environment.

- Instead of applications loaded directly onto endpoints, necessary apps are accessed through the virtualized data center. Employees no longer need to wait for their specific endpoint to be repaired before continuing to use their essential programs.

- A unified network fabric and updated infrastructure can now accommodate network traffic at all hours of the day. The mysterious congestion and network clogs no longer occur, which allows every department in the company to continue to work uninterrupted.

- When seeking new solutions, the infrastructure is no longer a roadblock that limits their options and restricts their capabilities.

- The new data center infrastructure enables the outdated line of business applications to be updated to the newest versions. Intelligent Supplies will now be able to take advantage of new versions of the application as they are released.

- The perception and culture around IT has changed. Bureaucratic roadblocks that used to prevent IT from delivering solutions are no longer a factor. Now, IT is part of the conversation and vision of Intelligent Supplies' future.

Impact of SDN

- Testing and development procedures are far easier. Instead of manually building a test network, one can be spun up like a virtual machine. Then when the testing and development phase is over, the network is not left idle. It can be disassembled as quickly as it was built to ensure that no resources are wasted.

- With this ability to rapidly build networks, end-user requests can be completed much more quickly. Suppose the manufacturing company was building a new module for their ERP system, and the module required testing. In Phase 1 or 2 of the Intelligent Supplies environment, building a network could require up to two weeks of work. With NSX, it could take less than two hours.

- Network security receives a significant boost. Though the applications may be virtualized and "all in one basket" as early critics of virtualization believed, they are now each surrounded by their own firewall. If there is a network breach and a virtual machine becomes compromised, that malicious traffic will remain quarantined in that single VM. The IT department can then respond accordingly before more of the network is affected.

CONCLUSION

There is an old colloquialism that bears stark relevance to IT environments. It's expensive to be poor. It means that though someone may feel like they are saving money by purchasing inexpensive shoes or appliances, the products will not last as long as their costlier counterparts. IT environments work in much the same way. It may seem like the company is saving money by clinging to an outdated and existing environment like the one outlined in Phase 1 of this paper. This couldn't be further from the truth. By looking at the total cost of ownership of Phase 1's environment compared to the other Phases and factoring in the lost opportunity cost, an outdated IT environment could be the most expensive option on the market.

Virtualization in the early 2000s brought enormous savings to companies across the globe. Data centers were shrinking by 80% or more while still maintaining the same capabilities.[7] Software defined networking can yield savings in the same vein.

In a software defined network utilizing NSX, companies may find that they do not need as many layers to their network, and therefore, may not need as much networking hardware. It is possible that companies may only need their core network layers and can eliminate several or all of their aggregate and access network layers while maintaining the same capabilities as before. At the same time, companies can leverage some of the features of Cisco ACI to be used in conjunction with NSX. We find that, in very large networks, both applications can be used simultaneously in a way that compliments their strengths and compensates for their weaknesses. See our Discussion section for more information.

A solution such as this hasn't yet been adopted on a wide scale at this time. It sounds risky and impossible, but so did virtualization at first. In our predictions, SDN is poised to have the same impact to environments everywhere. The first step is to prepare your environment for adoption. By following some of the principles outlined in this white paper, you can ready your environment for the networking revolution to come.

DISCUSSION

Combining VMware NSX with Cisco ACI

There is much debate over the direction software defined networking should take moving forward. In the industry today, there are two leading solutions that both fall under the umbrella of software defined networking, but each takes a very different approach to accomplishing similar goals. These two solutions are VMware NSX and Cisco Application Centric Infrastructure (ACI).

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Despite the differences in these two solutions, we find that in very large networks they can both be used together to yield the best results.

Before moving forward, here is the difference between NSX and ACI:

VMware NSX: NSX is a software overlay application. It can be applied over existing networking equipment. It overrides the intelligence in the networking hardware and instead dictates network traffic based on policies set by the administrator. This makes it very easy to create virtual networks and manage the network as a whole.

Cisco ACI: Conversely, ACI places more intelligence into the networking hardware. This requires the IT team to purchase ACI-enabled networking equipment, such as the Cisco Nexus 9000, in order to access the benefits of ACI. With this equipment, administrators can create application profiles that dictate how the networking equipment should behave in regard to the application in question. These policy templates can then be duplicated and assigned to each application in the network.

While at face value, it may sound like these applications accomplish virtually the same task, they can still be used in conjunction to great effect. ACI would best be used at the core and switching layer. Administrators can create networks within the core and assign profiles as necessary. This allows the team to configure the core of the network through software as well as track changes along the way.

Meanwhile, NSX would be in operation at the hypervisor level. Using the software overlay, the administration team could spin up new virtual networks throughout the environment quickly and efficiently while also enabling microsegmentation of the virtual machines.

This approach leverages the strengths of each solution while compensating for the weaknesses of the other.

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As a part of Mindsight's consultative services, we offer comprehensive analyses of data center technology through our Data Center Infrastructure Reports. In these reports, one of our senior consultants is sent to your office to analyze a particular area of your data center. Whether the network, storage, or even a troublesome application, Mindsight will provide the insight you need to achieve your business goals.

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Mindsight is a technology consulting firm that provides thoughtfully-crafted and thoroughly-vetted perspectives to its Chicago area clients' toughest technology challenges. Mindsight's recommendations come from its experienced and talented team, and are based on a solid understanding of its clients' unique business and technology challenges. Mindsight believes in being transparent and candid, which means more productive interactions and less pretense. The company provides the best thinking to achieve the best result. When you need a different point of view, you can count on Mindsight.

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