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KNOW
VIRTUALIZATION

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Preface

In both legacy IT data centers and emerging private and public clouds, virtualization is becoming the norm. Through virtualization, organizations are realizing the benefits of scalability, agility and efficiency. Scalability – so firms can multiply server capacity by several times over on the same budget. Agility – so IT can provision those servers in a matter of minutes or even seconds, rather than days or weeks. Efficiency – so you can do it all at a much higher return on investment than you could through physical infrastructure alone.

According to Gartner:

"Evolving server virtualization will also include long-distance VM mobility among data centers, allowing on-the-fly movement of running VMs among distributed data centers. This is the natural extension of a virtualized data center into a cloud-inspired infrastructure design, where virtualization spans multiple data centers that may be geographically distributed."

(Source: Gartner Report, Hype Cycle for Networking and Communications, 2014, Bjarne Munch and Jay Lassman, July 22, 2014)

Those are the heavy upsides, of course, but what about the trade-offs? More specifically, what about the effect on the network? As more of the world becomes virtualized, connecting virtual workloads on the network can present challenges for many legacy network infrastructures.

The problem with virtualization is that it doesn't just add more traffic to the network, it adds more complexity, too. For an organization to fully benefit from a virtualized cloud data center, it requires a network that can keep pace with today's agile virtual workloads. At the same time, the network needs to be able to serve as the bridge between the increasing number of virtualized resources and the legacy systems that are not yet virtualized. And it is increasingly difficult to do this if the network is a closed and proprietary system that is not open to innovation.

Section 1

KNOW THE LAY OF THE LAND

"The current state of the virtualization market is characterized by many proprietary technology stacks. This is partially due to a lack of open standards, and the cloud computing market is similarly fragmented, with many different standards, platforms, and services"

Ovum Report,'Selecting a Virtualization and Cloud Management Solution, 2013–14', Roy Illsley, Principal Analyst, July 26, 2013

In today's competitive enterprise landscape, IT leaders are focused on a range of business imperatives. Featured in many surveys and focus groups, these stakeholders have noted the need for greater cost management, increased mobility, higher application availability and enhanced customer experience.

It's a daunting list and, in response, many are looking to virtualization and cloud computing models to deliver unprecedented agility in support of these wide-ranging objectives. That's hardly surprising given the huge growth in the number, type and design of applications spun out by the modern enterprise.

Consequently, organizations have become cloud builders on an industrial scale as they ramp up their offer to service-hungry customers, suppliers and employees. Virtual appliances have played a key role in the acceptance of cloud computing as a well-proven means to rapidly and efficiently start up a pre-configured server environment.

While the first iterations of virtualization helped drive consolidation, improve resource utilization and lower the total cost of ownership, businesses are now looking for virtualization to promote business agility through shared resources and enhanced flexibility.

For those embracing these new models, many have found that their existing infrastructures are creaking under the demands for more performance, resiliency, flexibility and scalability. After all, the transition from a physical data center to virtualized, automated, and elastic clouds has the potential to introduce significant amounts of complexity.

Networks that were once connecting physical appliances are now connected to virtual endpoints. Resources that were static are now dynamic and provisioned on demand. With more virtual machines and network ports to connect them, the net result is an exponential growth in the number of interactions for the network to orchestrate.

So, to deliver on the promise of virtualization and cloud computing, IT and network professionals are looking to deploy flatter network architectures that are optimized to deliver the speed, flexibility and automation required by today's rapidly evolving compute environments.

Section 2

KNOW YOUR VULNERABILITIES

"The network is critical both within the data center and as public cloud adoption increases, requiring more in-depth monitoring of the network performance"

Gartner Report, Hype Cycle for Networking and Communications, 2014, Bjarne Munch and Jay Lassman, July 22, 2014

Every year, service providers and other enterprises invest heavily in data center compute, storage, applications, services, and management – plus the technologies to connect them all. For those who ignore open standards in these solutions, an unappetizing end is in store – one that involves more cost and complexity than is necessary to piece together the physical and virtual operating environments.

Industry analyst Ovum describes an environment that is still evolving: "Characterized by proprietary technologies that have only a rudimentary ability to support cross-platform interoperability. An often-overlooked aspect of managing virtual environments is the need for any management tool to operate at a more granular level than its physical environment counterpart. This approach is further complicated by the need to holistically

manage the server, network, client, user, and storage elements." (Source: Ovum Report,'Selecting a Virtualization and Cloud Management Solution, 2013–14', Roy Illsley, Principal Analyst, July 26, 2013).

Historically, most networking devices have been rigid in the number and types of architectures they support, so any change to that consequently sparks a wholesale refresh and a significant amount of downtime.

Installing and configuring individual building blocks also lengthens the time required to provision the network. That said, it's easy to see the predicament facing many enterprises that are struggling with proprietary systems and tools.

Dealing with multiple vendors also brings with it different programming languages to master. Adding new protocols and features, implemented via new devices, increases

application churn and contributes to network complexity.

Not every application needs to be virtualized. There may be applications that consume an entire server where additional utilization can't be achieved. Similarly, there may be apps that are processor-intensive and, therefore, virtualization doesn't make sense.

VM sprawl is also a disruptive factor caused by the relative speed and ease with which

VMs can be reproduced. The disruption arises not just from a complexity and management orchestration standpoint, but other factors too. VMs consume resources, even when they are unused. Plus, when left un-patched, they become a security vulnerability, too.

Your business cannot afford such vulnerabilities given the importance of data protection and user acceptance of the cloud model. Any impediment to this will breed fear and inhibit the

organization's ability to roll out services with optimum efficiency on preferred hosting platforms. How you protect the cloud is just as important as what you protect. Access to the entire cloud may be protected by physical firewalls but, once inside, virtual assets must be protected by an agile, virtual security architecture. To do that, security must be integrated into the cloud architecture, not addressed as a mere afterthought.

# Section 3

KNOW YOUR OPPORTUNITIES

The growing nexus of business, social and technological forces (e.g. social media, mobile, cloud and data) is driving the introduction of more virtualization and cloud-based solutions across the enterprise—and for good reason. But firms cannot afford to over-complicate the situation in the process and introduce after effects they live to regret.

With any cloud project that involves elements of virtualization and automation, the name of the game is eliminating complexity. Only with this approach can you hope to deliver better application performance, an enhanced user experience and improved economics for your business.

In the network, simplification can be achieved by consolidating and combining switching, routing, and security platforms, leveraging programmable systems, network orchestration, SDN, and open APIs that enable integration with the technology ecosystem. These solutions also need to be scalable, allowing you to develop and deploy new applications or protocols without a rip-and-replace – the net result bringing greater operational simplicity and lower cost of ownership.

"In 2016, 21% of x86 servers shipped will be for virtualization, supporting 82% of workloads."

Gartner Report, Forecast Analysis: External Controller-Based Disk Storage, Worldwide, 1Q14 Update, Roger W. Cox and Jimmie Chang, April 23, 2014
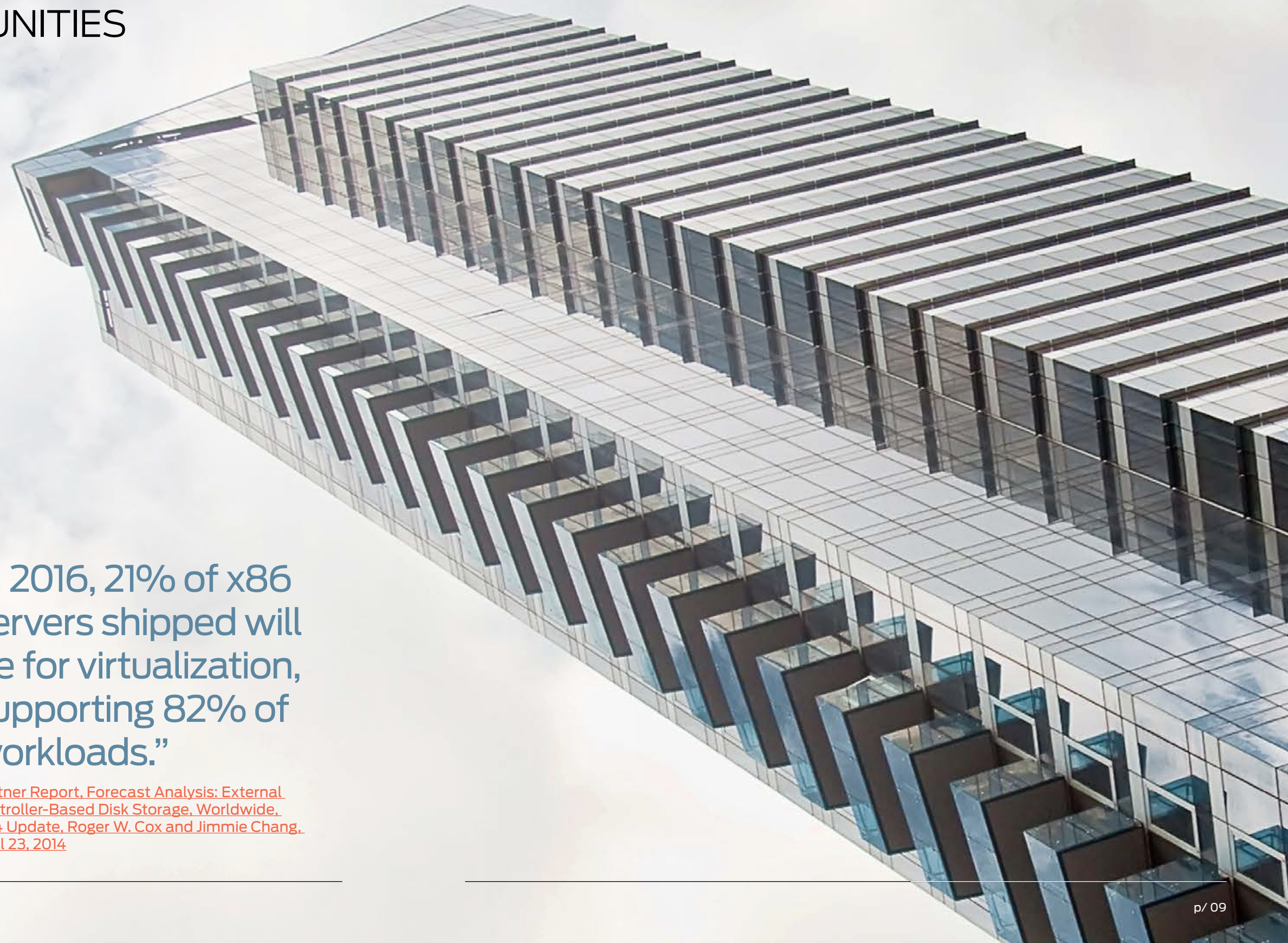
By having a simple, smart and open network architecture in their data centers, business leaders and IT personnel can look forward to improved agility and efficiency required for true transformation. Acting as the backbone of the business, this network infrastructure will enable you to keep pace with server virtualization and private, public or hybrid cloud computing.

In particular, there are two key elements of your network portfolio you need to address: the hardware and the interface. Your physical architecture should feature high-performance, integrated switching and routing platforms that deliver full business agility in the data center. To complement this, and ease the management of physical and virtual data centers, you should easily be able to view any changes to the network from a single pane of glass.

But remember, you'll need to look for quality in your solution. Quality that manifests itself through improved performance, lower latency and converged services in virtualized data centers of any size. With this in place, corporations can move around their virtual machines without having to worry about performance degradation, downtime and the associated business costs.

Software-defined networking (SDN) also promises to make the network more dynamic, manageable, cost-effective, and adaptable. But because the market is so dynamic, it's important to choose an approach that properly emphasizes choice, open standards and vendor-neutrality. The path to SDN is evolutionary, and allows you to enjoy a simplified network and operations that do away with the complexity of multiple, vendor-specific devices and protocols.

It's all about creating the most efficient network path for your mobile workloads.

Section 4

KNOW YOUR CHECKLIST

What are the key attributes of a virtualized network architecture?

Your checklist:

- Universal building blocks – a single switch, multiple deployment options to support new applications and larger scale

- Simplicity – multiple interconnected switches to form one logical device that's managed as a single chassis

- High-performance, any-to-any connectivity between all server, storage and security devices in the data center

- Agile SDN that automates and orchestrates the creation of highly scalable virtual networks

- Interoperability with operation and business support systems

- Ability to remove dependency on physical appliances that add cost to cloud models

- Ability to manage virtual services on VMs across the network, such as security and load balancing, and achieve service chaining with simplified integration through APIs

- Layered security in the network, firewall, DDoS and application

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