

A **Jeda Networks** White Paper



4400 MacArthur Blvd., suite 350
Newport Beach, CA 92660
(949) 748-7277
www.jedanetworks.com

Software Defined Storage Networks™

An Introduction



Contents

Executive Summary	1
Introduction	2
The Need for an Evolved IT Infrastructure	3
Software Eats Storage Networks	3
Benefits of Software Defined Storage Networks	4
Conclusion	5
About Jeda Networks	6



“Make things as simple as possible, but no simpler.”

Albert Einstein

Executive Summary

While Software Defined Networking (SDN) has captured the attention and focus on virtualizing networks, Jeda Networks has applied the SDN approach to one of the last major areas of the IT infrastructure that has yet to be truly virtualized: the connection between applications and their data. We call this technology Software Defined Storage Networks (SDSN™). SDSNs virtualize the network between applications and their data, referred to as the storage network, by decoupling the complex storage networking control plane (the intelligence that tells the hardware what to do) from the physical network. This results in an abstracted and simplified storage network capable of being “programmable” by software. SDSNs solve the limitations of a fixed and rigid physical storage network—namely scalability, high cost, high complexity, and lack of agility. As organizations of all sizes take advantage of a fully virtualized IT infrastructure, SDSNs free them from the limitations of an all hardware based storage networking infrastructure.

Introduction

In “Software Eats the World”, Marc Andreessen’s WSJ opinion article, Andreessen describes the technological trend that is moving like a tidal wave through many industries. This trend is the transformation of physical products into software. Everything from print, media, money, brick-and-mortar stores, music, video, IDs, servers, storage, networks: they are all being enhanced by or replaced with software. An accelerant to this phenomenon is the explosive growth of mobile devices. At the end of 2012, there will be more mobile devices than people in the world.

These popular devices (tablets, ultrabooks, smartphones and more) are running an exponential number of applications which themselves are generating unimaginable amounts of information. For example, global mobile data traffic in 2011 (597 petabytes per month) was over eight times greater than the total global Internet traffic in 2000 (75 petabytes per month). Mobile video traffic exceeded 50 percent of global Internet traffic for the first time in 2011. Of course, this is not to slight “traditional” fixed Internet users that generated 23,000 petabytes per month in 2011!

Another accelerant driving the need for a software storage networking solution is Big Data. As defined in Wikipedia, “Big Data is a collection of data sets so large and complex that it becomes difficult to process using on-hand database management tools or traditional data processing applications”. Big Data puts significant load on a traditional “physical” storage network creating the need to scale up the storage network to access these huge data sets in a cost-effective and timely manner. Big Data clearly sets the bar to a new level with its traffic demands, challenging the storage network to a point where traditional products and architecture lack the flexibility without an overabundance of additional dedicated resources and cost.

These macro trends have created a sea of changes and new requirements for IT infrastructures. The IT infrastructure is now accosted by fluctuating traffic patterns, requirements for immediate scale, and flexibility to allow consumers and their applications to have direct access to IT resources. The IT industry has reacted to these new requirements by applying software virtualization to abstract fixed and rigid physical infrastructure. Composed of compute, network and storage elements, these IT infrastructures are and can be virtualized, i.e., abstracting the logical capabilities from the physical capabilities, solving the onerous requirements generated by the mobility of applications and exponential increase in data. As Andreessen predicted, software is coming to the rescue.

The Need for an Evolved IT Infrastructure

According to industry studies, the amount of information stored, accessed and protected is doubling every 2 years. To support the increasing traffic load to information assets, however it's being driven; the IT infrastructure is evolving. Changes include innovation applying software virtualization, which separates the physical capabilities of the infrastructure into virtual resources that can be pooled, controlled and automated efficiently. These resources include compute, networking and storage.

Compute resources have been effectively virtualized with the innovation of the hypervisor, isolating the underlying compute resource from the physical hardware. This has enabled the “mobility” of applications breaking the tight coupling between the application and a fixed physical server. Storage resources have also been virtualized, capable of being partially provisioned, shared, and migrated from one storage array to another and from one location to another for data protection. The latest elements to be virtualized are the network resources. To overcome limitations in the physical network that are created as compute resources scale, virtualization is applied to abstract the essential elements of the network, increasing the agility and scalability of the network as well.

It seems all the IT infrastructure pieces are being “virtualized” or turned into software with lower cost physical elements. However, an important piece is still missing from within the IT infrastructure and that is the storage network resources.

Software Eats Storage Networks

Software Defined Networks (SDNs) are a bite size way to allow the “Software Eats the World” paradigm to progress. A SDN is an approach that helps overcome network resource limitations such as the limited number of VLANs and the resulting management complexity of configuring thousands of VLANs. With SDNs, a static network becomes a programmable and extensible network that responds more readily to changes in business, end-user requirements and market demands.

In the newly evolved virtualized IT infrastructure, any application on any server must have access to any data location or storage array to be agile and flexible. There are important classes of applications requiring deterministic, low latency and/or high bandwidth access to data. For many of these applications, which include database, data mining, high transactions, media feeds, virtual desktops, requirements are not being fulfilled resulting in



these same applications not being as scalable or agile as needed. There is a great need to virtualize the “paths” or networks between applications and their data.

The paths between applications and their data, i.e., storage networks, have been a very difficult area to virtualize. SDNs are not currently designed for storage networks, which have a very different set of requirements than networking compute elements. Storage networks are engineered for low latency, high bandwidth bursts of data resulting in a more time sensitive design. Congestion in a storage network spells trouble. The storage “software” stacks in the servers which host the applications and the storage arrays have been highly tuned over the years requiring a path, or network that will not get in the way. Whereas current SDNs interact with network edge switches, a “storage” SDN must interact with an entire network of switches as well as the access devices, i.e., the adapters in the servers running the applications and the adapters in the storage arrays. The approach taken by Jeda Networks is to evolve the storage network to meet the new requirements of virtualized and cloud Data Centers, building on the time, effort, tuning and management knowledge that have gone into the high performance and reliable storage networks in operation today. Jeda Networks has created an intelligent software controller required to implement *Software Defined Storage Networks* (SDSNs) bringing new levels of agility, scalability and economics, which will transform how storage is networked in the expanding Cloud era. SDSNs are software-based solutions that extend the SDNs paradigm to decouple the storage network control plane from the physical network hardware while remaining compatible with standard networking hardware including switches, host and storage adapters.

Benefits of Software Defined Storage Networks

SDSNs deliver demonstrable total cost of ownership (TCO) and return on investment (ROI) benefits for companies of all sizes, including small, medium and large business enterprises today. They greatly simplify storage network management and transform complex operational projects into highly automated tasks requiring only a few simple administrative steps. Additional tangible benefits that dramatically reduce the cost of ownership provided by SDSNs include:



- Reduction of capital costs for network hardware
- Centralized management of multi-vendor IT storage networking infrastructure
- Reduced operational expenses: lower administrative complexity and lower error rates
- Increased network reliability, availability, serviceability, and performance
- Lower setup, administration, management, and maintenance requirements
- Green efficiencies realized by a smaller footprint, lower power, reduced cooling and a more efficient IT infrastructure

With a SDSN in place, network administrators can manage storage networks in the same way they now manage local area networks (LANs) which translates into administrative ease and enhanced operational productivity. This new level of personnel efficiency is an added tangible benefit which allows SDSN enabled storage networking to deliver compelling corporate value.

Conclusion

With the deluge of data and the macro trend of software being applied to abstract the complexity of physical IT infrastructure, Jeda Networks has applied Software Defined Networks to storage networks. This innovation has resulted in a significantly lower CapEx and OpEx for deploying agile and scaled storage networks.

The Fabric Network Controller™ software (FNC™) by Jeda Networks is an intelligent software-based solution that transforms a network of standard Ethernet switches into powerful storage fabrics suitable for enterprise-class operations while delivering administrative simplicity resulting in dramatic operational savings. Jeda's FNC removes the requirement for purpose-built, high cost and high complexity storage switches which translates into significant CapEx and OpEx savings. Software Defined Storage Networking is the next trend in IT infrastructure virtualization and enables the next generation of data intensive applications. For a technical overview of SDSN, see the Jeda White Paper, "SDSN Architecture".



About Jeda Networks

Jeda Networks products enable unprecedented simplicity creating the next generation of virtualized storage networks delivering new levels of performance, scalability and cost effectiveness. Jeda Networks is the industry innovator of a new way for applications to talk to storage with software powering the next generation of data intensive applications operating across existing virtualized IT infrastructures. Jeda Networks game changing intelligent software product called the Fabric Network Controller (FNC) abstracts the complexity of a storage network into a software controller, delivering a simple open software solution to configure and manage the storage networking fabric.