Software Defined Networks (SDN) and the future of Storage

Stuart Berman, CEO
Jeda Networks
September, 2013
IT Industry Trends

• Emerging **Cloud** model
  • Resource pooling, dynamic allocation of resources, multi-tenant, software deployments/automation/management

• **Consumer cloud** companies created new requirements: economics, speed, scalability

• **Virtualization/consumerization** of the Enterprise
  • Motivation is to lower cost and increase resource utilization

• **Convergence** – “All in one” Ethernet fabric

All creating disruption to the CIO, the IT Infrastructure and to the technology vendors
Emergence of the Software Defined Network (SDN)

- Need for a networking architecture to support cloud computing
  - Virtualization, agility, multitenancy, scalability
  - Shared resource models more efficient to manage
- Growth of traffic & scale within the Data Center
  - East-West data flows now dominate
- Need more automated, multi-vendor methods for configuration & management
Software Defined Networks (SDN) Defined

- High level abstraction of the network switch control plane
- Overlay the physical network with a virtual network abstraction
- Abstraction handles (hides) complexity (ACL, QoS, mobility) of the physical network
- Virtualization of the network
- SDN Controller is logically centralized
Why SDNs? Benefits

- **Agility** – reduce time to provision custom storage network topologies
- **Lower cost** – reduce both OPEX and CAPEX through storage network automation and simplification of network hardware requirements
- **Virtual Networks** – a functional network in software, provisioned independently of the underlying hardware
- **Scale** – unbound by the low power processors contained in network switching hardware
- **Supports Cloud computing**
Applying SDNs to Storage Networks

- What are the SDN characteristics that are applicable to storage networks?
- Where are they similar?
- Where are they different?
- Why do it?

Let’s first discuss the requirements driving today’s Storage Networks....
Storage Networks are defined by the application workload requirements that run on top of them.
Application Workloads

Performance

Reliability through Replication

Capacity

99.999% Uptime

HPC
Motion Video
Tech Apps
Decision Support
Home Directories
App Dev
Email
Transaction Processing
VM Infrastructure
Online Archive
Web Content
IT
Content Mgmt.
Storage As-A-Service

Tech Apps

Apps

IT

Transaction Processing

VM Infrastructure

Home Directories

App Dev

Email

Online Archive
Web Content
IT
Content Mgmt.
Storage As-A-Service

Motion Video

Tech Apps

IT

Transaction Processing

VM Infrastructure

Home Directories

App Dev

Email

Online Archive
Web Content
IT
Content Mgmt.
Storage As-A-Service

HPC

Decision Support

Home Directories

App Dev

Email

Online Archive
Web Content
IT
Content Mgmt.
Storage As-A-Service

99.999% Uptime
Cloud versus Enterprise Infrastructure

99.999% Uptime

Reliability through Replication

Enterprise

Cloud

Performance

Technology Brick Wall

“High Performance hardware”

Specialized

99.999% Uptime

Commodity Hardware
(Whitebox/ODM hardware)

Capacity
Applying SDNs to Storage Networks

“Software Eats the Storage Network”

- Decouple the **storage network** control plane, include essential SAN services from the underlying hardware
- **Overlay** the physical network with a logical and consistent behavioral representation of a SAN
- Voila, all the benefits of an SDN, targeted to Storage Networks!
  - **Lower OpEx, lower CapEx, Scalable, Flexible**

SDSN: Abstracted & Simplified Storage Network

- Automation of configuration and Reduction in Complexity
- Data Center Ethernet Fabric
- Standard Ethernet Switches
- Storage Arrays
**Anatomy of an Storage SDN Controller**

**Storage SDN Controller**
- Implements Global SAN Services
- Communicates with Servers and Storage Arrays
- Interfaces with Switches to create high speed, secure Storage Networks
- Contains a global view of the network
Storage SDN Management

• Storage SDN “overlay network” managed by existing network LAN management tools
• Convergence of LAN & SAN network management on a single console
• Ease of network troubleshooting – centralized storage network control plane visibility & monitoring
• No change to Storage Array or Server storage management practices
• Leverages current network traffic engineering – does not impose “another physical network” to complicate network architecture
Scalability: Storage SDN’s in the Data Center

Software Defined Network (SDN)
Abstract Storage Network Overlay

Data Center Ethernet Fabric Core

10/40G b/s Core connection

Server Rack + SDN controller

High Performance Any-to-Any Application to Storage connectivity
Storage SDN Brings Enterprise Advantages to SMB

Storage SDN’s ease of use, simplification of OpEx, scalability and lower cost are things that drive IT behavior in an organization.

**Rack Server Savings**
- Before
- After Storage SDN Deployment
- **CapEx Savings:** Removal of 2 single purpose SAN switches, software licensing and cables

**Blade Server Savings**
- Before
- After Storage SDN Deployment
- **CapEx Savings:** Removal of 2 embedded single purpose SAN switches and software licensing
Storage SDN Benefits across IT Environments

- **Single Application Architectures**: Very low cost workloads, Economics, speed, enormous scale needed
- **Cloud**: “Middle of the band” workload requirements
- **Enterprise**: Highly Resilient High Performance workloads
- **High Performance SMB/SME**: Application specific solutions

Storage SDN’s move certain high performance workloads to the Cloud

Storage SDNs bring Cloud benefits to the Enterprise & SMB/SME Environments
Storage SDN – Evolution of the SAN

- Global View of the Network
- Abstracted/simplified multitenant storage networks
- Operates with standard DCB Ethernet Switches
- Speed Agnostic: Support for 10, 40, 100Gbps Ethernet

SDSN OVERLAY

Initiator

Ethernet Fabric

Target
Summary

- Storage SDNs will transform the way applications connect with high performance storage
- Storage SDNs can be deployed in Clouds, the Enterprise or in SMB Environments
- Storage SDNs are the evolution of SANs