Simplifying EMC Isilon Deployment with Brocade VCS

Brocade VDX 6740 deploys quickly and easily to create a robust network with minimal effort

## Operational Simplicity with Brocade IP Storage Network Deployments

New trends in storage technology and implementation are changing how storage is delivered to clients. These trends include automated provisioning, which has the potential to greatly improve operational simplicity. However, every IT manager knows that automating a single part of a system will only move operational bottlenecks. The entire system must be designed with this principle in mind to achieve the desired outcome. Modern storage solutions have shifted much of the automation bottleneck over to the network.

EMC Isilon is a leading example of a multipurpose storage solution that businesses rely on for file, application, and data lake storage services. Rapidly changing business requirements are served by responsive automation on the Isilon NAS device, but without equally responsive network automation and

operational simplicity, the storage system advantages may not be realized to their full capacity.

Fortunately, options now exist for automated networks to accelerate deployments of scalable IP storage solutions. The results presented in this report highlight the differences between Brocade's implementation of Brocade VCS fabric and a Cisco Nexus IP storage network in a standard leaf-spine topology. We demonstrate the significantly reduced complexity of the Brocade technology and the advantages that it brings to the network and the datacenter. Deploying Brocade switches in a Brocade VCS fabric takes just a handful of easy to understand commands. Similar Cisco Nexus configurations are four times more complex to implement.

Additional Complexity of Cisco Nexus IP SAN Compared to Brocade VCS
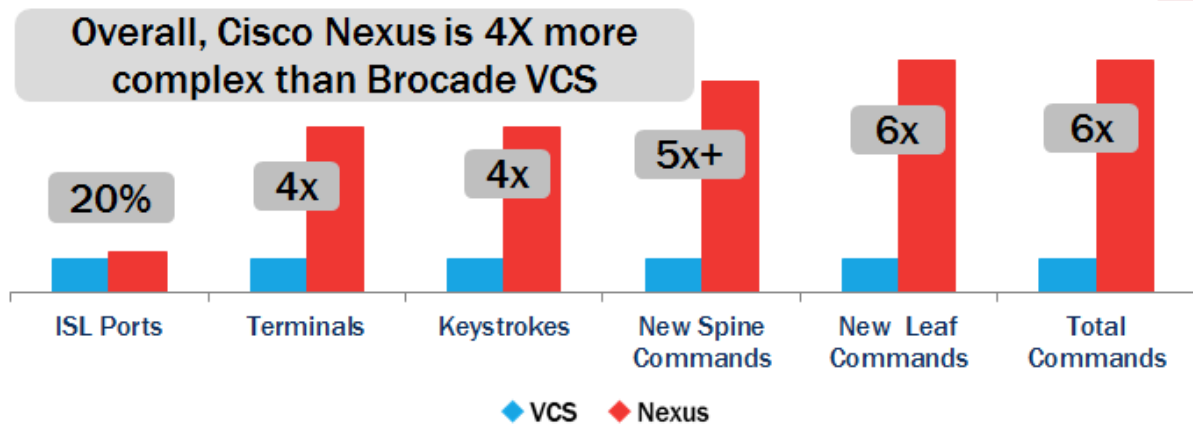
Network Deployment Simplification with Brocade VCS
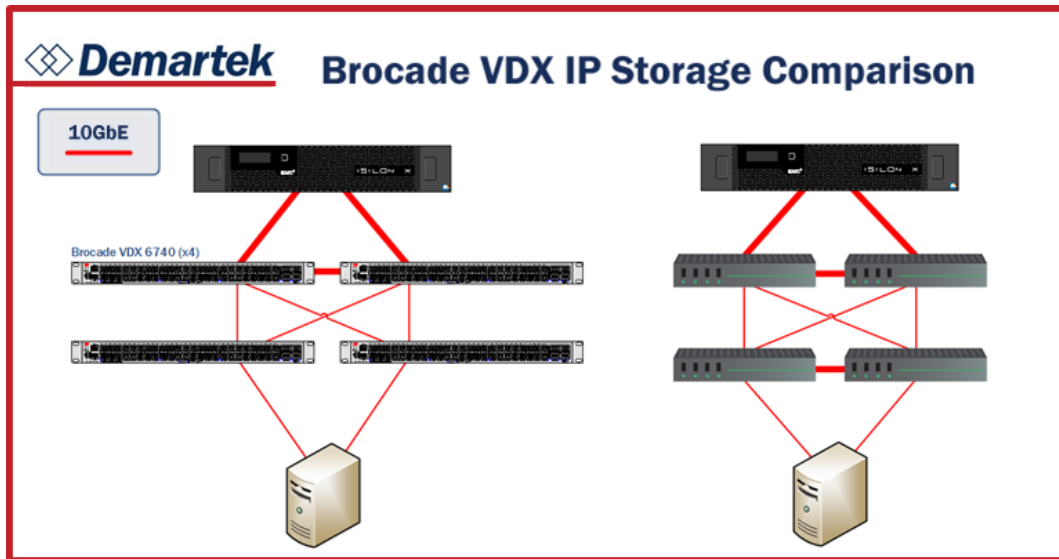
A 4-node Brocade VCS Logical Chassis in leaf-spine topology (left) and a 4-node Cisco Nexus leaf-spine network (right)- note the extra ISL between leaf switches in the Cisco topology.

These 4-node storage networks, presented in the diagrams above, demonstrate the smallest leaf-spine topology possible with full redundancy. Most enterprise IP storage networks will be larger with regard to number of switches, storage targets and clients. The configuration and associated usability data presented in this evaluation scales linearly. Consider these small networks to be 'building blocks' for larger scale deployments.

At first glance, these two networks appear remarkably similar, and so they should. The purpose of each technology is to deliver a scalable, reliable fabric for enterprise IP storage products, such as the EMC Isilon. However, if we examine each deployment more closely, it becomes quite apparent that the Brocade and Cisco implementation mechanics differ considerably. Brocade has taken a minimalist approach to the command line interface and administration functions compared to Cisco.

At the core of this strategy is the design of the operating system. Brocade Network OS and VDX switches work together to reduce command complexity, consolidate similar tasks on switches within the fabric, and automatically configure certain aspects of a network, driving down the manual effort required to build and manage a functional IP fabric. In contrast, Cisco Nexus OS and switches place greater demands on the network administrator through a more complex command line interface and a manual network configuration.

To ensure a fair analysis, out-of-the-box switches with default first-boot configurations and no pre-installation scripting or tools were employed to create the two networks.

Comparison of Complexity Metrics

Six metrics related to IP storage network setup, configuration, and support were recorded. These scores were given a weighting factor of one to five regarding the impact of each metric on deployment and administration, one being the least critical and five the most critical. The values were normalized, averaged, and a ratio calculated to evaluate the perceived

complexity of the Cisco Nexus solution compared with the deployment and support of a Brocade VCS fabric for EMC Isilon NAS. Through this method, Cisco Nexus was determined to be four times more complex to deploy and maintain than Brocade VCS.

	VDX	Nexus	Weight Factor	Complexity Ratio
Total Commands	35	206	5	Ratio of the average of weighted, normalized scores
Keystrokes	1144	4724	3	
Terminal Sessions	1	4	4	
ISLs Ports - Leaves	10	12	1	
Commands New Leaf	7	43	5	1 : 4
Commands New Spine	11	59	5	

A simple statistical analysis based on criticality weighted measurements determined that Cisco Nexus was four times more complex than deploying Brocade VCS fabric.

There is a degree of subjectivity when assigning weighting factors to discrete metrics; data center managers may prefer to weight the collected metrics differently, as applicable to their own specific network administration experiences and requirements. However, the inescapable observation is that Brocade VDX switches and VCS fabric still demonstrated smaller values for each measurement, and in this evaluation of complexity versus simplicity, smaller is better.

To assist data center managers in adapting these results for their own environments, the raw metrics are displayed and analyzed below. Decision makers and technical staff are invited to weight these metrics as appropriate for their own usage.

Basic Setup and Management

A Brocade VCS fabric presents all VDX 6740 switches as a single virtual chassis to network clients. VCS does not require connections between leaf switches which has the effect of reducing the number of the connections between switches (aka interswitch links or ISLs) and the number of ports those ISLs require, as well as limiting the number of administration console sessions needed

to manage the fabric. Preserving switch ports and minimizing administrative terminal sessions benefit the
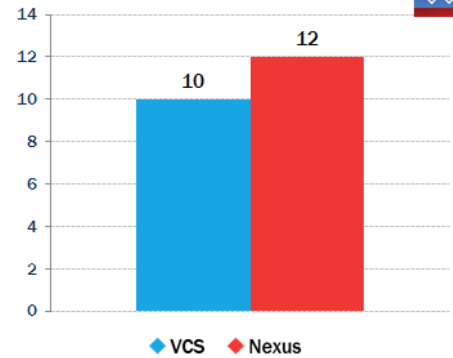
business by reducing cost and simplifying management. **Why the number of ISLs (and ports consumed) is important**

Brocade VCS automatically recognizes and configures ISLs whereas Cisco Nexus does not[1]. Both technologies require connections between spine switches for redundancy. However, not needing ISL between leaves, Brocade VCS, consumes two fewer ports per leaf switch than Cisco Nexus. This permits the VCS solution to support an additional two storage clients per switch.
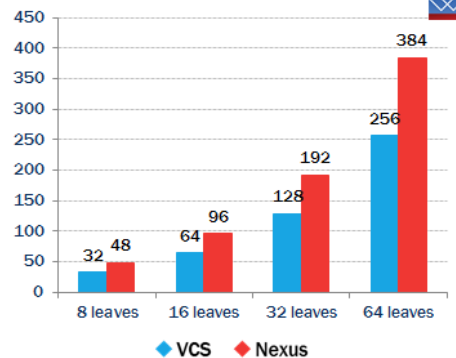

This may not seem significant in a small fabric, but as the number of leaves scales up to support more storage clients, it becomes a very big deal. Scaling up to even

[1] This is a feature that contributes to Cisco Nexus' additional command complexity, examined in another section of this report.

eight leaves, a Nexus fabric needs enough ISL ports to fill an entire 48 port switch. Scaling to a 64 leaf fabric, the Cisco IP storage network must either deploy the equivalent of eight switches for fabric administration or give up 384 potential storage clients. The same sized Brocade VCS fabric needs either a third less ISL ports than Cisco or, put more simply, can support 128 more storage clients.

Number of Terminal Sessions

	VCS	Nexus
	1	4

4x Difference

◆ VCS ◆ Nexus
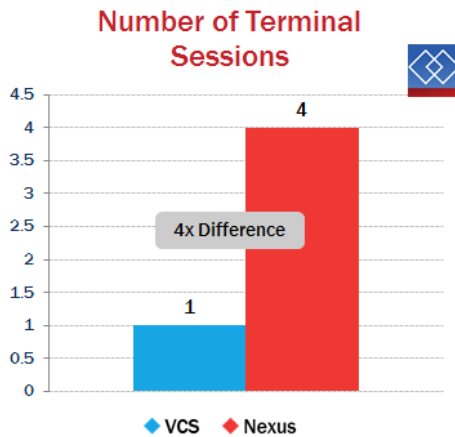
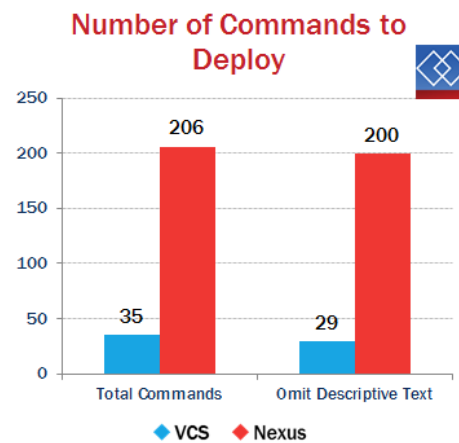### Why the number of terminal sessions is important

Once a switch is added to the VCS fabric (a single command per switch), that switch no longer requires a distinct terminal session to manage it. The Brocade VDX 6740 Isilon storage network can be set up and managed through a single console session, as opposed to a separate session for each Cisco Nexus switch. Cisco required four terminal sessions to fully configure for this evaluation.

As more switches are added to the topology, the number of sessions needed to manage VDX switches remains at "one", whereas Cisco will continue to need a new login for each switch. Multiple terminal sessions increase the potential for errors through the accidental issue of commands in a wrong window or tab. The criticality of issuing commands in the wrong window goes up for live networks supporting production storage traffic, where misconfiguration begins to impact reliability, Quality of Service, and even service uptime. While this problem might be mitigated by requiring the Cisco Nexus network administrator to only keep a single window open at a time, this is an unrealistic expectation

and introduces the aggravation of continually logging in and out of console sessions.

Fabric Configuration

Brocade Network OS greatly reduces the command complexity for switch and fabric deployment. This comparison of software-based complexity clearly shows Brocade VCS as the simpler of the two technologies.

Number of Commands to Deploy

	Total Commands	Omit Descriptive Text
VCS	35	29
Nexus	206	200

◆ VCS ◆ Nexus

Why the number of commands is important

Cisco's command-rich Nexus OS needed six times the number of commands to create the 4-node leaf-spine topology and ready it for connection to the EMC Isilon storage device and client server than Brocade's Network OS. When omitting the commands to document port configuration (not recommended as this improves switch supportability), the delta was even larger—seven times more commands for Cisco. Each command entry consumes time, and a complex command interface increases the amount of knowledge and skill required by the administrator. Operator skill is a good thing, but a simpler interface lowers the specialization needed to perform the same function, saving money by minimizing training, enabling personnel to accomplish more tasks in less time, and possibly eliminating the need to hire expensive specialized staff.

Number of Keystrokes to Deploy

Number of Commands to Deploy Additional Switches
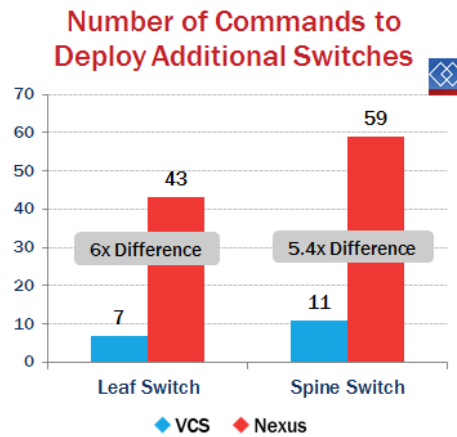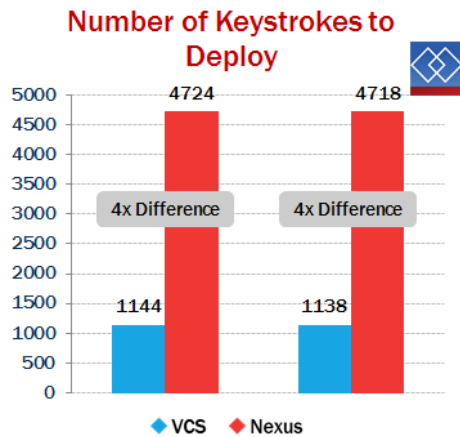
Why the number of keystrokes is important

Reducing the commands to individual keystrokes demonstrates that Brocade Network OS does not merely aggregate multiple commands into a single, long string of cryptic instructions and arguments. Brocade Network OS needed only a quarter of the keystrokes demanded by Cisco Nexus OS to deploy the four switches, build the VCS fabric, and connect the client server with the Isilon storage system. A small set of commands, delivered with fewer keystrokes, to create the same end product, is the result of a CLI interface that requires less time to navigate and master and is simpler to script.

Likewise, each keypress is another insertion point for error. Minimizing the number of characters typed reduces this risk and the need to re-key commands. If we assume an equal chance of error for every keystroke, then Cisco Nexus OS is four times more likely to experience erroneous characters than Brocade Network OS. Correcting errors as they occur requires troubleshooting and re-keying, which is time consuming. In some cases, remediation involves collaboration with additional personnel or support services, driving that time consumption even higher.

Why the number of commands to deploy additional switches is important

Most enterprise IP storage networks are going to scale larger than the 4-node fabric demonstrated in this report. Therefore it is important to understand how easy (or difficult) it is to scale up to larger networks. Brocade VDX 6740 switches can be added as leaves to the topology with as few as seven CLI commands per new switch. Cisco Nexus switches need 43. Adding spine switches has a similar delta, with Cisco requiring nearly five and a half times the number of commands to add another switch.

Adding switches to a fabric is not without risk. The potential impact of that risk may range from lost time, to irritating service outages, to interruption of business continuity, depending on the criticality of business assets leveraging the network. Regardless, the smaller command set of Brocade Network OS has the continual benefit of simplicity of execution and fewer potential points for error insertion into the infrastructure due to miskeying commands.

Brocade IP MAPS

It would be remiss to omit mention of Brocade's IP Monitoring and Alerting Policy Suite (MAPS) as a management tool that simplifies operational administration of a VCS fabric. IP MAPS is not included in the calculation of the complexity ratio because there isn't really anything to compare it to. It is included here as the "icing on the cake", so to speak–yet one more way in which Brocade makes the job of IP storage network implementation and management easier for the enterprise.

MAPS is an optional network health monitor that is supported on all Network OS devices. Available to use immediately out of the box, MAPS can be configured to monitor IP storage traffic on the fabric by protocol (such as NAS or iSCSI). The network or storage administrator can group ports and switches by function to set usage policies and limits or gain at-a-glance performance reporting. The alerting features will identify error types and counts, out-of-range conditions for policy compliance, and inform administrators of issues before they become performance impacting problems.

Conclusion

EMC Isilon NAS and other modern storage systems are redefining the way storage is provisioned. Automation and operational simplicity enables companies to be more nimble as they address the rapidly changing requirements of the modern business world. A robust IP storage network must be just as simple to deploy and manage at scale, or vendors risk their products becoming the complexity bottleneck in the data center.

Brocade VDX switches and VCS fabric compliment systems like Isilon by eliminating the bottlenecks inherent in traditional network deployment processes. Through built-in automation and logic, streamlined command interfaces, and a powerful monitoring and alerting suite, Brocade stripped away the minutiae to deliver a network fabric that is easy to install, straightforward to manage, and simple to scale.

Being four times more efficient to work with than the competition makes deploying an IP storage network with Brocade VDX switches and VCS a logical choice for businesses that need to implement new storage networks or upgrade legacy environments. Add in the bonus of IP MAPS, and supporting enterprise IP storage products on a Brocade-backed network makes business sense.