A Forrester Total Economic Impact™ Study Prepared For Brocade

The Total Economic Impact Of Brocade VCS Fabric Technology

Project Director: Michael Speyer

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FORRESTER®

Headquarters | Forrester Research, Inc.
60 Acorn Park Drive, Cambridge, MA 02140 USA
Tel: +1 617.613.6000 | www.forrester.com

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Executive Summary

In January 2013, Brocade commissioned Forrester Consulting to examine the total economic impact and potential return on investment (ROI) enterprises may realize by deploying Brocade VCS Fabric technology. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of the VCS fabrics on their organizations.

VCS Fabric Technology Lowers Opex And Improves Agility For Service Providers

Our interviews with four existing customers and subsequent financial analysis found that a composite organization based on these companies we interviewed experienced the risk-adjusted ROI, costs, and benefits shown in Table 1 and Figure 1. See Appendix A for a description of the composite organization.

Table 1

Composite Organization Three-Year Risk-Adjusted ROI[1]

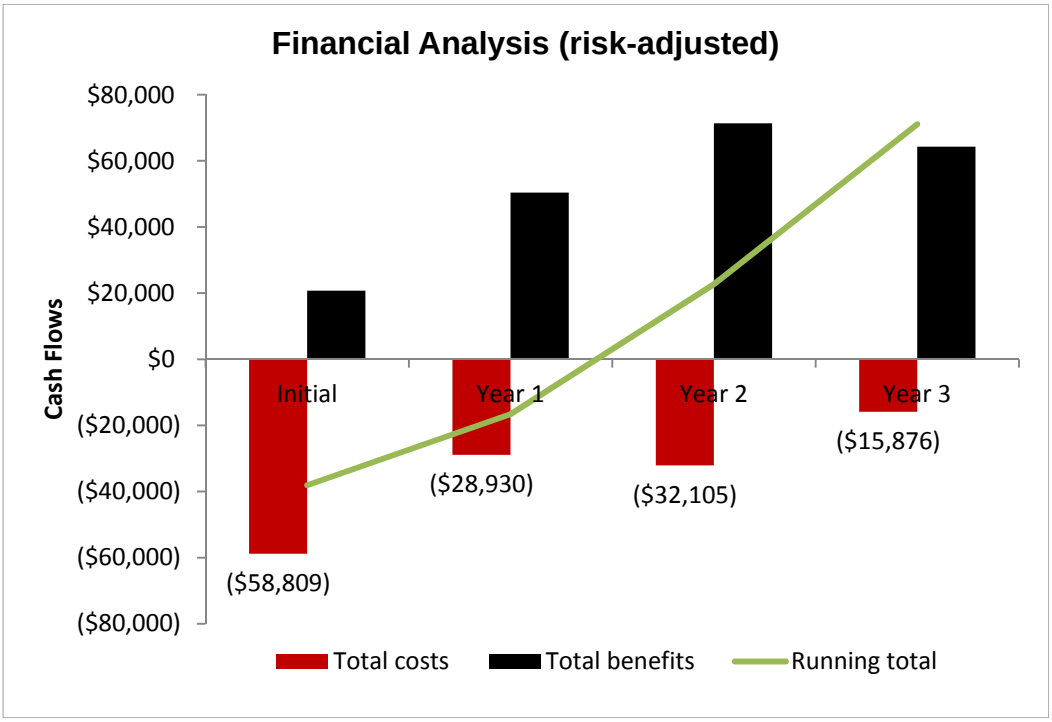
ROI	Payback period	Total benefits (PV)	Total costs (PV)	Net present value
41%	17 months	$173,802	($123,569)	$50,232

Source: Forrester Research, Inc.

- **Benefits.** The risk-adjusted benefits experienced by the composite organization are:
  - **Capital expense avoided of $34,521.** This represents the 30% difference between the cost of upgrading existing legacy network equipment and purchasing Brocade VDX switches with VCS Fabric technology to achieve similar bandwidth capabilities.
  - **Increased IT labor efficiency of $38,563.** This is the cost avoided of hiring additional IT administrators. It represents the difference in the labor effort needed to maintain a meshed, flattened network and a 3-tier network with spanning tree protocol of similar port densities and capacity. It also includes the flexibility of using administrators to support multiple technology silos and the ability to grow overall IT infrastructure capacity without a proportional increase in IT administrators.
  - **Reduction in power consumption of $2,543.** This is the difference in power draw between legacy network equipment and the Brocade VDX switches.
- **Costs.** The risk-adjusted costs experienced by the composite organization are:
  - **Hardware and software acquisition expense of $76,290.** This is the total cost of acquiring five VDX 6720 switches over a three-year period.

- **Hardware and software maintenance expense of $46,120.** This the total three-year cost of next-day hardware support and software maintenance for the VDX switches and VCS Fabric software.
- **Labor for switch deployment of $1,160.** This is the total internal labor expense to deploy the VDX switches.

Figure 1
Costs, Benefits, And Breakeven



Source: Forrester Research, Inc.

Factors Affecting Benefits And Costs

Table 1 illustrates the risk-adjusted financial results that were achieved by the composite organization. The risk-adjusted values take into account any potential uncertainty or variance that exists in estimating the costs and benefits, which produces more conservative estimates. The following factors may affect the financial results that an organization may experience:

- Increased IT labor efficiencies will vary with each company's ability to effectively cross-train its IT administrators in multiple technologies and with IT administrator pay rate.
- Capital expense avoided will depend on the cost of upgrading legacy equipment and with the number and type of VDX switches that are purchased.
- The hardware acquisition expense will vary with number and type of VDX switch purchased.

- Hardware support and software maintenance expense will vary with type of support and maintenance offerings that are purchased.
- The labor expense needed to deploy the VDX switches will vary with the complexity of the deployment and with labor rate.

Disclosures

The reader should be aware of the following:

- The study is commissioned by Brocade and delivered by the Forrester Consulting group.
- Forrester makes no assumptions as to the potential return on investment that other organizations will receive. Forrester strongly advises that readers should use their own estimates within the framework provided in the report to determine the appropriateness of an investment in VDX switches and VCS Fabric technology.
- Brocade reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.
- The customer names for the interviews were provided by Brocade.

TEI Framework And Methodology

Introduction

From the information provided in the interviews, Forrester has constructed a Total Economic Impact™ framework for those organizations considering implementing Brocade's VDX data center switches with VCS Fabric technology (VCS). The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision.

Approach And Methodology

Forrester took a multistep approach to evaluate the impact that VCS can have on an organization (see Figure 2). Specifically, we:

- Interviewed Brocade marketing, sales, and consulting personnel and Forrester analysts to gather data relative to VCS and the marketplace for Ethernet switches that support fabric technologies.
- Interviewed four organizations currently using Brocade's VDX Ethernet switches to obtain data with respect to costs, benefits, and risks.
- Designed a composite organization based on characteristics of the interviewed organizations (see Appendix A).
- Constructed a financial model representative of the interviews using the TEI methodology. The financial model is populated with the cost and benefit data obtained from the interviews as applied to the composite organization.

Figure 2
TEI Approach

Source: Forrester Research, Inc.

Forrester employed four fundamental elements of TEI in modeling Brocade VCS Fabric technology:

1. Costs.
2. Benefits to the entire organization.
3. Flexibility.
4. Risk.

Given the increasing sophistication that service providers have regarding ROI analyses related to IT investments, Forrester's TEI methodology serves the purpose of providing a complete picture of the total economic impact of purchase decisions. Please see Appendix B for additional information on the TEI methodology.

Analysis

Interview Highlights

A total of four interviews were conducted for this study, involving representatives from the following companies (Brocade customers based in the United States):

1. An infrastructure-as-a-service (IaaS) provider that sells primarily through systems integrators and value-added resellers (VARs).
2. An IaaS provider that offers high-performance solutions to enterprises.
3. A service provider that offers a range of IaaS services as well as email, collaboration, and CRM software-as-a-service (SaaS) applications.
4. A large supplier of medical products to physicians and hospitals.

The interviews focused on the challenges they were experiencing in their data center networks and on the benefits they experienced after deploying VDX switches with VCS Fabric software.

Networking Challenges

The companies we interviewed were experiencing a range of challenges in their data center network, primarily stemming from their existing network architecture and limitations of their legacy network equipment. All the companies were experiencing rapid growth in network traffic, which drove them to re-evaluate their network architectures. For the service providers, network scalability, performance, and reliability were essential to supporting business growth and meeting service-level agreements (SLAs).

The challenges that the companies were experiencing included:

- **Network architectures that could not handle changing network traffic patterns.** The legacy 3-tier architectures were designed to handle network traffic that flowed predominantly in a north-south direction. With the introduction of server virtualization, increasing amounts of traffic now flow between servers in an east-west direction. In a 3-tier topology, server-to-server traffic needed to traverse multiple layers of switches, straining switch backplane bandwidth and inter-switch links. In their traditional 3-tier network architectures, the existing architecture became a bottleneck that hampered overall network performance.
- **Inability to scale.** The legacy network equipment that the customers used was limited by its inability to support high densities of 10 Gbs ports and for the network infrastructure to scale accordingly. 10 Gbs port growth was being driven by migrating to 10 Gbs interconnects from the server farm to the network and by converging data

and storage traffic onto a single network. The customers all considered the option of increasing the scale of their 3-tier architectures. However, this approach was considered not to be cost effective, would increase network complexity, and would consume too much of the limited data center floor space. For some customers, floor space constraints were particularly acute.

- **Lengthy convergence times for spanning tree protocol (STP).** Each time new equipment was added to the customers' traditional 3-tier networks, the network would "blip" as STP converged, resulting in poor network performance. This was especially significant for the service providers because it directly affected their customers' experience and the service provider's ability to meet SLAs.

- **Power expense and capacity limitations.** For one service provider, power consumption was the biggest overhead expense. The provider wished to reduce equipment sprawl and to use equipment with lower power consumption. Another company was limited by how much power could be run into its data center. Therefore the company wanted to adopt low-power-consumption equipment that would let it increase the number of switches and still remain within its per-rack power budget.

- **Increasing network scale without increasing operations supports expense.** All the companies we interviewed felt that it would be difficult to significantly scale up their legacy networks without increasing their operations support staff overhead. Although the companies used sophisticated systems management tools, they were seeking ways to lower their network support burden. At the same time, they wished to transform their support staff from specialists (e.g., network operations only) to generalists that could manage many aspects of data center operations. This was important to the service providers, where operations support staff interfaced directly with customers and needed to address a wide range of technical support issues.

New Network Requirements

To overcome the limitations of their network architecture and legacy equipment, the companies had three common requirements:

- **Flattened network architecture.** To support growing east-west traffic volumes and to eliminate STP, the companies wanted to re-architect their network infrastructure by flattening or reducing the number of tiers in their network.

- **Support for high 10 Gbps port densities with scalable network capacity.** To support growing network traffic volumes, the companies wanted cost-effective platforms that offered high 10 Gbs port densities with non-blocking backplanes as a foundation of their network.

- **Simple, smooth expansion path.** The companies needed a simple way to add more capacity to the network without service interruptions. This was especially important to the service providers, where service interruptions could possibly result in financial penalties and unhappy customers.

The companies chose to deploy Brocade's VDX Ethernet switches, which enabled them to build scalable meshed networks using the VCS Fabric technology. Deploying a meshed fabric resulted in flattened networks and elimination of STP.

Qualitative Benefits

After deploying the VDX switches in their data centers, the interviewed companies experienced a variety of qualitative and quantitative benefits. The qualitative benefits include:

- **Predictable network latency and improved overall reliability.** The flattened, meshed network architecture and highly scalable infrastructure resulted in lower, predictable network latency. This was beneficial to the service providers because it allowed them to add more customers while knowing in advance what the effect of customer growth on the network would be. It also helped to ensure that they could meet their SLAs, which had a direct financial impact if they were not met. One service provider observed latency decreasing from 8 milliseconds to sub-millisecond. Another observed "near local disk transfer speeds." For their customers, decreased network latency resulted in near wire-speed VMotion performance.

- **Easily scalable network backbone that enables rapid network growth.** This benefit was experienced by all the companies we interviewed. One company had planned for 40% network growth in three years but experienced 60% growth in six months. Another increased server density from 48 to 72 servers per row because of increased port densities. One interviewee captured what all the customers experienced: "We could easily add capacity to the network because it is a fabric." Compared with the legacy equipment, the VDX switch's small form factor, high 10 Gbs port density, and VCS Fabric technology all contributed to easy network scalability without having to reconfigure the overall topology to accommodate the additional network capacity.

- **Elimination of STP and associated convergence delays.** This benefit results from implementing a meshed network in the network core using VCS Fabric technology, which contributed to improved overall network reliability and predictability.

- **Maintenance costs avoided.** Some companies decommissioned their legacy network gear that carried a higher annual maintenance expense than the Brocade gear. These companies were able to save on the maintenance expense for the decommissioned equipment. This benefit eroded over time as the companies added more capacity to their networks. We note that maintenance costs avoided are potentially a quantifiable financial benefit and can affect the ROI. Because the interviewed companies could not provide us with actual savings numbers, we did not include this in the financial analysis.

The quantitative benefits, which are detailed in the Benefits section include:

- Capital expense avoided on equipment acquisition.

- Improved labor efficiency for IT administrators.

- Reduced power consumption.

Composite Organization

In this TEI study, Forrester has created a composite or reference organization to illustrate the quantifiable costs and benefits, risk, and flexibility of deploying Brocade's VDX switches with VCS Fabric technology. The composite organization was derived from the four user interviews conducted for this study.

The composite organization is a service provider that offers public cloud, hosted private cloud, select SaaS services, as well as traditional managed hosted services. Its customers include enterprises and systems integrators that provide cloud solutions to their customers, and SaaS providers that host their services with the service provider.

The organization's legacy 3-tier network was proving to be an impediment to business growth, and the organization wished to upgrade the network to a flattened architecture using an Ethernet mesh. It also wished to increase overall capacity and lay the foundation for simple, hassle-free capacity expansion. The organization decided to upgrade its network using Brocade's VDX 6720-60 port Ethernet switches, connected in mesh using the VCS Fabric technology. Brocade's switches were chosen because of their 10 Gbs port density, VCS Fabric technology, and price. The organization chose to initially deploy three switches, followed by one additional switch in the following two years. See Appendix A for a full description of the composite organization.

Framework Assumptions

Table 2 provides the model assumptions that Forrester used in this analysis.

Table 2
Model Assumptions

Ref.	Metric	Calculation	Value
A1	IT administrator annual salary		$90,000
A2	Salary overhead multiplier		1.25
A3	Fully loaded IT administrator annual salary	A1*A2	$112,500

Source: Forrester Research, Inc.

The discount rate used in the PV and NPV calculations is 10% and time horizon used for the financial modeling is three years. Organizations typically use discount rates between 8% and 16% based on their current environment. Readers are urged to consult with their respective company's finance department to determine the most appropriate discount rate to use within their own organizations.

Costs

The companies we interviewed experienced the following initial and ongoing costs when deploying and operating their VDX switches:

- Hardware acquisition.
- Maintenance and support for switch hardware and software.

- Labor to deploy the switches.

We did not include the following costs in the analysis:

- Cabling for the switches or purchases of any new equipment racks.
- Labor associated with switch operations. This was not included because the interviewed companies experienced increased IT labor efficiencies, which is treated as a benefit.
- Training expenses for IT operations staff. The interviewed companies found that they were able to deploy and operate the switches without any formal training.

Switch Acquisition Expense

The companies we interviewed purchased a mix of VDX 6720 and VDX 6710 switches. The number of switches purchased initially varied between two and three units and increased thereafter at a variable rate. The switch purchase consists of two components: the hardware and the software license for the VCS Fabric technology.

We assume that our composite organization purchases three VDX 6720-60 port switches for the initial deployment followed by one additional switch in Year 1 and Year 2. The cost for a VDX switch and VCS software license is $16,110. This yields a total switch acquisition expense of $80,550. All pricing was provided to Forrester by Brocade.

Table 3
Switch Hardware And Software Acquisition Expense

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
B1	Number of switches		3	1	1		
B2	Brocade VDX 6720 60port switch + VCS software cost	$16,110	$16,110	$16,110	$16,110		
Bt	VDX switch acquisition expense	B1*B2	$48,330	$16,110	$16,110	$0	
Bto	Total (original)		($48,330)	($16,110)	($16,110)	$0	($80,550)

Source: Forrester Research, Inc.

Hardware Support And Software Maintenance Expense

To model the hardware and software maintenance expense for the composite organization, we assumed the following Brocade service offers: Essential Next-Business-Day Onsite Support for the switch hardware and Essential App Support for software. The prices for these offers are $1,644 for hardware and $1,296 for software annually, for each switch. The

first maintenance expense payment is incurred at the time of the initial switch purchase, and annually thereafter. The total switch maintenance expense is $49,980 (see Table 4). All pricing was provided to Forrester by Brocade.

Table 4
Switch Hardware And Software Maintenance And Support Expense

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
C1	Number of switches to be maintained		3	4	5	5	
C2	Hardware: Essential Next-Business-Day Onsite Support (replacement)	$1,644	$1,644	$1,644	$1,644	$1,644	
C3	Software: Essential App Support 24x7	$1,296	$1,296	$1,296	$1,296	$1,296	
Ct	Annual switch maintenance expense	C1*(C2+C3)	$8,820	$11,760	$14,700	$14,700	
Cto	Total (original)		($8,820)	($11,760)	($14,700)	($14,700)	($49,980)

Source: Forrester Research, Inc.

Labor For Switch Deployment

All the companies we interviewed remarked on the ease and simplicity of deploying the VDX switches. One service provider did its deployment during regular business hours without service disruptions. Another company only required the labor effort equivalent to two administrators working for one day. All the companies commented positively on the level of support they received from Brocade during installation, which certainly contributed to the relatively seamless deployment experience.

For the composite organization, we assume a total of 16 labor hours to deploy three switches for the initial installation. The initial installation is carried out over a period of weeks, allowing for a gradual migration from the legacy infrastructure. Thereafter, we assume the additional switches each take 2 hours for their initial deployment. Assuming a labor rate of $55.15 per hour, the total switch deployment cost is $1,103 (see Table 5).

Table 5
Labor For Switch Deployment

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
D1	Internal labor hours		16	2	2		
D2	Internal labor hourly rate	A3/2,040	$55.15	$55.15	$55.15		
Dt	Labor expense for switch deployment	D1*D2	$882	$110	$110		
Dto	Total (original)		($882)	($110)	($110)	$0	($1,103)

Source: Forrester Research, Inc.

Total Costs

The total costs experienced by the composite organization are $131,633 (see Table 6).

Table 6
Total Costs

Ref.	Cost category	Initial	Year 1	Year 2	Year 3	Total
Bto	VDX switch acquisition expense	($48,330)	($16,110)	($16,110)	$0	($80,550)
Cto	Annual switch maintenance expense	($8,820)	($11,760)	($14,700)	($14,700)	($49,980)
Dto	Labor expense for switch deployment	($882)	($110)	($110)	$0	($1,103)
	Total costs (original)	($58,032)	($27,980)	($30,920)	($14,700)	($131,633)

Source: Forrester Research, Inc.

Benefits

The companies interviewed experienced the following financially quantifiable benefits as a result of deploying Brocade's VDX switches with VCS Fabric technology in their network core:

- Capital expense avoided on equipment acquisition.
- Improved labor efficiency for IT administrators.
- Reduced power consumption.

Capital Expense Avoided

All the companies we interviewed reported that deploying VDX switches was more cost-effective than upgrading the line cards in their legacy equipment in order to achieve comparable 10 Gbs port densities and capacity. The actual savings varied, depending on the each customer's legacy equipment and VDX deployment. The companies reported capital expense avoided that varied between 30% and 40%.

For the composite organization, we assume an average capital expense savings of 30%. We also assume that the organization purchases three VDX 6720-60 port switches for the initial deployment followed by one additional switch in Year 1 and Year 2. The cost for a VDX switch and VCS software license is $16,110. Using this data, the composite organization had capital expense avoided of $34,521 (see Table 7). Note that all pricing data for the VDX switches was provided to Forrester by Brocade.

Table 7
Capital Expense Avoided For VDX Switch Acquisition

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
E1	Number of switches purchased		3	1	1	0	
E2	Brocade VDX 6720 hardware + VCS software acquisition expense	E1*$16,110	$48,330	$16,110	$16,110	$0	
E3	Average percentage of capex savings compared with upgrading prior installed equipment		30%	30%	30%	30%	
Et	Capital expense avoided	E2*E3/(1-E3)	$20,713	$6,904	$6,904	$0	
Eto	Total (original)		$20,713	$6,904	$6,904	$0	$34,521

Source: Forrester Research, Inc.

Improved IT Administrator Labor Efficiency

Three of the four companies that we interviewed reported increased labor productivity after deploying their VDX switches. The improved labor efficiency manifested as "doing more with the same"; that is, after increasing their network capacity in response to growth in network traffic, the companies were able to serve their customers or users without increasing IT support staff count. The companies attributed this to the overall stability and reliability of their VDX infrastructure and ease of use, which contributed to a lower overall maintenance burden. This freed up the time of the administrators and allowed them to become proficient in managing and supporting other technologies, such as storage. The labor savings that were reported to Forrester varied from 25% to 75%. This wide range is attributable to the unique differences in each company's network and the growth that each company was experiencing.

For the composite organization, we assumed that it employs two full-time network support staff and that labor productivity increases from 20% in Year 1 to 30% in years 2 and 3. Assuming a fully burdened salary of $112,500, the composite organization experiences a total labor productivity improvement of $180,000 (see Table 8).

Table 8
Increased IT Labor Productivity

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
F1	Number of FTEs managing network prior to upgrade			2	2	2	
F2	Estimated labor productivity improvement			20%	30%	30%	
F3	Average fully loaded IT operations manager salary	A3		$112,500	$112,500	$112,500	
Ft	Increased IT labor efficiency	F1*F2*F3	$0	$45,000	$67,500	$67,500	
Fto	Total (original)		$0	$45,000	$67,500	$67,500	$180,000

Source: Forrester Research, Inc.

Reduced Energy Expense

The companies that we interviewed reported that their VDX switches consumed significantly less power than the legacy equipment installed in their network cores. The VDX switches achieved power savings that varied from 60% to 80% compared with the legacy switches.

For the composite organization, we assume two legacy switches that consumed 1,500W each and that these are decommissioned when the VDX switches are deployed. The VDX switches consume 330W each, and there are three switches in Year 1, with one additional switch in years 2 and 3. This yields a total energy savings of $3,223 (see Table 9).

Table 9
Reduction In Power Consumption

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
G1	Average power consumption for previous backbone switches (W)	2*1,500W		3,000	3,000	3,000	
G2	Power consumption of Brocade infrastructure (W)	(Total of all VDX switches (E1))*330W		990	1,320	1,650	
G3	Reduction in power draw (W)	G1-G2		2,010	1,680	1,350	
G4	Operating hours per year	365*24		8,760	8,760	8,760	
G5	Annual reduction in data center switch energy consumption (kWh)	G3*G4/1,000		17,608	14,717	11,826	
G6	Energy costs ($/kWh)			$0.073	$0.073	$0.073	
Gt	Reduction power consumption	G5*G6	$0	$1,285	$1,074	$863	
Gto	Total (original)		$0	$1,285	$1,074	$863	$3,223

Source: Forrester Research, Inc.

Total Benefits

The total benefits experienced by the composite organization are $217,744 (see Table 10).

Table 10
Total Benefits

Ref.	Benefit category	Initial	Year 1	Year 2	Year 3	Total
Eto	Capital expense avoidance	$20,713	$6,904	$6,904	$0	$34,521
Fto	Increased IT labor efficiency	$0	$45,000	$67,500	$67,500	$180,000
Gto	Reduction power consumption	$0	$1,285	$1,074	$863	$3,223
	Total benefits (original)	$20,713	$53,190	$75,479	$68,363	$217,744

Source: Forrester Research, Inc.

Flexibility

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for some future additional investment. This provides an organization with the "right" or the ability to engage in future initiatives but not the obligation to do so. There are multiple scenarios in which a customer might choose to implement Brocade's VDX switches and later realize additional uses and business opportunities. Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix B).

The service providers that we interviewed were all planning to expand their networks in line with business growth and anticipated increasing their investments in Brocade's VDX switches. Forrester expects the increases in IT labor efficiencies and power savings to extend to the investments in new VDX switches.

Risk

Forrester defines two types of risk associated with this analysis: implementation risk and impact risk. "Implementation risk" is the risk that a proposed investment in VDX switches may deviate from the original or expected requirements, resulting in higher costs than anticipated. "Impact risk" refers to the risk that the business or technology needs of the organization may not be met by the investment in VDX switches, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for cost and benefit estimates.

Quantitatively capturing investment and impact risk by directly adjusting the financial estimates results in more meaningful and accurate estimates and a more accurate projection of the ROI. In general, risks affect costs by raising the original estimates, and they affect benefits by reducing the original estimates. The risk-adjusted numbers should be taken as "realistic" expectations since they represent the expected values considering risk.

The following implementation risks that affect costs are identified as part of this analysis:

- Hardware support and software maintenance expense will vary with type of support and maintenance offerings that are purchased.

- Labor expense for switch deployment will vary with the number of switches deployed and with the complexity of migrating from the legacy equipment to the VDX switches.

The following impact risks that affect benefits are identified as part of the analysis:

- Increased IT labor efficiencies will vary with each company's ability to effectively cross-train its IT administrators in multiple technologies and with IT administrator pay rate.
- Reduction in power consumption will vary with the difference between the power draw of the legacy equipment and the VDX switches.

Risks that are not quantified in this analysis but will affect the ROI include:

- Capital expense avoided will depend on the cost of upgrading legacy equipment and on the number and type of VDX switches that are purchased.
- Total infrastructure expense will vary with the number and type of VDX switches purchased and with the pricing that each buyer receives.

Table 11 shows the values used to adjust for risk and uncertainty in the cost and benefit estimates. The TEI model uses a triangular distribution method to calculate risk-adjusted values. To construct the distribution, it is necessary to first estimate the low, most likely, and high values that could occur within the current environment. The risk-adjusted value is the mean of the distribution of those points. Readers are urged to apply their own risk ranges based on their own degree of confidence in the cost and benefit estimates.

Table 11
Cost And Benefit Risk Adjustments

Costs	Low	Most likely	High	Mean
Annual switch maintenance expense	80%	100%	103%	94%
Labor expense for switch deployment	80%	100%	103%	94%
Benefits	**Low**	**Most likely**	**High**	**Mean**
Increased IT labor efficiency	100%	100%	125%	108%
Reduction power consumption	100%	100%	125%	108%

Source: Forrester Research, Inc.

Financial Summary

The financial results calculated in the Costs and Benefits sections can be used to determine the return on investment, net present value, and payback period for the organization's investment in VDX switches and VCS Fabric technology. These are shown in Table 12 below.

Table 12
Cash Flow — Non-Risk-Adjusted

Cash flow — Original estimates						
	Initial	Year 1	Year 2	Year 3	Total	Present value
Costs	($58,032)	($27,980)	($30,920)	($14,700)	($131,633)	($120,067)
Benefits	$20,713	$53,190	$75,479	$68,363	$217,744	$182,808
Net benefits	($37,319)	$25,209	$44,558	$53,663	$86,111	$62,741
ROI	52%					
Payback period (months)	15.3					

Source: Forrester Research, Inc.

Table 13 below shows the risk-adjusted ROI, NPV, and payback period values. These values are determined by applying the risk-adjustment values from Table 11 in the Risk section to the cost and benefits numbers in tables 6 and 10.

Table 13
Cash Flow — Risk-Adjusted

Cash flow — Risk-adjusted estimates						
	Initial	Year 1	Year 2	Year 3	Total	Present value
Costs	($58,809)	($28,930)	($32,105)	($15,876)	($135,720)	($123,569)
Benefits	$20,713	$50,413	$71,364	$64,262	$206,751	$173,802
Net benefits	($38,096)	$21,483	$39,259	$48,386	$71,031	$50,232
ROI	41%					
Payback period months	17.1					

Source: Forrester Research, Inc.

Brocade VDX Switch And VCS Fabric Technology: Overview

Enterprises and service providers are migrating to highly virtualized, cloud-based service models to accelerate new service delivery and drive innovation while also reducing costs. While the business justification for moving to cloud-style IT deployments is compelling, cloud computing imposes new requirements on the data center network infrastructure. Conventional hierarchical data center network topologies, originally designed to support client/server traffic, can't meet the automation, efficiency, and scalability requirements necessary to realize the full benefits of a cloud environment.

To address these critical network requirements, Brocade pioneered Ethernet fabrics with the delivery of Brocade VCS Fabric technology in 2010. Brocade VCS fabrics are elastic, self-forming, and self-healing, allowing administrators to concentrate on service delivery rather than administration of the network while significantly reducing ongoing operating costs. VCS also delivers load-balanced, multipathing at layers 1 to 3 for a highly efficient and resilient infrastructure. VCS fabrics scale more easily and efficiently than a traditional LAN architecture by scaling-out, eliminating the need to scale-up devices at each layer of a traditional data center LAN.

Appendix A: Composite Organization Description

In this TEI study, Forrester has created a composite or reference organization to illustrate the quantifiable costs and benefits, risk, and flexibility of deploying Brocades' VCS Fabric technology. The composite organization was derived from the four user interviews conducted for this study.

The composite organization is a service provider that offers public cloud, hosted private cloud, select SaaS services, as well as traditional managed hosted services. Its customers are enterprises, systems integrators that provide cloud solutions to their customers, and SaaS providers that host their services with the service provider.

Challenges

The organization's revenues grew 30% over the previous 12 months, and it expects similar growth rates for the next 12 months. As the organization grew, it added capacity to its network, server, and storage infrastructure. However, it had reached the point where its network architecture would no longer support its growth, and the organization faced the following interrelated challenges.

- **Network capacity constraints.** The growth in servers and storage subsystems had maxed out the company's Ethernet infrastructure, which was cobbled together from multiple 1 GbE links. The organization wanted to upgrade to a 10 GbE network and have a growth path toward higher bandwidths.
- **Strict capital budgets,** The cost of upgrading line cards for the existing network infrastructure was prohibitive and would not deliver the port densities that the organization wanted.
- **Floor space constraints.** The data center was quickly running out of floor space, and the organization needed to reduce equipment sprawl.

At the same time, the organization wished to reduce network latency and eliminate the STP from its network core. These requirements were driven by both competitive and technical needs. Specifically, STP introduced unwanted "blips" in network performance that could affect thousands of customers. Noting the fierce competition and relative ease of switching providers, that organization did not want the performance of its infrastructure to give customers a reason to change providers.

Requirements

The organization decided to upgrade its network equipment in a rip-and-replace operation. To allow for future business growth and overcome the challenges that it had with its network, the organization required that the new network architecture and underlying infrastructure:

1. Scale easily and without business disruption. This meant eliminating STP and supporting high port densities, especially for 10 Gbs ports.
2. Maximize customer performance. This implied delivering what appeared to customers as a "zero latency" experience, especially when moving virtual machines.

3. Maintain or reduce the labor expense associated with infrastructure operations and customer support. The organization wanted a solution that would simplify operations management.

4. Maximize floor space use. To achieve this, infrastructure needed to support high port densities.

At the same time, the organization decided to eliminate the dedicated Fibre Channel network used to support the storage subsystems and move all storage network traffic onto the IP backbone. The elimination of STP and the move from Fibre Channel to an all IP network would require network switches that could enable a converged network with a flat network architecture.

Appendix B: Total Economic Impact™ Overview

Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

The TEI methodology consists of four components to evaluate investment value: benefits, costs, risks, and flexibility.

Benefits

Benefits represent the value delivered to the user organization — IT and/or business units — by the proposed product or project. Often product or project justification exercises focus just on IT cost and cost reduction, leaving little room to analyze the effect of the technology on the entire organization. The TEI methodology and the resulting financial model place equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization. Calculation of benefit estimates involves a clear dialogue with the user organization to understand the specific value that is created. In addition, Forrester also requires that there be a clear line of accountability established between the measurement and justification of benefit estimates after the project has been completed. This ensures that benefit estimates tie back directly to the bottom line.

Costs

Costs represent the investment necessary to capture the value, or benefits, of the proposed project. IT or the business units may incur costs in the form of fully burdened labor, subcontractors, or materials. Costs consider all the investments and expenses necessary to deliver the proposed value. In addition, the cost category within TEI captures any incremental costs over the existing environment for ongoing costs associated with the solution. All costs must be tied to the benefits that are created.

Risk

Risk measures the uncertainty of benefit and cost estimates contained within the investment. Uncertainty is measured in two ways: 1) the likelihood that the cost and benefit estimates will meet the original projections, and 2) the likelihood that the estimates will be measured and tracked over time. TEI applies a probability density function known as

"triangular distribution" to the values entered. At minimum, three values are calculated to estimate the underlying range around each cost and benefit.

Flexibility

Within the TEI methodology, direct benefits represent one part of the investment value. While direct benefits can typically be the primary way to justify a project, Forrester believes that organizations should be able to measure the strategic value of an investment. Flexibility represents the value that can be obtained for some future additional investment building on top of the initial investment already made. For instance, an investment in an enterprisewide upgrade of an office productivity suite can potentially increase standardization (to increase efficiency) and reduce licensing costs. However, an embedded collaboration feature may translate to greater worker productivity if activated. The collaboration can only be used with additional investment in training at some future point in time. However, having the ability to capture that benefit has a present value that can be estimated. The flexibility component of TEI captures that value.

Appendix C: Glossary

Discount rate: The interest rate used in cash flow analysis to take into account the time value of money. Although the Federal Reserve Bank sets a discount rate, companies often set a discount rate based on their business and investment environment. Forrester assumes a yearly discount rate of 10% for this analysis. Organizations typically use discount rates between 8% and 16% based on their current environment. Readers are urged to consult their respective organization to determine the most appropriate discount rate to use in their own environment.

Net present value (NPV): The present or current value of (discounted) future net cash flows given an interest rate (the discount rate). A positive project NPV normally indicates that the investment should be made, unless other projects have higher NPVs.

Present value (PV): The present or current value of (discounted) cost and benefit estimates given at an interest rate (the discount rate). The PV of costs and benefits feed into the total net present value of cash flows.

Payback period: The breakeven point for an investment. The point in time at which net benefits (benefits minus costs) equal initial investment or cost.

Return on investment (ROI): A measure of a project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits minus costs) by costs.

A Note On Cash Flow Tables

The following is a note on the cash flow tables used in this study (see the example table below). The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1. Those costs are not discounted. All other cash flows in Years 1 through 3 are discounted using the discount rate (shown in Framework Assumptions section) at the end of the year. Present value (PV) calculations are calculated for each total cost and benefit estimate. Net present value (NPV) calculations are not calculated until the summary tables and are the sum of the initial investment and the discounted cash flows in each year.

Table [Example]
Example Table

Ref.	Category	Calculation	Initial cost	Year 1	Year 2	Year 3	Total

Source: Forrester Research, Inc.

Appendix D: Endnotes

[1] Forrester risk-adjusts the summary financial metrics to take into account the potential uncertainty of the cost and benefit estimates. For more information on Risk, please see page 16.