

A Forrester Total Economic
Impact™ Study
Commissioned By
Brocade

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The Total Economic Impact™ Of Brocade Data Center Fabrics

Cost Savings And Business Benefits
Enabled By Data Center Fabrics
Deployed With VDX Switches

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Executive Summary

Brocade commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying Brocade Data Center Fabrics with VDX switches. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Brocade Data Center Fabrics deployed with VDX Switches on their organizations.

To better understand the benefits, costs, and risks associated with an implementation of Brocade Data Center Fabrics deployed with VDX Switches, Forrester interviewed three existing customers with multiple years of experience using VDX Switches. Specifically, these customers had deployed Brocade VDX switches in core, aggregation and top-of-rack applications in the data center.

Prior to deploying Brocade Data Center Fabrics, the customers' data center LANs had legacy three-tier switching architectures. A variety of factors including the architecture of their networks, limitation in overall network traffic handling capacity and age of the network hardware motivated them to re-architect their networks. Specifically, they sought to simplify their network topologies, increase overall network capacity, and lower their network operations expenses.

With Brocade Data Center Fabrics, the interviewed customers were able lower their network operations expense, reduce the amount of unplanned network downtime and easily add new VDX switches to their networks with minimal labor. Brocade's Data Center Fabrics deployed with VDX Switches enabled the interviewed customers to implement their planned network architectures, which in turn positioned them to meet their current and future business needs.

BROCADE DATA CENTER FABRICS DEPLOYED WITH VDX SWITCHES LOWER NETWORK OPERATIONS EXPENSE AND INCREASE NETWORK AGILITY

Our interviews with three existing customers and subsequent financial analysis found that a composite organization based on these interviewed organizations experienced the risk-adjusted ROI, benefits, and payback period shown in Figure 1.¹ See Appendix A for a description of the composite organization.

Brocade Data Center Fabrics deployed with VDX switches can help organizations lower their overall network operations expense.

The total three-year costs and benefits for a composite organization, based on customer interviews, are:

- **Total costs: \$878,343.**
- **Total benefits: \$1,325,629.**

FIGURE 1

Financial Summary Showing Three-Year Risk-Adjusted Results

**ROI:
51%**

**NPV
\$447,285**

**Payback:
20 months**

Source: Forrester Research, Inc.

- › **Benefits.** The composite organization experienced the following risk-adjusted benefits that represent those experienced by the interviewed companies:
 - **Reduction in labor effort needed for network operations of \$440,639.** This benefit is a result of many factors including improved network stability and reliability, the ability to perform in-service-software-updates without bringing the network down, and by being able to manage the VDX switches as a single entity.
 - **Reduction in labor effort needed to add infrastructure to the network of \$10,706.** This benefit is a result of the VDX switches' ability to self-configure after being connected to a fabric.
 - **Reduction in unplanned network downtime events of \$874,284.** This represents reclaimed labor hours as a result of fewer unplanned network downtime events.
- › **Costs.** The composite organization experienced the following risk-adjusted costs:
 - **Hardware, software and maintenance acquisition expense of \$831,023.** This represents the cost to acquire four Brocade VDX 8770 chassis switches, 50 VDX 6740 fixed switches, associated software and three years' of next business day on-site support.
 - **Internal labor costs for network planning of \$43,540.** This expense associated with re-architecting and designing the new local area network.
 - **Training fees of \$3,780.** This is cost to send three network engineers or administrators on training for the Brocade VDX switches.

Disclosures

The reader should be aware of the following:

- › The study is commissioned by Brocade and delivered by Forrester Consulting. It is not meant to be used as a competitive analysis.
- › Forrester makes no assumptions as to the potential ROI that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the report to determine the appropriateness of an investment in Brocade VDX switches.
- › 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.
- › Brocade provided the customer names for the interviews but did not participate in the interviews.

TEI Framework And Methodology

INTRODUCTION

From the information provided in the interviews, Forrester has constructed a Total Economic Impact (TEI) framework for those organizations considering implementing Brocade Data Center Fabrics deployed with VDX Switches. The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision, to help organizations understand how to take advantage of specific benefits, reduce costs, and improve the overall business goals of winning, serving, and retaining customers.

APPROACH AND METHODOLOGY

Forrester took a multistep approach to evaluate the impact that Brocade Data Center Fabrics deployed with VDX Switches can have on an organization (see Figure 2). Specifically, we:

- › Interviewed Brocade marketing, sales, and/or consulting personnel, along with Forrester analysts, to gather data relative to VDX switches and the marketplace for VDX switches.
- › Interviewed three organizations currently using Brocade VDX 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 interview[s] 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.
- › Risk-adjusted the financial model based on issues and concerns the interviewed organizations highlighted in interviews. Risk adjustment is a key part of the TEI methodology. While interviewed organizations provided cost and benefit estimates, some categories included a broad range of responses or had a number of outside forces that might have affected the results. For that reason, some cost and benefit totals have been risk-adjusted and are detailed in each relevant section.

Forrester employed four fundamental elements of TEI in modeling Brocade VDX switches service: benefits, costs, flexibility, and risks.

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

FIGURE 2
TEI Approach



Source: Forrester Research, Inc.

Analysis

INTERVIEW HIGHLIGHTS

For this study, Forrester conducted a total of three interviews with representatives from the following companies:

- › **A global security and aerospace company.** The company had over 100,000 employees. We spoke to the deputy chief architect for network services. The company uses Brocade's Data Center Fabrics deployed with VDX Switches in its three datacenters to enable a flat, multi-domain network.
- › **A technology contractor that provides services to government departments.** The company has over 10,000 employees. We spoke with the senior network engineer who is responsible for daily network operations. The company uses Brocade's VDX switches in its data centers and campus.
- › **A provider of dedicated, hybrid, and cloud infrastructure-as-a-service (IaaS).** The company targets mid-market companies and departments or business units within larger enterprises. We spoke to the CEO and senior VP of technology services. The company uses a single infrastructure to enable all of its network services, which are powered by Brocade's VDX switches.

“Brocade has the engineering mindset, roadmaps that are believable and are open to discussion for solving problems”

~ Senior VP Of Technology Services, IaaS provider.

Situation

All of the companies we interviewed had legacy 3-tier network architectures in their datacenters prior to deploying Brocade VDX switches. Two of the organizations had adopted Brocade VDX switches up to 4 years prior to the interviews. The third was completing a multi-years upgrade of its entire network which had been built on equipment that was beyond end-of-life. The interviewed organizations collectively experienced a wide range of challenges that drove them to re-architect their network and power them with Brocade's VDX switches. These included:

- › **Limitations of three-tier network architectures.** Legacy three-tier architectures presented numerous challenges including inability to scale cost effectively, inability to handle growing volumes of east-west traffic in the datacenter, and inefficient utilization of network hardware. For the IaaS provider, it needed to deploy a flexible architecture where network operations could be automated in order to keep its costs down and provide the network services that its business called for. The enterprise networks had similar challenges in that they needed to scale up while keeping network operations expense under control.
- › **Inability to scale to meet growing and changing network traffic demands.** There were numerous factors behind changing network traffic patterns and overall traffic growth. For example, the enterprise networks were deploying increasing numbers of servers in their data centers that required switches that offered high density 10GbE connectivity and 40GbE trunks. Bandwidth limitations with existing networks affected server backups, and diskless workstation performance was comprised due to the intense data needs at startup. The enterprises also wanted to position their networks to support future private cloud deployments. These and other factors required the enterprise network operators to re-architect their networks, and introduce simplified network topologies.
- › **Contain network operations supports expense while increasing network scale.** 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.

Solution

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

- › **Simplified network architecture.** To support growing east-west traffic volumes and eliminate STP, the companies wanted to re-architect their network infrastructure by simplifying or reducing the number of tiers in their network.
- › **Support for high 10 and 40 GbE port densities with scalable network capacity.** To support growing network traffic volumes, the companies wanted cost-effective platforms that offered high 10 and 40 GbE port densities with non-blocking backplanes as a foundation of their network.
- › **A 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.
- › **Highly reliable network hardware.** While all the interviewed companies had extensive redundancy built into their networks, they wanted equipment that would minimize both planned and unplanned network downtime.

The companies chose to deploy Brocade's VDX Ethernet switches, which enabled them to build scalable fabric networks. Deploying a meshed fabric resulted in simplified networks and the VDX switches allowed for easy addition of new switches to the fabrics. Depending on each company's situation, the deployed a mix of VDX 8770 chassis switches in the core and aggregation layers, and VDX 6740 switches in the campus and top-of-rack.

Results

The interview revealed that [the following are examples:

- › **Reduction in power and cooling.** Both the enterprise network operators reported a decrease in power consumption after deploying Brocade VDX switches. One interview aptly described the reduction in relative terms, because power consumption needs be compared to the number and volume of network services that are supported by the switch infrastructure. This interviewee estimated a 33%-40% power reduction for the same net amount of network service that was being delivered relative to their previous network.
- › **Improved network reliability and stability.** All the interviewees commented on the stability and reliability of the VDX switches. According to the Senior VP of technology services for the IaaS company, "we have done in-service-software-upgrade while in service, with zero loss", which "boosts our confidence in the platform". The deputy chief architect for network services described the reliability improvement as "dramatic", and that "the LAN has been the most reliable technical silo of the new technical architectures".
- › **Improved network performance.** The interviewed companies adopted numerous tactics that were enabled by the VDX switches to increase overall network performance. These included introducing higher densities of 10 GbE and 40GbE ports, using fully meshed fabrics and increasing the overall network traffic carrying capacity. The area of backups was particularly noteworthy. One company noted that backups "can be managed easily by upping the bandwidth". Another company now has 85% of its storage traffic running on IP over Ethernet network, which comes at a "huge price advantage."

"As far as random failures while in operation, they have been the most reliable switches we ever had. I'm very, very pleased in that respect".

~ Deputy chief architect for network services, global security and aerospace company

- › **Fewer network operating systems to support.** After deploying the Brocade VDX switches, one company reduced the number and versions of network operating systems that the needed to support for twelve to two.

Other benefits that were described to us included improved network scalability, the flexibility to use 10-, 40- and 100 GbE ports on either fiber or copper, and the ability deploy any compute infrastructure without having to configure custom ports.

COMPOSITE ORGANIZATION

The composite organization is a large industrial firm with 50,000 employees and locations throughout the USA. The organization's IT department provides network services to its internal users. The organization has a wide variety of applications that run over the network, including ERP, engineering design and simulation, video and diskless workstations. The data center network originally had three-tier architecture. Over the previous few years, the organization re-architected its network. It eliminated the 3-tier architecture in its datacenters, and had replaced it with simplified 2-tier architecture. The simplified network was powered by Brocade switches using data center fabrics, specifically to handle growing amounts of east-west traffic that was generated by user applications. There was still some legacy equipment in place that ran side-by-side with the Brocade gear. The Brocade switches were primarily used in top-of-rack applications, with some switches at the aggregation layer.

Due to the increasing proliferation and demands of data intensive and delay sensitive applications, the organization needed to increase the overall bandwidth of its datacenter network and to adjust bandwidth within and between the fabrics. The organization was also building out its compute cloud, with the eventual goal of user self-service for compute and associated network loads. To support its future requirements, the organization embarked on a refresh of its datacenter network switches. This would require deploying top-of-rack and aggregation switches that supported high densities of 10GbE and 40GbE connections. The organization wished to minimize disruption during the upgrade, minimize the labor effort that would be needed to configure, deploy and maintain the network in the future, and to position the network to deliver the services that would be needed in the future.

BENEFITS

The composite organization experienced a number of quantified benefits in this case study:

- › Reduction in labor effort needed for network operations.
- › Reduction in labor effort needed to add infrastructure to the network.
- › Reduction in unplanned network downtime events.

Assumptions for salaries and hourly rates may be found in Table 11.



Reduction In Labor Effort Needed For Network Operations

The interviewed companies observed a number of factors which in aggregate reduced their overall network operations expense. These include increased network stability and reliability, the ability to perform in-service-software-updates without bringing the network down, and by being able to manage the VDX switches as a single entity. One interviewee noted that “the whole fabric ability that Brocade has, the manner in which that saved time and money is in designing complex connectivity models for different classes of hardware”. After introducing the Brocade Data Center Fabrics deployed with VDX Switches in response to changing business or network needs, the companies were able to serve their customers or end-users without increasing IT support staff count, or in some instance reducing the network support staff count.

To model the value of “doing more with less,” we assume that the composite organization needed six FTEs to manage the network prior to its re-architecture and upgrade. After deploying the VDX Switches, the number of

“The way Brocade VDX switches implements certain features is simple; training is easier and debugging is faster.”

~ Senior VP Of technology services, IaaS provider

FTEs needed to operate and maintain the network was reduced by 25%. Assuming a fully loaded annual salary of \$131,250, the total 3-years labor savings is \$690,625.

The interviewed organizations provided us with a range of network operations improvements, and the savings achieved depended on numerous factors including the use of automation, network size and network complexity. We risk adjust our estimates downward by 10% to reflect these variations, and variations in network engineer salaries. This yields a three-year labor savings of \$531,563 (see Table 1).

TABLE 1
Reduction In Labor Effort Needed For Network Operations

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
A1	Number of FTEs needed before deploying Brocade VDX switches			6			
A2	Percentage reduction in labor requirement			25%			
A3	Network engineer fully loaded annual salary			\$131,250			
At	Reduction in labor effort needed for network operations	$A1 \cdot A2 \cdot A3$	\$0	\$196,875	\$196,875	\$196,875	\$590,625
	Risk adjustment	↓10%					
Atr	Reduction in labor effort needed for network operations (risk-adjusted)		\$0	\$177,188	\$177,188	\$177,188	\$531,563

Source: Forrester Research, Inc.



Reduction In Labor Effort Needed To Add Infrastructure To The Network

All the companies that we interviewed commented on the ease and simplicity of adding new switches to an existing fabric, due to the switches ability to self-configure when connected to a fabric. The labor effort required to deploy a VDX switch amounted to little more than mounting it in the rack, plugging in the cables and turning it on. No labor was required to configure any aspect of the switch. We evaluate this benefit separately from the reduction in labor effort for network operations, because adding infrastructure is usually a one-time task and not a continuous day-to-day operation.

For the composite organization, we assume that it will deploy a total 54 Brocade VDX switches, and that 11 switches (20% of the total) are deployed in the Initial period to establish the foundation of the network. Subsequently in Year 1, the remaining 43 switches are deployed. It's in this time period when the labor savings are realized. We further assume that it takes eight hours to deploy a legacy switch and two hours for a Brocade VDX switch. Assuming a network engineer hourly rate of \$50.48, the total labor saving are \$13,085.

Due to variances in the actual time needed to deploy a new switch and labor rates, we risk adjust the estimate downward by 10%, yielding a 3-year labor savings of \$11,776 (see Table 2).

TABLE 2
Reduction In Labor Effort Needed To Add Infrastructure To The Network

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
B1	Total number of Brocade VDX switches to be deployed	54					
B2	Percentage deployed after initial rollout	54*80%		43			
B3	Time needed to install a legacy switch (hours)	8		8			
B4	Time needed to install a Brocade switch (hours)	2		2			
B5	Network engineer average hourly rate			\$50.48			
Bt	Reduction in labor effort needed to add infrastructure to the network	$B2*(B3-B4)*B5$	\$0	\$13,085	\$0	\$0	\$13,085
	Risk adjustment	↓10%					
Btr	Reduction in labor effort needed to add infrastructure to the network (risk-adjusted)		\$0	\$11,776	\$0	\$0	\$11,776

Source: Forrester Research, Inc.



Reduction In Unplanned Network Downtime Events

Because of the increased reliability and stability of the Brocade VDX switches, the interview companies experienced a decrease in unplanned network downtime events. In one instance, a company had experienced downtime with six of its legacy switches over a six month period, which caught the attention of senior management. Another company was experiencing one event every four to six months, which was reduced to one event every 18 months after deploying Brocade VDX switches. The same company mentioned that the number of employees affected by network downtime events was reduced by 80% - 90%.

For the composite organization, we assume that it experienced two unplanned downtime events annually. This is reduced by 67% (two thirds) after deploying Brocade VDX switches. Assuming an average downtime duration of 52 minutes, the 3-year value of downtime saved is \$1.2 million.

There are multiple factors that can affect the value of downtime saved. These include the number of users effected, the percentage of avoided downtime that is captured as productive work and average hourly pay rates. To account for variations in these factors, we risk-adjusted the downtime downward by 10%, yielding a three-year savings of \$1 million (see Table 3). For this benefit we assume 100% of downtime saved is captured as productive time for the affect employees.

TABLE 3
Reduction In Unplanned Network Downtime Events

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
C1	Number of network downtime events prior to Brocade annually			2			
C2	Percentage reduction in downtime			67%			
C3	Duration of downtime (hours)	52/60		0.87			
C4	Number of users affected			18,000			
C5	FTE average hourly rate			\$37.56			
Ct	Reduction in unplanned network downtime events	$C1 * C2 * C3 * C4$	\$0	\$390,625	\$390,625	\$390,625	\$1,171,875
	Risk adjustment	↓10%					
Ctr	Reduction in unplanned network downtime events (risk-adjusted)		\$0	\$351,563	\$351,563	\$351,563	\$1,054,688

Source: Forrester Research, Inc.

Total Benefits

Table 4 shows the total of all benefits across the three areas listed above, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total benefits to be a PV of more than \$1.3 million.

TABLE 4
Total Benefits (Risk-Adjusted)

Ref.	Benefit Category	Initial	Year 1	Year 2	Year 3	Total	Present Value
Atr	Reduction in labor effort needed for network operations	\$0	\$177,188	\$177,188	\$177,188	\$531,563	\$440,639
Btr	Reduction in labor effort needed to add infrastructure to the network	\$0	\$11,776	\$0	\$0	\$11,776	\$10,706
Ctr	Reduction in unplanned network downtime events	\$0	\$351,563	\$351,563	\$351,563	\$1,054,688	\$874,284
	Total benefits (risk-adjusted)	\$0	\$540,526	\$528,750	\$528,750	\$1,598,026	\$1,325,629

Source: Forrester Research, Inc.

COSTS

The composite organization experienced a number of costs associated with the Brocade VDX switches:

- › Hardware acquisition and maintenance expense.
- › Internal labor costs for planning.
- › Training fees.

These represent the mix of internal and external costs experienced by the composite organization for initial planning, implementation, and ongoing maintenance associated with the solution.



Hardware, Software, And Maintenance Acquisition Expense

For the composite organization, we assume it purchases 50 VDX 6740 fixed switches and four VDX 8770 chassis switches. The switches are configured for a total of 372 40 GbE ports; 1,200 10 GbE ports; and 560 1 GbE ports. The composite organization also purchases three-year, next-business-day onsite support. The total acquisition expense is \$831,023 (see Table 5).

We do not risk-adjust this cost, as these are actual costs that were supplied to Forrester by Brocade.

TABLE 5
Hardware, Software, And Maintenance Acquisition Expense

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
D1	Hardware, software, and maintenance acquisition expense		\$831,023				
Dt	Hardware, software, and maintenance acquisition expense	D1	\$831,023	\$0	\$0	\$0	\$831,023
	Risk adjustment	0%	□				
Dtr	Hardware, software, and maintenance acquisition expense (risk-adjusted)		\$831,023	\$0	\$0	\$0	\$831,023

Source: Forrester Research, Inc.



Internal Labor Costs For Planning

The enterprises that we interviewed invested significant time in re-architecting and planning their networks that would be powered by the Brocade VDX switches. For the LAN aspect of the re-architecture, the estimated time spent ranged from 300 – 500 hours in total.

For the composite organization, we assume two network architects worked for 300 hours each on re-architecting the LAN. Assuming an hourly rate of \$69.11, the total internal labor cost for planning is \$41,466.

We risk adjust this estimate upward by 5% to reflect potential variances in pay rates and hours spent on planning. This yields a 3-year risk adjusted labor expense of \$43,450 (see Table 6).

TABLE 6
Internal Labor Costs For Planning

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
E1	Number of network architects		2				
E2	Time spend on network design and planning (hours)		300				
E3	Network architect hourly rate		\$69.11				
Et	Internal labor costs for planning	$E1 * E2 * E3$	\$41,466	\$0	\$0	\$0	\$41,466
	Risk adjustment	↑5%	□				
Etr	Internal labor costs for planning (risk-adjusted)		\$43,540	\$0	\$0	\$0	\$43,540

Source: Forrester Research, Inc.



Training Fees

Two of the companies we interviewed sent employees on training. The cost of training was included in the overall switch acquisition expense, and actual costs were not shared with us.

For the composite organization, we assume that it sends three network managers on training, and no travel is required. Assuming its costs \$1,200 for a training class, the training expense is \$3,600.

We risk adjust the training expense upward by 5% to reflect variances in training expense. This yields a 3-year risk adjusted training expense of \$3,780 (see Table 7).

TABLE 7
Training Fees

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
F1	Number of people		3				
F2	Cost per person		1,200				
Ft	Training fees	$F1 * F2$	\$3,600	\$0	\$0	\$0	\$3,600
	Risk adjustment	↑5%					
Ftr	Training fees (risk-adjusted)		\$3,780	\$0	\$0	\$0	\$3,780

Source: Forrester Research, Inc.

Total Costs

Table 8 shows the total of all costs as well as associated present values, discounted at 10%. Over three years, the composite organization expects total costs to total a net present value of a little more than \$878,3473.

TABLE 8
Total Costs (Risk-Adjusted)

Ref.	Cost Category	Initial	Year 1	Year 2	Year 3	Total	Present Value
Dtr	Hardware acquisition expense	\$831,023	\$0	\$0	\$0	\$831,023	\$831,023
Etr	Internal labor costs for planning	\$43,540	\$0	\$0	\$0	\$43,540	\$43,540
Ftr	Training fees	\$3,780	\$0	\$0	\$0	\$3,780	\$3,780
	Total costs (risk-adjusted)	\$878,343	\$0	\$0	\$0	\$878,343	\$878,343

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 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).

None of the interviewed companies were planning additional investments in Brocade’s VDX switches at the time of interviews, therefore no flexibility option apply to this study.

RISKS

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 Brocade 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 Brocade VDX switches, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for cost and benefit estimates.

TABLE 9
Benefit And Cost Risk Adjustments

Benefits	Adjustment
Reduction in labor effort needed for network operations.	↓ 10%

Reduction in labor effort needed to add infrastructure to the network.	↓ 10%
Reduction in unplanned network downtime events	↓ 10%

Costs

Adjustment

Internal labor costs for planning.	↑ 5%
Training fees	↑ 5%

Source: Forrester Research, Inc.

Quantitatively capturing implementation risk and impact risk by directly adjusting the financial estimates results provides 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 impact risks that affect benefits are identified as part of the analysis:

- › Salaries and hourly rates paid to network engineers, architects and employees (users).
- › Network size, number of VDX switches, and network complexity.
- › Time needed to deploy new network elements.
- › Average downtime duration.

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

- › Number of hours needed to re-architect the network.
- › Number of network engineers and administrators receiving Brocade training.

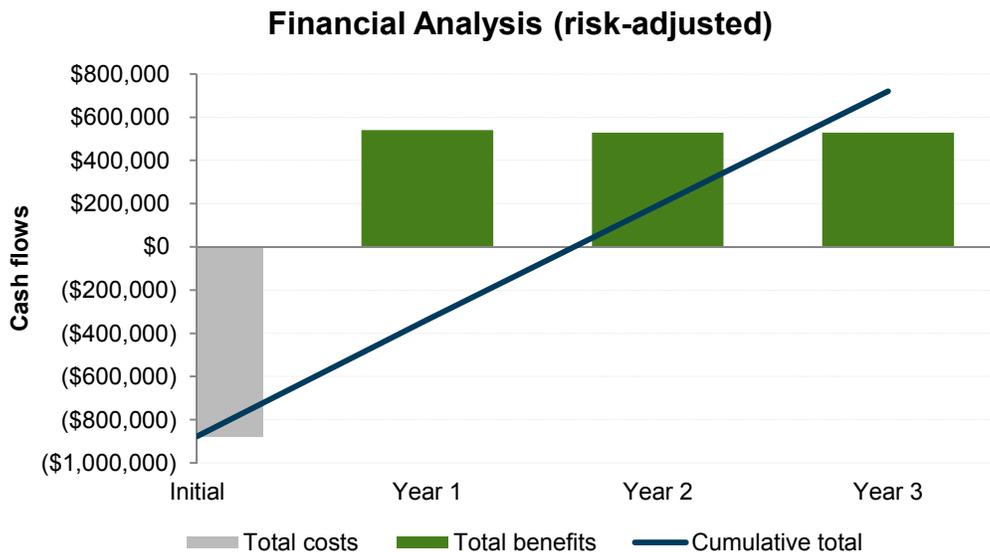
Table 9 shows the values used to adjust for risk and uncertainty in the cost and benefit estimates for the composite organization. Readers are urged to apply their own risk ranges based on their own degree of confidence in the cost and benefit estimates.

Financial Summary

The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the [composite organization/interviewed organization]'s investment in VDX Switches.

Table 10 below shows the risk-adjusted ROI, NPV, and payback period values. These values are determined by applying the risk-adjustment values from Table 9 in the Risk section to the unadjusted results in each relevant cost and benefit section.

FIGURE 3
Cash Flow Chart (Risk-Adjusted)



Source: Forrester Research, Inc.

TABLE 10
Cash Flow (Risk-Adjusted)

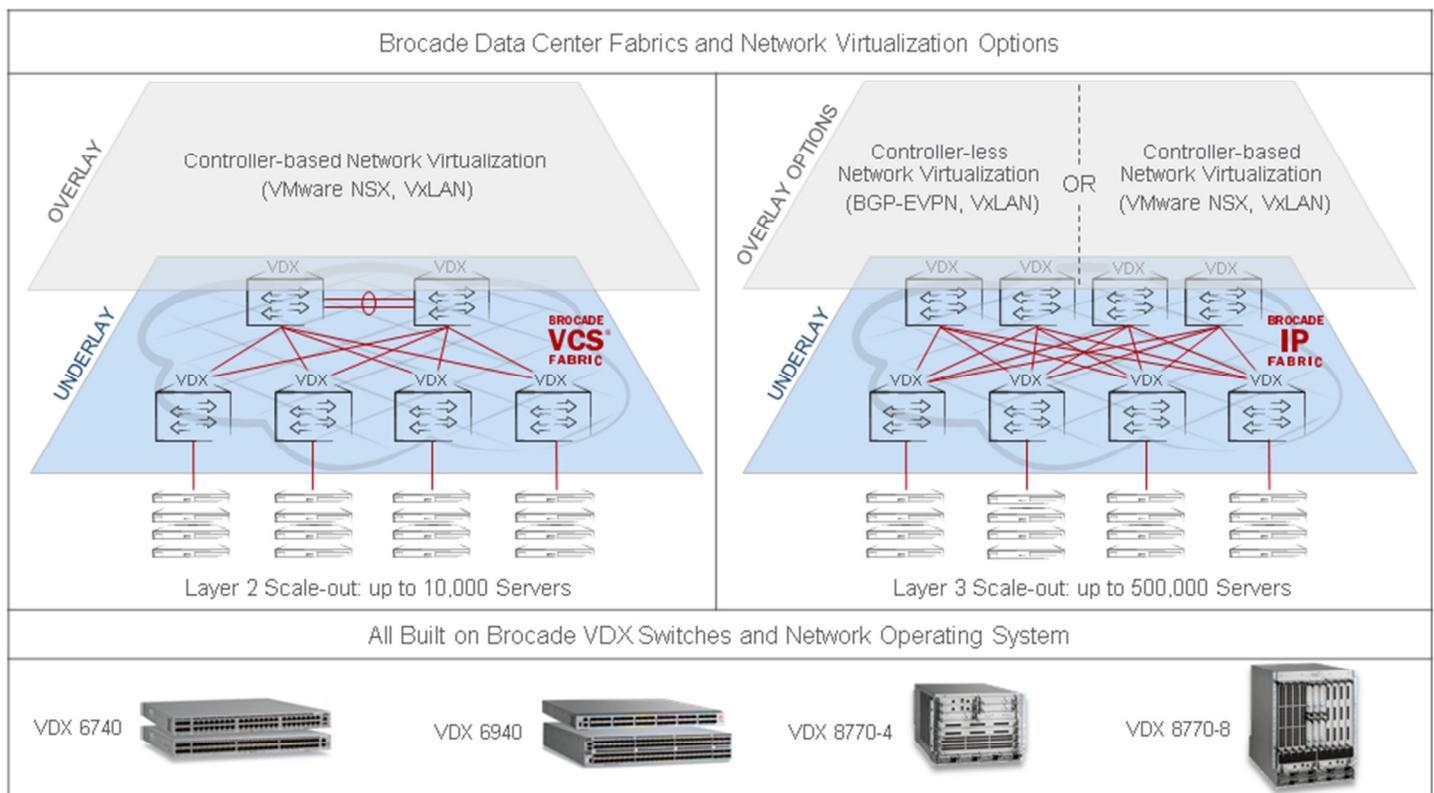
Summary	Initial	Year 1	Year 2	Year 3	Total	Present Value
Total costs	(\$878,343)	\$0	\$0	\$0	(\$878,343)	(\$878,343)
Total benefits	\$0	\$540,526	\$528,750	\$528,750	\$1,598,026	\$1,325,629
Total	(\$878,343)	\$540,526	\$528,750	\$528,750	\$719,683	\$447,286
ROI						51%
Payback period (months)						19.7

Source: Forrester Research, Inc.

Brocade Data Center Fabrics Deployed With VDX Switches: Overview

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Brocade Data Center Fabrics deployed with VDX switches allow customers to evolve their data center network architecture designs according to their own timeline, with full investment protection. As the foundation of multiple data center architectures, Brocade VDX switches support Brocade IP Fabrics and Brocade VCS Fabrics that scale from tens to hundreds-of-thousands of servers. They also support network overlays, including controller-based network virtualization architectures such as VMware NSX and standards-based BGP-EVPN controller-less architectures to enable workload agility, security, and segmentation within and across data centers. Brocade delivers open and programmable server-based automation through common industry tools such as Python, Ansible, Puppet and YANG model-based REST and NETCONF APIs. Pre-packaged Python libraries and Ansible modules get the network up and running quickly with further customization allowed down the road if and when needed. Cloud orchestration and control through OpenStack integrations, VMware vRealize plugins and OpenDaylight-based SDN Controller support enables full network integration with compute and storage resource provisioning and management for cloud-optimized data center operators. High availability is achieved through non-disruptive In-Service Software Updates (ISSUs) and resilient multipath fabrics.



Appendix A: Composite Organization Description

The composite organization is a large industrial firm with 50,000 employees and locations throughout the US. The organization's IT department provides network services to its internal users. The organization has a wide variety of applications that run over the network, including ERP, engineering design and simulation, video, and diskless workstations. The datacenter network originally had 3-tier architecture. Over the previous few years, the organization re-architected its network. It eliminated the 3-tier architecture in its data centers, and had replaced it with simplified 2-tier architecture. The simplified network was powered by Brocade switches using fabrics, specifically to handle growing amounts of east-west traffic that was generated by user applications. There was still some legacy equipment in place that ran side-by-side with the Brocade gear. The Brocade switches were primarily used in top-of-rack applications, with some switches at the aggregation layer.

Due to the increasing proliferation and demands of data intensive and delay sensitive applications, the organization needed to increase the overall bandwidth of its datacenter network and to adjust bandwidth within and between the fabrics. The organization was also building out its compute cloud, with the eventual goal of user self-service for compute and associated network loads. To support its future requirements, the organization embarked on a refresh of its datacenter network switches. This would require deploying top-of-rack and aggregation switches that supported high densities of 10GbE and 40GbE connections. The organization wished to minimize disruption during the upgrade, minimize the labor effort that would be needed to configure, deploy and maintain the network in the future, and to position the network to deliver the services that would be needed in the future.

To support its data center requirements, the organization decided to deploy four VDX 8870 chassis switches and 50 VDX 6740 fixed switches. The switches are configured with a total of 372 40 GbE ports, 1,200 10 GbE ports and 560 1 GbE ports.

FRAMEWORK ASSUMPTIONS

Table 11 provides the model assumptions that Forrester used in this analysis.

The discount rate used in the PV and NPV calculations is 10%, and the 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.

TABLE 11
Model Assumptions

Ref.	Metric	Calculation	Value
X1	Network engineer salary		\$105,000
X2	Network architect salary		\$115,000
X3	Average worker annual salary		\$62,500
X4	Salary overhead		25%
X5	Network engineer hourly rate	$X1*(1+X4)/2080$	\$50.48
X5	Network architect hourly rate	$X2*(1+X4)/2080$	\$69.11
X5	Average worker hourly rate	$X3*(1+X4)/2080$	\$37.56

Source: Forrester Research, Inc.

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. TEI assists technology vendors in winning, serving, and retaining customers.

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

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.

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. However, having the ability to capture that benefit has a PV that can be estimated. The flexibility component of TEI captures that value.

RISKS

Risks measure 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 risk factors are based on a probability density function known as "triangular distribution" to the values entered. At a minimum, three values are calculated to estimate the risk factor around each cost and benefit.

Appendix C: Glossary

Discount rate: The interest rate used in cash flow analysis to take into account the time value of money. Companies set their own 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 organizations 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 NPV of cash flows.

Payback period: The breakeven point for an investment. This is 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 the Framework Assumptions section) at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations are not calculated until the summary tables are the sum of the initial investment and the discounted cash flows in each year.

Sums and present value calculations of the Total Benefits, Total Costs, and Cash Flow tables may not exactly add up, as some rounding may occur.

TABLE [EXAMPLE]
Example Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3

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, see the section on Risks.