A Forrester Total Economic Impact™
Study Commissioned By Dell Technologies
June 2020

The Total Economic Impact™ Of Dell EMC SD-WAN Solution Powered by VMware

Cost Savings And Business Benefits

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Benefits And Costs

Avoided cost of legacy network at existing edge sites:
$10,762,941

Reduced data transport costs across existing and new sites:
$4,051,217

Total 3-year costs:
$7,954,616

Executive Summary

Dell Technologies provides a software-defined wide-area network (SD-WAN) solution powered by VMware that helps customers solve a wide variety of network-based challenges they face when transitioning to a cloud-enabled environment. Those challenges include but are not limited to increased transport costs over multiprotocol label switching (MPLS) circuits and the high cost of underutilized legacy network hardware. Dell Technologies commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying Dell EMC SD-WAN Solution powered by VMware. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Dell EMC SD-WAN Solution on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed five customers with experience using Dell EMC SD-WAN Solution powered by VMware. Dell Technologies' SD-WAN Solution combines Dell Technologies hardware with VMware SD-WAN™ by VeloCloud®, incorporating VMware SD-WAN software, VMware SD-WAN Gateways, and Dell EMC SD-WAN Dedicated Orchestrator. The combined solution enables customers to be more agile, efficient, and productive by updating their network environments to carry more bandwidth, prioritize critical applications, and be more resilient — all at a lower cost. Importantly, Dell EMC SD-WAN Solution helps organizations to more efficiently transition to an increasingly cloud-centric environment by disrupting the legacy hub-and-spoke network model to allow for more direct, and therefore higher-performing connectivity to cloud applications.

Prior to using Dell EMC SD-WAN Solution powered by VMware, the customers operated in point-to-point network environments and relied on sometimes expensive solutions such as MPLS to connect edge sites such as remote offices or retail locations with the data centers. With increased traffic moving from edge sites to the cloud, the old connectivity environments introduced network inefficiencies by sending data from the edge sites to the data centers, then out to the cloud and back through the same route.

After implementing Dell EMC SD-WAN Solution, customers were not only more agile in their abilities to manage cloud traffic, but they were also able to move network management itself to the cloud. That decreased reliance on physical network configuration at edge sites in favor of centralized network administration and orchestration via Dell EMC SD-WAN Dedicated Orchestrator. As one customer put it: "With Dell EMC SD-WAN Solution, you can have centralized network management, pushing policies globally from HQ or a data center. Before, you had to utilize local IT resources or fly IT to every particular location to set up or troubleshoot in the event of an issue."

Key Findings

Quantified benefits. The following risk-adjusted present value (PV) quantified benefits are representative of those experienced by the companies interviewed:

ROI
139%

Benefits PV
$19.2 million

NPV
$11.1 million

Payback
<3 months

- **Avoided cost of legacy network at existing edge sites worth $10.7 million.** The deployment of a software-defined WAN across company edge sites allowed customers to decommission a subset of the expensive hardware associated with the legacy networks at these sites. Costs for such hardware can vary from $50,000 to $100,000 over the term of the contract with annual maintenance fees of between $6,000 and $14,000 depending on the network capacity required at any given site.
- **Reduced data transport costs across existing and new sites worth over $4 million.** In addition to decommissioning legacy hardware, the deployment of a software-defined WAN allowed customers to reduce their reliance on expensive MPLS connections for data transport between edge sites, data centers, and the cloud. MPLS costs can vary between $300 and $600 per megabit per second per site.
- **Reduced cost to connect and operate new sites worth over $3.3 million.** For organizations that are expanding, SD-WAN provides additional cost savings when connecting a newly built site. Not only is the hardware needed to connect the site less expensive, but it requires less labor to wire up the site, set network policies there, and manage the site on an ongoing basis.
- **Increased efficiency from centralized network management worth over $914,470.** SD-WAN allows for the central management of network connectivity across the totality of data centers and edge sites. With SD-WAN, it is no longer necessary to have a local technician or to send one to a site to manage the network there. This allows IT departments to operate more efficiently and allows their existing headcounts to shift away from network management to other, more pressing or strategic projects.
- **Additional productivity from reduced network downtime worth $125,337.** SD-WAN connectivity can be more reliable than legacy connectivity technology like MPLS as it can provide for a backup connection when the primary network connection fails. This added resiliency means that edge-site employees can continue their work in the event of a connection failure and experience less interruptions to their workflow.

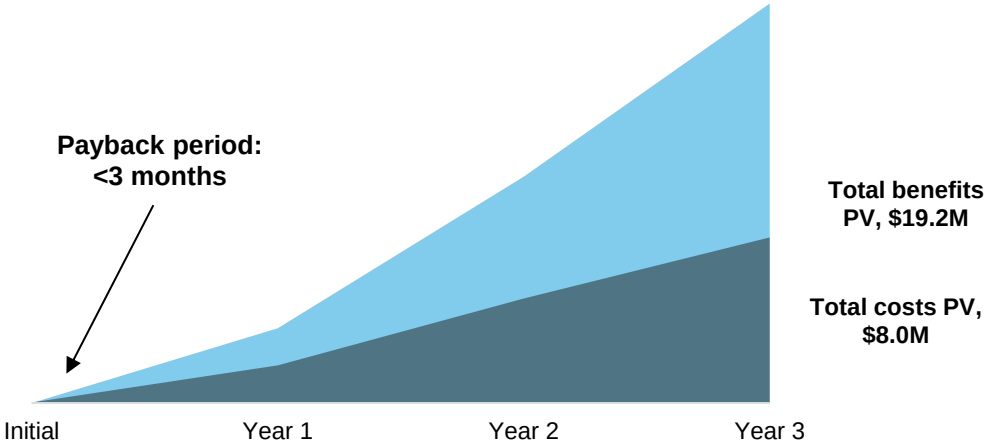
Costs. The interviewed organizations experienced the following risk-adjusted PV costs:

- **Cost of Dell EMC SD-WAN Solution Premium subscription.** Dell Technologies offers various subscription tiers for its SD-WAN solution based on the number of sites and whether or not a cloud-based gateway is needed. Dell Technologies' SD-WAN Edge series hardware comes preloaded with VMware SD-WAN software. Dell Technologies offers the VMware SD-WAN software as a subscription and sells it along with the device. The subscription is available in one-year, three-year, and five-year terms. Dell Technologies is fully responsible for end-to-end supporting the customer for any issue.
- **Cost of deployment and implementation.** The costs to deploy and implement Dell EMC SD-WAN Solution include upfront costs associated with analyzing a business's current application use and determining the correct connectivity model for those applications after implementing SD-WAN. These costs also include either the direct labor or third-party costs associated with the physical deployment and implementation of the solution.

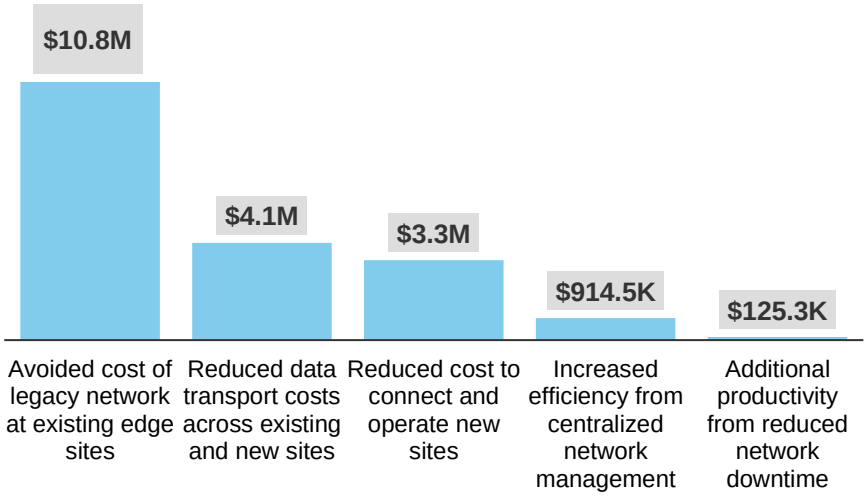
› **Cost of ongoing network management.** There are some ongoing labor costs associated with managing the new, software-defined WAN on an ongoing basis. However, this cost is minimal compared to the costs associated with managing the legacy network.

Forrester's interviews with five existing customers and subsequent financial analysis found that an organization based on these interviewed customers would experience benefits of $19,186,222 over three years versus costs of $8,040,903, adding up to a net present value (NPV) of $11,145,319 and an ROI of 139%.

Financial Summary



Benefits (Three-Year)



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TEI Framework And Methodology

From the information provided in the interviews, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering implementing Dell EMC SD-WAN Solution powered by VMware.

The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the impact that Dell EMC SD-WAN Solution can have on an organization:

The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

DUE DILIGENCE
Interviewed Dell Technologies stakeholders and Forrester analysts to gather data relative to Dell EMC SD-WAN Solution.

CUSTOMER INTERVIEWS
Interviewed five organizations using Dell EMC SD-WAN Solution to obtain data with respect to costs, benefits, and risks.

COMPOSITE ORGANIZATION
Designed a composite organization based on characteristics of the interviewed organizations.

FINANCIAL MODEL FRAMEWORK
Constructed a financial model representative of the interviews using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewed organizations.

CASE STUDY
Employed four fundamental elements of TEI in modeling Dell EMC SD-WAN Solution's impact: 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 A for additional information on the TEI methodology.

The Dell EMC SD-WAN Solution Powered By VMware Customer Journey

BEFORE AND AFTER THE DELL EMC SD-WAN SOLUTION INVESTMENT

Interviewed Organizations

For this study, Forrester conducted five interviews with Dell EMC SD-WAN Solution customers. Interviewed customers include the following:

INDUSTRY	REGION	INTERVIEWEE	STAKEHOLDERS AND EDGE SITES
Construction	North America	Director of infrastructure and operations; Junior network administrator	750 employees 41 edge sites
Financial services	North America	Vice president and Information security officer	1,000 employees 140 edge sites
Education	North America	Chief information officer	40,000 stakeholders 212 edge sites
Telecommunication	Asia	Global vice president of strategy and products	200,000 employees 1,000 sites
Healthcare	North America	Chief information officer	32,000 employees 5,000 sites

Key Challenges

Interviewees from organizations that decided to invest in Dell EMC SD-WAN Solution shared the following key challenges:

- **Transition to a cloud-heavy environment.** Dell EMC SD-WAN Solution customers noted that MPLS may have made sense in their legacy on-premises environments, but it ceased to provide value for cost in their increasingly cloud-heavy environments. Under the previous connectivity model, a central application ran in a data center and an edge site would access this application using a dedicated MPLS line. As firms increasingly shift to using cloud applications, edge sites first connect back to the data center using expensive MPLS, then connect to the cloud to access cloud applications. The vice president and information security officer stated: “As workloads move to the cloud, MPLS is less agile and scalable for the workload. It will continue to lag as we shift into future environments including the internet of things (IoT), edge computing, and 5G.”

> “As part of our digital transformation, we are leveraging more cloud and software-as-a-service (SaaS) workloads. That’s why this technology is not just good to have, but necessary. It’s necessary for the flexibility of the organization.”
>
> *Vice president and Information security officer, financial services*

- **High cost and unsatisfactory support associated with legacy transport technology.** Interviewed organizations expressed dissatisfaction with both the cost associated with and the support provided by their legacy transport technology providers. MPLS prices notably vary by geography, but they typically run 20 times to 400 times the price of broadband. Organizations used to be willing to pay these prices for the associated reliability of MPLS. However, a software-defined network provides similar reliability using backup broadband connections for failover at a substantially reduced cost. Customers also reported wait times of days to weeks to receive support for any issues related to their MPLS connections. The director of infrastructure and operations said: "MPLS wasn't bad, but it was getting kind of old. Also, the connections were expensive, and we had a lot of issues opening tech support cases and other unnecessary frustration dealing with our provider."

> "Cost savings is a major factor in switching to SD-WAN. So it didn't make sense to go with more expensive competitors that were still using costly proprietary hardware."
>
> *Global vice president of strategy and products, telecommunications*

- **High investment and complicated logistics to establish a new branch site.** Legacy network technologies lack the agility of Dell EMC SD-WAN Solution in the context of company expansion. Under the previous model, when establishing new offices or retail locations, firms needed to send or hire local professionals on the ground in order to deploy the networks while also having unresponsive local connectivity providers physically connect the site eventually. With Dell EMC SD-WAN Solution, on-site labor is minimized as large portions of setup can be managed centrally. The vice president of products and strategy explained: "If we needed to set up new offices, we used to have to recreate the wheel each time. The scale-up effort is super expensive compared to something like Dell EMC SD-WAN Solution."

> "It's almost like it doesn't cost anything in terms of scaling up. That's what the beauty is. If you are setting up a fresh, brand-new office, the economics are very compelling for Dell EMC SD-WAN Solution."
>
> *Global vice president of strategy and products, telecommunications*

Key Results

The interviews revealed that key results from the Dell EMC SD-WAN Solution along with VMware SD-WAN solution investment include:

- **Reduced transport costs and more responsive support.** Every customer interviewed shared that they were able to reduce their transport costs. This reduction varied from 20% to as much as 90% for some. Customers also stated that Dell Technologies provided much better support compared to their previous networking environments despite the lower cost associated with Dell EMC SD-WAN Solution. The chief information officer in healthcare noted: "Dell Technologies is definitely a part of our team. They've helped with laying down some of the boxes, with SD-WAN enablement in some of our conference rooms, and with dealing with our cloud infrastructure and application providers. They even helped some with the architecture of the network."

> "One reason we went with Dell Technologies was its understanding of customer service: Their proof of concept was offered at no charge to us. Other providers were going to charge us $20,000 or $25,000 just to find out if their solutions worked or not!"
>
> *Director, infrastructure and operations, construction*

- **Better performing network and flexibility for cloud applications.** The interviewed organizations experienced better network performance in terms of both speed and reliability after implementing Dell EMC SD-WAN Solution. One organization experienced 17 times higher download speeds at one site after shifting away from its T1 MPLS connection. This same firm saw bandwidth increase 500% across all sites, while another firm saw latency decrease 20% to 30% as it connected more directly to its cloud applications using one of Dell Technologies' 440 global cloud gateways for one-hop cloud access. Additionally, one customer said they previously experienced an outage every 90 days but did not experience a single outage after switching to Dell EMC SD-WAN Solution.

› **Ease of implementation and management.** Customers shared that their Dell EMC SD-WAN Solution environments along with VMware SD-WAN were much easier to implement and manage than their previous networks. Instead of having to physically go to each network device to configure profiles and policies, they could centrally manage this configuration through VMware SD-WAN, which saves time, money, and effort. Due to the ability of VMware SD-WAN to provide an end-to-end network visibility across the network and various applications, it enabled the customers to uncover that certain applications were more important than they previously thought, and it allowed them to then make associated policy changes to all network devices and the applications at the same time and centrally. Additionally, they could now dynamically scale the assets allowed on their networks without re-engaging local network administration resources. The director of operations and infrastructure noted: “Managing Dell EMC SD-WAN Solution is very simple. Install is also quick and doesn’t take a whole lot of effort. Considering how many sites we have and how spread out they are, those were two major factors for us.”

> “Dell Technologies was not the first SD-WAN vendor we have used, but it has easily proven itself to be the fastest to deploy."
>
> *Chief information officer, healthcare*

Composite Organization

Based on the interviews, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis that illustrates the areas financially affected. The composite organization is representative of the five companies that Forrester interviewed and is used to present the aggregate financial analysis in the next section. The composite organization that Forrester synthesized from the customer interviews has the following characteristics:

Description of composite. This global business operates in the financial services sector, offering banking solutions to consumers as well as small and medium-sized businesses. It has approximately 100,000 full-time employees spread across its corporate offices and retail branch sites, and it is currently undergoing a digital transformation initiative and becoming increasingly cloud-centric. It now relies on cloud applications for employee productivity as well as cloud infrastructure to operate some of its customer-facing products.

Deployment characteristics. The organization operates four data centers and a total of 1,000 corporate and branch sites worldwide. It is experiencing a period of growth, opening new offices and retail locations as it expands into new markets. It is shifting away from its traditional MPLS connectivity toward a software-defined WAN that leverages dual broadband for its combination of resiliency and cost effectiveness.

Key assumptions

4 data centers

1,000 corporate and branch sites

100,000 FTEs

Analysis Of Benefits

QUANTIFIED BENEFIT DATA AS APPLIED TO THE COMPOSITE

Total Benefits

Ref.	Benefit	Year 1	Year 2	Year 3	Total	Present Value
Atr	Avoided cost of legacy network at existing edge sites	$2,422,500	$5,142,500	$5,737,500	$13,302,500	$10,762,941
Btr	Reduced data transport costs across existing and new sites	$567,000	$1,701,000	$2,835,000	$5,103,000	$4,051,217
Ctr	Reduced cost to connect and operate new sites	$690,228	$1,551,456	$1,893,456	$4,135,140	$3,332,257
Dtr	Increased efficiency from centralized network management	$216,000	$378,000	$540,000	$1,134,000	$914,470
Etr	Additional productivity from reduced network downtime	$50,400	$50,400	$50,400	$151,200	$125,337
	Total benefits (risk-adjusted)	$3,946,128	$8,823,356	$11,056,356	$23,825,840	$19,186,222

The table above shows the total of all benefits across the areas listed below, 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 $19.2 million.

Avoided Cost Of Legacy Network At Existing Edge Sites

Under legacy network models, hardware and software are a proprietary, package deal. This packaging inflates the value of network appliances, as the physical hardware and its associated software are core to various necessary network functions like protocols, policies, and security. One of the core promises of software-defined networking is to abstract network functions from its underlying hardware to a virtualized, software-defined overlay. This virtualized network overlay, in addition to many other benefits discussed below, decreases the need for the more complicated and expensive appliances at the heart of legacy hardware-centric WAN models such as routers, WAN optimization devices, and firewall appliances. With Dell EMC SD-WAN Solution, the need for underlying specific WAN hardware diminishes, sometimes dramatically. By virtualizing network functions onto the SD-WAN overlay, customers reported consolidating the number of physical appliances they needed for the proper functioning of their networks, saving substantially on network costs.

The cost associated with legacy network hardware varies substantially, depending on the amount of traffic the hardware is expected to handle, but it typically ranges from $50,000 to $100,000 per site. The vice president of products and strategy said: “Even our smallest sites were spending $50,000 on proprietary network hardware for our previous network. So, with Dell EMC SD-WAN Solution, we’ve managed to cut those costs 80% to 90%.” Unfortunately, not all firms that implement SD-WAN are optimizing their underlying network hardware, or they are only doing so in a piecemeal fashion.

Based on the customer interviews, Forrester estimates for the composite organization:

› A legacy network hardware cost of $50,000 per site and associated annual maintenance fees amounting to 14% of the device cost.

> “Dell EMC SD-WAN Solution enables cost effectiveness in relation to hardware. It doesn’t just separate the data plane and control plane. You can really effectively use virtual appliances through their offerings."
>
> *Chief information officer, education*

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- The deployment of SD-WAN at every edge site over the course of the three years, with 200 in Year 1 and an additional 400 in years 2 and 3 each.
- The replacement of approximately 25% of underlying hardware across the deployment.

The actual reduction in costs associated with legacy network hardware may vary based on:

- The amount of network traffic coming from any particular edge site, and therefore the cost of that legacy hardware and the associated annual maintenance fees.
- The number of sites running on this legacy hardware.
- The amount of hardware consolidation pursued during deployment of Dell EMC SD-WAN Solution.

To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year risk adjusted total PV of $10,762,941.

Impact risk is the risk that the business or technology needs of the organization may not be met by the investment, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for benefit estimates.

Avoided Cost Of Legacy Network At Existing Edge Sites: Calculation Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
A1	Number of SD-WAN deployments to existing edge sites		200	400	400
A2	Expected cost of legacy network appliances at each site	Interview and Forrester Research	$50,000	$50,000	$50,000
A3	Expected cost of annual maintenance fees	A2*14%	$7,000	$7,000	$7,000
A4	Percentage of legacy network devices actually decommissioned		25%	25%	25%
A5	Subtotal of avoided cost of legacy network appliances	A1*A2*A4	$2,500,000	$5,000,000	$5,000,000
A6	Subtotal of avoided cost of annual maintenance fees, cumulative	Cumulative A1*A3*A4	$350,000	$1,050,000	$1,750,000
At	Avoided cost of legacy network at existing edge sites	A5+A6	$2,850,000	$6,050,000	$6,750,000
	Risk adjustment	↓15%			
Atr	Avoided cost of legacy network at existing edge sites (risk-adjusted)		$2,422,500	$5,142,500	$5,737,500

Reduced Data Transport Costs Across Existing And New Sites

A primary need for all the interviewed organizations was to save costs on their network transports by switching from expensive MPLS to more affordable broadband connections using Dell EMC SD-WAN Solution. MPLS circuits are the traditional circuits used to connect routers to data centers. These circuits are typically leased from local telecommunications firms and offer the high level of uptime ("five nines") needed for running business-critical applications. The tradeoff for this high availability is that the circuits are very expensive in terms of dollar per bandwidth. MPLS is typically priced from $300 to $600 per Mbps per month. Compare this with broadband prices, which generally range from $1.50 to $15 per Mbps per month.

"As soon as we implement SD-WAN Solution, we shift half of our traffic to broadband, typically reducing our MPLS costs by half. We're in the process of shifting to broadband primarily, and we expect to see 90% savings on MPLS in the future."

Global vice president of strategy and products, telecommunications

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However, as the interviewed customers shared, network traffic has been shifting away from the data center and toward the cloud. Under the legacy model, traffic must flow from the branch sites through the data centers and then out to the cloud and vice versa. Dell EMC SD-WAN Solution allows firms to decrease their reliance on MPLS, replacing less critical bandwidth — such as that going to the cloud — with broadband. For added resiliency, firms can even pursue a dual-broadband model with one broadband connection used for primary connectivity and a second broadband line for failover. As the vice president of products and services from the telecommunications firm said: "MPLS is very costly, with monthly recurring charges. Plus, you have to wait for your telco to connect at the last mile. This is just not practical when workloads have moved from the HQ or data center to the cloud. Why would I go through MPLS to get to the cloud if I don't have to?"

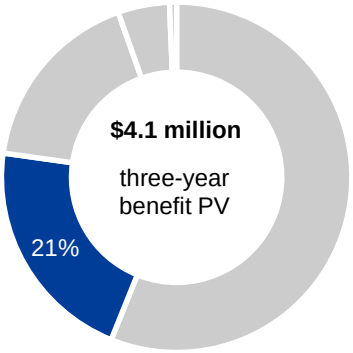
For the composite organization, Forrester assumes that:

- It pays approximately $500 in monthly MPLS costs per site.
- It establishes 10 new edge sites in Year 1 and an additional 20 new edge sites in years 2 and 3 each.
- It reduces its MPLS costs by 50% by shifting traffic away from MPLS toward broadband.

The reduction in transport expense will vary with:

- The price currently paid for MPLS connectivity.
- The total number of sites where Dell EMC SD-WAN Solution is deployed.
- The percentage of MPLS savings achieved by shifting bandwidth away from MPLS and toward broadband.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk adjusted total PV of $4,051,217.



Reduced data transport costs across existing and new sites: 21% of total benefits

Reduced Data Transport Costs Across Existing And New Sites: Calculation Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
B1	Monthly cost of MPLS per site	Interview	$500	$500	$500
B2	Number of SD-WAN deployments to existing edge sites	A1	200	400	400
B3	Number of new edge sites where SD-WAN deployed	Assumption	10	20	20
B4	Total cumulative SD-WAN deployments	Cumulative B2 + Cumulative B3	210	630	1,050
B5	Percent reduction in MPLS cost	Interview	50%	50%	50%
Bt	Reduced data transport costs across existing and new sites	B1*12*B4*B5	$630,000	$1,890,000	$3,150,000
	Risk adjustment	↓10%			
Btr	Reduced data transport costs across existing and new sites (risk-adjusted)		$567,000	$1,701,000	$2,835,000

Reduced Cost To Connect And Operate New Sites

Customers reported not only saving on network costs at existing branch sites, but also saving on connecting newly established edge sites. One customer even called edge-site scaling “the sweet spot for Dell EMC SD-WAN Solution.” Under the legacy model, when a firm needs to wire up a newly established branch site, it must first buy the expensive proprietary packaged software and hardware previously discussed for each site. It then would have to contract with a third party or send its own team to each edge site to spend one to two weeks deploying and implementing the network. It would then either need to retain a third party or hire its own professionals to administer the network at these sites.

With Dell EMC SD-WAN Solution, customers reported savings of 80% to 90% on the hardware at each site alone. Additionally, it only requires an employee or a third party a day or two of time to deploy the network appliance. There is also no retainer or new hiring required, as Dell EMC SD-WAN Solution is more efficiently managed centrally by the VMware SD-WAN software.

For any edge sites that directly generate revenue, an additional quantifiable benefit should be included here: the advanced time-to-market of connecting a new site using Dell EMC SD-WAN Solution and broadband versus waiting as much as six months to provision an MPLS link. This benefit would be quantified by the additional profit generated by the edge sites during the greater time period they are operational with Dell EMC SD-WAN Solution versus MPLS connectivity.

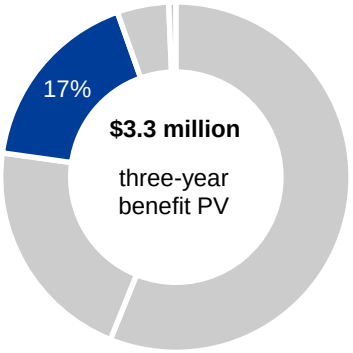
Based on the customer interviews, Forrester estimates for the composite organization:

- Two people at a fully burdened rate of $200,000 annually needed for one week to implement the legacy network at each site.
- One person at a fully burdened rate of $120,000, spending 10% of their time managing the legacy network at each site.
- The establishment of 10 new sites in Year 1 and 20 new sites in years 2 and 3 each.

The actual benefit to profit recouped from decreased network downtime may vary based on:

- The price paid for legacy network hardware and their associated annual maintenance fees.
- The cost to implement and manage the legacy network on an ongoing basis.
- The number of new sites established annually.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk adjusted total PV of $3,332,257.



Reduced cost to connect and operate new sites: 17% of total benefits

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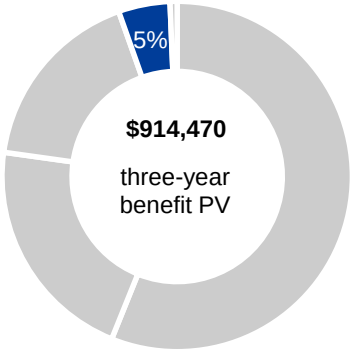
Reduced Cost To Connect And Operate New Sites: Calculation Table					
Ref.	**Metric**	**Calculation**	**Year 1**	**Year 2**	**Year 3**
C1	Number of new sites established	B3	10	20	20
C2	Avoided cost of legacy network device	A2	$50,000	$50,000	$50,000
C3	Professional services cost of implementing new legacy network	1 week, 2 professionals at $200K/year	$7,692	$7,692	$7,692
C4	**Subtotal avoided costs of legacy network device and professional services implementation**	**C1*(C2+C3)**	**$576,920**	**$1,153,840**	**$1,153,840**
C5	Avoided cost of legacy network maintenance fees	A3	$7,000	$7,000	$7,000
C6	Avoided cost of managing legacy network	1 FTE at $120K/year and 10% of time	$12,000	$12,000	$12,000
C7	**Subtotal avoided costs of legacy network maintenance fees and managing legacy network, cumulative**	**Cumulative C1*(C5+C6)**	**$190,000**	**$570,000**	**$950,000**
Ct	Reduced cost to connect and operate new sites	C4+C7	$766,920	$1,723,840	$2,103,840
	Risk adjustment	↓10%			
Ctr	Reduced cost to connect and operate new sites (risk-adjusted)		$690,228	$1,551,456	$1,893,456

Increased Efficiency From Centralized Network Management

Organizations reported the ability to centralize network administration and management with VMware SD-WAN, shifting away from physically managing edge site networks locally. Dell EMC SD-WAN Solution comes with “zero-touch” deployment and network management. A customer simply drops their new appliance at a branch site, it’s inserted into the infrastructure, and then it’s managed from a central orchestration engine. Dell Technologies devices configure themselves automatically by simply calling back to the data center and receiving configurations once connected. From the central orchestration engine, Dell EMC SD-WAN Dedicated Orchestrator, network administrators can push out applications and associated policies to specific sites or to all sites at the same time, using a simple-to-understand GUI. IT now has visibility into every single remote site without the need to send engineers to troubleshoot or physically administer appliances as with the legacy environment. One customer said centrally managed troubleshooting is “very instant” and that “connectivity is established in 15 minutes.” Central management allows firms to shift their IT resources to more pressing or more strategic concerns, saving costs directly related to ongoing network management.



Increased efficiency from centralized network management: 5% of total benefits

The chief information officer from the education sector said: “We have 212 locations spread all over the place. In our previous environment mixing MPLS, WAN, RAN, and LAN, we needed around eight to 10 folks driving around to our various locations to troubleshoot everyday issues. By switching to a virtual environment with Dell EMC SD-WAN Solution, we now only have two people doing that kind of work, and we have moved the rest back to the data center.”

For the composite organization, Forrester assumes that:

- It currently has 10 IT professionals dedicated to network management.
- The fully burdened annual rate for these professionals is an average of $120,000.
- The firm is able to shift between 20% and 50% of these resources to other projects over the course of three years.

The savings from increased network management efficiency will vary with:

- The fully burdened rate of pay of network administrators.
- The percentage of headcount reallocated.

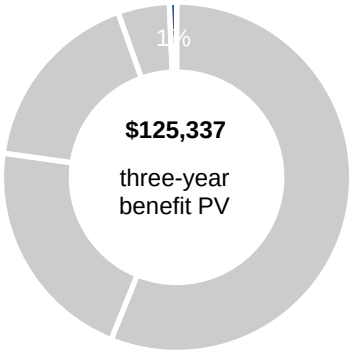
To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of $914,470.

Increased Efficiency From Centralized Network Management: Calculation Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
D1	IT professionals dedicated to locally managing network	Assumption	10	10	10
D2	IT professional fully burdened annual rate		$120,000	$120,000	$120,000
D3	Percent of local network management moved to other initiatives	Interview	20%	35%	50%
Dt	Increased efficiency from centralized network management	D1*D2*D3	$240,000	$420,000	$600,000
	Risk adjustment	↓10%			
Dtr	Increased efficiency from centralized network management (risk-adjusted)		$216,000	$378,000	$540,000

Additional Productivity From Reduced Network Downtime

Customers reported additional productivity of their employees stemming from decreased downtime within their new Dell EMC SD-WAN Solution environments coupled with a dual-broadband model when compared with their prior MPLS-connected environments. Despite the generally acknowledged high availability of MPLS, customers reported that they still experienced frequent downtime. One customer reported experiencing a connectivity failure at each of their sites “every 90 days or so.” This downtime could last anywhere from one to two full working days. The customer switched to Dell EMC SD-WAN Solution and used a dual-broadband model with failover to achieve resiliency. They subsequently reported: “Since implementing Dell EMC SD-WAN Solution, we haven't had any complete outages. And if we do lose a link, it doesn’t really matter. We don’t have to rush and open up a support ticket to get back up and running. We can take our time, see what’s going on, call our telecom provider, and then they come out on their own schedule. We’re not scrambling to get it fixed."



Additional productivity from reduced network downtime: 1% of total benefits

For the composite organization, Forrester assumes that:

- There are four network outages a year at an average of eight hours of downtime and recovery.
- The average fully burdened rate for employees is $35 per hour.
- Productivity is recaptured at a rate of 50%.

The added productivity from reduced network downtime will vary with:

- The amount and severity of network outages experienced.

- The average fully burdened hourly rate of employees at the site.
- The rate at which productivity is recaptured.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of $125,337.

Additional Productivity From Reduced Network Downtime: Calculation Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
E1	Average annual network outages avoided	Interview	4	4	4
E2	Average length of outage and recovery in work hours	Interview	8	8	8
E3	Average number of employees per site		100	100	100
E4	Average hourly fully burdened rate		$35	$35	$35
E5	Productivity recapture rate		50%	50%	50%
Et	Additional productivity from reduced network downtime	E1*E2*E3*E4*E5	$56,000	$56,000	$56,000
	Risk adjustment	↓10%			
Etr	Additional productivity from reduced network downtime (risk-adjusted)		$50,400	$50,400	$50,400

Unquantified Benefits

Organizations noted seeing several benefits from implementing Dell EMC SD-WAN Solution that were not quantifiable. These could potentially be quantified in a financial analysis if given the appropriate data and metrics and are as follows.

- **Additional profit from reduced network downtime.** Similar to the additional productivity a firm would receive from reduced network downtime, if a firm is experiencing network downtime at a site that is producing revenue, or if the downtime is negatively affecting revenue-producing employees, the additional uptime from Dell EMC SD-WAN Solution is likely to have a positive impact to profits. The actual impact will depend on how many outages occur at revenue-producing sites, how long these outages last, the revenue associated with the site, and the firm's profit margin. There are too many unknown variables that would have to be applied to Forrester's composite business to model a quantified benefit to profit from reduced network downtime.
- **Increased network visibility.** When using a proprietary router and an MPLS circuit for connectivity, customers reported having limited to very limited visibility into that connection, including the quality of service they received and even the utilization rate of the line. Customers were forced to operate in a state of ignorance regarding whether or not they were really getting the bandwidth for which they paid. Implementing Dell EMC SD-WAN Solution opened the windows to their networks and enabled them to hold the partners accountable for their respective solutions in the stack. The vice president and information security officer said: "[Our prior environment] had a lot of finger pointing. When an application was experiencing a bottleneck, we would go to each of our relevant partners and ask what the issue was. Each time, they would pass the buck to a different partner in the stack. There was a lot of back and forth, and I had to play the referee. With Dell EMC SD-WAN Solution, we can pinpoint the problem on our own, go to the relevant partner, show them it's their issue, and hold them to account."

> "Dell EMC SD-WAN Solution gives us real-time network visibility. We can better monitor our network, and even apply some predictive analytics to choose and change our service providers like flipping a switch."
>
> *Chief information officer, education*

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- **Increased employee satisfaction.** Thanks to the reduction in service outages across branch sites under Dell EMC SD-WAN Solution, customers reported that employees were having a much better experience in the workplace. The junior network administrator said: "[At one site,] we moved from T1 bandwidth speed over MPLS to 25 Mbps download speed with Dell EMC SD-WAN Solution, and it's made a world of difference. People at that site randomly email me every once in a while and say, 'This is so much nicer than what we had with MPLS!'"

Flexibility

The value of flexibility is clearly unique to each customer, and the measure of its value varies from organization to organization. There are multiple scenarios in which a customer might choose to implement Dell EMC SD-WAN Solution and later realize additional uses and business opportunities, including:

- **Flexibility in times of crisis.** Customers expressed that one key benefit they received from Dell EMC SD-WAN Solution was the network flexibility it provided during the COVID-19 pandemic. The chief information officer from the healthcare sector shared that they needed to accommodate an unprecedented number of patients at their organization's sites in New York state during the height of the crisis. The dramatic increase in patients required an equally dramatic increase in connected hospital equipment and nurse workstations. If not for having implemented Dell EMC SD-WAN Solution, they would have had to have sent network engineers to each site for approximately one to two weeks, risking their health and potentially their lives in order to count devices and connect them to the network. Thanks to Dell EMC SD-WAN Solution, the organization was able to accommodate the increase to the network load, as well as count and register new devices remotely and in real time. He described this effort as a "massive scale out" and said, "When unforeseen things like that happen, having a scalable architecture is vital."
- **Remote work.** Customers also said that Dell EMC SD-WAN Solution helped them make the switch to remote work. The director of operations and infrastructure in the construction industry shared: "We're trying to make some of our sites 100% remote. These will all be based on cameras. Somebody at a central location can handle trucks coming through and give them tickets. So, with the availability of more bandwidth to handle the camera feeds, we should be able to get more sites up where we don't need anybody working there all the time."
- **Internet of things.** Customers also said they expected Dell EMC SD-WAN Solution to continue to pay dividends on their investments as they incorporate more connected devices into their edge sites. The vice president and information security officer in the financial services industry said: "We already have quite a few connected devices like ATMs, cash-counting machines, or security cameras that are necessary when popping up a new branch site. With Dell EMC SD-WAN Solution, these just connect to the network and 'boom!' they are up and running, they can communicate back to the data center, and they can be centrally managed."

Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix A).

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for a 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.

"Dell Technologies' solution has proven critical given the recent outbreak of COVID-19. We were able to massively scale out our architecture at New York hospital sites to accommodate new patients while sparing the lives and health of our network engineers who could manage these networks remotely."

Chief information officer, healthcare

"If you fast-forward 18 months, we will have things like IoT devices, edge computing, and 5G network. How do you take advantage of these if you're not on an SD-WAN platform? Dell EMC SD-WAN Solution is setting us up for the next 18 months of technology adoption."

Vice president and information security officer, financial services

Analysis Of Costs

QUANTIFIED COST DATA AS APPLIED TO THE COMPOSITE

Total Costs

Ref.	Cost	Initial	Year 1	Year 2	Year 3	Total	Present Value
Ftr	Cost of Dell EMC SD-WAN premium subscription	$0	$1,700,500	$3,380,500	$3,401,000	$8,482,000	$6,894,932
Gtr	Cost of deployment and implementation	$33,000	$266,112	$532,224	$532,224	$1,363,560	$1,114,642
Htr	Cost of ongoing centralized network management	$0	$8,580	$12,870	$17,160	$38,610	$31,329
	Total costs (risk-adjusted)	$33,000	$1,975,192	$3,925,594	$3,950,384	$9,884,170	$8,040,903

Cost Of Dell EMC SD-WAN Solution Powered by VMware Premium Subscription

Dell EMC SD-WAN Solution offers three tiers of subscription service: a standard subscription for firms with less than 50 edge sites, an enterprise subscription for firms with more than 50 edge sites but no need for a cloud gateway, and a premium subscription for firms with 50 or more edge sites that need a cloud gateway. Customers pay one-time fees for Dell Technologies appliances at each of their data centers and edge sites, and then they pay a subscription fee for support at these sites. Dell Technologies provides a buffer period in the support and licensing costs in consideration of the potential delay between purchase and installation.

Forrester estimates for the composite organization include:

- A premium subscription including a cloud gateway.
- A total of four data centers, 1,000 existing edge sites, and 50 new edge sites deployed over the course of three years.

The cost of the premium subscription will vary in accordance with the number of data centers and edge sites deployed at any given time. As Forrester priced the composite organization directly with Dell Technologies, we did not adjust this cost for risk. The three-year risk-adjusted total PV of the Premium subscription is $6,894,932.

The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total costs to be a PV of more than $7.9 million.

Implementation risk is the risk that a proposed investment may deviate from the original or expected requirements, resulting in higher costs than anticipated. The greater the uncertainty, the wider the potential range of outcomes for cost estimates.

Cost Of Dell EMC SD-WAN Premium Subscription: Calculation Table						
Ref.	**Metric**	**Calculation**	**Initial**	**Year 1**	**Year 2**	**Year 3**
F1	Number of data centers deployed			1	1	2
F2	Cost per data center			$20,500	$20,500	$20,500
F3	Number of SD-WAN deployments to existing and new edge sites	A1+C1		210	420	420
F4	Cost per edge site			$8,000	$8,000	$8,000
Ft	Cost of Dell EMC SD-WAN Premium subscription	F1*F2+F3*F4	$0	$1,700,500	$3,380,500	$3,401,000
	Risk adjustment	0%				
Ftr	Cost of Dell EMC SD-WAN Premium subscription (risk-adjusted)		$0	$1,700,500	$3,380,500	$3,401,000

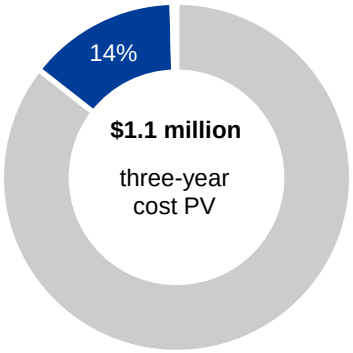
Cost Of Deployment And Implementation

Customers reported initial deployment and implementation costs related to undertaking a network and application analysis. During this analysis, customers investigated their applications and their associated usage to determine which ones would travel over which connectivity link. They also needed to determine the correct policies for different applications to be deployed with Dell EMC SD-WAN Solution at edge sites. Customers reported ongoing deployment and implementation costs associated with both existing edge sites and newly established edge sites.

Forrester estimates for the composite organization include:

- A team of five FTEs takes 10 working days to complete a network and application analysis.
- The use of one third-party contractor for 1.5 days at a cost of $800 per day to implement Dell EMC SD-WAN Solution at each site.

The cost of deployment and implementation will vary based on the amount of time and number of professionals needed to run a network and application analysis in addition to whether a third party is used for implementation. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year risk-adjusted total PV of $1,114,642.



Cost of deployment and implementation: 14% of total costs

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Cost Of Deployment And Implementation: Calculation Table						
Ref.	**Metric**	**Calculation**	**Initial**	**Year 1**	**Year 2**	**Year 3**
G1	Predeployment application and network analysis in hours		80			
G2	Predeployment analysis team size		5			
G3	Predeployment analysis team fully burdened hourly rate per member		$75			
G4	Third-party implementation hourly rate	Interview		$96	$96	$96
G5	Contractor hours to complete implementation	Interview		12	12	12
G6	Total sites implemented in the year	F2		210	420	420
Gt	Cost of deployment and implementation	G1*G2*G3; G4*G5*G6	$30,000	$241,920	$483,840	$483,840
	Risk adjustment	↑10%	□			
Gtr	Cost of deployment and implementation (risk-adjusted)		$33,000	$266,112	$532,224	$532,224

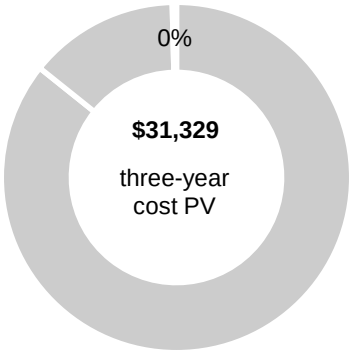
Cost Of Ongoing Centralized Network Management

Although the cost to manage Dell EMC SD-WAN Solution on an ongoing basis is remarkably less than that associated with legacy networks, customers still reported incurring some costs for ongoing network management. These costs include the time needed by IT professionals to troubleshoot network issues using the centrally managed orchestration software. As the various remote-site networks can all be managed from the same screen, there is a minimal amount of time increase associated with managing these networks, even as they increase substantially.

Forrester estimates for the composite organization include:

- A total of two IT professionals needed to manage Dell EMC SD-WAN Solution centrally.
- A fully burdened hourly rate of $75 for these professionals.
- Minimally increasing time to manage the solution as more sites are deployed, from 1 hour to 1.5 hours to 2 hours weekly and one hour needed of each network professional to manage Dell EMC SD-WAN Solution. The increase in time from 1 hour to 2 hours corresponds to an increase in sites managed from 200 to 1,000.

The cost of ongoing network management will vary depending on how many IT professionals are still needed to manage Dell EMC SD-WAN Solution on an ongoing basis as well as their fully burdened hourly rate of pay. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year risk-adjusted total PV of $31,329.



Cost of ongoing centralized network management: 0.4% of total costs

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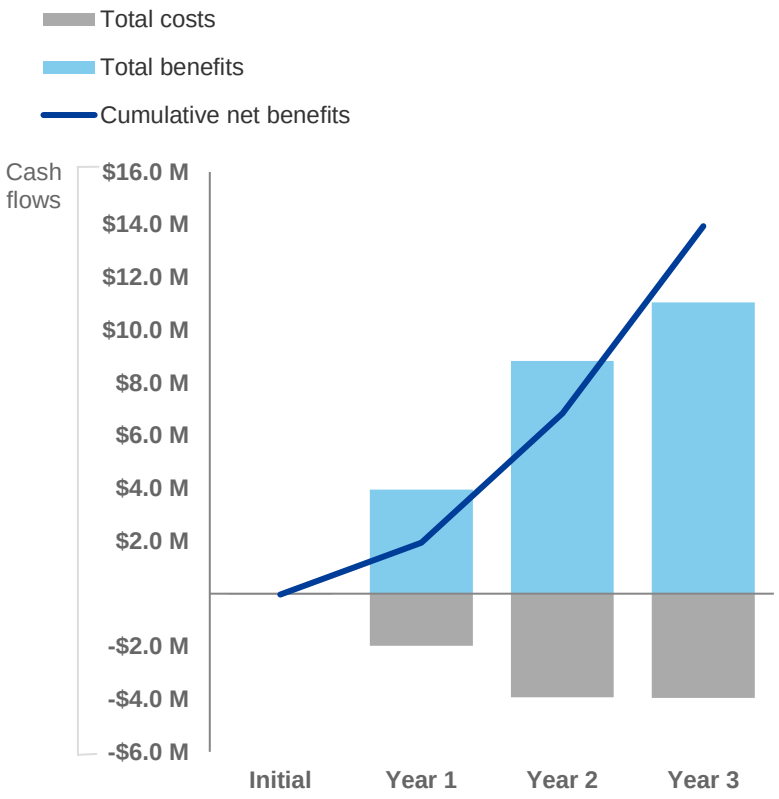
Cost Of Ongoing Centralized Network Management: Calculation Table						
Ref.	**Metric**	**Calculation**	**Initial**	**Year 1**	**Year 2**	**Year 3**
H1	IT professionals tasked with network management	Interview		2	2	2
H2	IT professional fully burdened hourly rate			$75	$75	$75
H3	Hours spent managing SD-WAN per week	Interview		1.0	1.5	2.0
Ht	Cost of ongoing centralized network management	H1*H2*H3*52	$0	$7,800	$11,700	$15,600
	Risk adjustment	↑10%				
Htr	Cost of ongoing centralized network management (risk-adjusted)		$0	$8,580	$12,870	$17,160

Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)



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's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

These risk-adjusted ROI, NPV, and payback period values are determined by applying risk-adjustment factors to the unadjusted results in each Benefit and Cost section.

Cash Flow Analysis (risk-adjusted estimates)

	Initial	Year 1	Year 2	Year 3	Total	Present Value
Total costs	($33,000)	($1,975,192)	($3,925,594)	($3,950,384)	($9,884,170)	($8,040,903)
Total benefits	$0	$3,946,128	$8,823,356	$11,056,356	$23,825,840	$19,186,222
Net benefits	($33,000)	$1,970,936	$4,897,762	$7,105,972	$13,941,670	$11,145,319
ROI						139%
Payback period (months)						<3

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Dell EMC SD-WAN Solution Powered by VMware: Overview

The following information is provided by Dell Technologies. Forrester has not validated any claims and does not endorse Dell Technologies or its offerings.

Dell EMC SD-WAN Solution powered by VMware is an all-in-one solution combining next generation x86 appliances from Dell with industry-leading VMware SD-WAN. The result is a turnkey solution that allows for the rapid deployment of SD-WAN, backed by Dell's world-class services, support, and global supply chain. Dell EMC SD-WAN Solution enables the utmost in application performance no matter the location or transport links used.

The Dell EMC SD-WAN Solution is deployed on-premises at the customers' locations and optimizes traffic between branches, data centers, and/or Cloud locations. Dell EMC SD-WAN Solution is available as a purpose-built appliance with combined hardware and software. The Dell EMC SD-WAN Solution is zero-touch provisioned from the Cloud for secure, optimized connectivity to applications and data.

Dell EMC SD-WAN Solution features include:

- All-in-one solution combining next generation Dell x86 appliances and industry-leading VMware SD-WAN solution
- Backed by Dell's world class services, support, and global supply chain capabilities
- Turnkey network transformation allowing for the rapid deployment of SD-WAN
- Cloud-based management of WAN functions via a single pane of glass experience
- Classifying traffic using a deep-packet application recognition (DAR) engine and applying policies based on real-time link quality.
- Making local decisions about how to steer traffic based on policies.
- The Dynamic Multipath Optimization™ (DMPO) feature of VMware SD-WAN solution delivers assured application performance over any type of transport link.

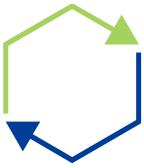
Appendix A: Total Economic Impact

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.

Total Economic Impact Approach

Benefits represent the value delivered to the business by the product. The TEI methodology places 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.

Costs consider all expenses necessary to deliver the proposed value, or benefits, of the product. The cost category within TEI captures incremental costs over the existing environment for ongoing costs associated with the solution.



Flexibility represents the strategic value that can be obtained for some future additional investment building on top of the initial investment already made. Having the ability to capture that benefit has a PV that can be estimated.

Risks measure the uncertainty of benefit and cost estimates given: 1) the likelihood that estimates will meet original projections and 2) the likelihood that estimates will be tracked over time. TEI risk factors are based on "triangular distribution."

The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1 that are not discounted. All other cash flows are discounted using the discount rate at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations in 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.

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.

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.

Return on investment (ROI)

A project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits less costs) by costs.

Discount rate

The interest rate used in cash flow analysis to take into account the time value of money. Organizations typically use discount rates between 8% and 16%.

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.

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Appendix B: Supplemental Material

Related Forrester Research

“Defining The Online Marketing Suite,” Forrester Research, Inc., October 17, 2007.