

How Using V3 Appliances Virtual Desktop
Total Cost of Ownership (TCO) is Reduced:
A Superior Desktop Experience
For Less Money

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VDI Overview

A V3 appliance is comprised of a powerful virtual desktop pool management system called Desktop Cloud Orchestrator (V3 DCO), and a purpose-built design that allow an organization to virtualize desktops. In today's market, VDI is playing an ever-increasing role in IT desktop management. The benefits of virtualized desktop computing, including lowered costs due to server consolidation, centralized management and high availability, appeal to many use cases. In fact, virtual desktops as a secondary system have been a staple for many organizations for several years.

However, few organizations have utilized virtual desktops as a primary system due to their current drawbacks, particularly latency that results in slow performance and ultimately a poor user experience.

VDI has not delivered on all the promised benefits to organizations, let alone allowed them to completely replace their physical desktops with virtual desktops. Nonetheless, today there are many drivers pointing toward increased adoption of virtual desktops as a primary system, including the increasing costs of productivity, more experienced mobile knowledge workers, and the need for IT organizations to balance control with flexibility. V3 appliances enable users to have an optimal experience, simplicity in deployment, ease of management, and greater energy efficiency.

V3 appliances overcome the primary challenges in reducing latency through superior architecture and the use of V3 certified storage to provide the fastest virtual desktops in the industry. The architectural changes that allows virtual desktops to perform faster than physical desktops involve components at both the network and storage layers. In addition, V3 appliances offer simple distributed deployment, centralized desktop management, and high energy efficiency. The V3 approach, along with the set of technologies that enable it, is capable of providing virtual desktops that can truly replace physical desktops.

Introduction

Much has been written, analyzed and claimed about Total Cost of Ownership (TCO) related to virtualized desktops. Some of the analysis claims that there is significant saving gained from migrating to virtual desktops. Others claim that, although offering some benefits, the license cost, extra backend equipment, and additional management push the TCO above traditional desktop deployments.

In this paper, we present a TCO analysis related to V3's infrastructure, the next wave in Virtual Desktop Infrastructure (VDI). The basis of this contention is that V3 appliances have produced a new VDI architecture that delivers a TCO that customers find compelling.

The V3 appliance is the first and only stack-agnostic desktop cloud management solution in the market today. It delivers the flexibility of persistent, non-persistent and hybrid pool deployment via a high performance purpose-built appliance. The management solution offers pool creation, management, policy-based administration for failover and reporting, and is specifically designed for the desktop administrator. The solution will perform faster than any desktop available today with a consistent density and cost for any virtual desktop deployment. Simplicity and elegance of design allow swift installation and high end-user satisfaction.

No other appliance currently delivers these results. Normally when a product offers "more," the cost related to either the Capital Expenditure (CAPEX) or the Operating Expenditure (OPEX) is higher. In the case of the V3 appliance, it is actually lower in both cases.

Examining V3's VDI Total Cost of Ownership

At the end of 2010, Microsoft produced a well-researched white paper titled, "VDI TCO Analysis for Office Worker Environments v1.2." Here is the conclusion of that paper.

"Many organizations are evaluating Virtual Desktop Infrastructure (VDI) as an alternative to traditional PCs for their office workers. The perception is that VDI desktops accessed from thin clients will reduce costs and optimize service desk operations. While VDI may result in savings in overall hardware costs, these savings will be offset by higher software and engineering costs. After all the costs are tallied, VDI is more expensive than a well-managed PC environment for office workers."

Not surprisingly, Microsoft concluded that their traditional desktop PCs are a better model than virtual desktops. This of course differs from every other VDI TCO model offered by those selling VDI products, including VMware, Citrix and Cisco. The approach of this paper is to follow the Microsoft model and properly assign costs and value to determine an approximate apples-to-apples comparison. For this paper the definition of a traditional desktop is a PC with Windows 7 running standard productivity software like MS Office and other common software for an office worker. Let's begin by examining the benefits of virtualized desktops over traditional desktops.

General Benefits of Virtualization

There are many well documented benefits of virtualizing desktops. These include:

- Centralized data protection
- Centralized management and application deployment
- Eliminate PC Move/Add/Change costs
- For IP protection: Centralized Code protection
- For Security: Control of remote access and data
- Reduce local PC's space, noise and heat
- Eliminate single point of failure (due to local PC failure)

In addition to the benefits listed above, V3's DCC solution offers these benefits:

- Virtual desktops that outperform traditional desktops
- Ease of deployment and no Storage Area Network (SAN) required
- Ease of management. According to V3 client Ken Adams, CIO at law firm Miles & Stockbridge, "There's nothing to manage. That's one of the great benefits of this appliance. I have not had to manage anything. It's a very simple product to use."
- Flexibility of widely diverse desktop implementation scenarios, from office deployments at law firms such as Miles and Stockbridge, to education deployments at campuses such as University of Texas at Dallas.
- Flexibility of performance in machines. V3's virtual desktop solution easily supports a wide variety of usage performance needs, from the minimal resources required for shift workers to the heavy-duty resources demanded by power user attorneys working with extensive document management systems.
- Fast boot and application launch
- Workforce flexibility/ continuity
- Eliminate having to transfer/transport files to home or to a different desktop
- Centralized server location for geographically dispersed desktops eliminates difficulty of managing remote workforces individually. V3's client EnergySolutions was challenged in supporting their dispersed workforce of more than 2000 employees across multiple time zones and countries. Using V3 appliances installed in centralized server locations, they are able to streamline desktop administration, support rapid deployment of centralized applications, and keep data secure. According to Carol Finegan, CIO at Energy Solutions, "We look forward to being out of the IT Desktop Management Business!" Management tools that will provide scalability from 50 to "tens of thousands" of desktops
- Optimization software tools provide maximum flexibility
- Failover (redundancy) ensures high availability

Base Model TCO

Assuming that Traditional Desktops and Virtual Desktops were the same, here are the factors upon which the systems will be measured. The following tables are reproduced from the Microsoft white paper titled, "VDI TCO Analysis for Office Worker Environments v1.2."

Total Cost of Ownership for Distributed Computing

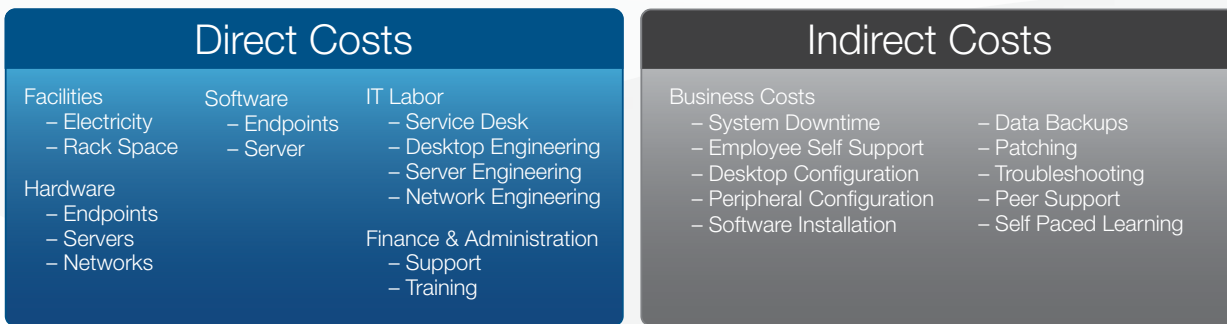


Figure 1. Total Cost of Ownership for Distributed Computing: Direct and Indirect Costs

The computing requirements are fairly simple for this base model. The office worker system factors are:

- Works 8 hours per day at the office
- Highly reliable computing
- Highly responsive computer
- Automated Document backup
- Remote desktop access
- High quality graphics

Based on these assumptions and using the Microsoft model assumptions, the results are listed below.

Note: The Microsoft whitepaper assumed a cost of \$0.09 per kWh for endpoint electricity. The calculation below uses an updated cost of \$0.132 per kWh, which is the average nationwide electricity cost according the Bureau of Labor Statistics, August 2011.

Table 1. Total Cost of Ownership for Physical Desktops, Legacy VDI and V3

Expense Categories	Physical Desktops	Legacy VDI	V3
Finance & Admin	116.0	120.0	105.0
IT Operations	271.0	292.0	200.0
Software	208.0	342.0	342.0
Hardware	209.0	130.0	116.6
Facilities/Energy	18.7	11.0	3.3
Overall TCO	822.7	895.0	766.9

More detail of the above summary can be seen in Exhibit A.

As the table shows, TCO for traditional Windows 7 desktops is slightly lower than Legacy VDI according to Microsoft, but much higher than V3. The primary culprit for the more expensive base VDI is software license costs (\$208 vs \$342). However, as can also be seen in the table, V3's TCO is much lower than Legacy VDI and \$55.8 lower than traditional desktops. Every category is lower for V3's solution with one exception—Software costs. Our customers are experiencing much lower IT operational costs and it goes without saying that hardware savings are substantial in the case of VDI. At an average nationwide electricity cost of \$0.132 per kWh (Bureau of Labor Statistics, Aug 2011 <http://www.bls.gov/ro5/aepchi.htm>) the electricity savings per desktop are significant--\$17.74 vs \$2.28.

In summary, for the Base Model comparison, traditional desktops have a 7% higher TCO as compared with V3's virtual desktop. We think this "base model" assumption is not a real world experience. Let's look at more realistic assumptions.

Real World Model TCO

You will recall that the requirements for the Base Model were quite simple:

- Works 8 hours per day at the office
- Highly reliable computing
- Highly responsive computer
- Automated Document backup
- Remote desktop access
- High quality graphics

Of course, V3's desktops meet these simple requirements as do traditional desktops. However in the "Real World" there are features that desktop users require that are not on this list, such as high availability and data security. In addition, there are many very desirable features that most organizations would like to have in their computing environment. We have already listed these in the section detailing benefits of VDI. Here again are those desirable benefits, which are already provided by the V3 appliance:

- Centralized data protection
- Centralized management and application deployment
- Eliminate PC Move/Add/Change costs
- For Security: Control of remote access and data
- Reduce local PC's space, noise and heat
- Eliminate single point of failure (due to local PC failure)
- Ease of deployment and no Storage Area Network (SAN) required
- Ease of management. According to V3 client Ken Adams, CIO at law firm Miles & Stockbridge, **"There's nothing to manage. That's one of the great benefits of this appliance. I have not had to manage anything. It's a very simple product to use."**
- Eliminate having to transfer/transport files to home or to a different desktop

In this "Real World" analysis, we have two choices in approaching an apples-to-apples comparison:

1. Reduce features of the VDI desktop to match traditional desktops
2. Enhance the traditional desktop with systems and features to match the V3 appliance

For a thorough analysis, this paper will analyze both approaches.

Low Feature VDI TCO

There is no realistic way to completely dumb-down a virtual desktop to match a traditional desktop, because there are simply too many benefits of VDI that can't be matched by traditional desktops. Because V3 has architected a virtual desktop that out performs traditional desktops, from the perspectives of latency, boot-up and general performance, this approach can be replicated with a shift worker model TCO.

In the base model, the office worker requirement was a computing environment used for 8 hours at the office. VDI can also do this with a floating pool virtual desktop model that allows workers to log in to a desktop available from the pool of desktops. Of course, this model would be practical in an organization having desktop users who work in shifts, but it illustrates the low-feature system. The table below reflects the TCO model for these assumptions:

Table 2. Total Cost of Ownership for Low-Feature VDI for Physical Desktops and the V3 virtual desktop

Expense Categories	Physical Desktops	Virtual Desktops
Finance & Admin	116.0	105.0
IT Operations	271.0	200.0
Software	208.0	118.0
Hardware	209.0	82.6
Facilities/Energy	18.7	1.8
Overall TCO	822.7	507.4

The savings primarily result from dividing license and hardware cost by three (number of shifts in a 24-hour period). However, this does not reflect the persistent benefits provided with VDI even in this low-feature scenario. For example, each worker can log into an end-point device no matter where they are working (even from home). And the savings don't reflect the many other benefits of VDI such as centralized data, ease of management and less frequent replacement costs.

Enhance The Traditional Desktop

In order to accomplish this comparison, the traditional desktop model would need to be enhanced as nearly as possible to match the features of VDI. Here are some of the needed enhancements:

- All files and changes to files would need to be saved on Network storage
- Every session on the desktop would require secure login to the network
- Remote access would require secure login to each user's desktop
- Stringent and controlled policies would need to be established and enforced so that organization data would never be outside of a controlled environment
- An accounting of boot-up and restore to previous desktop session would be needed to show productivity loss
- Backup physical desktops would need to be on-hand in case of failure to match the high-availability of virtual desktops
- Costs of personnel change would need an accounting. Turnover and or new workers require desktop setup time and resources. Virtual Machine (VM) images are easily deployed.

The above list attempts to replicate virtual desktops with physical desktops. In reality, this is an impossible task. This paper could attempt to quantify the cost of each of the above requirements. They would include:

- Deploying a VPN system
- Installing greater storage capacity with backup for disaster recovery
- Monitoring software to ensure users follow policies on the physical desktops
- Using an accounting system to show lost productivity and time in working from physical desktops only (including VPN login, remote desktop login, slower bootup and application launch, and so forth).

Rather than attempting such an accounting, several customers and users of V3 appliances were asked the following question: "If a virtual desktop had the same or better performance of a traditional desktop, in percentage terms, how much more valuable would this VDI system be than traditional desktops?" The answers ranged from 20% to 40%. Additionally, one customer with many diverse office locations and varying makeup of workers in each location said a centrally managed system in a data-center serving all locations was worth at least 50% more. They have deployed such a system on a proof-of-concept basis and are ready to move the entire company

over the next 18 months (over 2,000 desktops). The median response of the survey was over 30%. Applying these results to the base model we get the results in the following table.

Table 3. Total Cost of Ownership assuming Performance the Same or Better than Traditional Desktops, for Physical Desktops and V3-powered virtual desktop.

Expense Categories	Physical Desktops	Virtual Desktops
Finance & Admin	127.6	105
IT Operations	379.4	200
Software	289.1	342
Hardware	250.8	116.6
Facilities	18.7	3.3
Overall TCO	1065.6	766.9

Again this reflects the total solution being 30% more expensive for traditional desktops. The itemized breakdown in the table is simply an allocation of where the expense might come from.

What this doesn't reflect are the countless situations where virtual desktops are potentially even more valuable. One engineering firm was running high performance AutoCAD software from Texas on an appliance hosted in Salt Lake City. Of course the resources dedicated to that virtual desktop are commensurate with the software's demands. The firm's experience was amazing. This is no surprise given the amazing processor, storage and RAM implemented for his needs. His comment was that this performance would require a \$7,000 to \$12,000 desktop. For the V3-powered virtual desktop, the cost is no more than \$1,500 and would have a TCO of under \$1,000 per year. The above example illustrates the flexibility of VDI. Some users may need a basic data entry machine and others may need an AutoCAD machine. Virtual desktops can be customized for the user and a V3-based appliance solution allows such flexibility.

Summary

This paper has analyzed the total cost of ownership for the V3 virtual desktop appliance solution from various perspectives. When using Microsoft's "Base Model" TCO comparison, it has been shown that traditional desktops have a relatively higher TCO when compared to virtual desktops. From the perspective of the Real World Model TCO comparison, for both the low-feature VDI and the enhanced traditional desktop versions, we have proven that these also have a significantly higher TCO than virtual desktops.

Virtual desktop infrastructure provide performance as fast as or faster than traditional desktops, resulting in increased productivity and employee job satisfaction. In addition, a V3 appliance offers efficiencies including simple distributed deployment, centralized desktop management, and reduced IT footprint due to the V3 Appliance's high-density of desktops served. Finally, with a CAPEX and OPEX actually lower than comparable desktop solutions, virtual desktop solution has a lower TCO than virtually any other vendor in the market. In summary, virtual desktop solution offers a truly superior desktop experience for less money.

Exhibit A.

Expense Categories	Physical Desktops	Legacy VDI	V3's DCC
Finance & Admin	116.0	120.0	105.0
IT Operations	271.0	292.0	200.0
Software	208.0	342.0	342.0
Hardware	209.0	130.0	116.6
Facilities / Energy	18.7	11.0	3.3
Overall TCO	\$822.7	\$895.0	\$766.9
Assumptions			
Lifecycle end points (years)	4.0	7.0	7.0
End point and flat panel	750.0	450.0	450.0
Server and storage lifecycle (years)	4.0	4.0	4.0
Facilities / Energy Cost			
Endpoint Electricity (13.2 cents per kwh)	17.7	5.0	2.3
Data Center (space, cooling, electricity)	1.0	6.0	1.0
	18.7	11.0	3.3
Annual Hardware Costs			
Endpoints (Wyse TCX)	189.0	64.0	64.0
Storage	5.0	20.0	5.0
Server	15.0	46.0	47.6
	209.0	130.0	116.6
Software Costs			
Wyse (TCX Support)	0.0	6.0	6.0
Microsoft	208.0	208.0	208.0
VMware	0.0	128.0	128.0
	208.0	342.0	342.0
IT Labor costs			
Network Engineering	5.0	10.0	5.0
Server Engineering	2.0	25.0	10.0
Desktop Engineering	119.0	141.0	90.0
Service Desk	145.0	116.0	95.0
	271.0	292.0	200.0
Finance & Administration costs			
Training	101.0	105.0	90.0
Procurement, Legal, HR	15.0	15.0	15.0
	116.0	120.0	105.0

Service Desk			
Other	1.0	1.0	1.0
How to Request	30.0	30.0	30.0
Service Request	24.0	24.0	18.0
Authentication/Password resets	26.0	36.0	36.0
Application troubleshooting	42.0	28.0	28.0
O/S Troubleshooting	4.0	3.0	3.0
Hardware Troubleshooting	18.0	5.0	5.0
	145.0	127.0	121.0
Desktop Engineering			
Training	3.0	3.0	3.0
Monitoring/Capacity Planning	6.0	30.0	15.0
App Deployment/Patching	32.0	13.0	13.0
Client Imaging Engineering	11.0	9.0	9.0
Endpoint Deployment	40.0	25.0	20.0
Escalated Support (tier 3)	21.0	51.0	20.0
Program Management	6.0	10.0	10.0
	119.0	141.0	90.0

Table 4. 50-seat Virtual Desktop TCO Scenario: 28% Advantage with V3 Appliances

Scenario: Full Function Physical Desktop versus Full Function Virtual Desktops

Expense Categories	Physical Desktops	V3 Appliance Powered Desktops	V3 Advantage
Software	\$289.10	\$342.00	-\$52.90
Hardware	\$250.80	\$116.60	\$134.20
IT Operations	\$379.40	\$200.00	\$179.40
Direct Expenses per Desktop	\$919.30	\$658.60	\$260.70
Finance and Administration	\$127.60	\$105.00	\$22.60
Facilities/Energy	\$18.70	\$3.30	\$15.40
Indirect Expenses per Desktop	\$146.30	\$108.30	\$38.00
Total Cost per Desktop	\$1,065.60	\$766.90	\$298.70
Total Number of Desktops	50	50	
Annual Cost for 50 Desktops	\$53,280.00	\$38,345.00	\$14,935.00
3-year Total Cost	\$159,840.00	\$115,035.00	\$44,805.00