Dell Wyse Datacenter for VMware Horizon View Branch Office Desktop with Silver Peak

Optimizing VMware Horizon View in a geographically distributed enterprise

Dell Wyse Solutions Engineering
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## Revisions

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Executive summary

As businesses grow and become more global, IT organizations are faced with workforces in remote and branch office locations that need access to data, applications, and communication methods to effectively collaborate, communicate, and remain productive. Traditional approaches typically involve solutions that are difficult to manage and troubleshoot remotely providing a poor end user experience.

VMware Branch Office Desktop is architected in a way that supports the best end user experience at a remote/branch office while providing optimized access to centralized resources hosted in a local data center. Technologies used in this architecture include Dell PowerEdge servers, Dell Wyse thin clients with PCoIP support, Silver Peak virtual WAN optimization, and VMware Horizon Suite. Virtual desktop infrastructure (VDI) compute resources can be located in the remote branch office or centralized in a local data center. Both instances can be accelerated and secured with the Silver Peak WAN optimization software.

Dell Cloud Client Computing has combined Dell Wyse Datacenter for VMware Horizon View, which is comprised of Dell data center hardware components along with virtualization and management software from VMware, and the broad portfolio of Dell Wyse virtualization end points to include thin, zero, and cloud clients. VMware Branch Office Desktop provides a comprehensive approach to addressing multiple requirements within the branch office while ensuring that employees have fast, secure access to the applications and data they need to maximize productivity.
1 Introduction

Today, there are over 11 million branch offices worldwide with 80% of employees accessing their desktops remotely. When it comes to managing IT infrastructure in branch offices, it’s not uncommon for organizations to look at centralization. It simply isn’t efficient or cost effective to maintain IT staff and resources locally at each location, especially when the work tasks being performed in each location are nearly identical. Not only is the inefficiency of replicated and distributed IT management an unnecessary resource drain, it can expose the organization to greater risks of lost productivity and revenue by creating additional points of vulnerability. As such, desktop virtualization becomes an increasingly compelling technology option because it provides a quick and straightforward mechanism for centralizing existing distributed end user capabilities. The recognized security, high availability and cost streamlining characteristics of desktop virtualization seem ideally suited to the branch office requirement.

Unfortunately, there is one major hurdle that has consistently stood in the way: the WAN. Not only is bandwidth expensive, and in some cases a constraint on application performance, but as a single point of failure it presents a risk to user productivity.

To address these different needs, VMware, Dell, and Silver Peak have partnered to deliver solutions that have been tested and validated to deliver the efficiencies and cost savings of centralization. The solution leverages hosted virtual desktops with VMware Horizon View to help enhance security, ensure high-availability and streamline management.

1.1 Traditional approach

The traditional approach to addressing an increasingly globally distributed workforce has been to implement incremental solutions that address individual components and aspects of the computing experience. Typically, separate management applications had to be installed with separate administrative consoles at each site to manage a variety of devices. Even worse, IT administrators would have to touch every physical machine. The lack of centralized management and consistency was difficult to manage and required an enormous amount of effort and IT resources to maintain.

There exist a multitude of challenges with traditional solutions for remote and branch office users. Many of these challenges relate to backups, quality of service, external connectivity, security, management, and maintenance. With traditional approaches, there are no easy answers to these challenges. Ultimately, the workflow and productivity of the user will suffer.

1.2 VMware Branch Office Desktop approach

VMware Branch Office Desktop takes a drastically different approach to managing an increasingly global workforce in remote and branch office locations. It uniquely addresses many of the challenges of remote and branch office computing with comprehensive solutions. IT administrators can leverage the remote management capabilities in VMware vCenter Server to monitor and maintain high levels of service across multiple remote and branch offices – all from a central point of view. IT departments can add a higher degree of security and control by using VMware Horizon View to host complete desktop environments for remote office users as virtual machines, further optimizing management, costs, and availability, and a Silver Peak Accelerated IPSec site-to-site VPN to secure and accelerate communications.
2 Solution overview
VMware Branch Office Desktop provides a consistent and easy way to manage the end user experience for an increasingly global and distributed workforce. It also streamlines IT management for end user access by combining multiple technologies to provide a quality desktop experience for the end user. The user environment is delivered in a way that allows employees to be productive regardless of location – on-site or remotely. For the administrator, the result is fewer management points and less complexity. End users encounter the same user experience as if they were using a physical laptop or desktop and remain productive and connected to the data and information that they need.

2.1 VMware Branch Office Desktop features
VMware Branch Office Desktop enables enterprises to securely and efficiently provide a virtual desktop infrastructure to users in remote office and branch office locations. It allows for a consistent and unified approach for IT administrators to manage an employee’s corporate workspace. This solution provides greater security, a better user experience, and a consistent approach. This helps to reduce downtime, configuration issues, and poor application experience that are commonly experienced by end users in remote locations.

VMware Branch Office Desktop is architected with a consistent approach to tackling the difficulties and challenges that are associated with supporting users in remote and branch office locations. It allows flexibility for IT architects and administrators to design the solution to meet their requirements and tailor the components to meet their specific business use cases. IT administrators enjoy the benefits of managing the virtual desktop infrastructure from a single “pane of glass” and in a consistent manner rather than a sprawl of management interfaces and configuration panels. The result is that IT administrators can deliver a more consistent desktop computing environment in less time. The end user receives a consistent, secure, high quality computing experience, and the company benefits from higher efficiency and productivity at all levels.

Typical users of VMware Branch Office Desktop are IT administrators and architects, help desk specialists, and end users. IT administrators can use the management points to provision desktops and support remote user requests. Help desk specialists can quickly manage resources relating to permissions and access control. Remote users get the benefit of a quality computing experience as if they were located near the main data center or headquarters.
3 Solution details

3.1 VMware Branch Office Desktop architecture
A typical VMware Branch Office Desktop deployment is composed of the following components:

- VMware vSphere and vCenter
- VMware Horizon View
- VMware vCenter Operations Manager (vCOps)
- Silver Peak WAN optimization software on Dell PowerEdge Servers (or consolidated platform like PowerEdge VRTX)
- Dell Wyse Thin or Zero Clients with PCoIP support

The purpose of each component is outlined below.

**VMware vSphere and vCenter**
The solution is built on the industry-leading vSphere hypervisor virtualization platform. Read more about the product at the many benefits it provides at [www.vmware.com/products/vsphere](http://www.vmware.com/products/vsphere).

**VMware Horizon View**
The central component of the solution architecture, VMware Horizon View is the industry-leading VDI product. More information on VMware Horizon View is found here [www.vmware.com/products/view](http://www.vmware.com/products/view).

**VMware vCenter Operations Manager**
One of the biggest challenges faced by IT is on-demand management of the entire environment and the need to proactively identify and plan the infrastructure. VMware vCOps for VMware Horizon View provides the management infrastructure required for the environment. More information on VMware vCOps can be found at [http://www.vmware.com/products/desktop_virtualization/vcenteroperations-manager-view/overview.html](http://www.vmware.com/products/desktop_virtualization/vcenteroperations-manager-view/overview.html).

**Silver Peak WAN Optimization Software on Dell PowerEdge (VRTX)**
Silver Peak WAN optimization techniques help to secure and scale VDI across the geographically distributed enterprise by addressing the performance, security and availability WAN challenges that can undermine a VDI deployment.

**Dell Wyse Thin Clients with PCoIP support**
Dell Wyse offers a wide selection of secure, reliable, and cost-effective thin and zero clients designed to easily integrate into any virtualized or web-based infrastructure, while meeting the budget and performance requirements for any application.

3.2 How VMware Branch Office Desktop components work together
VMware vSphere and vCenter provide the basic framework in which the virtual desktop infrastructure resides. It provides the hypervisor, virtual networking, and management to deliver an environment with mainframe-like resiliency.
VMware Horizon View provides personalized virtual desktops as a managed service and is built to tightly integrate with VMware vSphere in order to take advantage of the benefits and features it provides. Horizon View can be deployed in a distributed compute model, where a Horizon View server remains in the branch office servicing local users or a centralized compute model where the Horizon View server sits in the data center and services users in remote locations.

vCOps and the vCOps for VMware Horizon View adapter provide a single dashboard for monitoring the entire infrastructure for the branch. By adding Quality of Service (QoS) monitoring software provided with Dell Wyse thin clients, additional feedback such as application response times can be checked to ensure that the user experience remains high.

The Dell Wyse thin client with PCoIP support is used by the end user to connect to the virtual desktop infrastructure hosted either in the data center or at the branch office.

### 3.3 Benefits of Silver Peak WAN Optimization

Silver Peak software ensures users receive the optimum Dell Wyse and VMware Horizon View experience over the WAN and that all data is protected from eavesdropping or attack. IT professionals are all too familiar with how application and protocol performance degrades over the Internet; VDI within an office or campus will obviously be more responsive than across the continent. Less obvious, though, is why protocol performance degrades and what can be done about it. Three factors determine the performance of VDI or any application over distance – latency, network congestion, and bandwidth:

- **Latency** is the time it takes for data to travel from one location to another. Latency is bound by the laws of physics (that is, the speed of light), and exacerbated by chatty protocols that require many back and forth acknowledgements when communicating across a WAN.

- **Network congestion problems** occur on shared network infrastructure (for example, MPLS and IP VPN WANs) and result in lost and out of order packet. Lost packets must be retransmitted and out-of-order packets must be reordered before the packet flow can be processed by the higher-layer. Both add considerable latency, turning a cross-country connection (about 80 milliseconds round trip) into a connection with nearly a half-a-second of delay.

- **Limited bandwidth of the WAN** is probably the most obvious problem and constrains the amount of data that can be sent at one time. Even when WAN bandwidth purports to offer “LAN speeds,” the service level parameters, such as committed rates, coupled with the latency and network congestion, constrain the usable bandwidth.

Silver Peak virtual WAN optimization addresses all of these problems and can also optionally secure the site-to-site traffic with SSL termination and Accelerated IPSec, which establishes an accelerated, secured, site-to-site virtual private network (VPN) between locations. Silver Peak uses a range of technologies to overcome application performance problems:

- **Latency** is mitigated by streamlining the protocols underlying enterprise applications. TCP applications are improved through window scaling, HighSpeed TCP, and other technologies. Windows file sharing and other CIFS-based applications are improved using technologies such as, CIFS read-ahead and CIFS write-behind. Packet coalescing helps by re-packaging multiple smaller
packets into a single larger one, minimizing protocol exchanges that increase delay. Dynamic Path Control selects the fastest path to a remote location.

- **Congestion** is overcome by dynamically choosing the least-congested path to a location for an application. Lost or out-of-order packets are recovered and re-sequence in real time, avoiding retransmission delays. Traffic shaping and QoS mechanisms ensure thin clients receive the necessary bandwidth.

- **Bandwidth** usage is minimized with real-time, byte-level de-duplication. The Silver Peak software in each location inspects, compresses, and stores a single local copy of all outgoing traffic in real time. Subsequent instances of the traffic and never sent across the WAN, but delivered from the local Silver Peak instance, saving bandwidth.

In addition, Silver Peak’s Dynamic Path Control allows IT to protect branch offices from network outages. In the past, equipping branch offices with an MPLS and a backup Internet connection meant paying for an unused access line. With Silver Peak software, traffic is balanced across all connections, selecting the path that most closely matches the application’s availability, loss and latency characteristics. The Internet connection, for example, can then be used to normally carry less-critical or less-sensitive site-to-site traffic, which is de-prioritized to accommodate the more critical MPLS traffic in the event of an outage. In addition, Silver Peak’s real time intelligence allows applications to be switched before a line fails, further improving uptime.

How much Silver Peak’s performance, security and availability features help Horizon View depends on the particular deployment model. With a distributed Horizon View deployment, View Composer–Pool Server traffic must be optimized and secured between the branch and the data center:

- Latency, network congestion, and bandwidth are less of a challenge as VDI traffic is kept on the local network. However, all three factors undermine the View Composer–Pool Server communications as well as other applications running between locations.
- Security is a problem as View Composer–Pool Server is unencrypted.
- Network availability is less of a problem with VDI traffic localized to the branch office, but remains an issue with View Composer–Pool Server traffic and all other applications.

With a centralized deployment, the View Client communications must traverse the WAN:

- **Latency** and **Network Congestion** directly impact the responsiveness of virtual applications and VDI. Virtual applications or desktops appear to be unresponsive causing user to re-hit the keys on their client machine, compounding the congestion problems as even more data is sent across the WAN.
- **Bandwidth** is less of a problem for the PCOIP protocol, which is encrypted and optimized for the WAN. However, where the View Client utilizes the Microsoft RDP display protocol, bandwidth can be an issue. Silver Peak’s ability to eliminate repetitive data from the WAN enables RDP to run more efficiently.
- **Security** is less of a problem when the deployment solely relies on PCOIP, which is encrypted by default with AES-128. However, when the View Client uses RDP over HTTPS, Silver Peak can terminate the SSL session and apply bandwidth optimizations. In addition, Silver Peak’s Accelerated
IPSec encrypts all traffic with AES-256, protecting any other traffic running between locations and adding another layer of protection to PCoIP traffic.

- Availability of the network remains a significant problem. Silver Peak’s Dynamic Path Control allows organizations to eliminate that single point of failure with low-cost Internet access lines.

3.4 VMware Branch Office Desktop topologies

Topologies that are currently supported by Dell Cloud Client Computing Engineering are discussed in greater detail in the following sections. Currently, the “distributed” and “centralized” compute models are supported.

**Distributed Deployment**

While most organizations would prefer to centralize their IT infrastructures, network reliability or functionality requirements may prohibit some from doing so. By deploying VMware vSphere in the remote office, organizations can maintain a local IT infrastructure in the branch office and manage it from the central data center. By hosting virtual desktops locally in the office, the remote office can continue business operations in the event that network connectivity to the data center is lost.

Virtualizing workloads at the remote site offers optimal desktop performance and responsiveness. Although technical expertise remains geographically distant from the remote office IT infrastructure, central IT staff is able to leverage VMware vCenter Server for automating server maintenance tasks and monitoring resources. These remote management capabilities minimize the need to troubleshoot remote servers and desktops in person.

Dell Wyse end point devices that provide access to the virtual desktops are also located on-site at the branch office. The connection to the virtual desktop and its “presentation” traffic are localized. Initial desktop broker connection to VMware View Connection Server redirects VMware Horizon View Clients to local desktop connections so that PCoIP traffic is all local to the branch office.

Applications used in the VMware Horizon View Desktop context will take advantage of the Silver Peak WAN optimization software to optimize and secure the connection back to Data Center resources. Availability is improved by dual-homing offices with low-cost Internet access lines and relying on Silver Peak’s software to maximize the investment in those connections. In this manner, the resultant desktop PCoIP traffic is optimized since the traffic is local to the branch office and the applications that run in the desktop also have an optimized data path.
Remote workers or local to the branch office workers connect to local View infrastructure with optimized application data path back to Datacenter.

WAN OP optimizes traffic for apps such as email, CIFS, etc.

Figure 1  Flow of network traffic between branch office and data center with PowerEdge VRTX and Silver Peak at Remote Branch Office
Centralized Deployment

Organizations with reliable, high-bandwidth, low-latency network links to remote offices, or organizations who have implemented a wide-area data services solution for application acceleration across the WAN, can manage and standardize server and desktop environments in the corporate data center, where administrators can perform backups, upgrades and complete maintenance. Administrators can remove servers and desktops from the remote office, convert them into virtual machines using VMware vCenter Converter and host them on the virtual infrastructure behind a secure firewall in the data center. End users in remote offices can then access server and desktop workloads over the network. Administrators can enforce strict control over access to virtual machines by delegating customized roles and permissions to authorized administrators and end users.

A centralized approach to deployment maximizes consolidation ratios, ensures security, and minimizes management complexity. Because the remote office IT infrastructure is located in the data center, IT staff with technical expertise can offer faster response times and better support to end users in remote locations. Additionally, remote office services can leverage data center resources, including high-end servers, storage and networking, as well as existing data center disaster recovery and backup plans. Centralized deployment not only enhances security and compliance, but local backups can be performed more quickly in the data center over the high-speed local area network (LAN).
Since end users must access workloads over the WAN, a centralized deployment will increase network traffic between the remote site and the data center. Application performance will depend on application type, network bandwidth and distance between the site and the data center. Wide-area data services solutions or WAN acceleration products, such as Silver Peak VX software on Dell PowerEdge, can help alleviate performance issues. Security can be enhanced with a site-to-site VPN, such as the Accelerated IPSec VPN included in Silver Peak software and branch office availability can be improved by dynamically balancing traffic across MPLS and Internet access lines using Silver Peak software.

In this scenario, Dell Wyse end point devices that provide access to the virtual desktops are located on-site at the branch office. The connection to the virtual desktop and its “presentation” traffic occur over the WAN. The PCoIP protocol used to connect from the Dell Wyse end points to the virtual desktops in the data center offer many enhancements such as caching and bandwidth optimizations that make it ideal for use over the WAN.

Applications used in the VMware Horizon View Desktop context are localized in the data center. In this manner, the only traffic that has to traverse the WAN is the desktop PCoIP traffic while the application traffic remains local to the data center. This provides for an optimized data path that consumes a minimal amount of WAN bandwidth.

![Diagram](https://example.com/diagram.png)

Figure 3  Initial client connection to the VMware Horizon View Connection Server in which the user is authenticated and PCoIP connection redirected to the appropriate virtual desktop
3.5 Branch office deployment guidance and considerations

3.5.1 Distributed branch office deployment
The following are general considerations for a distributed model of branch office deployments:

- Data center is overseas or has a high-latency connection that would not be conducive to the PCoIP presentation traffic of a virtual desktop in the data center to a remote VMware Horizon View Client.
- Number of remote desktop users is so high that the amount of outbound WAN traffic is large enough to cause contention for existing WAN connectivity resources, or require increased WAN bandwidth to support multiple concurrent PCoIP connections.
- Best possible end user desktop experience in terms of presentation traffic and “feel” of the desktop is required.
- Segmentation is required of remote ESXi hosts which enable certain Business Desktop use cases (i.e. 3rd party offshore development work) to ensure security and firewalls are in place.
- Localized services such as print/fax are available in the branch office facilitating an optimal connection to the virtual desktop.
- Distribute the architecture for the VMware Horizon View desktops so there is not a single point of failure across the enterprise.
- Centrally managed from the VMware Horizon View infrastructure in the data center.

3.5.2 Centralized branch office deployment
The following are general considerations for a centralized model of branch office deployments:

- Application servers, data, and services that are consumed by remote desktops should be in the same geographical area, or the latency between the data center and the remote branch office should be low. Example: Branch offices in the same country or region as the data center.
- Limit deployments to a smaller number of remote desktop users and size the WAN link proportionally to provide a good end user computing experience.
- The performance of the application running on the desktop is highly dependent on very low latency access to the data path. As such, the desktop and the application data should be co-located in the same data center.
- The branch office is part of the regular company offices and internal corporate WAN/MPLS access is available, and where the link is sufficient to run the remote user’s desktop with a good user experience.
- Support for highly mobile users that do not have a home base of operations (e.g. Sales, etc.)

3.5.3 General branch office deployment notes
The following should be considered for branch office deployments, in general.

- In scenarios without video or demanding graphics, WAN latency of up to 75 ms may deliver acceptable performance for typical office applications remotely, but this is highly dependent on user workload, branch office uplink speeds, and the number of concurrent users connecting to the data center.
- Use of zero clients with embedded PCoIP technology can potentially provide better performance.
- WAN optimization provided by Silver Peak VX software is a very important consideration when designing supported models of branch office deployments.
• WAN optimization will improve the application data path back to the data center (traffic such as CIFS shares, SharePoint, web applications, etc.), and can also facilitate better performance for VMware Horizon View Composer operations and other similar management operations.

• Consolidate all branch office infrastructure software, such as VMWare Horizon View and Silver Peak WAN Acceleration, on a consolidated, highly available branch hardware platform, such as Dell VRTX.

• Where a consolidated branch-office platform is not utilized, consider deploying Silver Peak WAN Acceleration software on a vSphere cluster with HA enabled and equipped with fail-to-wire cards for maximum uptime.

• Dual home branch offices with low-cost Internet access lines. The Silver Peak software will load balance across the lines, accounting for the latency and loss characteristics of an application, maximizing the WAN investment.
Business benefits

There are a multitude of business benefits than can be realized by using VMware Branch Office Desktop in VDI environments. Some of them are measurable using metrics such as support desk calls, while others are not, such as ease of use or end user computing experience. Some of the largest benefits can be summarized by the following points:

- Reduce resources required in the branch office to manage and maintain IT infrastructure
- Reduce IT hardware and operating costs for servers and desktops
- Reduce operating costs for WAN infrastructure
- Simplify IT management and accelerate provisioning from a single “pane of glass”
- Improved uptime by eliminating single-points of failure.
- Ensure always-on availability and recover quickly from disasters
- Improved service levels, availability, data protection, and platform security
- Centralized management of the entire IT environment through a single interface
Summary

VMware Branch Office Desktop is optimized for organizations looking to cost-effectively and reliably support desktops for branch office employees accessing applications and data on VMware Horizon View virtual desktops. It is uniquely designed to support a variety of architectures that can be deployed to best address business and user requirements while being comprehensive and cost-effective. It provides an enhanced user experience, ease of management for IT administrators, and the security needed to keep crucial business data safe and secure.