Joint Cisco and VMware® Solution for Optimizing Virtual Desktop Delivery

Cisco Wide Area Application Services and Application Control Engine Optimize Delivery of VMware Virtual Desktop Infrastructure Across the Enterprise

What You Will Learn

Cisco® Wide Area Application Services (WAAS) and Cisco Application Control Engine (ACE) with VMware® Virtual Desktop Infrastructure (VDI) reduces the cost and complexity of managing desktops by optimizing virtual desktop delivery over the WAN while avoiding costly bandwidth upgrades.

- This jointly validated solution improves employee productivity by combining VMware VDI for virtualizing and centralizing desktops and Cisco WAAS for compressing and accelerating Microsoft Remote Desktop (RDP) and optimizing branch-office printing.
- Cisco WAAS increases the scalability and number of VMware VDI users supported over the WAN, and Cisco ACE improves the availability and scalability of data center VMware VDI.
- Enterprise business continuity is improved by reducing the amount of time required for backup and replication of data center VMware VDI.

Business Challenges

Customers use desktop virtualization solutions such as VMware VDI to replace traditional PCs with virtual machines that are managed from the data center to reduce operating costs, increase control of desktop management, and extend business continuity and disaster recovery to enterprise desktops.

However, when desktop virtualization solutions are deployed over the WAN, latency and bandwidth constraints limit the effectiveness of virtual desktop solutions. Customers face the following challenges in deploying virtual desktop solutions for the enterprise:

- Poor performance of RDP over the WAN, affecting employee productivity
- High bandwidth consumption, increasing solution costs
- Limited scalability, reducing the number of users that can be supported
- Poor performance of centralized printing and increased costs of printing at the branch office
- Considerable time and bandwidth required for transfer of virtual images, affecting business continuity
- Need to maintain continuous availability within and across the data center for the VMware VDI solution
• High server resource consumption for Secure Sockets Layer (SSL) functions, resulting in a large number of servers

**VMware VDI Overview**

VMware VDI is an integrated desktop virtualization solution that delivers enterprise-class control and manageability. VMware VDI, built on the industry-leading VMware Infrastructure, provides an efficient and reliable environment for virtual desktops.

The VMware VDI solution consists of the following components (Figure 1):

• **VMware Infrastructure 3 Enterprise** software, which provides a platform for hosting virtual desktops including the VMware ESX and VMware ESXi software

• **VMware Virtual Desktop Manager (VDM)**, a desktop management server that securely connects users to virtual desktops in the data center and provides an easy-to-use web-based interface for managing the centralized environment

• **VMware VDM Client**, which runs on a Microsoft Windows PC and allows users to connect to virtual desktops through VMware VDM; VMware VDM Clients of VMware VDM certified thin clients connect using Microsoft RDP

**Figure 1.** VMware VDI Solution Components

**Cisco WAAS Overview**

Cisco WAAS is a comprehensive WAN optimization solution that accelerates applications over the WAN, delivers video to the branch office, and provides local hosting of branch-office IT services. Cisco WAAS allows IT departments to centralize applications and storage in the data center while maintaining LAN-like application performance and to provide locally hosted IT services while reducing the overall branch-office device footprint.
Cisco WAAS enables organizations to accomplish four primary IT objectives:

- **Application acceleration**: Improve productivity of remote employees.
- **IT consolidation and WAN optimization**: Reduce branch-office IT costs.
- **Branch-office IT agility**: Provide local branch-office IT services such as printing without additional servers.
- **Simplified data protection**: Ease compliance and business continuity.

The Cisco WAAS solution provides application-specific acceleration and hosted services validated by application vendors, proven network integration that preserves existing network services and simplifies operations, and lower overall cost of ownership.

**Cisco ACE Overview**

Cisco ACE provides core server load-balancing services; application acceleration through server offloading; and security services to maximize application availability, performance, and security. The Cisco ACE is coupled with an innovative virtualized hardware platform, application-specific intelligence, powerful performance, and granular role-based administration. By delivering up to 16 Gbps of throughput and support for up to 4 million TCP concurrent connections, the Cisco ACE can handle large production environments and be partitioned for sharing across multiple application or service environments. Using Cisco ACE, IT departments are better positioned to achieve the following business benefits:

- Improved application availability and scalability
- Cost reduction through virtualization
- Improved application performance using server offloading

**Joint VMware and Cisco Solution**

The jointly tested and validated solution from Cisco and VMware optimizes virtual desktop delivery and consists of the following components (Figure 2):

**Figure 2. VMware VDI Solution Components**
VMware VDI and VMware VDM to virtualize and centralize desktops
- The virtual desktops hosted on VMware Infrastructure 3 Enterprise in the data center
- The VMware VDM Connection Server allows remote branch users to connect to their virtual desktops in the data center running on VMware ESX Server.

Cisco WAAS to accelerate RDP performance and reduce bandwidth demands
- Cisco WAAS, deployed on both sides of the WAN optimizes RDP traffic between the end users and the data center using a sophisticated combination of TCP optimizations that reduce the effects of the WAN, persistent session-based compression, and data redundancy elimination. Cisco WAAS is used to optimize VMware VDI delivery, including Microsoft RDP, the underlying protocol used by the current version of VMware VDM and currently the predominant protocol used by the various virtual desktop implementations.
- The data center also hosts a Cisco WAAS Central Manager, which is used to manage the Cisco WAAS solution from a central point.
- The branch-office Cisco WAAS appliance provides print services locally to branch-office users by running Microsoft Windows print services.
- Cisco WAAS can be deployed between data centers to optimize backup of VMware VDI for disaster recovery (not shown in Figure 2).

Cisco ACE to improve availability and scalability of data center VMware VDI infrastructure
- The Cisco ACE appliance load balances virtual desktop connections among multiple VMware VDM Connection Servers based on application response time, providing scalability and resiliency to the VMware VDI solution.
- Cisco ACE reduces the number of VMware VDM Connection Servers required by offloading SSL functions to the network. With reduced costs due to SSL offloading, customers can more easily afford to adopt SSL for VMware VDI applications. Cisco ACE also enables centralized management of SSL certificates.
- Cisco ACE virtualization enables customers to partition a physical Cisco ACE device into multiple isolated virtual Cisco ACE devices, each with all the capabilities of the physical device. This virtualization capability facilitates data center consolidation, reducing the number of load balancers needed and reducing power and cooling requirements.
- The Cisco ACE appliance is typically deployed in front of the VMware VDM Connection Servers.

Solution Benefits

Performance Acceleration
The combined solution accelerates the performance of all applications accessed through VMware VDI, such as Microsoft Exchange for email and calendars and the use and sharing of Microsoft Office documents such as Microsoft PowerPoint, Excel, and Word, as well as enterprise websites.

- Cisco WAAS accelerates VDI performance by 70 percent (Figure 3).
- Cisco WAAS provides near-LAN performance for VMware VDI over the WAN.
Figure 3. Performance for 1.5-Mbps WAN, 100 milliseconds (ms) round-trip time (RTT), and 15 Virtual Desktop Users

Bandwidth Optimization

A single enterprise virtual desktop user can consume more than 300 Kbps of bandwidth, increasing WAN costs and degrading the end-user experience (Figure 4).

Cisco WAAS reduces RDP bandwidth demands by 70 percent, saving expensive WAN costs.

Figure 4. WAN Bandwidth Reduction: 1.5 Mbps, 100 ms, Single User
**Availability**

An individual VDM Connection Server does not provide adequate availability in the event of hardware or software failure. To help ensure continuous availability, multiple VDM Connection servers are required for the VMware VDI solution.

- Cisco ACE monitors the health of the application and load balances the traffic to any available VMware VDM Connection Server.
- Cisco ACE maintains the affinity between the client and the VMware VDM Connection Server using session persistence.
- Cisco ACE improves availability by replicating connection and persistence information to the standby server and providing instant application service failover.

**Scalability**

A T1 or 1.5-Mbps WAN link can support fewer than 10 users using native RDP, making virtual desktop deployment prohibitively expensive for many customers.

- Cisco WAAS increases the number of VMware VDI users that can be supported on a given infrastructure by 4 times (Figure 5).
- Cisco WAAS provides uniform, scalable performance for all users. With native RDP, the user experience rapidly degrades with the addition of users.
- Cisco ACE improves the scalability of the data center VMware VDI infrastructure. As additional users are migrated from traditional PCs to virtual desktops in the data center, increasing numbers of VDM Connection Servers are required.
- Cisco ACE exposes only one virtual IP address for users to connect to regardless of the number of VMware VDM Connection Servers in the data center and load balances user requests across them.
- Cisco ACE reduces CPU and memory use on VMware VDM Connection Servers by offloading SSL functions to the network, thereby freeing resources to handle more users.
- With virtualization, Cisco ACE can also be used to load balance other applications in the data center without affecting the VMware VDI solution.
Optimized Printing

Customers face considerable challenges in printing in VMware VDI environments since the printer at the branch office and the virtual desktop image at the data center are separated by the WAN. Using Cisco WAAS, customers have flexible choices for selecting the right print topology for their environments.

- Cisco WAAS accelerates centralized print through printing-specific optimizations, data reduction, compression, and TCP optimizations to provide more than 70 percent improvement.
- Cisco WAAS provides a Microsoft Windows Server printer option on branch-office Cisco WAAS appliances, saving the cost of additional servers at the branch office.

Accelerated Backup and Virtual Image Transfer

Virtual machine images are backed up or transferred across the WAN as part of deployment and management of VMware VDI infrastructure (Figure 6).

- Cisco WAAS accelerates transfer of virtual machine images by 50 times.
**Business Benefits**

The joint Cisco and VMware solution optimizes VMware VDI delivery and allows customers to achieve the benefits of VMware VDI by providing the following features:

- Near-LAN performance for virtual desktops over the WAN, improving performance by 70 percent
- Increased scalability of the number of VMware VDI clients, increasing the number of clients supported by 2 to 4 times, and massive scalability of VMware VDI and VMware VDM data center infrastructure
- 60 to 70 percent reduction in WAN bandwidth requirements
- Optimization of printing over the WAN by 70 percent, with the option of a local print server hosted on the Cisco WAAS appliance
- Improved business continuity by accelerating virtual image backup by up to 50 times and reducing bandwidth by more than 90 percent

**Conclusion**

Cisco and VMware have worked together to deliver this joint solution, collaborating on lab setup, solution testing, and validation of test results. Cisco and VMware jointly validate that the lab setup and solution testing represent best efforts in creating a realistic customer deployment and accurate documentation of such deployment.

Cisco and VMware recommend that customers use this jointly tested and validated solution to deploy optimized, scalable virtual desktop solutions to reduce infrastructure costs and improve management control.
Cisco and VMware intend to continue to enhance this partnership to develop joint solutions for optimizing virtual desktop delivery in the enterprise.

**For More Information**

- Cisco ACE product information: [http://www.cisco.com/go/ace](http://www.cisco.com/go/ace)