
Dell vStart 50 for VDI- VMware View

5.1 Rack Reference Architecture

*Release 1.0 for Dell PowerEdge Rack Servers, PowerConnect Switches,
and Equallogic Storage*

Dell Wyse - Desktop Virtualization Solutions Team

Revision: A00



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July 2012

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Revision History

Revision	Description	Date
A00	Initial Version	July 2012

1 Introduction

The Dell vStart 50 for VDI - Rack VMware View 5.1 solution is a virtualization infrastructure solution that has been designed and validated by Dell Engineering. It is delivered racked, cabled, and ready to be integrated into your datacenter. The Dell vStart 50 for VDI - Rack VMware View 5.1 configuration includes Dell PowerEdge R620 servers running VMware® ESXi™, Dell EqualLogic PS4100X iSCSI storage, Dell PowerConnect switches, and a Dell PowerEdge R420 server that manages the solution by hosting VMware vCenter™ Server and Dell management tools, with VMware View 5.1 delivering the virtual desktop sessions.

The configurations also include Dell Management and Dell EqualLogic Host Integration Tools for VMware Edition (HIT/VE) Plug-ins for VMware vCenter Server. VMware ESXi 5.0 is the supported hypervisor. The solution can either be configured with PowerConnect 7024 or PowerConnect 6224 switches

2 Audience

This document is a guide for IT administrators and IT managers who are planning to purchase a vStart for VDI deployment. Please work with your Dell Sales Representative to ensure that the vStart solution is appropriately configured before ordering.

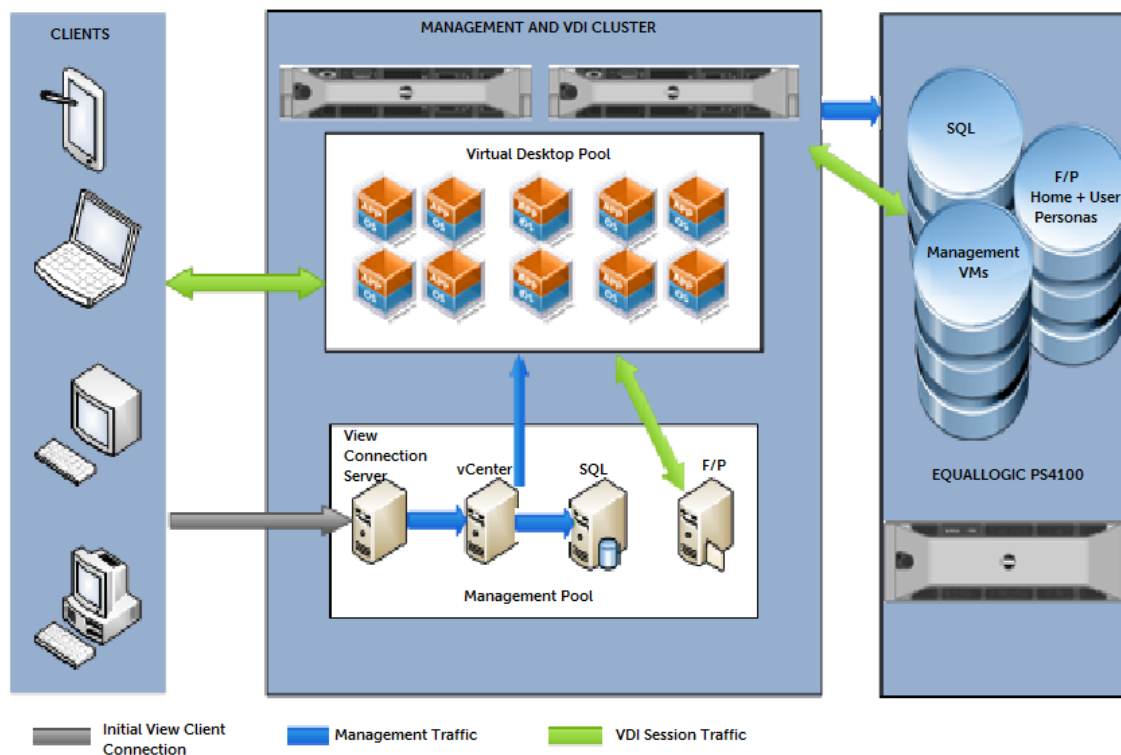
3 Overview

This section provides a high-level product overview of the VMware vSphere, Dell PowerEdge rack servers, PowerConnect 7024 or PowerConnect 6224 switches, and Dell EqualLogic PS4100X iSCSI storage.

To provide the highest service levels for the most critical components of the solution, the management stacks and database services have been designed into dedicated and highly available solutions fully supported by Dell, VMware and Microsoft. This also provides an added benefit of increased user densities and centralized management services for multiple stacks.

The Solution Overview, below, provides a summary of the solution which will be deployed for the Dell vStart 50 for VDI Rack solution.

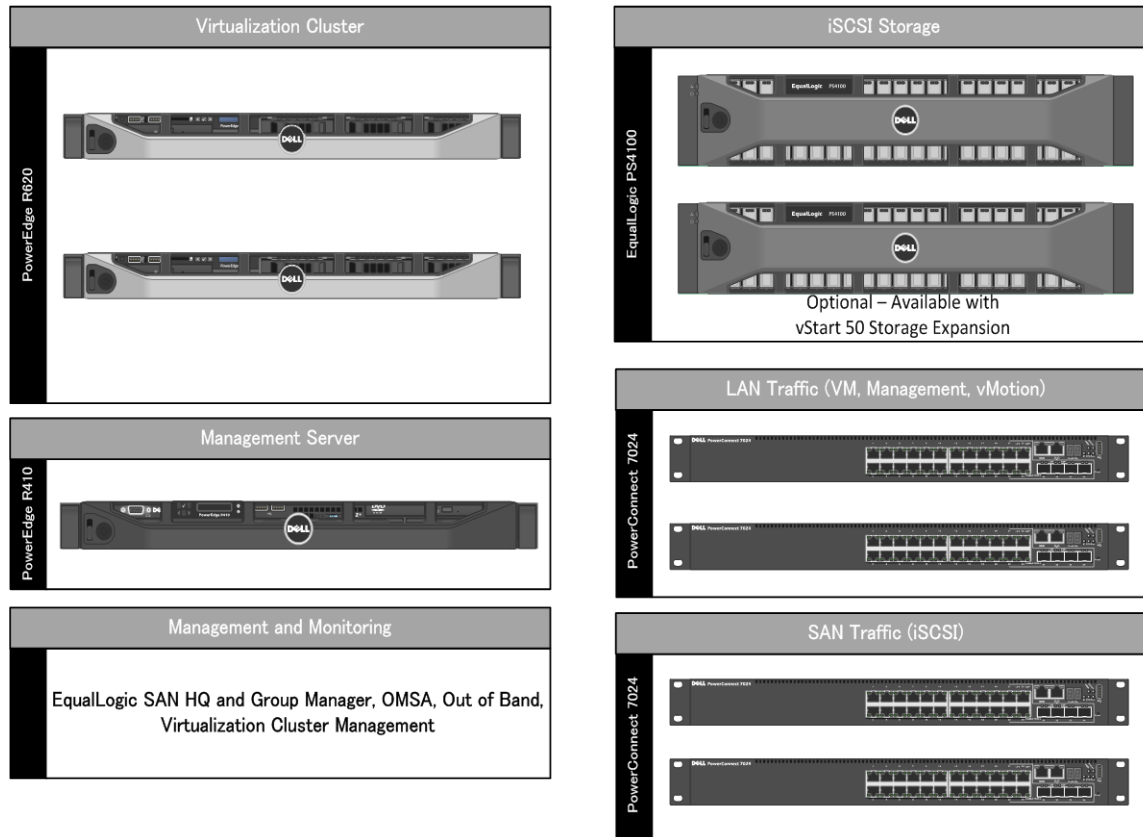
Figure 1. Solution Overview



The diagram above does not detail the shared infrastructure components which are leveraged by the environment.

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Figure 2. Dell vStart 50 for VDI Rack Overview



3.1 Solution Summary

The following table summarizes the components for the Dell vStart 50 for VDI - Rack VMware View 5.1 configuration. Storage expansion options are available for customers who require additional storage capacity, throughput, or bandwidth. As such, the EqualLogic PS4100X quantities will increment by one if the storage expansion option is selected. The solution with one additional storage array is called vStart 50+. For more information about the storage expansion option, please consult with your Dell Sales representative.

Table 1. Solution Summary

	Dell vStart 50 for VDI Configuration	
	Component	Quantity
Hypervisor Servers	PowerEdge R620 Servers	2
Hypervisor	VMware ESXi (2x Compute Nodes and 1 Management Node)	3
Storage Device	EqualLogic PS4100X	1 + (1 optional storage)

		expansion)
Ethernet Switch	PowerConnect 7024 or 6224 Switch	4
RPU	RPS-720/RPS-600	1
Management Server (optional)	PowerEdge R420 Server	1
Management Server OS	Windows Server 2008 R2 SP1 Standard Edition	2
Rack	Dell 2420 Rack Enclosure	1
Equipment Shelf	Rack Equipment Shelf for Switches	1
KMM (optional)	Dell 1U KMM Console	1
UPS (optional)	Dell UPS R3750	2
PDU	Dell PDU 24A, 208V	1

Table 1 below describes the key solution components and the roles served.

Table 2. Solution Components

Component	Description	Role
ESXi Cluster	PowerEdge R620 servers running VMware ESXi Embedded	Host virtual machines (VMs)
iSCSI Storage	EqualLogic PS4100X with 24 x 300 GB 10K RPM 2.5" SAS Drives	Provide shared storage for the ESXi cluster to host the VMs
Management Server	PowerEdge R420 server running VMware ESXi 5.0	Host VMware vCenter Server and EqualLogic SAN HQ along with the VMware View management VM's
LAN Traffic Switches	PowerConnect 7024 or 6224 switches	Support VM, vMotion, Management, and Out-of-Band Management traffic
SAN Traffic Switches	PowerConnect 7024 or 6224 switches	Support iSCSI data and iSCSI management traffic
Dell Management Plug-in for VMware vCenter	Dell virtual appliance hosted on the ESXi Cluster	Enables hardware monitoring, inventory, firmware updates, bare metal deployment of hypervisors, and warranty retrieval, all integrated into the vCenter Server user interface
Dell EqualLogic HIT/VE Plug-in for VMware vCenter	Dell virtual appliance hosted on the ESXi Cluster	Enables Auto Snapshots and storage volume management, all integrated into the vCenter Server user interface

3.2 VMware vSphere 5

VMware vSphere 5 includes the ESXi™ hypervisor as well as vCenter™ Server which is used to configure and manage VMware hosts. Key capabilities for the ESXi Enterprise Plus license level include:

- **VMware vMotion:** VMware vMotion technology provides real-time migration of running virtual machines (VM) from one host to another with no disruption or downtime.
- **VMware High Availability (HA):** VMware HA provides high availability at the VM level. Upon host failure, VMware HA automatically re-starts VMs on other physical hosts running ESXi. VMware vSphere 5 uses Fault Domain Manager (FDM) for High Availability.
- **VMware Distributed Resource Scheduler (DRS) and VMware Distributed Power Management (DPM):** VMware DRS technology enables vMotion to automatically achieve load balancing according to resource requirements. When VMs in a DRS cluster need fewer resources, such as during nights and weekends, DPM consolidates workloads onto fewer hosts and powers off the rest to reduce power consumption.
- **VMware vCenter Update Manager:** VMware vCenter Update Manager automates patch management, enforcing compliance to patch standards for VMware ESXi hosts.
- **VMware Storage vMotion™:** VMware Storage vMotion enables real-time migration of running VM disks from one storage array to another with no disruption or downtime. It minimizes service disruptions due to planned storage downtime previously incurred for rebalancing or retiring storage arrays.
- **Host Profiles:** Host Profiles standardize and simplify the deployment and management of VMware ESXi host configurations. They capture and store validated configuration information, including host compliance, networking, storage, and security settings.

For more information on VMware vSphere, see www.vmware.com/products/vsphere.

3.3 VMware View 5.1

VMware View 5.1 is a desktop virtualization solution that delivers virtual desktops as an on-demand service to any user, anywhere. With VMware's desktop delivery technology, View 5.0 can quickly and securely deliver individual applications or complete desktops to the entire enterprise, whether they are task workers, knowledge workers or mobile workers. Users now have the flexibility to access their desktop on any device, anytime, with a high-definition user experience. With VMware View, IT can manage single instances of each OS, application and user profile and dynamically assemble them to increase business agility and greatly simplify desktop management.

- › **VMware View PCoIP protocol:** Was designed to deliver an uncompromised desktop experience. To deliver on this vision, PCoIP was architected to recognize different types of content and then use different compression algorithms based on the content type.
- › **VMware View Administrator:** Provides a single management tool to provision new desktops or groups of desktops, and an easy interface for setting desktop policies. Using a template, you can customize virtual pools of desktops and easily set policies, such as how many virtual machines can be in a pool, or logoff parameters.
- › **VMware View Composer:** Based on the mature Linked Clone technology, VMware View Composer enables the rapid creation of desktop images from a golden image. Updates implemented on the parent image can be easily pushed out to any number of virtual desktops in minutes, greatly simplifying deployment, upgrades and patches while reducing desktop

operational costs. With the core components of the desktop being managed separately the process does not affect user settings, data or applications, so the end-user remains productive on a working desktop, even while changes are being applied to the master image.

- › **VMware View connection Server:** Acts as a broker between end users and virtual desktops they are allowed to access.

VMware View 5.1 delivers important features and enhancements that improve the performance, security, management, and flexibility of virtual desktops. This release of VMware View adds the following new features and support.

- **Advanced storage options that leverage vSphere 5.0** - The following performance optimizations and integration features take advantage of vSphere 5.0 enhancements:
 - **View Storage Accelerator uses Content Based Read Cache (CBRC)** - CBRC is an ESXi 5.0 server memory cache of common blocks. During peak I/O workloads such as logon boot storms, View desktops can access common blocks of the OS disk and shared applications in the main memory cache, improving performance, enhancing the user experience, and saving storage array costs.
 - **Tech Preview: View Composer Array Integration with VAAI** - Additional View Composer cloning options leverage the vStorage API for Array Integration (VAAI) Native Cloning capability of Network Attached Storage (NAS). **Note:** The storage vendors developing support for NFS native cloning (VAAI) need additional certification to support the View workload. CBRC is not supported with the NFS native cloning feature.
 - **Customizable View Composer disposable disk drive letter.**
 - **Support for up to 32 hosts in a cluster when Network File System (NFS) is in use.** (The former limit was 8 hosts per cluster.)
- **Improved USB support.**
- **Radius two-factor authentication support.**
- **View Administrator user interface (UI) enhancements** - These include context menus, linking to saved View Administrator pages, enhanced table column viewing, and globalization and localization in five languages.
- **Support for pre-created Active Directory machine accounts.**
- **Optional customer experience improvement program.** View collects anonymous data about View usage to help make View more responsive to customer needs. No user-identifiable data is collected. You can opt in or out of the program at any time.
- **View Persona Management is supported on physical computers** - View Persona Management (virtual profiles) can manage user profiles across physical computers and View desktops. Simultaneous sessions are not supported.
- **View Persona Management user profile migration** - The View Persona Management utility migrates Windows user profiles from Windows XP to Windows 7. The utility migrates profiles from physical computers to View or from View to View.
- **Standalone View Composer server** - View supports the installation of the View Composer server on a standalone machine separate from VMware vCenter Server

When implementing a VMware View solution it's critical to design the vSphere cluster and View components with high availability and resource management according to best practices. The Dell DVS Engineering team leverages the strategic relationship with VMware to evaluate and implement the most current best practices for a given configuration.

3.4 PowerEdge R620 for ESXi Cluster

The Dell PowerEdge R620 uses Intel® Xeon® E5 2600 series processors and Intel chipset architecture in a 1U rack mount form factor. The R620 supports up to ten 2.5" drives. There is also an option for an LCD on the front of the server for system health monitoring, alerting, and basic management configuration. The server features two CPU sockets and 24 memory DIMM slots supporting 2, 4, 8, 16 or 32GB DIMMs to meet the varying memory density demands of a virtualized infrastructure. The 10 local disks are configured for RAID10 and host the virtual desktop sessions

Figure 3. Dell PowerEdge R620



Table 3. Dell PowerEdge R620 Hardware Configuration

Local Tier 1 Compute Host – PowerEdge R620
2 x Intel Xeon E5-2690 Processor (2.9Ghz)
192GB Memory (12 x 16GB DIMMs @ 1600Mhz)
VMware vSphere 5 on internal SD
2 x 2GB SD Card for RIPS
10 x 146GB SAS 6Gbps 15k Disks
PERC H710 Integrated RAID Controller 1GB – RAID10
Broadcom 5720 1Gb DP NDC (LAN)
Broadcom 5729 1Gb QP NIC (LAN)
iDRAC7 Enterprise w/ vFlash, 8GB SD
2 x 750W PSUs

3.5 EqualLogic PS4100 for iSCSI Storage

The Dell EqualLogic PS4100 is a virtualized iSCSI SAN that combines intelligence and automation with fault tolerance to provide simplified administration, rapid deployment, enterprise performance and reliability, and seamless scalability. The storage architecture delivers a self-optimizing SAN that is simple to manage and has an all-inclusive software suite to help reduce Total Cost of Ownership (TCO). In the Dell vStart 50 for VDI the PS4100X uses 10,000 RPM Serial Attached SCSI (SAS) 2.5 " form factor disk drives to provide capacity and performance for a range of applications.

3.6 PowerConnect 7024 or 6224 for LAN and SAN Traffic

At the heart of the solutions network configuration are four Dell PowerConnect 7024 or 6224 switches. These managed Layer 3 Gigabit Ethernet switches offer the enterprise-class level of performance required for this configuration. The LAN switches use a stacked configuration that enables connection redundancy and added bandwidth where required. Additionally, the 10Gb uplink enables design and

implementation flexibility needed by advanced users. LAN and SAN switches are physically and logically separated per best practices to support security and network traffic segmentation. VLANs are implemented to support solution management, security, and network traffic segmentation, and routing is leveraged to provide flexible connectivity.

3.7 Dell Hardware and Storage Management integrated into vCenter

Dell Management Plug-in for VMware vCenter is included in the solution. This enables customers to:

- Get deep-level detail from Dell servers for inventory, monitoring and alerting – all from within vCenter
- Apply BIOS and Firmware updates to Dell servers from within vCenter
- Automatically perform Dell-recommended vCenter actions based on Dell hardware alerts
- Access Dell hardware warranty information online
- Rapidly deploy new bare metal hosts using Profile features

EqualLogic HIT/VE Plug-in for vCenter is also included in the solution. HIT/VE enables customers to:

- Create and manage Smart Copies and Smart Clones of VI objects
- Schedule creation of Smart Copies and Smart Clones
- Provision new datastores and expand existing datastores
- Create and deploy Virtual Desktops (This is outside the scope of this solution, and requires additional software.)

For more information on Dell Management Plug-in for VMware vCenter see [the Dell Management Plug-in web page](#). For more information about the Dell EqualLogic HIT/VE Plug-in for VMware vCenter see

<http://www.dellstorage.com/WorkArea/DownloadAsset.aspx?id=1616&terms=HIT%2fVE>.

3.8 PowerEdge R420 Management Server

The Dell PowerEdge R420 uses Intel Xeon E5-2600 series processors and Intel chipset architecture in a 1U rack mount form factor. These servers support up to six 2.5" drives and provide the option for an LCD located in the front of the server for system health monitoring, alerting, and basic management configuration. An AC power meter and ambient temperature thermometer are built into the server, both of which can be monitored on this display without any software tools. The server features two CPU sockets and 12 memory DIMM slots.

Table 4. Dell PowerEdge R420 Hardware Configuration

Shared Tier 1 Mgmt Host – PowerEdge R420
2 x Intel Xeon E5-2470 Processor (2.3Ghz)
96GB Memory (12 x 8GB DIMMs @ 1600Mhz)
VMware vSphere 5 on internal SD
2 x 2GB SD Card for RIPS
Diskless
1 x Broadcom 5720 1Gb DP NIC (LAN) LOM
1 x Broadcom 5729 1Gb QP NIC (LAN)
iDRAC7 Enterprise w/ vFlash, 8GB SD
2 x 550W PSUs

For more information, see the PowerEdge R420 guides at Dell.com/PowerEdge.

4 Design Principles

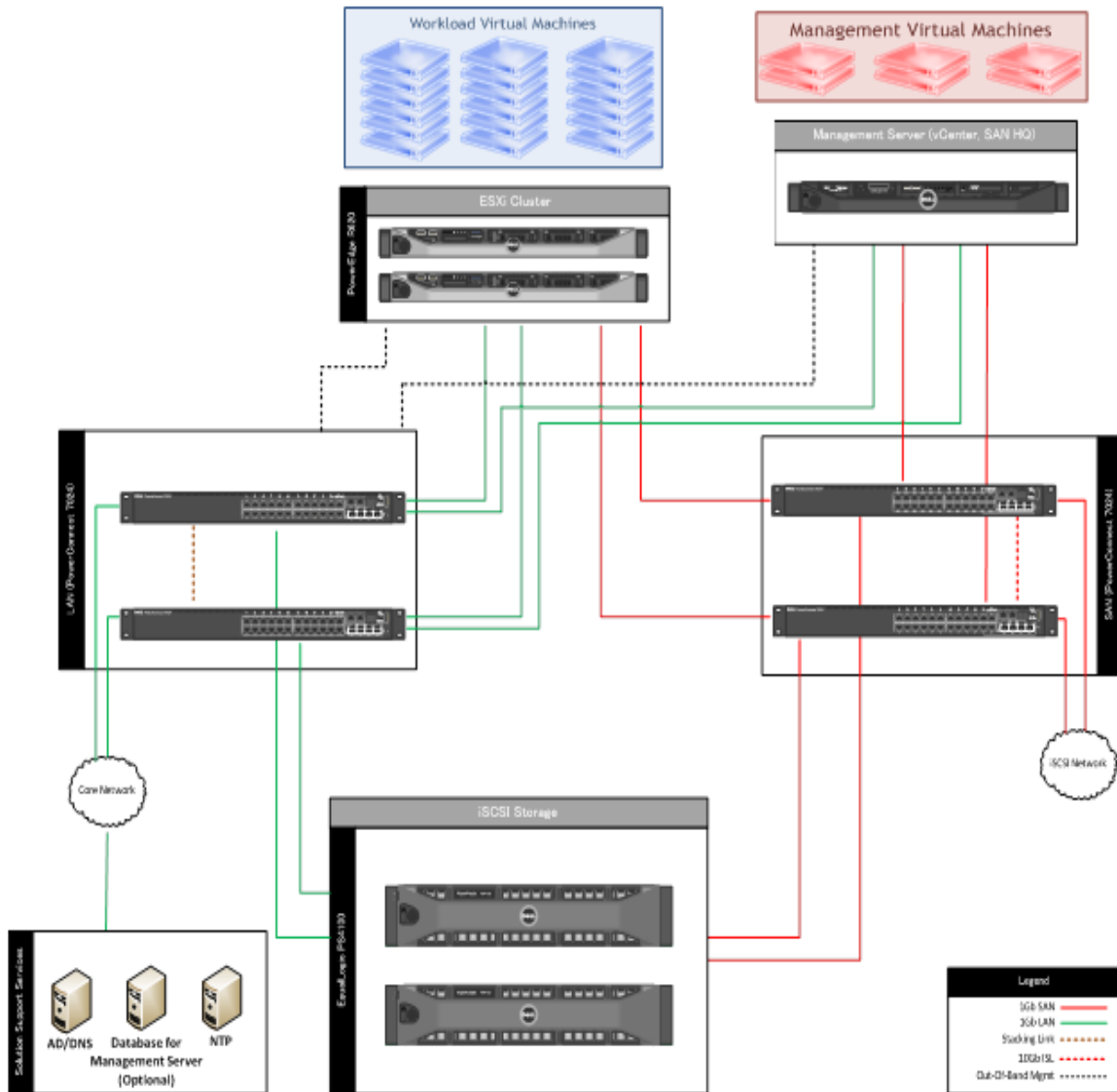
The following principles are central to the design and architecture of Dell vStart 50 for VDI for VDI Solution.

1. **Redundancy with no single point-of-failure:** Redundancy is incorporated in every aspect of the solution, including server high availability features, networking, and storage.
2. **Management:** Provide integrated management using VMware vCenter, Dell Management Plug-in VMware vCenter, Dell OpenManage Essentials, and Compellent plug-in for VMware vCenter.
3. **Cloud Enabled:** The solution includes VIS Creator, which enables customers to manage their virtualization infrastructure as a private cloud. The private cloud can in turn be connected to Dell vCloud using VMware vCloud Connector.
4. **Integration into an existing data center:** This architecture assumes that there is an existing 10 Gb Ethernet infrastructure with which to integrate.
5. **Hardware configuration for virtualization:** This solution is designed for virtualization for most general cases. Each blade server is configured with appropriate processor, memory, host bus, and network adapters as required for virtualization.
6. **Racked, Cabled and Ready to be Deployed:** vStart is available partially racked, cabled, and delivered to the customer site, ready for deployment. Components are configured and racked to optimize airflow and thermals. Based on customer needs, different rack sizes and configurations are available to support various datacenter requirements.
7. **Power, Cooling, and Weight Considerations:** Dell vStart 50 for VDI solution is configured with Power Distribution Units (PDUs) to meet the power requirements of the components as well as regional constraints. Power consumed, cooling required, and information regarding rack weight are provided to enable customers to plan for the solution.
8. **Flexible configurations:** Dell vStart 50 for VDI is pre-configured to suit most customer needs for a virtualized infrastructure. The solution also supports additional options, such as configuring racks, server processors, server memory, and storage, based on customer needs.

5 Reference Architecture

This solution consists of a PowerEdge R620 servers running VMware ESXi with PowerConnect switches and Equallogic PS4100X array(s). Below provides high-level reference architecture for the solution. The figure shows high-level logical connectivity between various components. Subsequent sections provide more detailed connectivity information.

Figure 4. Dell vStart 50 for VDI Network Topology (Logical View)



6 Network Architecture

The LAN includes two PowerConnect 7024 or 6224 switches which support the VM, Management, vMotion, and OOB traffic. These traffic types are logically separated through the use of VLANs. The two switches are stacked together, which forms a single logical switch and provides a 48Gb stack bandwidth between the two PC6224 switches, or 64Gb stack bandwidth between the two PC7024 switches. The solution provides four 1Gb uplinks from each switch to link into an existing core network infrastructure. If the core network infrastructure supports 10Gb Ethernet, then 10Gb uplink modules may be added to each switch; however, this option is beyond the scope of this document.

6.1 Traffic Isolation using VLANs

The traffic on the LAN is separated into four VLANs: one VLAN each for Management, vMotion, VM, and Out-of-Band Management (OOB) traffic. VLAN tagging for the OOB traffic is performed by the PowerConnect switches. Table 2 below provides VLAN and Subnet examples. For the other traffic types, the tagging is performed in the virtual switch by the ESXi hypervisor. Routing between VLANs is dependent on the specific customer requirements and is not included in this document. Consult with your Dell Sales and Services representatives if you have questions about routing or require assistance implementing in your environment. If desired, the PowerConnect switches can be configured to provide the routing function.

Table 5. VLAN / Subnet Examples

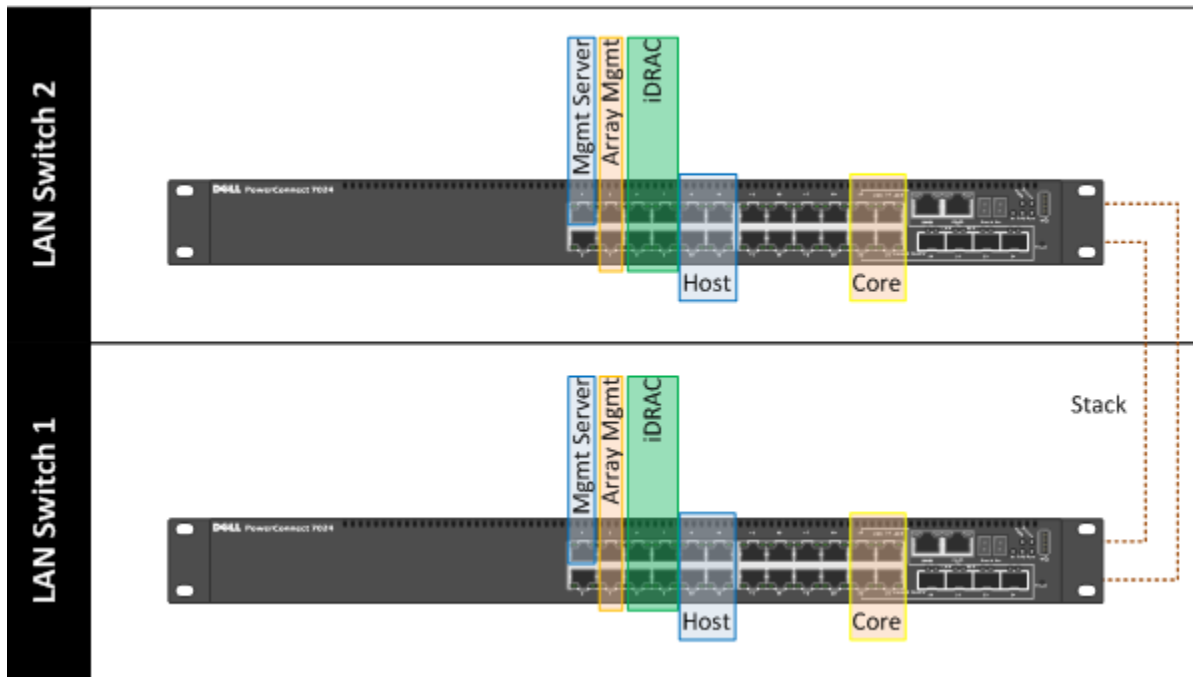
Traffic Type	Sample VLAN	Sample Subnet
OOB	10	192.168.10.X
Management	20	192.168.20.X
vMotion	30	192.168.30.X
VM	100	192.168.100.X

Additional VLANs can be implemented for VM traffic, if required.

6.2 PowerEdge R620 LAN Connectivity

Each PowerEdge R620 has eight 1Gb ports, of which four are dedicated for LAN traffic. In addition, the iDRAC7 OOB interface is connected to the LAN switches. Figure 5 shows the connectivity of Server 1 to the LAN switches.

Figure 5. Server 1 LAN Connectivity



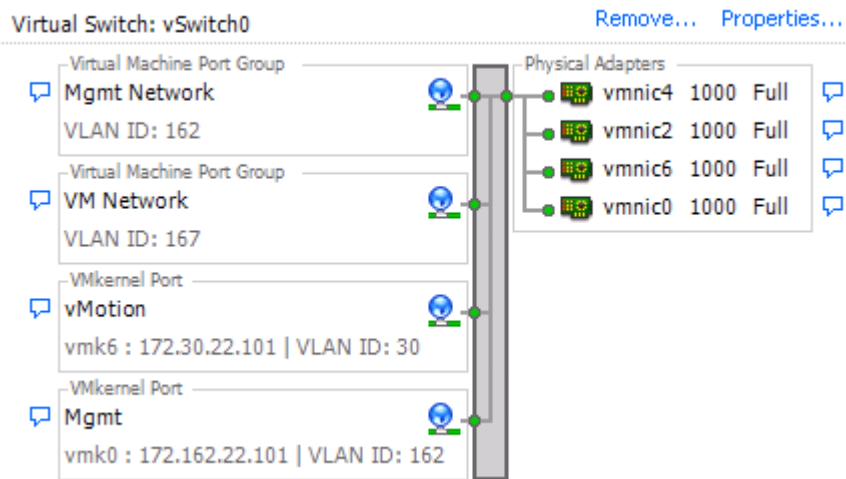
The other PowerEdge R620 server follows the same connectivity pattern to the LAN switches with the exception that each server uses a unique set of physical ports on the switches.

6.3 PowerEdge R620 LAN Virtual Switch Configuration

For each PowerEdge R620, a single ESXi virtual switch is created to support all LAN traffic. Unique port groups are then created for management and VM traffic. In addition, VMkernel interfaces are defined for management and vMotion traffic. Each port group and VMkernel interface is configured to tag with the appropriate VLAN. The Management port group is utilized by the Dell Management Plug-in and the EqualLogic HIT/VE Plug-in for VMware vCenter.

Figure 6 is a screenshot taken in vCenter Server of the LAN virtual switch on Server 1. Note the vmnics and how they correlate to the physical adapters as shown in Figure 6. “Mgmt Network” is a Virtual Machine Port Group, which allows VMs to communicate on the management network, and “Mgmt” is a VMkernel port, which allows the ESXi kernel to communicate with the management network.

Figure 6. LAN vSwitch Configuration



6.4 Load Balancing and Failover

Load balancing enables sharing network traffic between the physical network ports in a team, thereby generating higher throughput. The VMware virtual switch has three options to configure load balancing:

- Route based on the originating virtual switch port ID
- Route based on source MAC hash
- Route based on IP hash

The default load balancing configuration of route based on the originating virtual switch port ID is recommended. This setting enables multiple VMs to use different physical adapter ports to transmit and receive traffic without requiring additional physical switch configuration.

The Management and vMotion networks each have only one port ID or MAC address. Hence, these networks will each use only one physical adapter port for communicating unless there is a failover to another physical adapter port.

Table 5 notes any required configuration changes that should be explicitly made to the port group configuration.

Table 6. Port Group Configuration

VMKernel Ports	Configuration Notes
Mgmt	vmnic0: active vmnic2,vmnic4, vmnic6: standby management traffic: enabled failback: no
vMotion	vmnic4: active vmnic0,vmnic2,vmnic6: standby vMotion: enabled failback: no

While the configurations explored in the section above along with Table 5 depict a robust and fault tolerant ESXi network design, customers can implement an additional level of resiliency by implementing VMware HA. More information on setting up VMware HA can be found in [VMware High Availability \(HA\): Deployment Best Practices](#) for vSphere 4.1 and [vSphere High Availability Deployment Best Practices](#) for vSphere 5.0.

7 Storage Architecture

A RAID 10 volume across 10 x 146GB 15k SAS drives on each R620 hosts the linked clone and replicas for the VDI sessions.

A Storage pool is created for PS4100x to reside in, this is used to store management VM's, user home and profile directories, and SQL, additional arrays can be added for scalability.

RAID 50 is used for each LUN (Volume), configured with a maximum size of 500GB in line with best practice with the exception of the LUN presented for file storage (Homes and Profile directories) which were configured as 1024GB. This configuration ensures that there is at least 10% of each array available for system overhead which is required for optimal performance.

The space required for each desktop has been calculated as follows for the shared disk image machines;

- Page File (1.5x RAM to a maximum of 4GB) + Temporary Session Data + VMware Swap File (1x non-reserved RAM)
 - Basic - $(1 \times 1.5) + 1 + 0.5 = 3.0\text{GB}$
 - Standard - $(1.5 \times 1.5) + 1 + 0.5 = 3.75\text{ GB}$
 - Premium - $4 + 1 + 1 = 6.0\text{GB}$

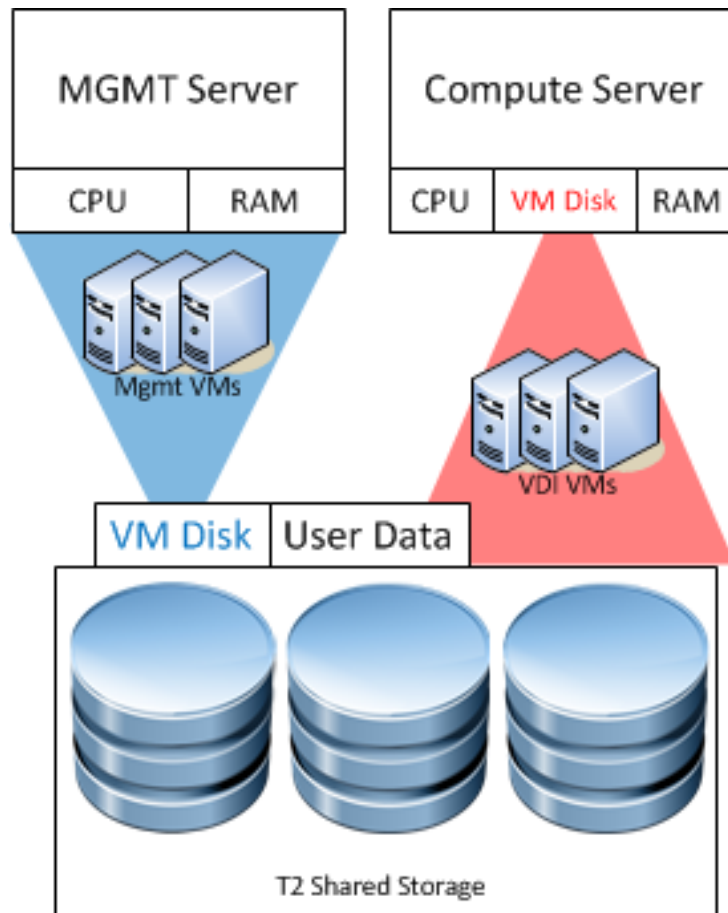
The table below identifies the volume configuration on the Equallogic PS4100X Tier 2 storage

Table 7. Equallogic PS4100X Tier 2 storage configuration

Volumes	Size (GB)	Storage Array	Purpose	File System
Management	500	Tier 2	vCenter, View broker, File and SQL	VMFS 5
User Data	2048	Tier 2	File Server	NTFS
SQL DATA	100	Tier 2	SQL	VMFS 5
SQL LOGS	100	Tier 2	SQL	VMFS 5
TempDB Data	5	Tier 2	SQL	VMFS 5
TempDB Logs	5	Tier 2	SQL	VMFS 5
SQL Witness	1	Tier 2	SQL (optional)	VMFS 5
Templates/ ISO	200	Tier 2	ISO storage (optional)	VMFS 5

The diagram below shows the high level layout of Tier 1 and Tier 2 storage

Figure 7. Tier 1 and Tier 2 storage Configuration



With a 24 drive chassis full of 300GB SAS drives, the PS4100X array delivers 7.2 Terabyte (TB) of iSCSI-based storage built on fully-redundant, hot-swappable enterprise hardware. Scale out capacity and performance is provided by adding additional arrays. Built-in software functionality includes automated load balancing, snapshots and replication, multi-path I/O, and consistency sets. [SAN HQ](#) is also available for Multi-SAN historical performance monitoring.

Advanced data protection features such as Auto Replication and Auto-Snapshot Manager (ASM) also come standard. The ASM integrates with VMware vCenter and VMware's native snapshot technology to provide intelligent and consistent snapshots.

EqualLogic also provides a Multipath Extension Module (MEM) for VMware vSphere to enable MPIO for the iSCSI storage. EqualLogic MEM offers:

- Ease of installation and iSCSI configuration in ESXi servers
- Increased bandwidth
- Reduced network latency
- Automatic load balancing across multiple active paths

- Automatic connection management
- Automatic failure detection and failover
- Multiple connections to a single iSCSI target

For more information on EqualLogic MEM, refer to the technical report [Configuring and Installing the EqualLogic Multipathing Extension Module for VMware vSphere 4.1 and PS Series SANs](#) and [Configuring and Installing the EqualLogic Multipathing Extension Module for VMware vSphere 5 and PS Series SANs](#).

7.1 Storage Expansion Options

This section provides an overview for the vStart 50 storage expansion options.

As previously shown in Figure 1 above, the vStart 50 comes with one PS4100X array. For customers whose VM profiles and workloads require additional storage capacity or IOPS, an additional PS4100 array can be added as an upgrade for existing vStart 50's with one array (vStart 50+). For customers who are considering purchasing a vStart 50, the option for two PS arrays is available.

Table 8. vStart 50 Storage Expansion Options

vStart Model	vStart 50: Base vStart Storage Array Configuration	vStart 50+: With Storage Expansion Configuration
vStart 50	1 x PS4100X	2 x PS4100 Series Arrays

It's important to note that adding an additional storage array will not require customers to purchase additional PowerConnect switches, management servers, or software since the vStart architecture was designed with storage and host expansion in mind.

8 Management Infrastructure

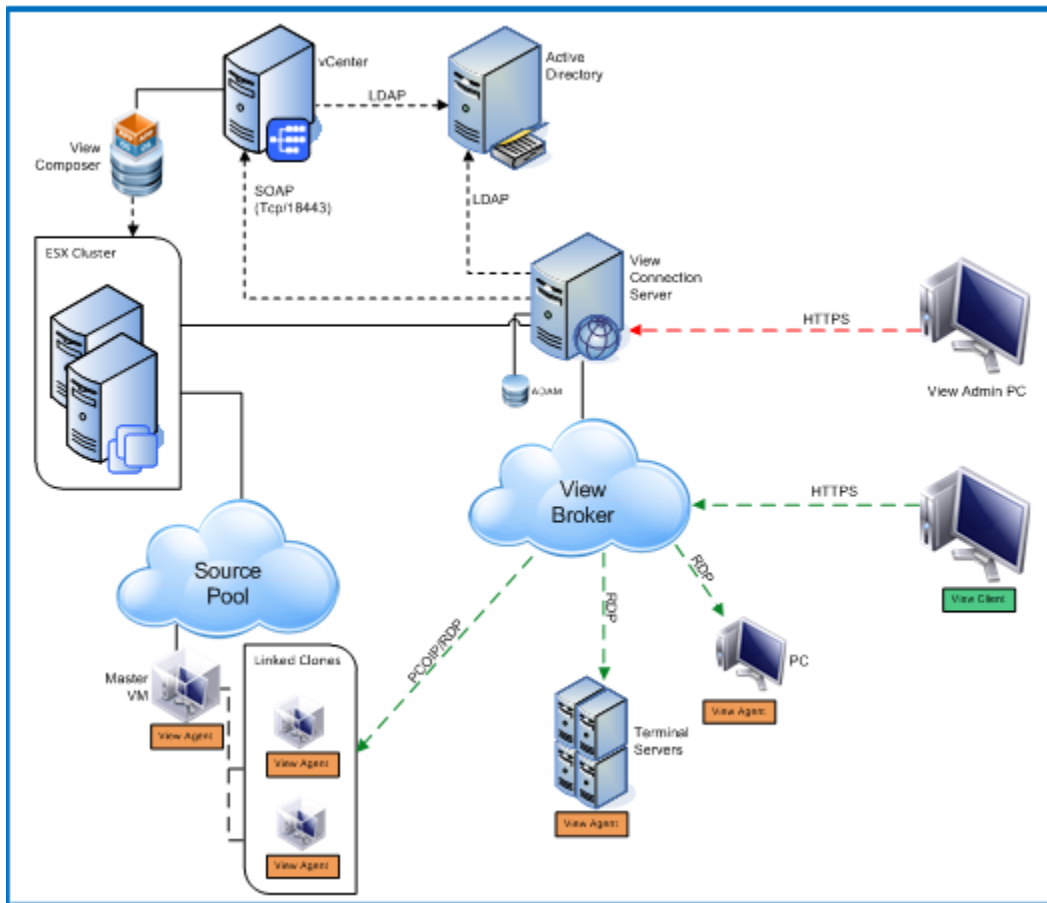
There is a PowerEdge R420 server used for management infrastructure. The management server connects across the iSCSI network to the Equallogic PS4100X where a volume hosts the Management VM's for the stack. Note that the Equallogic storage is shared between management cluster and compute cluster. The Equallogic storage must be sized so that sufficient bandwidth is allocated for both the management VMs, databases and user profiles.

The R420 server runs VMware ESXi 5.0 hypervisor and is part of a unique vSphere Cluster. VMware High Availability can be enabled in that cluster to provide HA for virtual machines by adding an additional management host. The following management components are installed as virtual machines in the management infrastructure as illustrated in:

- VMware vCenter Server (Equallogic Plugin for vCenter is installed along with VMware vCenter client)
- VMware View 5.1 (Further detail on View 5.1 components below)

9 VMware View Infrastructure

Figure 8. VMware View Infrastructure



The Dell vStart 50 for VDI architecture for VMware View is designed to provide maximum performance and scalability starting at very low user counts for SMBs and up to tens of thousands of users for large enterprise deployments. VMware View 5.1 brings with it many new features, most notably a new feature called View Storage Accelerator that provides block-level read caching as well as reduced storage load during boot storms. This solution architecture follows a distributed model where solution components exist in tiers. The Compute tier is where VDI desktop VMs execute, the Mgmt tier being dedicated to the broker management server role VMs. Both tiers, while inextricably linked, scale independently.

Table 9. Solutions Components

Solution Architecture Components	
Hypervisor	VMware vSphere 5.0 U1 Desktop Edition
VDI Broker	VMware View 5.1 Premier
Non-persistent provisioning	View Composer 3.0
Database software	Microsoft SQL Server 2008 R2 (x64)
Server OS	Microsoft Windows Server 2008 R2 SP1 (x64)
Desktop OS	Microsoft Windows 7 Enterprise (x86)

Table 10. Virtual Machine Configuration

Virtual Machine Configuration	
VM Version	8
SCSI Controller	LSI Logic SAS
Network Adapter	VMXNET 3
Disk Provisioning	Thin
Swap File	Store with VM
vRAM Reservations (Mgmt)	50% of configured vRAM
vRAM Reservations (VDI)	500MB - Basic, 1GB - Std, 1.5GB - Prem

10 Enterprise Zero and Thin Client Recommendations

Wyse Thin and Zero Client devices and software provide superior security, reliability and energy efficiency when compared to a traditional PC. Wyse desktop devices and software help streamline the delivery of VMware infrastructure to millions of users around the world. Thin Clients create a more secure environment that minimizes or eliminates exposure to data loss, viruses and malware. By utilizing thin clients as the access device for end user, deployments can benefit from centralized management and complete control of all endpoints. Since thin clients eliminate components with high failure rates, deployments can expect reduced costs and improved reliability over the life of a desktop virtualization deployment.

10.1 Wyse P20

Experience uncompromised computing, with the benefits of secure, centralized management. The Wyse P20 zero client for VMware View is a secure, easily managed zero client that provides stunning graphics performance for advanced applications such as CAD, 3D solids modelling, video editing and advanced worker-level office productivity applications. About the size of a notebook, this dedicated, zero client processes the PCoIP protocol in silicon to deliver the highest level of display performance available in an extremely compact, energy-efficient form factor. The Wyse P20 delivers a rich user experience while resolving the challenges of provisioning, managing, maintaining and securing enterprise desktops.

Figure 9. Wyse P20 and Display Recommendations



Click [HERE](#) for more information on the Wyse P20.

Display recommendations for the P20 Zero Client are listed below



The P2412H shown above supports 1920x1080, VGA, DVI and USB. Other options include the E2213 with 1680x1050, VGA and DVI, and the E1913 with 1440x900, VGA and DVI.

10.2 Wyse Z50D

Designed for power users, the new Wyse Z50D is the highest performing thin client on the market. Highly secure and ultra powerful, the Z50D combines Wyse-enhanced SUSE Linux Enterprise with a dual-core AMD 1.6 GHz processor and a revolutionary unified engine for an unprecedented user experience. The Z50D eliminates performance constraints for high-end, processing-intensive applications like computer-aided design, multimedia, HD video and 3D modeling. Scalable enterprise-wide management provides simple deployment, patching and updates. Take a unit from box to productivity in minutes with auto configuration. Delivering unmatched processing speed and power, security and display performance, it's no wonder no other thin client can compare.

Figure 10. Wyse Z50D and Display Recommendations



Click [HERE](#) for more information on the Wyse Z50D.

Display recommendations for the Z50D are listed below



The U3011 shown above supports 2560x1600, VGA, DVI, DP and USB. Other options include the P2212H with 1920x1080, VGA, DVI and USB, and the E2213 with 1680x1050, VGA and DVI.

11 Scalability

As customer VDI needs grow, so does the depth and breadth of the Dell vStart 50 for VDI solution. The various management components of the stack exist as virtual server instances running on physical servers. This provides tremendous flexibility when adding resources to the solution while keeping the existing components intact and untouched. This also adds a level of resiliency in being able to backup copies of the server virtual images. The following tables gives an overview of Dell's recommended scaling of management components

Based on the DVS Engineering validation work, the per host density numbers below provide an idea of the number of users each host can accommodate. The Basic, Standard and Premium user workloads are generated by LoginVSI (from Login Consultants), the intensity of activity and applications increases as you go up through the workloads, giving real world relevance to the validation. There is of course always a ratio of basic, standard or premium users so actual densities will vary in production

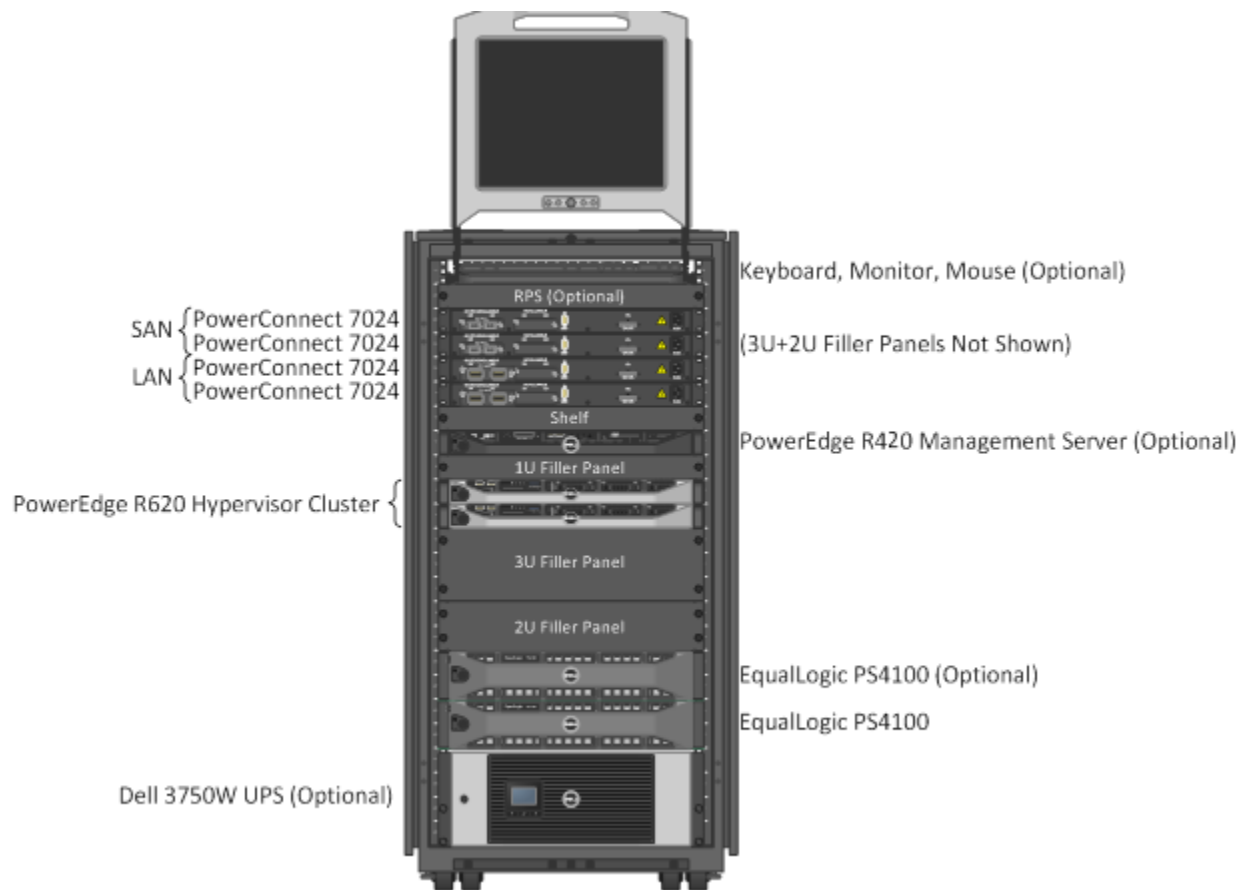
Table 11. Per Host User Density by Workload

User Type	View 5.1 Per Host User Density
Basic	145
Standard	116
Premium	95

12 Delivery Model

The solution will be racked, cabled, and delivered to the customer site, ready for deployment¹. Dell Services will deploy and configure the solution based upon the architecture developed and validated by Dell Engineering, while meeting the customer's business and technical needs. The final turn-key virtualization infrastructure solution will be available for customer's use. For more details or questions about the delivery model, consult with your Dell Sales representative. Figure 2 shows the configuration in a Dell 24U rack (front side only) with all of the components.

Figure 11. vStart 50 Racked Configuration



¹ In certain unique and limited circumstances Dell may not be able to deliver a pre-built vStart, and will have to assemble the vStart at the customer's site. Please consult with your Dell Sales and Services team for more information.