Deploying Pano System on VMware View Redbook

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Virtualized Desktops running a standard Windows operating system (OS) but hosted on centralized servers, promises to radically reduce the ever-increasing drain on IT resources from deploying and supporting desktop computing. Pano Logic® is the first company to offer a complete, purpose-built solution for full native Windows® virtual desktops, combining a unique zero client endpoint with centralized management tools designed specifically for managing virtual desktops.

This redbook covers the basic architecture of deploying the Pano System™ on the VMware® View™ platform, explaining how it integrates with different required and optional components included in the VMware View suite.

Overviews of different architecture, scalability and availability configurations for both View and Pano System components are discussed, along with detailed sample deployment architectures for 25-, 1,000- and 10,000-seat deployments and platform-specific differences and limitations.

This redbook assumes that you have a good familiarity with the operation of VMware View and with the basic structure and operation of the Pano System. It does not replace the installation instructions found in the View documentation and in the Pano Logic online help. It provides platform-specific details that supplement the more general Pano deployment planning and infrastructure sizing guidance provided by the *Deployment Architecture Overview Redbook, Infrastructure Sizing Redbook,* and the *Remote Deployment Redbook*.

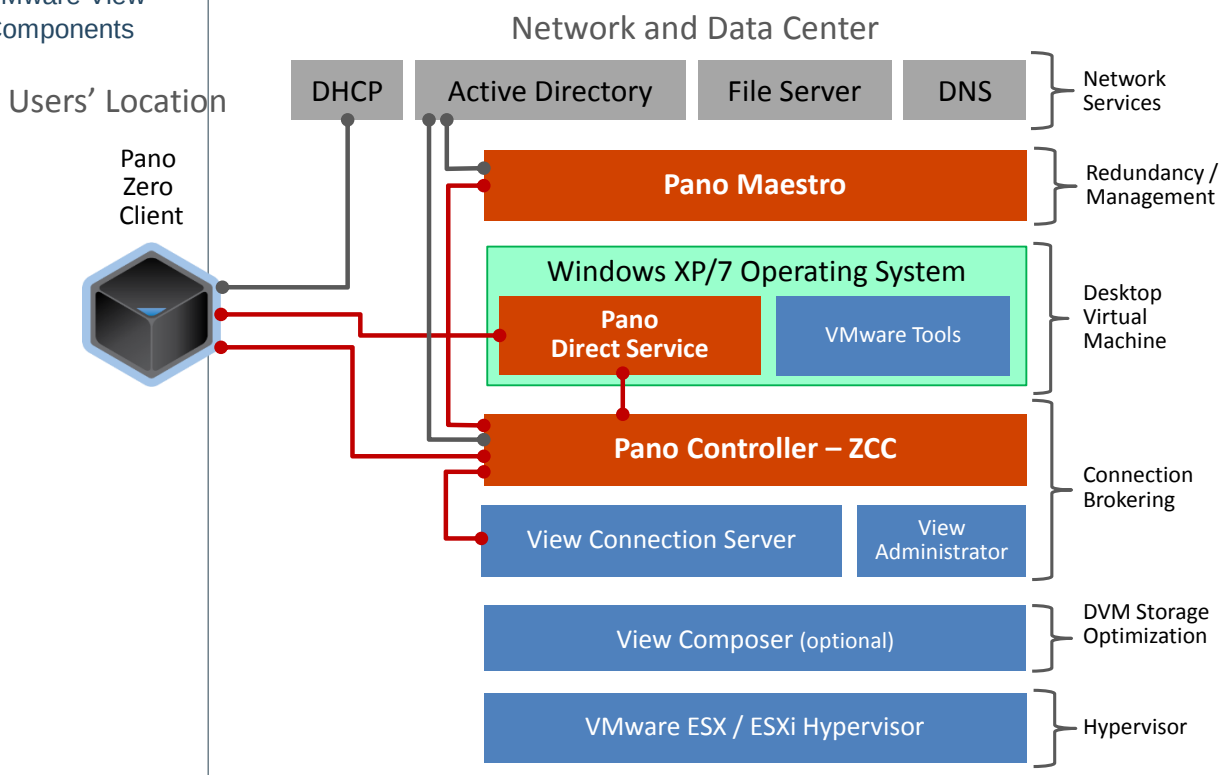
VMware View Components

This section describes the various VMware View 4.5-5 components and describes how they function in a Pano System deployment.

BASIC ARCHITECTURE

The diagram below illustrates the system architecture when using the Pano System and VMware View together. Depending on a particular deployment's needs for redundancy and added performance for scalability, many of these components can either be grouped together on a limited number of infrastructure and desktop servers, or spread across a larger number of separate physical servers. In very small deployments (under 30 seats) you can even run all of the desktop and infrastructure components on a single, properly sized server.

Figure 1:
Diagram of Pano System and VMware View Components



HYPERVISOR

Hypervisor software allows multiple virtual machines to run concurrently on a host server. Hypervisors are used both to host desktop virtual machines (DVMs) running on desktop servers and to host system VMs like Pano Controller or vCenter Server on infrastructure servers. Both the ESX and the ESXi hypervisors included with View are supported for Pano deployments.

Both ESX and ESXi are type 1 or bare metal hypervisors that require no other host operating system (OS). They interact directly with the server hardware rather than relying on host OS driver stack. Because of this you need to be sure that your server hardware, including RAID controllers and network interface cards, are on the VMware hardware compatibility list for your selected hypervisor version.

CONNECTION BROKERS

VMware View Connection Server can be used to broker connections between Pano clients and their virtual desktops, integrating with Pano Controller and replacing it as the primary connection broker.

View Connection Server performs the following functions:

- Connection brokering and single sign-on, including secure connections coming in from a demilitarized zone (DMZ) network
- Managing desktop virtual machine (DVM) sessions
- User authentication with Active Directory®
- Setting and applying user policies
- Entitling users to specific desktops and pools based on an embedded LDAP database
- Providing the administration interface used by the View Administrator browser-based interface

The connection brokering integration of Pano Controller with View Connection Server is covered in more detail in the “What Happens When a User Logs In” on page 16.

View Connection Server also integrates with vCenter™ Server to provide enhanced management capabilities beyond what is available in vCenter. These additions include DVM creation (via View Composer), and managing DVM pools and power operations, like automatic suspend and resume. When Pano Controller is integrated with View Connection Server to use it as the primary connection broker only one DVM Collection of the special “VMware View” type is created in Pano Controller. All DVMs will be provisioned by View, rather than by Pano Controller, and will be automatically added to that DVM Collection.

View Connection Server requires a Windows Server® platform, which can be a virtual machine or a dedicated physical server. The Connection Server is also dependent on Active Directory – the supporting server or VM must be joined to an Active Directory domain. When the server hosting the Connection Server is joined to the domain, a computer object will automatically be created. You can use the web-based View Administrator interface provided by the Connection Server to manage it.

Multiple View Connection Servers can be used, but since the connection servers themselves do not provide load balancing, some external form of load balancing is required. While there is a distinct option for Standard install vs. Replica install in the View Connection Server installer, the new Connection Server is an equal peer of the original; there is no master/slave relationship when additional Connection Servers are deployed.

View Connection Servers can also be configured as Security Servers when installed into a DMZ network to act as a gateway. This configuration provides a secure, single point of access from external networks, like the Internet for non-Pano connections from thin clients and PC clients. However, this installation type is not required when using Pano Remote as the Pano Gateway plug-in provides equivalent protection running on Windows Server 2008 R2 Remote Desktop Services.

DVM PROVISIONING AND MANAGEMENT TOOLS

vCenter Server is an advanced-configuration, deployment and provisioning tool for ESX servers. vCenter is optional, but highly recommended for all but single ESXi server Pano System deployments. vCenter Server integrates with Pano Controller to supplement DVM collections and provide advanced provisioning options for DVMs.

When using the Pano System with vCenter Server, vCenter Server and optionally View Composer perform all desktop provisioning services. Pano Controller will not cause any DVMs to be created, nor will it attempt to keep a certain number of DVMs powered on. These provisioning and power-management functions are all performed by vCenter Server.

When using the Pano System with View Connection Server configured as the primary connection broker, the DVM Collections tab must be configured for one, and only one, DVM collection of type “VMware View.” DVMs provisioned by vCenter Server will be automatically added to that DVM Collection.

vCenter can be run inside a Windows VM on the ESX/ESXI hypervisor – this is the recommended configuration for Pano deployments.

View Composer is optional, but it can be used to optimize storage use in very large VMware View deployments. View Composer enables you to stream a single desktop image to create linked clones. This capability lets you quickly generate multiple virtual desktops from a single DVM template on one or more servers in a data center. This facility greatly reduces (by as much as 90%) the amount of storage required compared to other methods of creating virtual desktop or DVM images. Linked clones also allow you to update or configure a single DVM image rather than dozens or hundreds of DVM images, significantly reducing the management overhead and workload.

Each linked clone is a duplicate copy of a parent virtual machine and shares files and disk space with its parent virtual machine. This commonality allows linked clones to take up less physical space on virtual disks, while still allowing them to share the software installed on their parent virtual machines. Each linked clone can operate with its own IP address and hostname, while minimizing the amount of disk space it occupies. You can automate the process of installing software patches/updates by installing the changes on the parent virtual machines and then pushing these changes onto their linked clones. This functionality is especially useful in large VMware View deployments.

View Administrator is the web-based application used to administer View Connection Server. On the Access tab, specify the accounts that are to have access to the DVMs. The simplest approach is to specify a security group that includes all domain users. Even though all users would be entitled within Pano Controller, the user entitlements defined in View Administrator will still be used to implement more specific user-to-desktop mappings. Thus, if an account is entitled in Pano Controller but not in View Administrator, the user will be prevented from connecting to a desktop.

PLATFORM TOOLS IN DVMS

All **Desktop Virtual Machines (DVMs),** of which you will typically have many in your deployment, will need to have both the Pano Direct Service™ (PDS) software and platform-specific add-ins or tool software installed directly in the Windows operating system. Each DVM must have the **VMware Tools software** installed. These tools are required in order for the ESX or ESXi hypervisor to manage the state of the DVM. Without these tools installed, VMware View’s components will consider the DVM to be unavailable.

Hybrid Endpoint Populations

VMware View can provide a unified DVM management and provisioning system for hybrid populations of endpoints that mix Pano Zero Clients with traditional thin clients and PCs running the View Client software. While all of these endpoints can benefit from the management, provisioning and connection brokering functionality provided by View's components, there are a number of differences in how they operate.

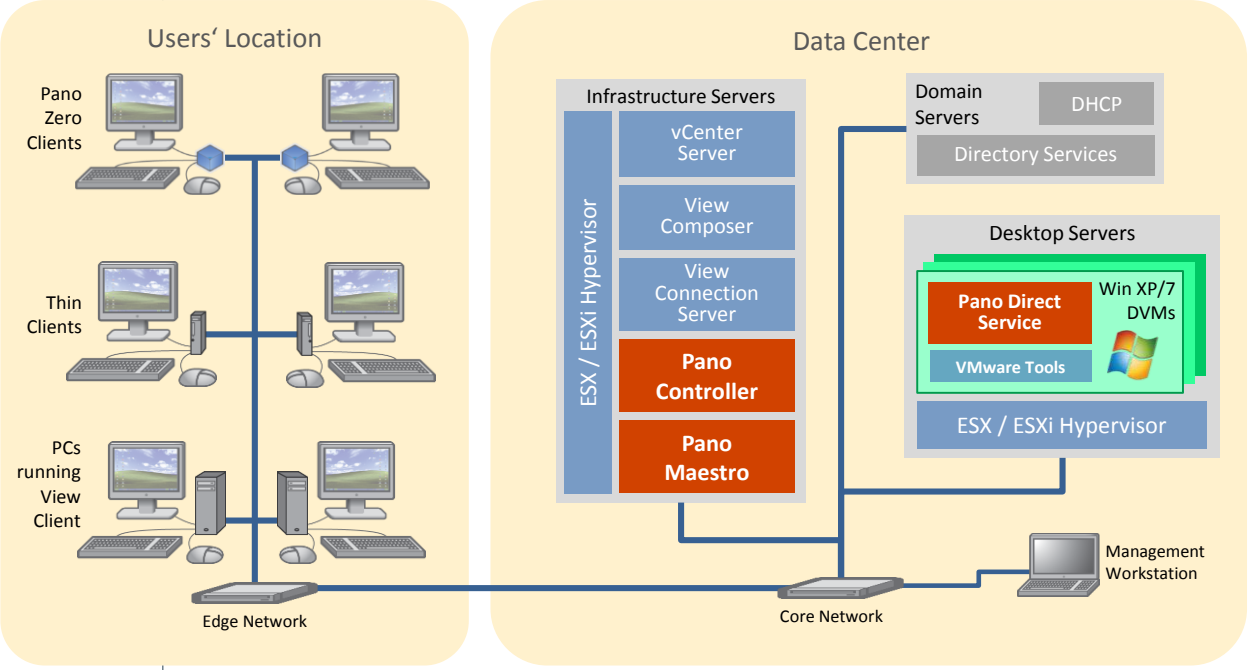


Figure 2:

Hybrid Endpoints managed by View and Pano Controller

Key differences between Pano Zero Clients and other types of View clients are:

- Pano clients still require Pano Controller to provide login dialogs and initiate connection brokering. Because of this, if the number of Pano clients exceeds 500, you'll need to deploy additional Pano Controller instances in a scalability group.
- Pano clients use the Pano Direct Protocol rather than the Remote Desktop Protocol (RDP) or PC-over-IP protocols used by other View clients. This shouldn't have a direct impact on your deployment unless you are using protocol-based routing or quality-of-service prioritization; in which case, you may need to include all three protocols.
- Pano clients require that you install Pano Direct Service into the Windows DVMs in addition to VMware Tools, while most other View clients require only VMware Tools. You can still access the same DVMs from both Pano Zero Clients (and from Pano Remote) and from other View endpoints, including thin clients or even tablets running software like the View Client for iPad.
- Some View clients support connections over WANs with lower bandwidth and higher latencies than Pano Zero Clients support. You can mix in WAN access via these clients with access via Pano Zero Clients over LAN-quality connections to the desktop server hosting the DVMs. Or, you can use Pano Remote when users need WAN-based connections to their DVMs, which is roughly equivalent to the RDP-based View Client software running on Windows PCs or laptops.

- View clients accessing DVMs from unsecured networks like the Internet typically connect via an intervening View Security Server (a specialized installation of the View Connection Server) residing in a DMZ network protected by firewalls. Pano Remote clients use a similar architecture, but use Pano Gateway running on Windows Server 2008 Remote Desktop Services in the DMZ rather than using a View Security server.
- Unlike software-free Pano Zero Clients, both thin clients and repurposed PCs acting as platforms for View Client need a full operating system and software stack running on the endpoint itself. Required maintenance usually includes software/OS patch management, security suite installation/updates and client OS image provisioning and backup. Some of the maintenance overhead on non-zero clients can be reduced by implementing write-filters and policy changes that lock-down the configuration and prevent changes by users or malware.

Scalability and Redundancy

For larger deployments on the VMware View platform, it may be necessary to use optional VMware View components and configurations, in addition to multiple instances of these components and Pano Controller, to provide both greater scalability and improved availability via redundancy.

SCALABILITY ON VMWARE VIEW

For deployments larger than 500 seats, you will need to use a Pano Controller group that combines two to six Pano Controller instances to provide redundancy for up to 2,000 Pano Zero Clients and DVMs.

For Pano System deployments on VMware View with up to 10,000 endpoints, you may need to also integrate View Connection Server as the primary connection broker, replacing the Virtual Desktop Broker (VDB) or Full Roles of your Pano Controllers. In very large deployments, you may also need to deploy multiple instances of the View Connection Server running on separate physical servers. If multiple Connection Servers are used some form of load-balancer is required to distribute the connection request to these servers.

Pano Controller is still used, via its Zero Client Controller (ZCC) Role, during the connection brokering process to provide the client login dialogs. Pano Controller is also still used to monitor Pano Zero Clients and Pano Remote Clients. For more details on the shared login and connection brokering process see “What Happens When a User Logs In” on page 16.

PANO SCALABILITY AND REDUNDANCY

If we also want to provide redundancy or failover capabilities in the event of server hardware or software failure, two Pano Controller instances need to be installed on two different physical servers and configured as primary (active) and secondary (passive), and a third Pano Controller instance would be added and configured as a slave.

Table 1: Scalability Group Requirements for Scalability and Redundancy

Pano Controller Configuration	# of Pano Controllers	Redundant	Max. Clients or DVMs
Single	1	No	500
Scalability Group	2	No	1,000
Failover Group	2	Yes	500
Failover Group with Scalability	3	Yes	1,000
Failover Group with Scalability – with View Connection Server as primary connection broker	3	Yes	1,000+

In this configuration, all three instances of Pano Controller belong to the same Pano Controller group; connection brokering logic is made highly available by implementing an active/passive, two-node failover cluster using the two Pano Controller instances. Pano Controller also displays login screens to the Pano clients. In this configuration, Pano login screens are active across all available Pano Controller nodes, up to three nodes.

Sample Architectures on VMware View

This section details three sample architectures for a Pano System deployed on VMware View in 25-, 500- and 1,000-seat deployment sizes. It provides guidelines on the hardware and software requirements for the different deployment sizes, along with information about VMware View platform software components and configurations.

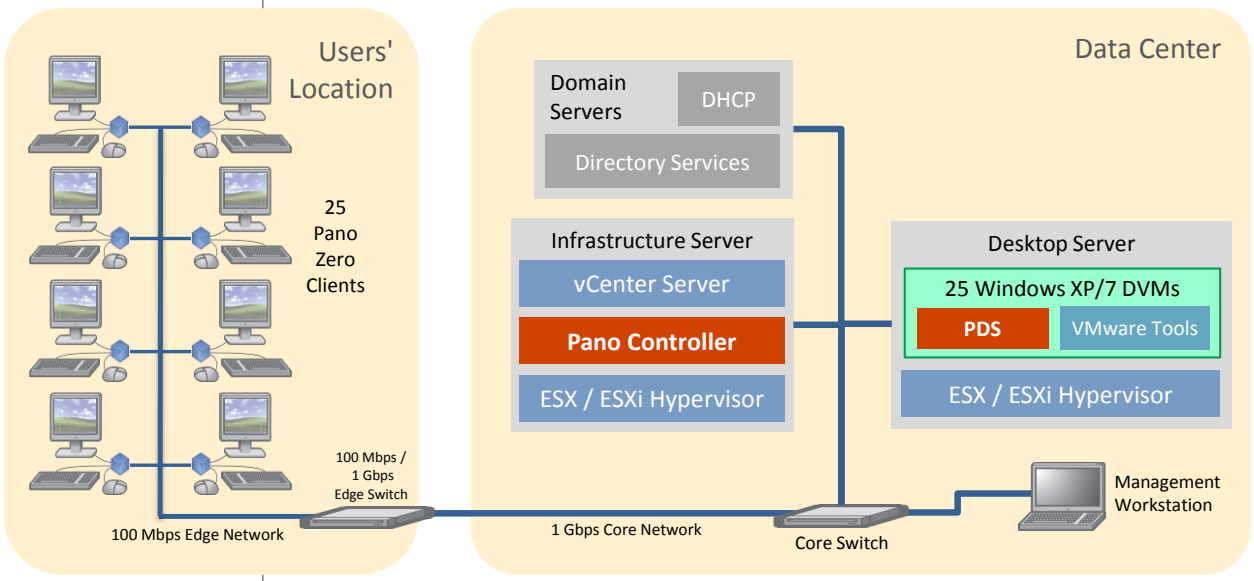
These sample architectures are based on typical 1U or 2U servers equipped with dual, quad-core or six-core Intel® Nehalem or Westmere CPUs, 32-72 GB of RAM each (depending on the deployment size), a 50% mix of Windows XP and Windows 7 users, combined light task worker and heavy knowledge worker workloads and a duty cycle of concurrently active DVMs of 75%. Deployments with higher duty cycles, a greater proportion of Windows 7 DVMs, or a user mix favoring heavy workloads will require additional server and storage resources.

Figure 3:

Sample architecture for a 25-seat deployment on VMware View

25-SEAT DEPLOYMENT

This section provides information on sample architectures for a basic (25-seat) Pano System deployment on VMware View.



Hardware Sizing and Architecture

This section provides general guidelines for sizing and architecture configuration for the server and storage infrastructure to help ensure a successful 25-seat Pano System deployment.

For a 25-seat deployment, typically one desktop server will be needed to host the DMVs. Depending on the load on the desktop server, a separate infrastructure server may be needed for Pano Controller, vCenter Server and supporting ESX/ESXi hypervisors.

Given that the storage needs for this size deployment are fairly modest (at 15-20 GB per DVM image), direct-attached storage using enterprise-class drives configured as a RAID 5 or RAID 6 volume within the server may be the most cost-effective approach.

However using this sort of internal server storage, rather than shared storage like a storage area network (SAN), means that if a user needs to access a specific DVM image (like a permanently assigned user-based DVM) and the server containing it is down, the DVM is effectively inaccessible.

In addition to the risks from internal or direct-attached storage, the processing performed by a single desktop server also represents a single point of failure – if the server should go offline, access to all of the DVMs would be interrupted.

Likewise, the infrastructure server represents another single point of failure – if it were to be offline, user logins would be blocked, although users already connected to their DVMs would be able to continue working until they needed to log in again or connect to another DVM. Both of these availability risks can be mitigated by adding redundant infrastructure and desktop servers, but the hardware and software costs involved might not be workable for a deployment of this small size.

Table 2: Summary of Hardware Needed for a Sample 25-Seat Deployment

Component	Amount	Description
Desktop Server	1	Dual, quad-core Westmere CPUs (E5620 or better), and 32-48 GB of RAM. Server hosts ESX/ESXi hypervisor software and Windows DVMs.
Infrastructure Server	1-2	Server hosts Pano Controller, vCenter Server and supporting ESX/ESXi hypervisors. These components can be hosted on the same desktop server as the DVMs, rather than a separate server, if user workloads are light.
Storage	Size: 0.6 TB	Allows 15 GB per DVM, an average of 1.5 DVMs per user, plus 50 GB overhead for Pano Controller and VMware View VMs, with a limit of 80% capacity utilization and less the 20% RAID overhead.
	IOPS: 1,040	Requires at least six 15K RPM drives or eight 10K RPM drives, plus RAID parity drives. Use direct-attached storage internal to servers unless deploying multiple servers for redundancy.
Networking	1	1 Gbps/100 Mbps switch for the edge network
	1	1 Gbps segment in the core network
Management Workstation	1	Windows workstation needed to configure and manage the Pano System and platform.

Pano System Configuration

One instance of Pano Controller is sufficient for this deployment size, unless you want to configure the system for greater scalability in the future. Additional Pano Controller instances, ideally on separate infrastructure servers, can be used to provide redundancy and ensure availability in the event of a server failure. See “Pano System Configuration for Scalability and Redundancy” on page 6 for information.

Because of this small deployment size typically Pano Maestro is not required although it might be used as a remote management front-end to multiple small deployments each with just one or two Pano Controllers.

Platform Considerations and Configuration

For this deployment size only two key components are needed out of the VMware View suite – vCenter and the ESX or ESXi hypervisors. Integrating VMware View Connection Server as the primary connection broker would not be recommended for this deployment size unless you need to support hybrid or mixed populations of virtual desktop endpoints – such as Pano Zero Clients plus thin clients and PCs running the View Client software. If you need to support this sort of mixed deployment, deploying these additional View components and using them to manage your entire deployment is recommended.

Table 3: Summary of Software Needed for a Sample 25-Seat Deployment

Component	Number	Description
Pano Controller VM	1-2	Only one is required, unless you use a Pano Controller group. (You should install additional Pano Manger instances on separate servers to protect against server failure.)
ESX/ESXi Hypervisor	2-3	Only one per server is required, unless you use a Pano Controller group for redundancy on separate servers.
View Connection Server	1	Optional – if used, can be hosted on the same desktop server as the DVMs and Pano Controller.
vCenter Server	1	Provides DVM management capabilities for Pano Controller and VMware View. Can run inside a Windows VM.
View Composer	optional	Not recommended because linked clones are not recommended at this deployment size.

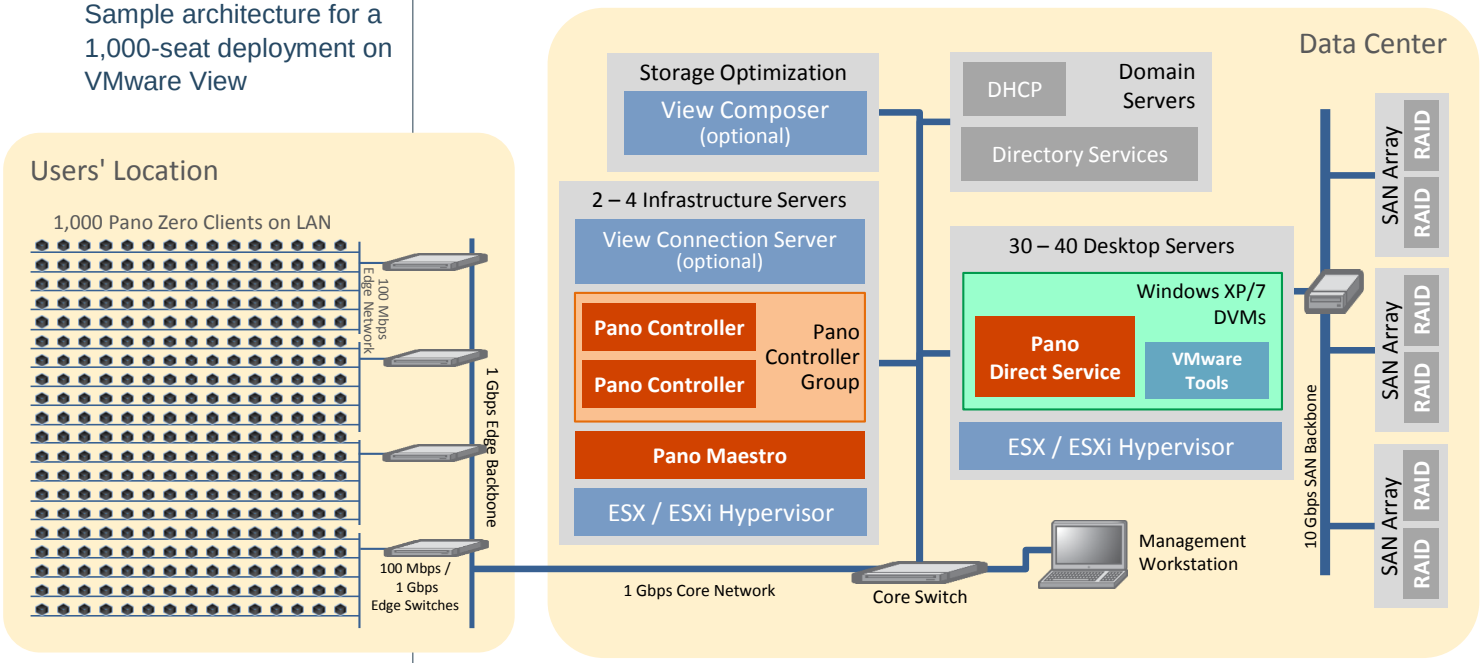
In most cases, View Composer, which is used for storage deduplication across sets of similar DVM images, can typically be omitted, as well. This is due to the fact that the storage requirements for 25 DVM images, plus any other DVM templates, aren't enough to warrant the added complexity and cost of licensing (as part of View Premier Edition) and deploying View Composer.

1,000-SEAT DEPLOYMENT

This section provides information on sample architectures for 1,000-seat Pano System deployments on VMware View.

Figure 4:

Sample architecture for a 1,000-seat deployment on VMware View



Hardware Sizing and Architecture

For a 1,000-seat deployment on VMware View, typically at least 30 to 40 desktop servers, depending on user workloads, will be needed to host the DVMs (see Table 1 in the *Deployment Architecture Overview Redbook* for information on evaluating user workloads).

Two to four infrastructure servers are also required, depending on what level of redundancy or availability is needed. Added infrastructure servers may also be needed if the platform components on the servers, such as View Connection Server or vCenter Server, are potential performance bottlenecks.

Shared storage in the form of a SAN or NAS is typically essential for deployments of this size. Shared storage is needed to ensure that DVM images remain available in the event of a desktop server failure – something which is much more likely with up to 40 servers. It is also typically required to provide the high level of IOPS (30,000 to 50,000, depending on workloads) needed for up to 1,000 concurrently active DVMs.

Pano System Configuration

Because we're deploying over 500 seats, we are required to use a Pano Controller Scalability group with at least two Pano Controller instances. Any secondary or slave Pano Controller instances can be deployed on separate infrastructure servers for performance and redundancy. See "Pano System Configuration for Scalability and Redundancy" on page 6 for more information.

Table 4: Summary of Hardware Needed for a Sample 1,000-Seat Deployment

Component	Amount	Description
Desktop Servers	30-40	Each with dual, quad-core Intel Westmere CPUs (E5620 or better) and 48-72 GB of RAM. Servers host ESX/ESXi hypervisor software and Windows DVMs.
Infrastructure Servers	2-4	Deploy one group of six Pano Controller instances for scalability. Infrastructure servers host Pano Controller, Pano Maestro, vCenter Server, and the required supporting ESX/ESXi hypervisor. They can also optionally host the VMware View Connection Server and View Composer.
Storage	Raw Capacity: 33 TB	Allows 15 GB per DVM, an average of 1.5 DVMs per user, plus 50 GB overhead for Pano Controller and VMware View VMs, with a limit of 80% capacity utilization and less the 20% RAID overhead.
	Min IOPS: 30,000-50,000	Requires SAN with at least 222 15K RPM drives or 286 10K RPM drives, plus RAID parity drives based on allocation of 40 IOPS/DVM.
Networking	6-7	1 Gbps/100 Mbps switches for the edge network
	4-6	1 Gbps segments for the core network
Management Workstation	1	Windows workstation is required to configure and manage the Pano System and platform.

Platform Considerations and Configuration

This section discusses VMware View-specific factors that you should consider for 1,000-seat deployments.

Table 5: Summary of Software Needed for a Sample 1,000-Seat Deployment

Component	Number	Description
Pano Controller VM	2-3	Two Pano Controller instances are required; three Pano Controller instances are required for a failover group with scalability. (For redundancy, install additional Pano Manger instances on separate servers.)
ESX/ESXi Hypervisor	1-2	One per server is required for both desktop and infrastructure servers.
View Connection Server	1	Optional, but recommended for deployments of 1,000 or more seats. Should be hosted on a physical Infrastructure Server separate from Pano Controller for performance and redundancy. Security Server installations
vCenter Server	1	Provides DVM-management capabilities for Pano Controller and VMware View. Can run inside a Windows VM.
View Composer	1	View Composer is recommended because linked clones are recommended at this deployment size.

View Connection Server as Primary Connection Broker

Configuring VMware View Connection Server to be the primary connection broker is optional for this deployment size, but it is recommended if the planned deployment size will grow to exceed 1,000 seats. Integrating with View Connection Server is also recommended if you need to deploy both Pano Zero Clients alongside traditional thin clients and PCs or laptops running the View Client software (sometimes referred to as a hybrid endpoint population).

Linked Clones for Storage Deduplication

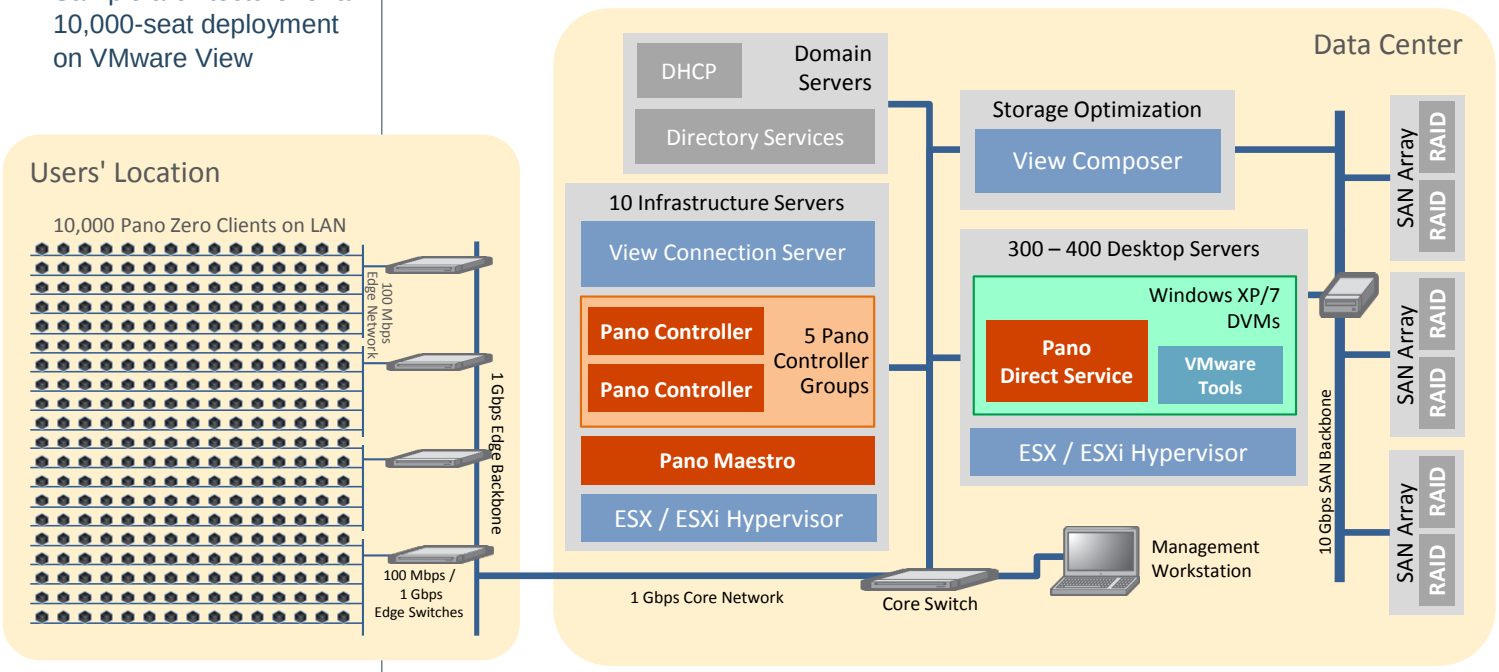
You can optionally deploy View Composer, which enables you to use linked clones, where a single DVM image template is used to create multiple DVM images on one or more desktop servers. This can greatly reduce the amount of storage required compared to other methods of creating DVM images. This is typically most useful in deployments of 500 or more seats. View Composer is only included in the View Premier edition – it is not included in the Enterprise edition. See “Provisioning and Managing DVMs” on page 3 for more information.

Figure 5:

Sample architecture for a 10,000-seat deployment on VMware View

¿10,000-Seat Deployment

This section provides information on sample architectures for 10,000-seat Pano System deployments on VMware View.



Hardware Sizing and Architecture

For a 10,000-seat deployment on VMware View, typically at least 30 to 40 desktop servers, depending on user workloads, will be needed to host the DVMs (see Table 1 in the *Deployment Architecture Overview Redbook* for information on evaluating user workloads).

Two to four infrastructure servers are also required, depending on what level of redundancy or availability is needed. Added infrastructure servers may also be needed if the platform components on the servers, such as View Connection Server or vCenter Server, are potential performance bottlenecks

Shared storage in the form of a SAN or NAS is typically essential for deployments of this size. Shared storage is needed to ensure that DVM images remain available in the event of a desktop server failure – something which is much more likely with up to 400 desktop servers. It is also typically required to provide the high level of IOPS (300,000 to 500,000, depending on workloads) needed for up to 10,000 concurrently active DVMs.

Table 6: Summary of Hardware Needed for a Sample 10,000-Seat Deployment

Component	Amount	Description
Desktop Servers	300-400	Each with dual, quad-core Intel Westmere CPUs (E5620 or better) and 48-72 GB of RAM. Servers host ESX/ESXi hypervisor software and Windows DVMs.
Infrastructure Servers	10	Deploy five groups of six Pano Controller instances each for scalability. Infrastructure servers host Pano Controller, vCenter Server, and the required supporting ESX/ESXi hypervisor. They can also optionally host the VMware View Connection Server and View Composer.
Storage	Raw Capacity: 330 TB	Allows 15 GB per DVM, an average of 1.5 DVMs per user, plus 50 GB overhead for Pano Controller and VMware View VMs, with a limit of 80% capacity utilization and less the 20% RAID overhead.
	Min IOPS: 300,000-500,000	Requires SAN with at least 222 15K RPM drives or 286 10K RPM drives, plus RAID parity drives based on allocation of 40 IOPS/DVM.
Networking	60-70	1 Gbps/100 Mbps switches for the edge network
	4-6	1 Gbps segments for the core network
Management Workstation	1	Windows workstation is required to configure and manage the Pano System and platform.

Pano System Configuration

Because we're deploying over 500 seats, we are required to use a Pano Controller Scalability group with at least two Pano Controller instances. Any secondary or slave Pano Controller instances can be deployed on separate infrastructure servers for performance and redundancy. See "Pano System Configuration for Scalability and Redundancy" on page 6 for more information.

Platform Considerations and Configuration

This section discusses VMware View-specific factors that you should consider for 10,000-seat deployments.

Table 7: Summary of Software Needed for a Sample 10,000-Seat Deployment

Component	Number	Description
Pano Controller VM	20-30	Twenty to thirty Pano Controller instances are required configured in 5 to 7 groups for both failover and scalability.
ESX/ESXi Hypervisor	10-20	Ten to twenty server are required for both desktop and infrastructure servers.
View Connection Server	1	Optional, but recommended for deployments of 10,000 seats. Should be hosted on a physical Infrastructure Server separate from Pano Controller for performance and redundancy. Security Server installations required for Pano Remote connections via the Internet.
vCenter Server	5-7	Provides DVM-management capabilities for Pano Controller and VMware View. Run inside a Windows Server VM.
View Composer	1	View Composer is recommended because linked clones are recommended at this deployment size.

View Connection Server as Primary Connection Broker

Configuring VMware View Connection Server to be the primary connection broker is optional for this deployment size, but it is recommended if the planned deployment size will grow to exceed 10,000 seats. Integrating with View Connection Server is also recommended if you need to deploy both Pano Zero Clients alongside traditional thin clients and PCs or laptops running the View Client software (sometimes referred to as a hybrid endpoint population).

Linked Clones for Storage Deduplication

You can optionally deploy View Composer, which enables you to use linked clones, where a single DVM image template is used to create multiple DVM images on one or more desktop servers. This can greatly reduce the amount of storage required compared to other methods of creating DVM images. This is typically most useful in deployments of 1,000 or more seats. View Composer is only included in the View Premier edition – it is not included in the Enterprise edition. See “Provisioning and Managing DVMs” on page 3 for more information.

Pano Remote with VMware View

The use of Pano Remote is supported when using VMware View with the same functionality as on other virtualization platforms (except as noted in “Differences Running on VMware” on page 16). Pano Remote uses the Microsoft RDP protocol to connect to Pano Gateway over public WANs like the Internet. Pano Remote does not support the optional Teradici PC-over-IP protocol provided with VMware View.

And although Pano Remote uses the RDP protocol, it requires a Pano System installation and Pano Controller to connection to any DVMs. It cannot connect directly to the View Connection Server even though that infrastructure also supports the RDP protocol.

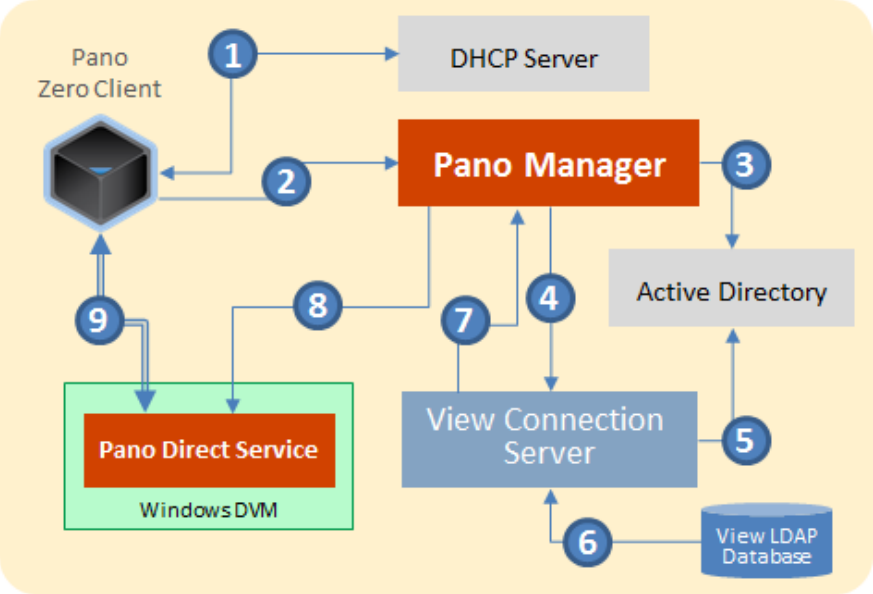
Please see the online help for instructions on how to install and configure Pano Gateway on Windows Server Remote Desktop Services. More information on deploying Pano Remote can be found in the *Remote Deployment Redbook.*

What Happens When a User Logs In

This section describes the connection brokering workflow that occurs when a VMware View Connection Server serves as the primary connection broker and an end user logs in using a Pano Zero Client.

Figure 6:

Login process of Pano Zero Client deployed with View Connection Server as the primary connection broker



This isn't a process you need to manage or directly configure beyond integrating View Connection Server with Pano Controller. However, understanding this shared connection brokering process can help you anticipate and resolve network and server processing bottlenecks.

The descriptions below and Figure 6 above assume that the setup steps detailed in the online help have been completed and that the system architecture matches one of the sample architectures that include VMware View Connection Server (see "Sample Architectures on VMware View" on page 7 for information).

1. DHCP – the Pano Zero Client connects to a DHCP server, receiving its IP address, along with the IP address for the Pano Controller VM.
2. Login screen – depending on the selected Pano client discovery method, the Pano client contacts Pano Controller, which causes the Pano Zero Client to display a login screen. To log in, the end user enters their user name and password into the fields provided on-screen and presses the Login button (or the Enter key.)
3. Credential validation – the user's credentials are transmitted by the Pano Zero Client to Pano Controller. Pano Controller submits these credentials to the directory service and receives validation (or rejection) from the directory service.
4. Pass credentials to connection broker – upon successful authentication, Pano Controller passes the user's credentials to View Connection Server.
5. Credential validation – View Connection Server repeats the validation of the user's credentials with the directory service.
6. DVM lookup – View Connection Server checks its database for the list of DVMs to which the user is entitled.

7. Determine the specific desktop – View Connection Server returns a list of Desktop Groups to Pano Controller. If the user is entitled to multiple Desktop Groups, Pano Controller will automatically connect the user to the desktop most recently accessed. (If instead of clicking the Login button, the user clicks the Options button in Step (2), the user will be prompted to select the desired specific desktop from a list of available desktops.)
8. Establish the connection – Pano Controller next checks on the status of the Pano Direct Service running in the target DVM and ensures that it is ready to connect. Once ready, Pano Controller facilitates the connection between the Pano Zero Client and the Pano Direct Service on the appropriate DVM and steps aside.
9. The user is now connected to their desktop and all session traffic flows directly from the Pano Direct Service to the Pano Zero Client.

Differences Running on VMware

This section describes the differences when running the Pano System on VMware View.

GENERAL DIFFERENCES ON VIEW

Pano Zero Clients and the current release of Pano System (4.5) have a number of important differences and limitations when running on VMware View:

1. The Pano System does not use either the RDP or the Teradici PC-over-IP protocols supported natively by VMware View. Instead, the Pano Direct Protocol (PDP) is used to connect a Pano Zero Client to a DVM. In order to establish this connection, the Pano Direct Service must be installed and running on the DVM. Simply installing the VMware Tools in the DVM is not sufficient.
2. End users cannot access their DVMs from an RDP client such as Windows Remote Desktop Connection if View Secure Authentication is enabled. For more information, see “Configure VMware View Agent” in the online help.
3. You must be running in a vSphere 4.0 Update 1 (or later) environment. This is a VMware requirement.
4. Pano Direct Service includes an XPDM display driver. This driver is incompatible with the WDDM display drivers, including the ones installed by VMware Tools or the VMware View Agent installers. You must uninstall the VMware SVGA 3D (WDDM) driver and replace it with the VMware SVGA II (XPDM) driver. Please refer to the online help for details instructions on installing the SVGA II display driver.

LIMITATIONS WITH VIEW CONNECTION SERVER

You can run Pano Controller without integrating with View Connection Server as the primary connection broker, using just the vSphere ESX/ESXi hypervisor and vCenter Server from the View suite). However, there are limitations on what you can do when integrated with View Connection Server. The main limitation is that only user-based collections are supported, using a single special DVM Collection of the “VMware View” type.

Table 8 on the next page lists limitations when deployed with and without View Connection Server as the primary connection broker.

Table 8: Limitations with and without View Connection Server

Activity	*Without* View Connection Server	*With* View Connection Server
Create folders from Pano Controller	✓	✗
Create folders from vSphere Client	✓	✓
Create more than one collection in Pano Controller	✓	✗
Trash DVM from Pano client login screen	✓	✓
Copy/clone from vSphere Client	✓	✓
Automatically provision desktops	✓	✓ - in View
End users can power on DVMs from the client UI	✓	✓
Pano Controller can perform power-management tasks on DVMs [1]	✓	✗

DEVICE-BASED COLLECTIONS ON VIEW

If you need to setup your Pano clients in device-based mode (so that a specific DVM is associated with a specific Pano client rather than with a specific user), you will need to define device-based collections in Pano Controller, and also setup the Virtualization Configuration between Pano Controller and vCenter Server. Once this is done, you can define as many device-based collections as needed. For these collections, you can create folders from Pano Controller and/or vSphere Client.

For these device-based collections, using the Trash DVM option is not supported, copy/clone can be done from vSphere Client or vCenter Server, and automatic provisioning could be initiated from Pano Controller or View. Pano Controller keeps these device-based DVMs powered up regardless of what the end user does in the login dialog as it keeps any DVM assigned to a Pano client continuously active (running in a hypervisor or powered on).

[1] Power management tasks include: power on, power off, suspend, reset, shut down guest, restart guest, and power off the surplus.

More Information

Moe information can be found in these resources:

- For detailed information on setting up and managing the Pano System, consult the online help available at help.panologic.com and the support knowledgebase in the Pano Logic Customer Center at support.panologic.com.
- Specifications for the Pano System can be found in in the *Pano System Data Sheet* at www.panologic.com/datasheet/panosystem.
- Go to www.panologic.com/brochure-briefs for solution briefs on using VMware View with the Pano System and for the Pano System on the VMware platform.
- Information on VMware View and trial software downloads can be found on the VMware website at www.vmware.com/products/view/
- Detailed capacity planning advice for server, storage, and network hardware can be found in the *Infrastructure Sizing Redbook* at www.panologic.com/redbook/infrastructure.
- General information on Pano deployment planning, platform choices, scalability and redundancy options, best practices and sample architectures for 25-, 1,000-, and 10,000-seat deployments can be found in the *Deployment Architecture Overview Redbook* at www.panologic.com/redbook/overview.
- Information on deployment planning for remote locations, such as branch offices, distributed facilities and mobile workers, can be found in the *Remote Deployments Redbook* at www.panologic.com/redbook/remote.

To obtain a Pano System Starter Kit, visit store.panologic.com, email sales@panologic.com or call 650-454-8940/877-677-PANO.

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