



DVS Enterprise Executive Brief for



Citrix XenDesktop/ XenApp

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1 Introduction

This is the Dell Executive Brief for Citrix XenDesktop Desktop Virtualization solution designed to scale from 50 to more than 50,000 VDI (Virtual Desktop Infrastructure) users. This document discusses the various components of the VDI solution and highlights the differences between them to offer you all the available options you will need to make a decision based on your individual needs. The solution options encompass a combination of solution models including local disks and storage area networks based either on iSCSI or Fiber Channel technologies and networking options (Ethernet or Fiber Channel) based on those choices.

This document provides a high level overview of the key components of the architecture required to deliver virtual desktops via Citrix XenDesktop 7. We will also discuss how to get started with this technology by exploring a VDI Experience Proof of Concept (POC) aka "pilot" Solution as well as an entry level configuration supporting up to 90 users.

1.1 1.1 Why VDI?

Simply put, VDI lets you move your hardware (and headaches associated with it) from the end user site to the datacenter. There are many benefits of this including, but not limited to, security, management, better inventory & logistics, enabling BYOD, enabling remote workers, etc. Having all your user data in the datacenter means that not only do you not have to worry about losing data or IP theft, your remote teams can collaborate much more efficiently-no need to send large files back and forth across the pond, simply share in seconds what used to take hours or days to share.

1.2 What's New in This Release

This new release features the latest Intel Ivy Bridge CPUs which allow for increased user density per server which lowers the total cost of this solution. We have also added support for the Dell PowerEdge VRTX system with the remote and branch office deployments in mind. The newly added support for shared NVIDIA graphics allow us to provide an excellent end user experience to graphics designers and engineers. Last, but not least, we have added support for the latest unified communications platform from Microsoft- Lync 2013.

2 Solution Architecture Overview

2.1 Introduction

The DVS Enterprise Solution leverages a core set of hardware and software components consisting of 4 primary layers:

- Networking Layer
- Compute Server Layer
- Management Server Layer
- Storage Layer

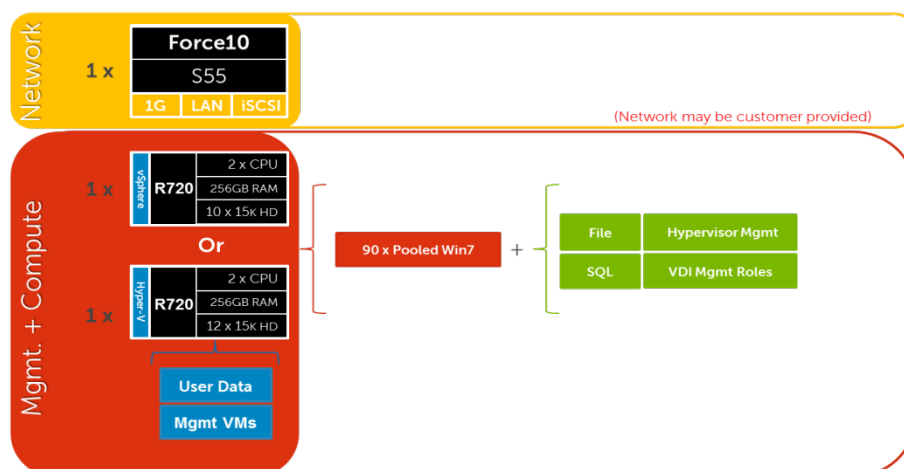
These components have been integrated and tested to provide the optimal balance of high performance and lowest cost per user. Additionally, the DVS Enterprise Solution includes an approved extended list of optional components in the same categories. These components give IT departments the flexibility to custom tailor the solution for environments with unique VDI feature, scale or performance needs. The DVS Enterprise stack is designed to be a cost effective starting point for IT departments looking to migrate to a fully virtualized desktop environment slowly. This approach allows you to grow the investment and commitment as needed or as your IT staff becomes more comfortable with VDI technologies.

2.2 Local Tier 1

2.2.1 Local Tier 1 & Tier 2– Combined Pilot

We offer a 90 user combined pilot solution to test the waters, so to say. This might entail either a small deployment, or a pilot effort to familiarize yourself with the solution architecture. This architecture is non-distributed with all essential core functions residing on a single server running either vSphere or Hyper-V. If additional scaling is desired, you can grow into a larger distributed architecture seamlessly with no loss on initial investment.

In addition to the 90 user combined offering, we also offer a scale ready version that includes Tier 2 storage. The basic architecture is the same but customers looking to scale out quickly (much faster than the above mentioned solution) will benefit by building out into Tier 2 storage initially.



2.3 Shared Tier 1 Rack

For POCs or small deployments, Tier1 and Tier2 can be combined on a single Dell EqualLogic 6110XS storage array. Above 500 users, a separate array needs to be used for Tier 2.

For 500 or more users on EqualLogic, the Storage layers are separated into discrete arrays. Additional 6110XS arrays are added for Tier 1 as the user count scales, just as the Tier 2 array models change also based on scale. The 4110E, 6110E, and 6510E are 10Gb Tier 2 array options. NAS is recommended above 1000 users to provide HA (High Availability) for file services.

Utilizing Compellent storage for Shared Tier 1 provides a fiber channel solution where Tier 1 and Tier 2 are functionally combined in a single array. Tier 2 functions (user data + Mgmt VMs) can be removed from the array if the customer has another solution in place. Doing this will net an additional 30% resource capability per Compellent array for Tier 1 user desktop sessions based on our test results. Scaling this solution is very linear by predictably adding Compellent arrays for every 1000 users, on average.

2.4 Shared Tier 1 Blade

As is the case in the Shared Tier 1 model using rack servers, blades can also be used in a 500 user bundle by combining Tier 1 and Tier 2 on a single 6110XS array. Above 500 users, separate Tier 1 and Tier 2 storage into discrete arrays. Above 1000 users the Storage tiers need to be separated to maximize the performance of the 6110XS for VDI sessions. At this scale we also separate LAN from iSCSI switching. Load balancing and NAS can be added optionally for HA.

3 Hardware Components

3.1 Network

The Dell Force10 S-Series S55, Force10 S60, Force10 S4810 and PowerConnect M6348 are the recommended switches for deploying the Dell Citrix VDI solution in an iSCSI storage environment. Brocade 6510 and M5424 are the recommended switches for deploying the Dell Citrix VDI solution in a Fiber Channel storage environment.

The Dell Force10, PowerConnect and Brocade switches are recommended for DVS Enterprise deployments of 6000 users or less. For over 6000 users, you can stack them with additional switches. For a bursty network, the Dell Force10 S-Series S60 is recommended since it is equipped with the industry's largest packet buffer (1.25 GB), enabling it to deliver lower application latency and maintain predictable network performance even when faced with significant spikes in network traffic. If you have applications that require 10 Gb/s speeds, the Force10 S4810 is recommended.

3.2 Servers

The rack server platform for the DVS Enterprise solution is the best-in-class Dell PowerEdge R720 (12G). This dual socket CPU platform runs the fastest Intel Xeon E5-2600 family of processors, can host up to 768GB RAM, and supports up to 16 2.5" SAS disks. The Dell PowerEdge R720 offers uncompromising performance and scalability in a 2U form factor.



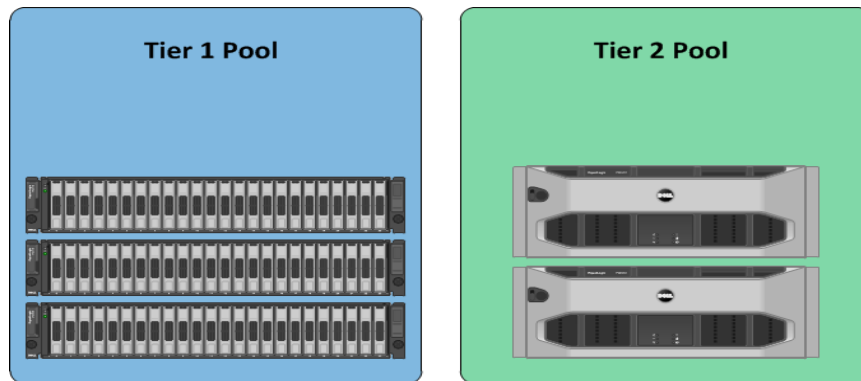
The blade server platform for the DVS Enterprise solution is the PowerEdge M620. This half-height blade server is a feature-rich, dual-processor platform that offers a blend of density, performance, efficiency and scalability. The M620 offers remarkable computational density, scaling up to 24 cores, 2 socket Intel Xeon processors and 24 DIMMs (768GB RAM) of DDR3 memory in an extremely compact half-height blade form factor.



3.3 Storage

3.3.1.1 EqualLogic Configuration

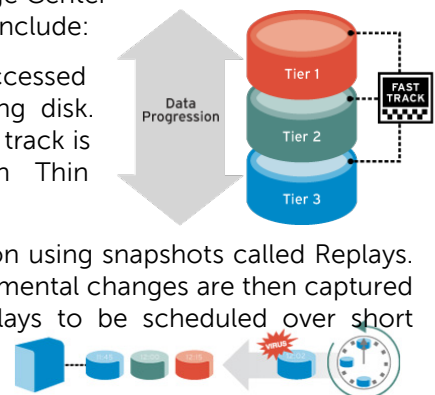
Each tier of EqualLogic storage is to be managed as a separate pool or group to isolate specific workloads. Manage shared Tier 1 arrays used for hosting VDI sessions together, while managing shared Tier 2 arrays used for hosting Management server role VMs and user data together.



3.3.2 Compellent Storage (FC)

Dell DVS recommends that all Compellent storage arrays be implemented using 2 controllers in an HA cluster. Fiber Channel is the preferred storage protocol for use with this array, but Compellent is fully capable of supporting iSCSI as well. Key Storage Center applications used strategically to provide increased performance include:

- Fast Track – Dynamic placement of most frequently accessed data blocks on the faster outer tracks of each spinning disk. Lesser active data blocks remain on the inner tracks. Fast track is well-complemented when used in conjunction with Thin Provisioning.
- Data Instant Replay – Provides continuous data protection using snapshots called Replays. Once the base of a volume has been captured, only incremental changes are then captured going forward. This allows for a high number of Replays to be scheduled over short intervals, if desired, to provide maximum protection.



3.1 Dell Wyse Cloud Clients

The following Dell Wyse thin (T10 and D10D) and zero clients (Xenith2 and Xenith Pro 2) are the recommended choices for this solution. Thin clients offer greater flexibility in protocol support but require some maintenance since they do have a (tiny) local os-Linux or Windows embedded. Zero clients have no operating system and so offer complete protection against viruses and malware, but they only support one protocol (Citrix or VMware) and so the choice between thin and zero clients will depend on your needs.

3.1.1 Dell Wyse T10 (Basic Workload)

The T10 handles everyday tasks with ease and also provides multimedia acceleration for task workers who need video. In addition, the T10 is one of the only affordable thin clients to support dual monitors with monitor rotation, enabling increased productivity by providing an extensive view of task work. Designing smooth playback of high bit-rate HD video and graphics in such a small box hasn't been at the expense of energy consumption and heat emissions either. Using just 7 watts of electricity earns this device an Energy Star V5.0 rating.



3.1.2 Dell Wyse D10D (Standard Workload)



The Dell Wyse D10D is a high-performance and secure ThinOS 8 thin client that is absolutely virus and malware immune. The D10D features an advanced dual-core AMD processor that handles demanding multimedia apps with ease and delivers brilliant graphics. Powerful, compact and extremely energy efficient, the D10D is a great VDI end point for organizations that need high-end performance but face potential budget limitations.

3.1.3 Wyse Xenith 2 (Standard Workload)



Establishing a new price/performance standard for zero clients for Citrix, the new Dell Wyse Xenith 2 provides an exceptional user experience at a highly affordable price for Citrix XenDesktop and XenApp environments. With a zero attack surface, the ultra-secure Xenith 2 offers complete protection against network-borne viruses and malware. Xenith 2 boots up in just seconds and delivers exceptional performance for Citrix XenDesktop and XenApp users while offering usability and management features found in premium Dell Wyse cloud client devices. Using about 7 Watts of power in full operation, the

Xenith 2 creates very little heat for a greener, more comfortable working environment.

3.1.4 Xenith Pro 2 (Premium Workload)

Dell Wyse Xenith Pro 2 is the next-generation zero client for Citrix HDX and Citrix XenDesktop, delivering ultimate performance, security and simplicity. With a powerful dual core AMD G-series processor, Xenith Pro 2 is faster than competing devices. This additional computing horsepower allows dazzling HD multimedia delivery without overtaxing your server or network. Scalable enterprise-wide management provides simple deployment, patching and updates—your Citrix XenDesktop server configures it out-of-the-box to your preferences for plug-and-play speed and ease of use. Completely virus and malware immune, the Xenith Pro 2 draws under 9 watts of power in full operation—that's less than any PC on the planet.



4 Software Components

4.1 Citrix XenDesktop v7

The solution is based on Citrix XenDesktop which provides a complete end-to-end solution delivering Microsoft Windows virtual desktops to users on a wide variety of endpoint devices. Virtual desktops are dynamically assembled on demand, providing users with pristine, yet personalized, desktops each time they log on.

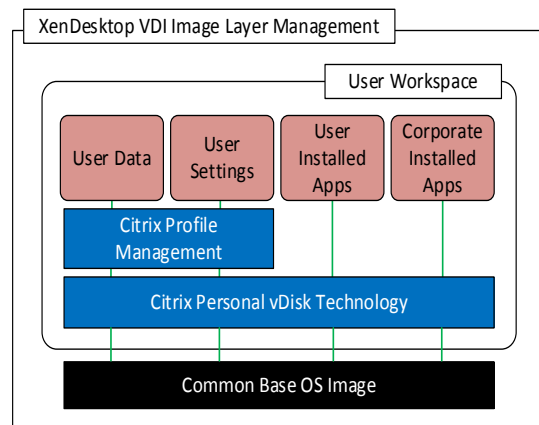
Citrix XenDesktop provides a complete virtual desktop delivery system by integrating several distributed components with advanced configuration tools that simplify the creation and real-time management of the virtual desktop infrastructure.

4.1.1 Citrix Personal vDisk Technology

Citrix Personal vDisk is a high-performance enterprise workspace virtualization solution that is built right into Citrix XenDesktop and provides the user customization and personalization benefits of a persistent desktop image, with the storage savings and performance of a single/shared image.

With Citrix Personal vDisk, each user receives personal storage in the form of a layered vDisk, which enables them to personalize and “persist” their desktop environment.

Additionally, this vDisk stores any user or departmental apps as well as any data or settings the VDI administrator chooses to store. Personal vDisk provides the following benefits to XenDesktop:



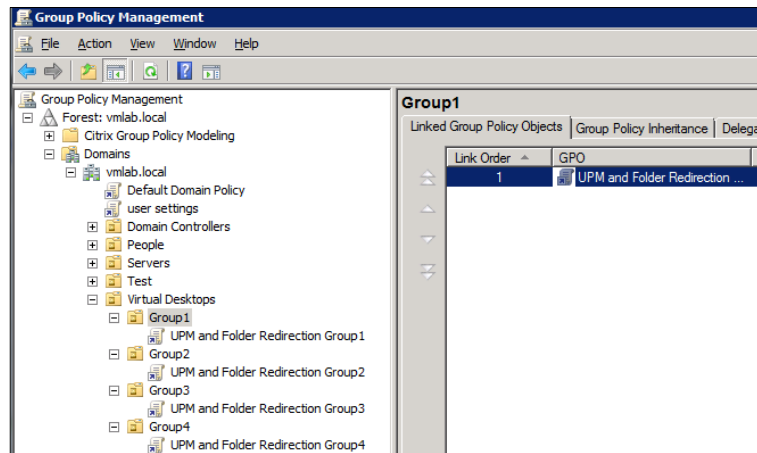
- Persistent personalization of user profiles, settings and data.
- Enables deployment and management of user installed and entitlement based applications
- Fully compatible with Application delivery solutions such as Microsoft SCCM, App-V and Citrix XenApp.
- 100% persistence with VDI pooled Storage management
- Almost Zero management overhead.

4.1.2 Citrix Profile Manager

Citrix Profile Management is a component of the XenDesktop suite which is used to manage user profiles and minimize many of the issues associated with traditional Windows Roaming profiles in an environment where users may have their user profile open on multiple devices at the same time. The profile management toolset has two components, the profile management agent which is installed on any device where the user profiles will be managed by the toolset, which will be the virtual desktops. The second component is a Group Policy Administrative Template, which is imported to a group policy which is assigned to an organizational unit within active directory which contains the devices upon which the user profiles will be managed.

In order to further optimize the profile management folders within the user profile that can be used to store data will be redirected the users' home drive. The folder redirection will be managed via group policy objects within Active Directory. The following folders will be redirected:

- Contacts
- Downloads
- Favorites
- Links
- My Documents
- Searches
- Start Menu
- Windows
- My Music
- My Pictures
- My Videos
- Desktop



4.2 Desktop and Application Delivery with Citrix XenApp

The DVS Enterprise Solution has been expanded to include integration with Citrix XenApp. XenApp, formerly known as WinFrame, MetaFrame and then Presentation Server, has been the cornerstone application virtualization product in the Citrix portfolio since the 1990's. Today, XenApp's proven architecture and virtualization technologies enable customers to instantly deliver any Windows-based application to users anywhere on any device.

XenApp perfectly complements a XenDesktop-based VDI deployment by enabling the delivery of applications within a user's virtual desktop. This gives the user a customized application set with a "locally-installed" application experience even though the applications are centrally installed and managed on XenApp servers. This can dramatically simplify their XenDesktop environment by leveraging a widely shared virtual desktop image, while at the same extending the scalability of XenDesktop by alleviating the desktop 'compute' servers from virtually all application loads by only having to run an instance of Citrix Receiver. This two-tiered approach to desktop and application delivery brings management simplification, a much quicker return on investment and the absolute best end-user experience.

4.2.1 XenDesktop with XenApp and PvDisk Integration

In a XenApp implementation, applications and desktops execute from a centralized Windows-based server and then are accessed via the Citrix ICA protocol and Citrix Receiver client plug-in. There are some instances, however, where certain departmental or custom applications cannot run hosted on a Windows server. At the same time for organizational policy or certain storage considerations, delivering these applications as a part of a base image is not possible either. In this case, Citrix PvDisk technology is the solution.

With Citrix Personal vDisk, each user of that single shared virtual desktop image also receives a personal layered vDisk, which enables the user to not only personalize their desktop, but provides native application execution within a Windows client OS and not from a server. When leveraging the integration of XenApp within XenDesktop, all profile and user data is seamlessly accessed within both environments.

5 Solution Architecture for XenDesktop 7

5.1.1 Local Tier 1 Rack

In the Local Tier 1 model, VDI sessions execute on local storage on each Compute server. Due to the local disk requirement in the Compute layer, this model supports rack servers only. vSphere or Hyper-V can be used as the solution hypervisor.

In the Shared Tier 1 model, VDI sessions execute on shared storage so there is no need for local disk on each server. All configuration options are identical except for CPU and RAM which are reduced on the Management host.

5.1.2 Shared Tier 1 Rack (FC)

Fiber Channel can be optionally leveraged as the block storage protocol for Compute and Management hosts with Compellent Tier 1 and Tier 2 storage. Aside from the use of FC HBAs to replace the 10Gb NICs used for iSCSI, the rest of the server configurations are the same. Please note that FC is only currently DVS-supported using vSphere.

In the above configurations, the R720-based DVS Enterprise Solution can support the following user counts per server (PVS). User density numbers are provided below:

Workload	vSphere	Hyper-V
Basic (Win8)	180	200
Standard (Win8)	115	150
Premium (Win8)	100	125

5.1.3 Shared Tier 1 Blade

The Dell M1000e Blade Chassis combined with the M620 blade server is the platform of choice for a high-density data center configuration. The M620 is a feature-rich, dual-processor, half-height blade server which offers a blend of density, performance, efficiency and scalability. The M620 offers remarkable computational density, scaling up to 16 cores, 2 socket Intel Xeon processors and 24 DIMMs (768GB RAM) of DDR3 memory in an extremely compact half-height blade form factor.

5.2 Solution High Availability

High availability (HA) is offered to protect each layers of the solution architecture, individually if desired. Following the N+1 model, additional ToR switches for LAN, iSCSI, or FC are added to the Network layer and stacked to provide redundancy as required, additional compute and management hosts are added to their respective layers, vSphere or Hyper-V clustering is introduced in the management layer, SQL is mirrored or clustered, Citrix Netscaler is leveraged for load balancing, and a NAS device can be used to host file shares. Storage protocol switch stacks and NAS selection will vary based on chosen solution architecture.

Appendix- XenMobile, CloudBridge & Netscaler

The following sections explain some of the ancillary (optional) components offered to ease certain pain points like mobile device management, branch office WAN optimization & application acceleration as well as load balancing and disaster recovery. Depending on your environment, they may or may not be needed and are hence listed in the optional section.

Citrix XenMobile

Citrix XenMobile is a comprehensive solution to manage mobile devices, apps, and data while giving users the freedom to experience work and life their way. The solution includes configure, secure, provision and support mobile devices with MDM (Mobile Device Manager) and mobile app management with the largest ecosystem of apps built for business. It also includes Sandboxed email, browser and document sharing apps, unified corporate app store and multi-factor single sign-on. Available for any mobile device, Citrix Worx Home is an app that allows IT to enforce mobile settings and security while also providing access to a unified app store and live support services. ShareFile, which is included and seamlessly integrated with XenMobile, is a solution that enables organizations to securely store, sync and share data, both within and outside the organization.

Citrix CloudBridge

Citrix CloudBridge provides a unified platform that connects and accelerates applications, and optimizes bandwidth utilization across public cloud and private networks. The only WAN optimization solution with integrated, secure, transparent cloud connectivity, CloudBridge allows enterprises to augment their datacenter with the infinite capacity and elastic efficiency provided by public cloud providers. **For more information please visit:** [Citrix CloudBridge](#)

Citrix Netscaler

Citrix NetScaler is an all-in-one web [application delivery controller](#) that makes applications run five times better, reduces web application ownership costs, optimizes the user experience, and makes sure that applications are always available. It does so by utilizing [HTTP compression](#) and [caching](#), providing an advanced L4-7 [load balancer](#), an integrated [AppFirewall](#) and server offloading to consolidate servers.

Where Does a Citrix NetScaler Fit in the Network?

A NetScaler resides between the clients and the servers, so that client requests and server responses pass through it. In a typical installation, virtual servers (vservers) configured on the NetScaler provide connection points that clients use to access the applications behind the NetScaler. In this case, the NetScaler owns public IP addresses that are associated with its vservers, while the real servers are isolated in a private network.

Global Server Load Balancing

GSLB is an industry standard function. It is in widespread use to provide automatic distribution of user requests to an instance of an application hosted in the appropriate datacenter where multiple processing facilities exist. The intent is to seamlessly redistribute load on an as required basis, transparent to the user community. This distribution can be used on a localized or worldwide basis. Many companies use GSLB in its simplest form to automatically redirect traffic to Disaster Recovery (DR) sites on an exception basis. That is, GSLB is configured to simply route user load to the DR site on a temporary basis only in the event of a catastrophic failure or only during extended planned datacenter maintenance. GSLB is also used to distribute load across datacenters on a continuous load balancing basis as part of normal processing.

XenDesktop HA with Netscaler White Paper: [High Availability](#)

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