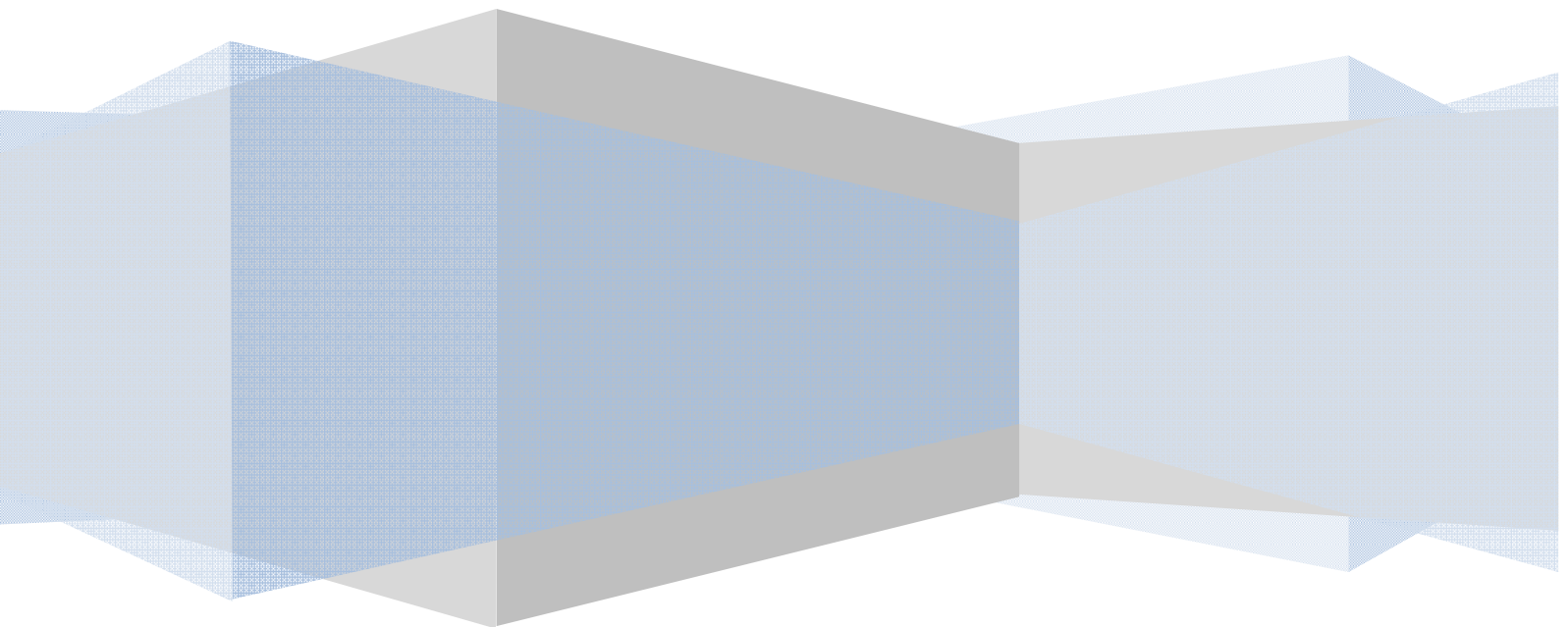# *Citrix*
XenDesktop: Overcoming Bandwidth Issues

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Overcoming Bandwidth Issues with XenDesktop

Executive Summary

Today, implementing virtualization has become an increasingly viable option for many companies. But virtualization also presents new bandwidth and infrastructure challenges to enterprises of all sizes. These common bandwidth obstacles cover a wide range, from inefficient system performance to LAN/WAN bandwidth problems. For administrators and executives, maintaining a balanced outlook on the benefits and downsides of virtualization is essential. This white paper explores the obstacles and bandwidth issues related to virtualization within an enterprise and how desktop virtualization can help to overcome them.

Enterprise-wide Virtualization

Virtualization—running multiple operating systems and applications on the same server at the same time—enables IT professionals to provide their organizations with dynamic flexibility. It can also lead to new problems, such as inefficient system performance, business-critical application conflicts, and LAN/WAN issues.

For example, system performance can suffer due to the heterogeneity and variations of OS needs per application. For administrators, a good understanding and awareness of application interdependencies is necessary in order to eliminate degraded performance.

In addition, most modern applications rely on dozens of data center components. Conflicts between applications, insecure data, and server latency can occur as a result of poor planning and preparation or from having an inadequate infrastructure at implementation.

Finally, LAN/WAN bandwidth problems can impede workload sharing, performance and traffic flow. These problems often result from issues, such as server consolidation and frequent changes in the locations of application servers.

With desktop virtualization, which allows users to access their desktop environment from anywhere via an Internet connection to a virtualized server, these kinds of bandwidth problems are minimized, if not entirely eliminated.

Business-critical Applications in a Virtual Environment

A key benefit of virtualization is the ability to quickly deploy a new OS, application, or service. However, neglecting critical assessments of goals and data center capabilities can lead to application performance issues.

In a virtualized environment, two or more operating systems and associated applications are run on one physical server.

Theoretically, virtualization allows you to implement applications without having to configure a new server, thus bringing new capabilities to users faster.

However, common problems often arise when multiple applications are running on the same server:
- conflicts occur between applications requiring exclusive drivers
- interruptions and downtime result from single point of failure
- increased bandwidth required to run multiple apps
- degraded application performance due to lack of proper management tools

These potential problems mean that if a dependency, such as a database or other aspect of the application infrastructure, isn't running correctly users will feel the impact.

Therefore, regardless of where problems might arise, it's important for administrators to have visibility into the application transaction flow. Having a proper balance of applications competing for server resources is critical.

Virtualization and System Performance Issues

Optimal system performance in a virtual data center is based on a range of variables. These include: server computing power, adequate storage infrastructure, and back-end network competency, to name a few.

Virtual machines (VMs) differ from single stand-alone servers in significant ways.

For example, with a physical server and its particular processing power assignment is based on peak usage. However, in a virtualized environment, increasing the number of virtual CPUs (vCPU) doesn't always result in faster performance. Frequently, VMs reach optimal speeds only after eliminating vCPUs. This is often due to scheduling issues between multiple vCPUs that can hold a system down.

Having an adequate storage infrastructure in place is critical for a high-performance virtualized data center. Storage virtualization consists of separate storage systems running on a storage area network (SAN). This system has significant differences from direct, attached storage, such as server hard disks and laptops/desktops.

Storage virtualization allows users and administrators to access different storage types as though the disparate devices were a single storage pool of the same type. A SAN makes the tasks of copy services, backup, archiving, and recovery less cumbersome.

Virtualization can also optimize disaster recovery (DR), eliminating hardware duplicates and initiating automatic rollovers within a virtualized environment to ensure business continuity (BC).
Even though virtualization can help to alleviate problems associated with managing physical storage systems, it can introduce new complications, both organizational and technical. For example, an inadequate or ineffective virtual storage infrastructure can negatively impact ROI and inhibit quick scalability as need increases.

Ultimately, virtualization is much more than just server consolidation and application availability; it can actually transform organizations. Having mastered the virtualization learning curve, IT can have availability for other mission-critical applications and processes. Yet without a high-competency network in place, whether internal or external, the dividends will likely be modest.

For example, instead of a standard network interface card (NIC) used for physical network switching, virtualization introduces multiple virtual NICs (vNIC). These contribute an added layer of complexity, i.e., multiple switching nodes and increased management points. The resulting relationship between vNICs, MAC addresses and virtual switch points can become quite complex and ever-shifting.

LAN/WAN Performance Obstacles in a Virtual Environment

The detrimental effects of LAN/WAN bandwidth problems on a high-functioning data center can be serious. Typically, the ease with which administrators implement server consolidation often combines with a failure to perform capacity planning or to implement effective management methods.

Virtualization ensures that large amounts of traffic will be centralized on a few key servers instead of spread out across a large number of smaller computers in the data center. Therefore, when a network connection slows or breaks, it impacts all those centralized applications as well as the endusers who rely on them.

In addition, virtualized environments function best with a SAN, that is, multiple physical storage devices combined into a single logical storage device. However, a SAN also increases network traffic, intensifying pressure on the LAN/WAN. Moreover, enterprises on average tend to deploy multiple endpoint virtualization technologies. According to analysts, a high percentage of these deploy more than six different technologies simultaneously.

While this array of offerings provides users with the application diversity and specificity desired, it also requires very fast, dependable network connectivity. As a result, the resource management system monitoring traffic across the LAN/WAN must be applied at a finer level of granularity.

Overall, the effect of virtualization today is forcing WAN and LAN functions into the center of the IT infrastructure, displacing the traditional mainframe. Because virtualized environments cannot tolerate network overloads or switch failures, a LAN/WAN with adequate bandwidth and strong network management is crucial for virtualization success.

Desktop Virtualization: Desktops on Demand

For users, personalization and mobility are a few of the key advantages of desktop virtualization. Benefits also accrue for administrators who struggle with virtualization bandwidth issues. For example, the ability to manage multiple operating systems from a single interface, easily access user accounts, and seamlessly roll out upgrades are key leverage points.

Because desktop operating systems are hosted in the data center, IT can centrally manage these multiple OSs. Citrix XenDesktop, for example, helps companies overcome bandwidth issues by enabling IT to rapidly create, provision, update and deliver desktops on demand to any user in any location.

Users also have flexibility regarding the ways in which they work. They can access their desktop environment using a PC, Mac, laptop or device of their choice. And since services are provided from off-site servers across the Internet, endusers can access their desktop from any location.

Cost-savings is another benefit for companies adopting desktop virtualization. For example, enterprises can reduce the cost of ownership of full-featured PCs by up to 40% and keep data center overhead to a minimum. Companies can also reap the rewards of 24/7 business continuity. XenDesktop offers workers flexibility and access wherever and whenever they choose.

Optimizing System Performance with Desktop Virtualization

With XenDesktop, the desktop operating systems are hosted in the data center along with applications. This configuration meets the needs of both administrators and users.

Processing power is one area that can be optimized by implementing desktop virtualization. For example, resource-hungry applications can "roam" across multiple virtual servers until they locate a latent server that can provide the necessary computing resource.

Desktop virtualization also translates to less hardware expenditures because "virtual" desktop machines can be stored in the data center. This means optimal ROI and value investments for

enterprises. One example for companies is the cost-saving "BYOC" (bring-your-own-computer) program. In this scenario, employees have the freedom to purchase any laptop of their choice in lieu of standard-issue PCs owned and managed by IT.

Moreover, XenDesktop incurs minimal start-up expenses because it leverages existing IT infrastructures. Simple installation and low cost are key factors for companies exploring desktop virtualization in the hope of alleviating data center bandwidth issues.

Overcoming IT Obstacles & Enhancing User Experience with Desktop Virtualization

Citrix XenDesktop enables IT to control data access, manage fewer desktop images, eliminate system conflicts, and reduce application regression testing. Adding, updating and removing apps becomes more agile because users can, for example, leverage a self-service app store, enabling them to access applications instantly from anywhere.

Desktop virtualization also strengthens data protection and offers administrators secure central management. IT is able to comprehensively monitor, analyze, and accelerate individual application performance as well as to administer updates and patches to applications. The ability to control application access and usage provides an unprecedented level of administrative granularity and protection.

In addition, XenDesktop's functionality, coupled with HDX extensions for high definition, allows for media-rich applications to perform graphics and media rendering using the local electronics of the PC. This reduces server load, minimizes LAN/WAN traffic, and enables administrators to make sure that all applications are meeting service-level objectives.

Conclusion

The obstacles and bandwidth issues related to virtualization can cover a wide range, from system performance impairment to application conflicts and LAN/WAN issues. Fortunately, desktop virtualization has come a long way toward alleviating these kinds of problems. This article outlines some of the ways that Citrix XenDesktop can provide both users and administrators with needed flexibility. Strengthening data security, lowered implementation costs, comprehensive management, and increased user freedom are just some of the key benefits. For Citrix XenDesktop, delivering desktops as an on-demand service to any device dramatically simplifies the world of desktop computing for enterprises.