Virtualization and Consolidation vs. Application Performance and WAN Optimization

Virtualization and infrastructure consolidation can offer significant benefits for both IT and business operations. The cost savings and administrative efficiencies are the main reasons why organizations are looking to consolidate and move to a virtual infrastructure en masse. While clearly beneficial, organizations should always give careful consideration to the performance and availability requirements for their businesses, and look to a leading WAN optimization solution to address challenges in accessing centralized data and applications.

The combination of WAN optimization solutions along with virtualization offers the unique opportunity to strategically enable IT operations, and improve service delivery while saving costs at the same time. IT managers would be well served to consider both technologies as key components of the IT infrastructure going forward.

IDC forecasts that the number of servers used to run virtual machines will increase significantly from 2011 to 2015. In 2010, 1.7 million physical servers shipped to run virtual machines — 14.6 percent of the total shipments compared with 4.5 percent in 2005.

The past two decades have seen a migration to a decentralized computing model with companies globally distributing their operations. As a result, the amount of data and IT assets stored outside of corporate data centers has risen significantly, and IT managers are now increasingly looking to consolidate their IT infrastructure. Organizations have embraced the benefits of IT consolidation in an effort to reduce complexity, lower costs, improve resource utilization, and protect their data. In more recent years, the term virtualization has also become synonymous with IT consolidation

as an enabler of simplified IT administration and improved resource management.

While the centralization of IT resources and data clearly offers the above described benefits, there are two major caveats that organizations embracing this trend must consider. The first challenge revolves around application performance. The rise of the decentralized computing model was largely driven by the need to keep IT resources closer to the distributed user base to achieve the best possible performance.

Consolidating servers from remote sites reverses this distribution and, consequently, many applications suffer severe performance degradation after consolidation.

To remedy these performance problems, organizations often look to upgrade the bandwidth of wide area network (WAN) links in an effort to improve application response times. Instead, CIOs often discover that upgrading bandwidth to remote sites has little or no effect on application performance, because the performance problem lies instead with latency and application protocol inefficiencies across the WAN. In addition, the cost of bandwidth upgrades can often offset a significant portion of any cost savings achieved from IT consolidation.

The second consideration that organizations must weigh is the increased reliance on all of the centralized IT assets. Because these virtualized assets are more highly leveraged, meaning the infrastructure is serving more users per physical piece of hardware, the requirements for system and data availability go up dramatically. As a result, virtualized data centers must become more highly available to ensure timely access to the data that drives businesses today.

WAN optimization can help IT organizations address the challenges of application performance and information availability within these environments.

Consolidation Trends

With the increasing globalization of business, more than two-thirds of employees are working outside company headquarters -- in a branch office, at customer sites, on the road, or at home. As workforce demographics continue to change, data at remote offices continues to grow at a rapid rate, in many cases doubling annually.

In response to this data sprawl and distribution of IT resources, more and more organizations are pulling back servers and applications from remote branches to centrally house them in data centers. This has proven to be an effective way to manage and protect data while reducing costs and simplifying administration.

Why consolidate?

- Simplify IT management
- Reduced server and software costs
- Improve resource utilization
- Increase data security.
- Improve change management control

Consolidation Main Drivers

The reasons to consolidate IT infrastructure, which includes files, email, applications, databases and backup infrastructure, are wide-ranging. Some of the key drivers are mentioned below:

• Simplify IT management – As server sprawl increases, IT organizations are forced to spend more time on basic administrative tasks supporting, maintaining, and troubleshooting distributed resources. This inhibits IT's ability to work on more proactive, strategic projects to improve infrastructure and service levels, deploy new applications, and align more closely with the business. With fewer locations to support, and servers to backup and manage, consolidation leads to an increase in productivity for IT operations. It also allows for the best use of the available staff resources. High-cost manpower resources are often poorly utilized in IT environments because their skills are stretched over multiple technologies and locations.

• Cost Reduction – With consolidation, IT organizations can reduce the number of a company's physical servers and related infrastructure overhead, resulting in a dramatic reduction in physical infrastructure costs. The cost of purchasing hardware as well as software licensing for servers previously located in remote sites is eliminated. In addition, organizations realize other cost savings in terms of floor space, power consumption, cooling, and maintenance. Consequently, IT administrators become more productive in terms of the amount of resources they can effectively manage, and companies achieve additional cost savings by not having to staff remote offices for support.

• Data Protection and Security -- Consolidation addresses many of the issues surrounding data protection and archiving. Data consolidation eliminates the need for backup infrastructure in remote sites and minimizes the number of people who have physical access to IT assets. As a result, companies can reduce the risk of data breaches and exposure to enhance their overall security posture.

Consolidation and Server Virtualization

Along with the IT consolidation trend, server virtualization has risen to the forefront of initiatives because of the multiple benefits it offers to IT in the form of:

• Additional cost and power savings by eliminating server hardware
• Increased resource utilization
• Consistent test and production environments
• Hardware independence through the virtual abstraction layer
• Improved release times for new services
• Enhanced disaster recovery capability

Virtualization offers far-reaching opportunities for IT managers to fundamentally transform the operations in their datacenters. Traditionally, servers at data centers operate at 10 to 20 percent of CPU capacity and are dedicated for a specific workload to minimize incompatibilities and resource conflicts. Server virtualization technology allows a single physical server to be partitioned into several isolated virtual containers for running multiple applications at the same time. By leveraging many virtual servers, organizations can drive up server CPU resource utilization to eliminate idle capacity. This allows system administrators to consolidate greater workloads onto fewer servers, and provide substantial savings in space, power, and cooling. Apart from consolidating servers, virtualization also provides a solution to contain future server growth by deferring the need to purchase new physical servers.

Server virtualization is especially useful when deploying new IT services and applications. By creating a consistent replica of development and production environments, IT organizations can complete testing of applications faster and speed up the release times of new services. In fact, the deployment of new servers is also reduced dramatically by virtualizing the environment. This enables IT organizations to respond more rapidly to business demands for new applications and computing resources. In addition, the ability to snapshot servers, redeploy virtual machine images, along with hardware platform independence combines to deliver enhanced disaster recovery capabilities. In terms of DR, virtual machines can be recovered more rapidly than traditional physical server builds, further reducing downtime and associated costs to create a more resilient data infrastructure in the face of outages or failure events.

Since the 1990s, server virtualization and consolidation have evolved to a point where they have become almost synonymous with each other. Together, they simplify data centers while reducing costs and administrative overhead. However, these benefits come at a high price from a performance perspective, and as a result, companies who have embarked on a consolidation or virtualization project are looking to WAN optimization in increasing numbers to help eliminate

the performance penalties associated with distributed environments.

WAN Optimization Solution to Virtualization and Consolidation vs. Application Performance

For most organizations today, IT infrastructure consolidation presents a major opportunity to cut costs, but the degradation in application performance creates a significant trade-off that, in some cases, renders applications unusable over the WAN. In these scenarios, organizations must decide to either forego consolidation efforts or run the risk of crippling the end-user experience. In some cases, companies have embarked on a consolidation project only to have it come to a halt due to the adverse impact on business applications and end-users.

In today's world of multi-megabyte files, massive email attachments and the dominance of network and web-based applications, enterprises are more than ever faced with the problem of sharing applications and data across disparate locations. Site and server consolidations only work to compound this problem even further. The most common complaint network managers hear is that the network is "slow" or the application is "broken." The client-server applications that worked smoothly on the LAN break down over the WAN and perform poorly, or not at all, and tasks that were instantaneous on the LAN now might take several minutes.

WAN congestion is another potential problem. Since more data and applications are running across the network, WAN connections can frequently become saturated. This can have an adverse affect on application performance as well, and the problem is compounded even further with the move towards site and server consolidations. A common misconception is that bandwidth is the sole root cause of poor application performance on the WAN, but the main causes of poor application performance over the WAN can be grouped into three main categories: bandwidth congestion, transport layer chattiness and latency, and application protocol inefficiencies.

Most IT managers realize that networks are critical to business - and if the network is slow, so is business. No enterprise can afford application usability problems for any end user, whether at headquarters or a branch office. Thus, application performance optimization is an important, and often unaccounted for, component of consolidation. Business seeking to fully realize the benefits of consolidation must ensure real-time access to applications and data for their end-users. WAN optimization solutions help businesses, who have centralized their computing environment, address this problem by delivering LAN-like performance for applications over the WAN.

Information Availability in Virtualized Environments

With an increased reliance on information technology, the success of an organization is largely dependent on the availability of its IT infrastructure, data, and applications. Over the years, the cost of downtime has also grown steadily along with the value of information increasing the business impact of outages. With organizations looking to consolidate sites and servers, as well as virtualize the infrastructure, the net result has been a dramatic increase in the number of users leveraging consolidated IT resources.

In some cases, the number of users has increased from 200 on a single physical server to over 10,000 accessing multiple virtual servers running on one physical box. The impact and cost of downtime in this virtual server scenario has increased several-fold because of the sheer number of users affected by a failure event. In addition, site consolidations where companies have pulled servers back from remote offices or data centers limit the geographical diversity of IT operations and subject businesses to the risk of a site or regional outage. While server virtualization can help greatly reduce the amount time required to redeploy servers in the event of a failure, it does not necessarily protect against site failures or data loss or corruption.

Consequently, as more businesses adopt a consolidated infrastructure model, disaster recovery (DR) and business continuity are no longer optional, they are an essential requirement. Organizations, in response, are looking at a range of different approaches to remediate some of these risks. While tape backup still dominates as the most commonly used mechanism for data protection, IT shops are increasingly turning to technologies such as synchronous and asynchronous data replication and continuous data protection (CDP) to remote sites along with virtual tape library (VTL) for disk-to-disk backup operations.

This is where WAN optimization can again augment the availability and performance of consolidated and virtualized infrastructure.

It not only boosts application performance but also serves as the delivery foundation for DR. For instance, backup and recovery strategies require data to be replicated offsite, but if the WAN can't support the traffic, the backup or replication windows cannot be met. In addition, the resulting bandwidth congestion wreaks havoc with other application traffic causing subpar performance across a multitude of business operations. WAN optimization solutions can dramatically accelerate the speed at which data is backed up or replicated. Some organizations even see backup or replication windows reduce from over 24 hours down to two-tot hree.

Additionally, idle DR sites represent a significant cost for IT, with most managers acknowledging that nearly a third of the cost associated with DR goes directly to bandwidth. By reducing

bandwidth utilization, WAN optimization solutions can also help companies save on recurring DR-related expenses without expensive bandwidth outlays. Furthermore, companies often provision smaller links into DR sites or secondary data centers, so when they need to failover due to a DR event, they often experience degraded performance that may make applications unusable. This has the same net effect of a complete outage despite the fact that the applications and data have been recovered at the remote DR site. With WAN optimization, organizations can access data and applications in a remote DR site as if they were local, once again ensuring timely access to information during a failure when the organization needs it the most.

Infrastructure Flexibility -- WAN optimization, Virtualization and Disaster Recovery

The combination of WAN optimization and virtualization together provide a unique architecture that is hardware platform independent and unconstrained by geographical limitations. This gives the IT organization infrastructure flexibility to deploy new servers and migrate them across data centers.

Forward-looking enterprises are embracing this capability to strategically leverage initiatives around dynamic capacity expansion and DR planning.

As discussed previously, the migration to virtualized environments has increased DR and availability requirements for organizations. The value of WAN optimization and server virtualization together becomes evident in these situations.

Organizations gain the capability to replicate their entire virtualized server infrastructure to a DR site in minutes. This provides IT with hardware independence at the DR site and no performance hit on access.

The subsequent benefits are the capability to perform rolling upgrades or maintenance across hardware to minimize downtime for the organization during scheduled outages rather than focusing exclusively on DR events. For example, a company could migrate servers over to a data center in another city in minutes with WAN optimization while performing maintenance in the primary data center and then migrate back upon completion during a scheduled maintenance window. The end-users would likely not notice any performance hit due to the WAN optimization acceleration and uptime would be maximized for business processing. In addition, IT could perform the maintenance at the primary data center during normal working hours saving additional costs and giving an added convenience factor for technical staff.