

VENDOR PROFILE

Xsigo Enables Virtual Machine Mobility with I/O Virtualization

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IDC OPINION

Current server I/O architecture is extremely inflexible because device addresses are typically associated with the physical device. This significantly drives up cost and complexity in the datacenter, especially as the number of servers in the datacenter grows and as each device requires a host of LAN and SAN connections that are tied to a specific machine. Furthermore, the advent of server virtualization actually adds to the I/O issues. To compensate for the increased flexibility that comes with server virtualization, users find they have to build flat networks in which the hosts can attach to a variety of SAN or LAN resources. This means that, in the absence of I/O virtualization, to get the maximum flexibility out of server virtualization investments, companies are taking on additional security risks. To address these needs, IDC believes I/O virtualization is emerging as the natural extension of server virtualization and a necessary component for an enterprise looking to achieve the full benefits of a flexible yet secure virtualized computing environment. With the launch of the I/O Director, Xsigo joins a number of other start-ups and established vendors with products addressing I/O virtualization. IDC sees this as a validation of the I/O virtualization market and believes it is a healthy development for both Xsigo and customers working toward a vision of a virtualized datacenter. IDC believes there are a number of compelling benefits to implementing I/O virtualization, including:

- Capital cost reduction associated with reduced NIC, HBA, and cabling in the datacenter
- Improved agility by pairing server and I/O virtualization to enable the automation of application migration across the server, storage, and network pools
- More secure server virtualization by allowing organizations to keep the best practices of network isolation while still benefiting from flexibility associated with server virtualization

IN THIS VENDOR PROFILE

This IDC Vendor Profile examines Xsigo and the launch of its new Xsigo VP780 I/O Director, a network appliance that replaces NIC and HBA cards tied to individual servers with a virtualized I/O fabric. It discusses the benefits of I/O virtualization, especially in terms of implementing a virtualized server environment; describes some of the advantages of the Xsigo approach to I/O virtualization; and provides insights from a financial services firm — currently evaluating Xsigo — that IDC interviewed for this Vendor Profile.

SITUATION OVERVIEW

Growth of Datacenter Server Virtualization

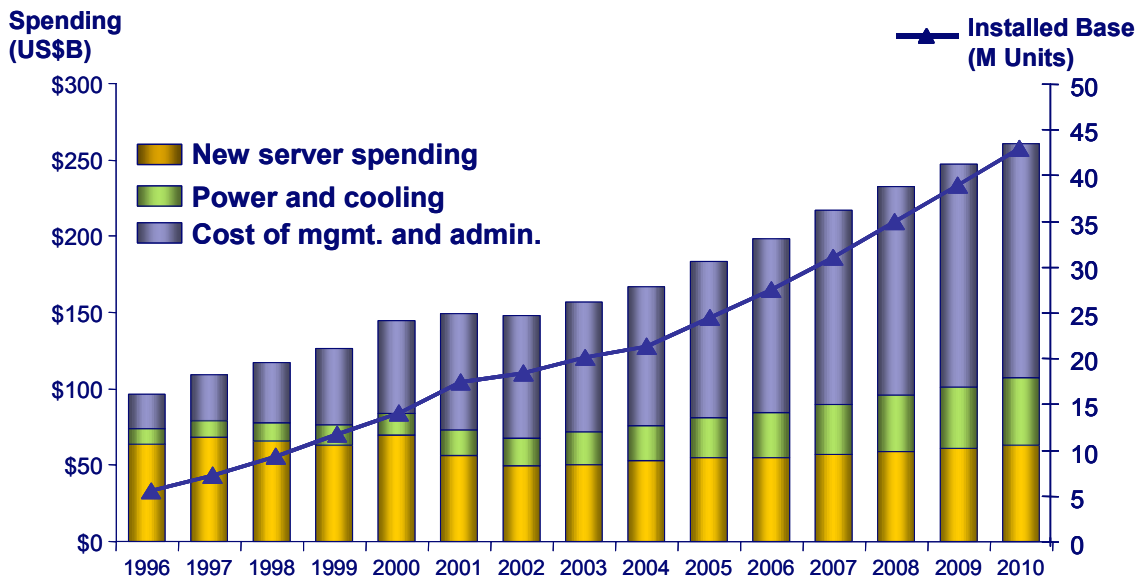
In recent years, there has been an explosion of servers in the datacenter, driven by a number of factors including a proliferation of enterprise applications and a shift in the server mix from mainframes to lower-cost, x86-based servers. It is not uncommon for datacenters to support many thousands of servers, taxing the ability of facilities to house, power, and cool them, and of administrative staffs to manage and maintain them. IDC estimates that for every dollar spent on new server acquisitions in 2006, nearly eight dollars was spent on management and maintenance of the installed base of servers (see Figure 1), and IDC expects that ratio to continue to grow unless the industry intercedes with new technology that significantly enables automation across the server, storage, and network environments.

Ironically, most of these servers are underutilized. With each server supporting a single application on a typical deployment, IDC estimates that overall, only about 10% of the total computing resources within an average datacenter are actually utilized. To address this challenge, enterprises are consolidating servers in their datacenter by implementing server virtualization. IDC also estimates that most enterprises that implement server virtualization house 8–12 virtual machines (VMs) on each physical server and as a result are able to improve server utilization rates to 40–60%.

In recent years, server virtualization has seen significant uptake as a tool to enable consolidation and to increase utilization, effectively enabling customers to lower the number of devices in the environment they have to manage. The increased use of virtualization software has helped a growing base of customers reduce capital costs associated with buying new server hardware, helped organizations "go green" by lowering power and cooling budgets for their datacenters and, more recently, shown significant benefits in lowering operation costs of managing devices by increasing the server to administrator ratios. As such, server virtualization is fast becoming a key technology for leading-edge datacenters. As a financial services company interviewed for this profile and currently evaluating Xsigo technology stated, "The only way to succeed in our business environment is to outvirtualize the competition."

FIGURE 1

Worldwide Server Market Spending and Installed Base, 1996–2010



Source: IDC, 2007

Traditional I/O Limits Server Virtualization

Today's I/O infrastructure was not designed for virtualized servers. Specifically, it is not optimized to run multiple applications on a single server, nor, more importantly, was it designed to allow applications to migrate from server to server. By mapping network addresses to physical servers, today's I/O technology increases the management burden and weakens the network security associated with running a virtualized server environment.

Server Management Burden Increases Cost, Reduces Agility

One of the key benefits of server virtualization is the ability to quickly and easily move VMs from one physical server to another. This allows datacenters to optimize their application workloads against available server resources. Unfortunately, while server virtualization software enables seamless and automated migrations at the server level, the necessary changes to the I/O involve a manual, time-consuming process.

With traditional approaches to I/O, each server's network address is associated with its physical NIC or HBA cards. By extension, VMs also assume the identity of the cards associated with their server. As a result, to move VMs from one physical server to another requires the remapping of their identities (i.e., their MAC addresses and WWNs), which is a cumbersome process typically requiring the coordination of server, storage, and network administrators. When applied to a datacenter running thousands of VMs, this can result in significant management costs and can greatly reduce the IT organization's ability to quickly respond to changing business requirements.

Security Challenges with Server Virtualization

Security limitations are another critical issue associated with server virtualization. A common approach to implementing network security is to control access at the I/O card level, using the unique identifiers of I/O cards to regulate users' or applications' permitted connectivity to specific resources.

Unfortunately, this model breaks down with the introduction of server virtualization. If the network is set up to allow VMs to move from physical server to physical server, the configuration must be opened up to grant each application access across multiple servers. The result is a "big flat network" in which all servers are granted access to all resources, a model that goes against the core tenets of layered network security.

Company Overview

Xsigo Systems was founded in August 2004 with the goal of becoming the technology leader in datacenter I/O virtualization. Headquartered in Sunnyvale, California, Xsigo has over 100 employees and is backed by leading investment firms: Kleiner Perkins, Khosla Ventures, Greylock Partners, and Juniper Networks.

A number of technology visionaries serve on Xsigo's board, including Ray Lane, former president of Oracle; Mark Leslie, cofounder of Veritas; Vinod Khosla, cofounder of Sun Microsystems; and Ashok Krishnamurthi, founding team member at Juniper.

Xsigo aims to reduce I/O bottlenecks and improve IT efficiencies by bringing I/O virtualization to the datacenter. Its flagship product, the Xsigo VP 780 I/O Director, was introduced in September 2007 and employs an open standards-based approach to consolidating server connectivity.

Company Strategy

Xsigo VP780 I/O Director

The VP780 I/O Director is a 4U rackmounted appliance. It replaces the Ethernet and Fibre Channel connections within a server pool with an InfiniBand-based high-speed connectivity fabric. The I/O Director comes with 24 ports that each support a 10Gbps InfiniBand server connection, along with 15 hot-swappable modules that connect to the SAN and LAN via 1Gb Ethernet, 10Gb Ethernet, and 4Gb Fibre Channel links. Hundreds of additional servers can be supported by integrating the Xsigo IS24 Expansion Switch.

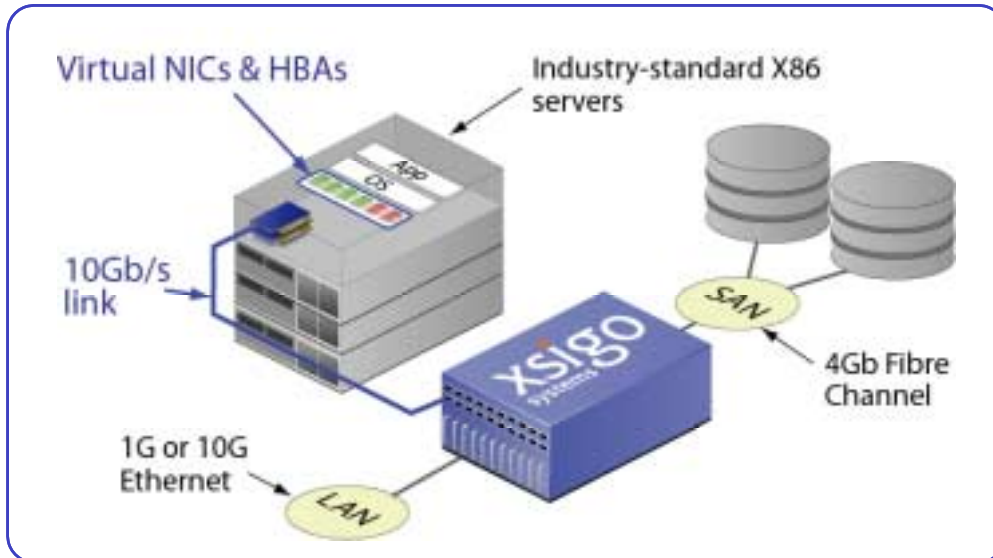
The I/O Director consolidates I/O, reducing the need for cards and cables. With traditional I/O, a typical server could be deployed with 2 HBAs and 4 NICs, requiring 2 Fibre cables and 4 Ethernet cables per server, plus FC switch ports. With the Xsigo I/O Director, these network cards are replaced by 2 InfiniBand HCA ports per server (for redundancy) plus 2 HCA cables, which can greatly reduce the capital cost outlay, not to mention the complexity associated with the network (see Figure 2).

With the Xsigo I/O Director, the InfiniBand connection carries the traffic of both the Fibre Channel and Ethernet ports. These virtual NICs and virtual HBAs present themselves to applications and operating systems as physical NICs and HBAs and

can be moved among servers without changing their MAC addresses or WWNs so changes remain transparent to the network and to storage. Furthermore, because the I/O Director enables quality-of-service control on a per-virtual-resource basis, bandwidth can be guaranteed to specific applications or virtual machines.

FIGURE 2

Xsigo Architecture



Xsigo consolidates connectivity to storage and networks.

Source: IDC, 2007

Benefits of the I/O Director

Companies can realize a variety of benefits by virtualizing I/O using the VP 780 I/O Director:

- ☒ **Reduce capital expenses.** By significantly reducing the amount of network cards and cables required in a datacenter environment, the Xsigo I/O Director can reduce the required capital expenses accordingly. This benefit can be particularly compelling for companies building new datacenters or doing complete infrastructure refreshes. As the financial services institution interviewed for this vendor profile put it, "It's insane how much it costs to wire your servers with copper and glass. A virtualized I/O solution can reduce these costs significantly."

- ☒ **Reduce operating expenses.** Virtualizing the I/O infrastructure with the I/O Director can drive a number of operational benefits as well. Without I/O virtualization, moving or reconfiguring servers can be a cumbersome and time-consuming task, involving recabling and remapping network addresses, and can take up many hours of server, network, and storage administrators' time. In contrast, the time and personnel expense required to perform these tasks in an infrastructure virtualized with the I/O Director can be cut significantly.

- ☒ **Increase IT agility.** The agility to respond and adapt to a rapidly changing business climate is one of the watchwords of today's datacenter. Unfortunately, traditional approaches to I/O can slow the redeployment of virtual machines onto new physical machines, as they often require the coordination of security, LAN, server, backup, and SAN administrators. With the I/O Director, a single server administrator can perform all network changes instantaneously, in the fabric, with the aid of a Web-based management console. In the words of the financial services firm interviewed for this profile "With the I/O Director, you just have to interrogate the fabric, not the humans."

- ☒ **Improve network security.** The I/O Director can also alleviate the security issues associated with server virtualization. Each VM is given its own unique identity (i.e., MAC address or WWN) that follows it from physical server to physical server, letting datacenters once again implement the best practices security procedures they do with individual servers and restricting access as necessary all the way to the level of the individual application. Datacenters are no longer forced to implement big flat networks. Companies can get the network isolation they want, while server virtualization provides the flexibility they need. Additionally, the association of VMs with a unique network identity enables the customer to apply security at the application — a place where the organization maintains much more user context.

For the reasons described above, the benefits of the I/O Director are most apparent in a virtualized server environment. As the financial services firm interviewed for this profile put it, "Scaling up of a virtualized server environment is hindered by the cabling and network cards. Virtualized I/O gives me a network connectivity fabric that allows me to easily and cost effectively scale up my virtual servers."

FUTURE OUTLOOK

IDC believes that I/O virtualization will continue to emerge as a critical component to a fully virtualized datacenter. As datacenters continue to appreciate the benefits of server virtualization, and as server virtualization technology continues to make inroads into the enterprise datacenter, IT administrators will need to identify tools and technologies that will enable them to overcome associated network administration bottlenecks and security challenges. IDC believes that because I/O virtualization addresses these challenges — simplifying the network management associated with server virtualization and alleviating network security issues — I/O virtualization will see strong growth in the market, particularly as an adjunct to the server virtualization market.

ESSENTIAL GUIDANCE

Advice for Xsigo

As a player in the new field of I/O virtualization, Xsigo has a number of opportunities and challenges. Perhaps Xsigo's greatest opportunity is to clearly position its products as enablers of server virtualization. Challenges include demonstrating that the technology can scale to the datacenter level (i.e., tens of thousands of servers) and dealing with a culture shift in the datacenter.

Ride the Wave of Server Virtualization

As server virtualization moves out of the leading edge and into the mainstream, users will begin running into I/O challenges. Xsigo should position itself as a critical enabler of I/O for virtual server environments in an attempt to ride the wave of the server virtualization market. It should also look to partner with leading virtualization vendors such as VMware, Microsoft, and XenSource as a complementary technology enabler to tap into these companies' existing sales channels and customer-installed bases.

Demonstrate Scalability

The financial services company interviewed for this profile stated that Xsigo technology has worked well in its trials, commenting "We've poked and prodded it, even pulled out cables and done all sorts of nasty things to it, and it hasn't seemed to lose a step."

But as a new technology, Xsigo has yet to be proven out in any large-scale production deployments consisting of thousands of servers. Xsigo will need to work hard to demonstrate the underlying scalability of its architecture and secure a lighthouse customer willing to implement and provide public testimony of a large-scale deployment before most enterprises will be willing to commit to the technology in a big way.

Culture Shift in Datacenter

Another challenge for Xsigo is that its products break a basic cultural paradigm in the datacenter. Today, network, server, and storage administrators control their own spheres of influence; however, with the I/O Director, server administrators will be able to perform the vast majority of functions previously privy only to network administrators. It is yet to be seen how IT organizations will react to this shift and whether network administrators will play along or will throw up roadblocks to the adoption of the technology. It will be important for Xsigo and others in the I/O virtualization market to help negotiate any cultural resistance with how the product allows LAN and SAN and server administrators do their jobs. To overlook this in any go-to-market strategy will likely result in long sales cycles and weak overall adoption.

Overall, IDC believes that I/O virtualization is an exciting area that will play a major role in the virtualization of the datacenter. IDC believes that Xsigo is well positioned with solid technology in this area and is entering the market at just the right time to ride the next wave of virtualization adoption that IDC expects to see in the years to come.

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- ☒ *Virtualization Rights Only for the Best of Customers* (IDC #lcUS20631507, April 2007)
- ☒ *SAVVIS Leverages Virtualization to Reshape Managed Services* (IDC #206270, April 2007)
- ☒ *Nationwide: Leveraging Policy-Based Automation in a Virtual Environment* (IDC #204953, January 2007)
- ☒ *Worldwide Windows Server Operating Environments 2006–2010 Forecast: Winds of Change from Virtualization, 64-Bit, and Longhorn Are Coming Your Way* (IDC #204779, December 2006)
- ☒ *The Impact of Virtualization Software on Operating Environments* (IDC #203989, October 2006)
- ☒ *Virtualization: 10 Questions with QUALCOMM* (IDC #203501, October 2006)
- ☒ *Worldwide Virtual Machine Software 2005 Vendor Shares* (IDC #203207, September 2006)
- ☒ *Worldwide Virtual Machine Software 2006–2010 Forecast* (IDC #203213, September 2006)
- ☒ *VMware: Virtualization 3.0* (IDC #202061, June 2006)
- ☒ *Virtualization and Change and Configuration Management Software* (IDC #202128, June 2006)
- ☒ *Microsoft Acquires Softricity for Application Virtualization and Management* (IDC #201844, May 2006)
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- ☒ *Worldwide Virtual Environment Software 2002–2004 Competitive Market Final View* (IDC #34419, November 2005)

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