WHITE PAPER

The Best Virtualization Strategy for Lowering Your IT Costs

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Introduction

Managing an IT staff, budget and infrastructure is never an easy task, even in the best of times. A down economy makes the job that much harder, as IT managers face even greater pressure to cut costs, while maintaining the acceptable IT service level that the organization needs to function.

Fortunately, this challenge also presents an opportunity for IT managers to reshape their infrastructure in such a way as to deliver greater efficiencies, streamline operations, and improve performance and reliability. These changes also contribute to "greener computing" by introducing energy-efficient devices and methods. The benefits of these changes to IT will carry over when the upturn in the economy occurs, allowing IT to contribute to the bottom line.

This paper discusses cost-cutting strategies for IT organizations, involving some of the key virtualization solutions available on the market – Desktop Virtualization (through VDI), Presentation Virtualization (also known as Server Based Computing – SBC) and Blade PCs. A summary TCO comparison discussion to help the IT manager navigate through these key virtualization solutions available on the market is included.

IT Cost Components

In devising a cost-cutting IT strategy, one needs to examine the components comprising the bulk of IT costs, which according to Gartner[1],are as follows:

Hardware: Typically 20% of direct total cost of ownership (TCO) includes investment in PCs, servers, printers, networking equipment, maintenance fees, and other miscellaneous items.

Software: Approximately 51% of total direct TCO includes operating system software for end-user devices and servers, in addition to application software, database software, and IT software, etc., including maintenance.

Operations: Approximately 20% of total direct TCO. This includes end-user support, network management, application management, software deployments, hardware maintenance, systems research and planning, user administration (adds and changes) and more.

Administration: Typically 9% of total direct TCO. This component refers to end-user and IT staff training, budget and asset management, purchasing and procurement management, etc.

Indirect Costs: "End-user costs" is an indirect, yet significant cost component. End-user costs include downtime due to system problems, self-training and self-support, formal training and file and data management.

Another important indirect cost is energy consumption. A typical PC consumes anywhere from 65-250 watts of electricity, depending on device configuration and operating profile (intense vs. occasional use). During volatile changes in the price of energy, these costs can significantly impact one's bottom line.

[1] Gartner SBC TCO Report, 2008 (Except for energy figures)

Cutting IT Costs through Windows Terminal Server and Desktop Virtualization

One of the best ways to cut IT costs while also improving security, reliability, productivity and efficiency is by hosting desktops or applications on servers located in the data center, and implementing centralized computing technologies such as Windows Terminal Server (Server-Based Computing – SBC), Desktop Virtualization (VDI) and Blade PCs. These virtualization technologies take full advantage of the computing power and capacity available on today's powerful servers to offer a number of significant benefits over the traditional desktop PC model, including easier management, stronger security, regulatory compliance, lower TCO (in hardware, energy and administration costs), improved disaster recovery and green computing.

Centralized computing via virtualization technologies provides the following cost savings in addition to increasing management efficiencies:

Lowering the cost of IT operations and desktop management

The ways in which hosting applications (or desktops) on central servers increases IT efficiencies and lowers desktop management are twofold:

Facilitates faster and easier software deployments, removing the requirement for IT staff to go from PC to PC to install or update applications. It's also easy to add new users; with a few clicks the system administrator can assign users standard configurations based on department, function or other parameters. Moreover, users can be up and running quickly via a link to their target applications or desktops, provided the system administrator.

Reduces end-user support costs, as the applications or desktops are hosted in the data center, within easy access of the IT staff. This means fewer visits to end-user PCs for troubleshooting.

How can these savings impact the bottom line? Let's say that three times a year, an organization needs to install or update software on 500 end-user devices. Without a centralized computing system in place, it would take a system administrator about one hour per PC to install or update the software. Now multiply that by 500 users and the end result is 500 man-hours per deployment - or 1500 man-hours per year!

Even when software installations and updates are performed using remote tools, there is still an overhead of preparing these tools, and the necessity to help users with the process.

With a centralized computing model, however, these applications could be installed or updated and deployed to all users in a couple of hours. That's a savings of almost 1500 man-hours. At the average IT staff cost of $50 per hour, that's almost $75,000 a year—an amount that could be effectively utilized elsewhere in the organization – especially meaningful in today's economic climate.

In the case of remote offices, the cost savings are even higher; centralized computing eliminates the need for IT staff to be at the end-user workstation, which saves on travel time and costs.

- **Lowering hardware costs** – Since applications and desktops are installed and processed centrally, the user PCs can be less powerful, less expensive devices – even repurposed PCs. The savings are twofold as PCs will need to be replaced only every five-six years, instead of every two-three years[2].

In addition, PCs can be replaced by less expensive, energy-efficient thin clients, resulting in hardware cost and energy savings (more on that below). Since the average thin client costs around $350, that's a savings of $900 or more per device compared with a business PC.

- **Lower energy costs** –A typical PC, depending on configuration, uses between 65-250 watts of energy, while thin clients consume around 40 watts of energy (including the server).[3] With the average US cost of electricity at around 10¢ per kilowatt hour, an organization with 500 devices can save over $6,000 annually by using thin clients instead of PCs. Moreover, deploying thin clients also reduces energy consumption by lowering cooling requirements, as they generate less heat.

- **Improving user productivity** – Besides raising IT staff efficiencies, virtualization technologies can improve overall employee productivity through improved reliability, more up-time and faster support.

What are my Virtualization Options?

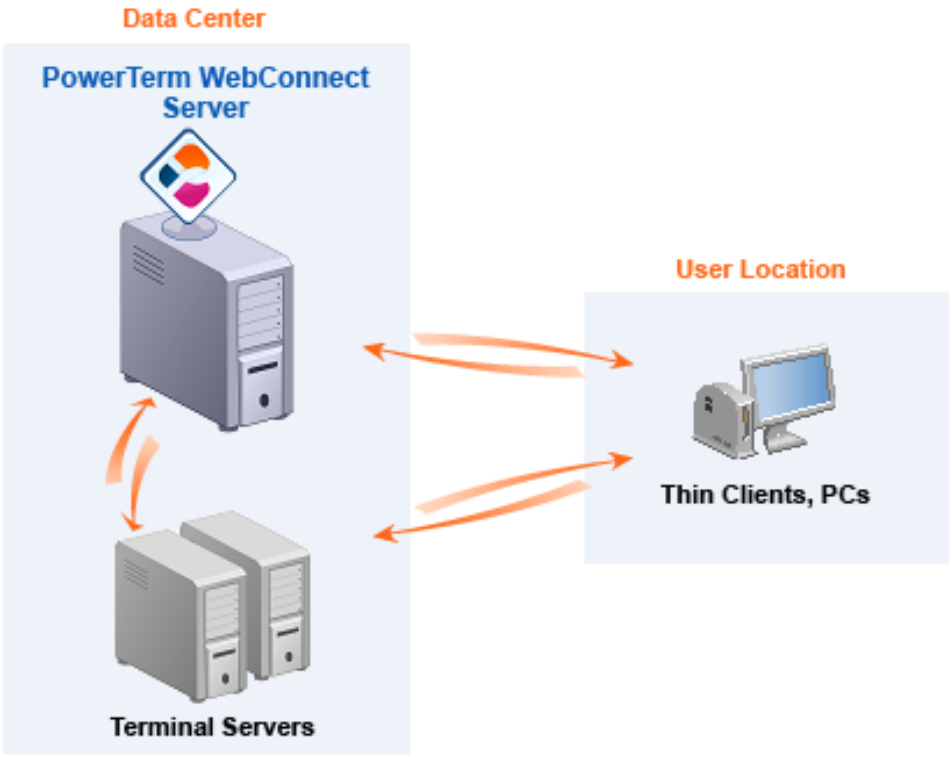
Virtualization of the end-user computing environment can be achieved using a variety of technologies and platforms. While it's necessary to identify the unique needs of users (ranging from task-based users to general purpose users to power users), one should also assess IT's requirements before evaluating the available options and choosing the best solution fit for the organization. Let's take a look at some of the most effective virtualization solutions on the market:

[2] With PC costs at around $1200 per device[2], an organization with 500 PCs can save around $600,000 over a five year period, due to requiring only one replacement cycle instead of two.
[3] http://www.bosanova.net/energy-savings-calculator.htm

Windows Terminal Server (SBC)

Server Based Computing (SBC) enables an application to be run in one location, and controlled in another. Screen images are delivered (presented) to the users, and the users' client machines, in turn, send keystrokes and mouse movements back to the server.

The technology behind SBC is Microsoft Windows Server Terminal Services, which is often enhanced with third party products such as Ericom Software's PowerTerm WebConnect. SBC is most suited to task based users – those that access a small number of standard applications, such as Microsoft Outlook, ERP, CRM, etc.



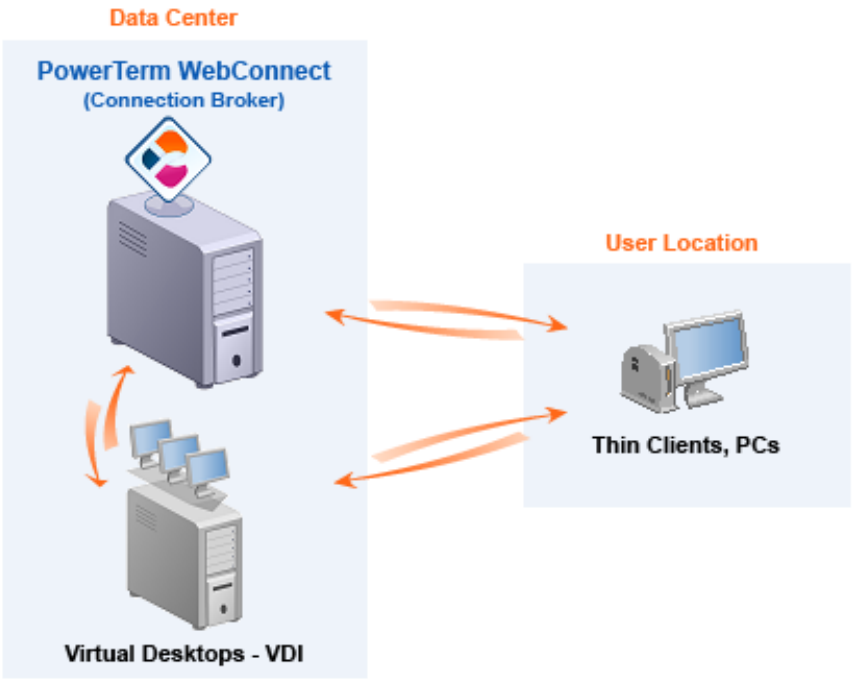
Windows Terminal Server Diagram

Desktop Virtualization (VDI)

Desktop virtualization (VDI) involves hosting full desktops inside virtual machines, on servers at a data center. Users then access these desktops from a local computer or a thin client.

With desktop virtualization, a software layer called a hypervisor is added to the central server(s). The hypervisor allocates the server's hardware resources dynamically and transparently so that multiple desktops can run simultaneously on the same physical device. There are over a dozen hypervisor solutions available in the market, from companies such as VMware, Microsoft, Sun, Citrix, Virtual Iron, Oracle, Red Hat, Novell and others.

This solution is considered best-suited to general purpose users such as executives.



VDI Diagram

Blade PCs and Remote Workstations

Blade PCs are PCs that are entirely contained in a thin, modular card (blade), housed in a centralized, secure chassis ("rack") in the data center. A standard network cable/connection connects the card to the user's display, keyboard and mouse via standard network connections. This solution is ideal for power users of graphics intensive applications, such as stock traders, graphics artists and CAD/CAM users, who need the full power of a dedicated machine all to themselves.

How Do These Virtualization Technologies Compare?

Desktop Virtualization vs. Windows Terminal Server

The primary difference between desktop virtualization and SBC relates to *how* user sessions are managed on the server.

With SBC, multiple users connecting to the same physical Terminal Server access multiple sessions running within the same operating system (OS). In contrast, desktop virtualization enables each user to access a distinct OS instance having a single session running inside a unique virtual machine. Multiple virtual machines run on top of the same Virtualization Layer, such as VMware ESX Server.

Desktop virtualization provides several advantages over SBC:

- Each user can have a totally **personalized and customizable desktop**, with a unique set of installed applications and configurations. On the other hand, with SBC, personalized configurations are limited.
- Desktop virtualization **sessions are much more isolated** than SBC sessions, catering to users of applications that cannot run on a Terminal Server.
- Virtualized desktops utilize desktop operating systems such as Windows Vista or Windows XP, whereas presentation virtualization (classical SBC) solutions utilize server operating systems, such as Windows Server 2008 and Windows Server 2003. **Desktop operating systems present a friendlier more familiar user interface**, and have better compatibility with client applications.
- It is possible to **mix several operating system types or versions within a single desktop virtualization environment.** For example some desktops can be Windows Vista while others can be Windows XP or even Linux.

On the other hand, SBC has several advantages over desktop virtualization:

- With SBC, **all the applications are installed on a single operating system, and are centrally managed.** With desktop virtualization however, the administrator has to manage numerous virtual desktops, each of which has its own operating system and suite of applications installed on it.
- Windows Terminal Server is **typically 5 times more scalable then virtual desktops on the same hardware.** This is because all sessions run in the same operating system instance which allows for more efficient sharing of resources such as memory and CPU. In contrast, each virtual desktop user runs a separate, complete instance of the operating system, resulting in a significant amount of overhead.
- SBC is generally **less expensive than desktop virtualization** – presentation virtualization costs about $200-$250 per user for server software and hardware while desktop virtualization costs about $600-$700 per user. The difference in cost is based primarily on two factors: (1). Desktop virtualization requires more servers, and (2). Each virtual desktop requires a full operating system, at full operating system license costs. Desktop virtualization also requires more storage, leading to increased storage costs.

Blade PCs vs. Desktop Virtualization and SBC

The **robust performance and stability** of Blade PCs offers clear advantages over both desktop virtualization and presentation virtualization. **Each Blade PC has its own CPU,** whereas in desktop and presentation virtualization environments, users share CPU power. Also, graphics, media and other large files run fastest in this environment which offers the closest performance experience to that of a local PC.

The downside of the Blade PC solution is primarily its cost - $1300-$3500 per user, including management software[4] as well as space and energy requirements.

The following table ranks the various virtualization options for different parameters. (SBC = Server Based Computing, VDI = Desktop Virtualization)

	Solution Cost	Data Center Space (Density)	Energy Usage	Manageability	Performance
Highest to Lowest	Blade PCs	Blade PCs	Blade PCs	SBC	Blade PCs
	VDI	VDI	VDI	Blade PCs	SBC, VDI
	SBC	SBC	SBC	VDI	

- **Solution Cost (hardware and software) –** Blade PCs requires a large investment in hardware, and thus by far is the more expensive solution. Desktop virtualization is the next most expensive, requiring more servers and a greater investment in OS software than SBC.
- **Data Center Space –** The amount of space required to house these solutions in the data center increases costs. Allocating a dedicated Blade PC for each user requires the most space, followed by desktop virtualization **and then SBC (requiring fewer servers than desktop virtualization).**
- **Energy Usage –** The hardware-intensive nature of Blade PCs leads to higher energy consumption costs than desktop virtualization. The larger number of servers required for desktop virtualization amounts to higher energy costs than those incurred under SBC.
- **Manageability –** This refers to the effort required to manage the end user computing environment under the three solutions. SBC concentrates the applications on one OS on the central servers. Under both Blade PCs and desktop virtualization, the administrator must manage multiple installations of operating systems and applications on the individual Blade PCs and virtual desktops.
- **Performance –** Blade PCs will provide the fastest system response and performance, in reference to the speed of system response when running or accessing large files, e.g., heavy graphics or multimedia.

So, How Do I Choose the Best Path?

Each of the virtualization technologies discussed enables organizations to reduce TCO. However, we have seen that the technologies have different associated costs, and different benefits and highlights. SBC costs the least in terms of implementation and management. Likewise, Blade PCs and VDI technologies offer performance/TCO benefits for select groups of users / specific IT infrastructures. Yet, if a business implemented either as its sole enterprise-wide access solution, neither would be able to meet most organizations' access needs nor budget.

[4] Risk Waters Group - http://www.clearcube.com/view/articles/FTIGuide_ClearCube.pdf

The fact is, most organizations will require, and be best served by, a mix of technologies. The logical path is choosing a solution that gives each user type what they need in an economically optimized manner, with one management environment.

Ericom's hybrid approach combines the different virtualization technologies while addressing the needs of different user groups. The principal behind this approach is to address the requirements of the various types of users while minimizing costs as much as possible by only paying for what you need.

A typical organization consists of three types of users:

- **Task-based users** comprise 70%-80% of the organization's users and are ideal candidates for WTS Server-based Computing (SBC). They require access to one or two specific applications, and do not need a customized environment.
- **Knowledge or general-purpose users** require access to a wider range of applications and have greater needs for individual configuration capabilities. They typically represent 20%-30% of users, and are not able to use SBC. A more appropriate solution for them is virtual desktops (VDI).
- **Power users** require dedicated hardware resources to access performance-intensive applications, such as CAD/CAM or powerful trading software. This group, which might represent 5% to 10% of an organization's users, cannot use SBC or desktop virtualization. Due to the graphics-intensive nature of their tasks, they require the performance of Blade PCs.

Taking a stock brokerage company as an example, the traders would use the high performance, high cost Blade PC solution to access their powerful trading software, upper management and account executives would access virtual desktops customized for their unique individual requirements, while administrative staff would connect to applications such as Microsoft Office running on Windows Terminal Servers.

The hybrid approach makes virtualization more affordable for the organization, by using the lower cost virtualization option (Windows Terminal Server instead of desktop virtualization, or desktop virtualization instead of Blade PCs) wherever possible. This approach provides users with the functionality they require, while at the same time allowing organizations to benefit from applying virtualization to the broadest range and number of users possible across the entire organization instead of to isolated departments and specific groups of users.

TCO Comparison of Virtualization Technologies and the Traditional Desktop Model

The following table shows a comparison between an end-user computing environment comprised of Traditional Desktops only, and end-user computing environments using other architectures –, Windows Terminal Server (SBC) only, VDI only, Blade PC only and a solution comprised of Ericom's Hybrid Solution and a hybrid combination of the above.

The results highlight the significant savings that can be achieved through virtualization. The scenario, which involves 500 end-user devices (PCs for the Traditional model, thin clients for the others) is for illustrative purposes only, and is not comprehensive. The analysis does not take into account the impact on data center space and data center energy costs due to the increased amount of servers required for virtualization. It also does not include increased storage solution costs associated with VDI.

Annual TCO per User – Comparison with Traditional Desktops

	Traditional Desktops[5]	Windows Terminal Server (SBC) Only[6]	Virtual Desktops (VDI) Only[7]	Blade PCs Only[8]	Combination of Virtualization Options Managed by Ericom's Hybrid Solution
Desktop Capital Expenditures (PCs for traditional desktop scenario, thin clients for other options)	$490	$70	$70	$70	$70
Desktop Operating Expenses (Includes management and overhead costs)	$534	$202	$259	$320	$225
Desktop Energy Costs (Power & cooling)	$94	$69	$69	$69	$69
Environment Investment (Servers & software)	$0	$125	$263	$471	$187
Total Annual TCO Per User	$1,118	$466	$661	$930	$551
Total Annual TCO Savings vs. **Traditional Desktops (500 users)**		**$326,000**	**$228,500**	**$94,000**	**$283,500**

It might appear as if implementing Windows Terminal Services (SBC) alone would provide the lowest TCO. However it is critical to note that this is true only in theory as this solution is impractical – it would leave many users under the traditional desktop model as quite a few applications are incompatible with the Windows Terminal Services environment. In addition, this does not provide the session/desktop isolation required by some users - together raising the overall cost to the organization.

On the other hand, Ericom's hybrid approach enables 100% virtualization for the organization, with each user getting the most cost effective technology for their

[5] VMware Calculator
[6] Gartner, Citrix
[7] VMware Calculator
[8] IDC

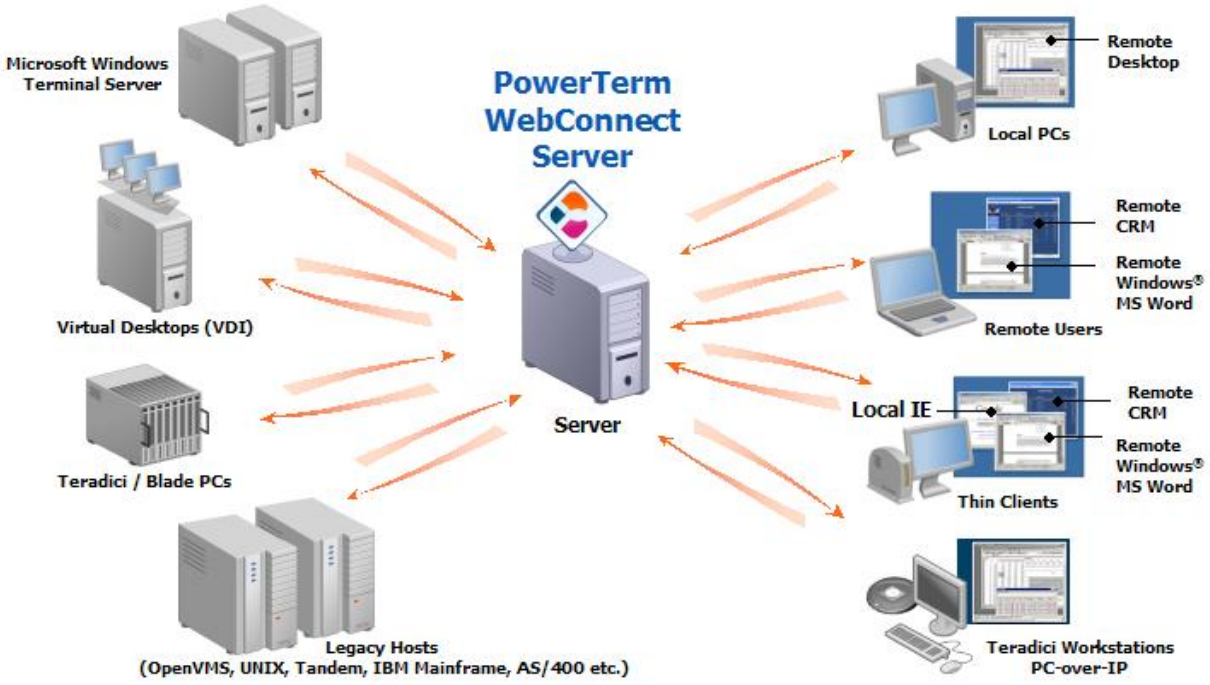
requirements. Thus making the hybrid approach the only comprehensive and the most TCO-effective solution available. In the example above of 500 users, this amounts to annual savings of $283,500!

Implementing Ericom's Hybrid Approach

How is this hybrid approach implemented? Isn't it difficult to manage three different technologies?

Enhancing Virtualization

While the various virtualization options offer significant benefits to the organization, end-users and IT staff alike, the challenge is in tying them all together. Ericom's answer is a multi-platform access and management solution that enhances the overall functionality of each of these options. Ericom's PowerTerm WebConnect uses **ONE management environment** to provide secure anytime, anywhere access to desktops and applications hosted on over a dozen leading virtualization platforms, including VMware, Microsoft, Virtual Iron and Xen-based platforms, as well as Windows Terminal Servers and Blade PCs.



Ericom's Hybrid Approach – The best of all worlds in one solution

PowerTerm WebConnect enhances the benefits provided by these platforms with the following capabilities:

Efficiently manages large groups of servers, desktops and users with a single, centralized administration and control console.

Enhances server performance and scalability through centrally managing and load-balancing VM pools, Terminal Servers and Blade PCs.

Facilitates regulatory compliance with customizable logging and auditing capabilities which enable monitoring and auditing users' access to applications, services and documents.

Improves user experience through improved performance as well as with the ability to customize the desktop environment in accordance with user requirements.

Provides remote support to users in branch offices or other locations with tools that allow IT staff to take over user sessions and desktops, reducing the need to travel and speeding support response time.

Most importantly, PowerTerm WebConnect provides these enhancements **with one product, one license**. This makes managing these varied platforms much simpler and cost effective than having to manage them with multiple solutions from multiple vendors.

Summary

Managing an IT organization and budget in difficult economic times can be very challenging. IT management must balance the need for cost cutting with the need to deliver the computing resources the parent organization requires to function.

Ericom's hybrid virtualization approach enables organizations to cut IT costs in the areas of hardware, user support and energy consumption, while maintaining and often enhancing IT's contribution to day-to-day operations. Ericom's PowerTerm WebConnect optimally combines access to Virtual Desktops, Windows Terminal Services and Blade PCs under a single management environment, with one product, one license.

Visit http://www.ericom.com/hybrid-approach to learn more about Ericom's cost saving hybrid approach to virtualization and to download an evaluation version of *PowerTerm WebConnect*.

About Ericom

Ericom® Software is a leading global provider of **Application Access and Virtualization Solutions.** Since 1993, Ericom has been helping users access business-critical applications running on a broad range of Microsoft® Windows® Terminal Servers, Virtual Desktops (VDI), Blade PCs, legacy hosts, and other systems. Ericom provides concrete business value by helping organizations realize the benefits of their IT investments. With offices in the United States, United Kingdom, EMEA, India and China, Ericom also has an extensive network of distributors and partners throughout North America, Europe, Asia and the Far East. Our expanding customer base is more than 30 thousand strong, with over 7 million installations.

For more information on Ericom's products and services, contact us at the location nearest to you. And visit our web site: http://www.ericom.com

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