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Publication Date: 17 February 2009 **ID Number: G00164950**

Emerging Technology Analysis: Hosted Virtual Desktops

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The hosted virtual desktop market will accelerate through 2013, reaching 49 million units. PC vendors must prepare for the growth in demand for this client computing architecture by adjusting sales strategies and compensation models or they risk losing expenditure share with enterprise customers.

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1.0 Overview

- Distributed computing, requiring significant hardware capabilities in the hands of the user, has been the dominant client computing architecture for the past 15 to 20 years. The result has been an assumption from users and suppliers that the feature sets and performance of PCs and other client computing devices should always improve. But a number of changes in the way users can access applications and client computing capabilities are now challenging this assumption.
- The professional desktop PC market is the most-exposed segment, with alternative architectures such as application streaming, hosted virtual desktops (HVDs) and blade PCs already resetting enterprise expectations of the client computing devices that are permanently connected to their networks. By moving some or all application executions to the data center, enterprises see an opportunity to pursue capital and operation cost savings by buying and deploying thinner, less capable desktop devices. However, deployment of HVDs requires initial high-cost investments in the server and network infrastructure.

HVDs are the most visible of these alternative architectures. An HVD is architecturally similar to a blade PC (the full PC image runs in the data center, not on the remote device) but does not require re-engineering of the applications (see “Bubbles and Footprints: Redrawing the Rules of Client Computing”). It allows users to get “full thick client” image via thin-client delivery model. Gartner expects HVDs to be adopted more rapidly across mature markets, where the ability to leverage existing data center and networking investments results in lower cost of entry. We estimate that about 15% of the current worldwide traditional professional desktop PCs installed base will migrate to HVDs by 2014 equal to some 66 million connected devices. The U.S. will reach double of the worldwide average with over 18 million connected devices (see "Hosted Virtual-Desktop Deployments Are Set to Accelerate").

The trend to deploy HVDs and other client computing architectures is set to accelerate during the next three to five years, but the sales strategies and compensation models of most PC vendors are poorly positioned to respond. PC vendors will need to review and adjust some of their strategies and products to address that growing market segment in the next 12 to 24 months. Enterprises that previously purchased high volumes of desktop PCs on a regular basis will now look to replace some desktop PCs with less-expensive devices and replace them less frequently. But while PC hardware expenditure falls, these enterprises will also require more servers, network bandwidth and software to support the new architectures. To harness this growing demand, PC vendors must expand their view of desktop sales to include these other requirements: otherwise, they face the prospect of falling revenue and diminishing marginal returns.

2.0 Description of Technology

An HVD is a full, thick-client user environment run as a virtual machine on a server and accessed remotely. An HVD implementation includes multiple components:

- Server virtualization software to host desktop software
- Brokering/session management software to connect users with their desktop environment

- Tools for managing the provisioning virtual desktops

HVDs provide mechanisms for centralizing a thick-client desktop PC without re-engineering each application for centralized execution. This appeals to enterprises on the basis of manageability and data security. By combining server-hosted PC virtual machines with a brokering/session manager that connects users to their desktop instances (operating system and applications), enterprises can centralize user data and applications without changing their applications.

Frameworks for licensing compliance already exist, but some technical issues still must be resolved before mainstream viability is reached. Improvements in the complexity of brokering software, remote-access protocols, graphics rendering and the manageability of hosted desktop virtual machines are expected through 2009.

Hosted virtual images deliver a near-identical result to blade-based PCs. But, instead of the motherboard function being located in the data center as hardware, it is located there as a virtual machine “bubble." Using standard server virtualization technology, multiple virtual machines can be simultaneously run on a standard-volume server. When users log on, it is a free virtual machine instead of a free blade that extracts their image from storage.

3.0 Current HVD Suppliers

VMware is the leader in the HVD market, and until 2008 almost all HVD deployments were VMware-based. In mid-2008, Citrix entered the HVD market, which encouraged many organizations to look more closely at the HVD approach. For now, only VMware, Citrix, Fujitsu Siemens, NEC, Red Hat (Qumranet) and Parallels qualify as suppliers of own-branded HVDs. Qumranet was purchased by Red Hat in late 2008, and we have yet to see if this will help Red Hat to expand its HVD offering or lead to its exit from the market.

Currently, Fujitsu Siemens (with its Virtual Workplace solution) and NEC are the only traditional enterprise PC vendors that can be qualified as HVD suppliers. Other enterprise PC vendors, such as HP and Dell, act as resellers for VMware’s HVD approach, but are primarily acting as hardware OEMs by offering the necessary hardware. Recently, HP has been expanding its offering of components for HVD implementations, but for now, its offering is still missing one of the three key components: server virtualization software to host desktop software on servers.

4.0 Factors Driving Adoption

The following factors are driving adoption of HVDs:

- Further improvements in performance of HVDs are expected in 2009. HVD performance constraints are linked to two factors: the speed of network and the protocol of connection. The network latency issues will be reduced further in the next 12 months. While Windows Remote Desktop Protocol has been the cause of performance constraints, we expect the emergence of new faster connection protocols in the next 12 months. Sun Microsystems and HP already offer better protocols (Appliance Link Protocol and Remote Graphics Software, respectively) that are already offered with some VMware installations through partnering arrangements. Both VMware and Citrix are also working on improved protocols.

- Further improvements in manageability of HVDs are anticipated in 2009. Currently, there are two levels of management for HVDs: managing the virtual machines and managing within each virtual machine. Most organizations already have significant investments in a range of PC configuration life cycle management tools that they expect to apply within the virtual machines. The need to integrate these two levels of management tools brings complexity to most implementations, so we expect to see the conversion of the

management tools. The emergence of management tools that will combine the current levels of management into one will lead to acceleration in HVD deployments from 2H09.

- The entrance of Citrix has legitimized the HVD market in the perception of many organizations.
- Growing support from Microsoft through frameworks for Windows licensing compliance has brought confidence in long-term viability for HVDs. Windows licensing for HVDs became less expensive in 2008, and licensing of offline support for HVD images is now possible. Future technology developments promise to support offline use.
- Growing awareness and visible successes in the adoption of virtualization technologies will encourage enterprises to consider HVDs.
- The overall trend toward centralization of the computing functions for many organizations will encourage them to consider HVDs versus standard PC deployments. Also, after the initial cost of deployment for HVD, organizations will be able to reduce some management and support costs because of greater centralization of user images.

5.0 Factors Inhibiting Adoption

However, the following factors could inhibit the adoption of HVDs:

- The current economic downturn is expected to inhibit the adoption of HVDs, because HVD deployments require large upfront investments in server and network infrastructure. Because of IT budget cuts, many planned HVD implementations will be delayed from 2009 into 2010 and 2011.
- While the connection protocol limitations can be addressed through technology development, little can be done to address network latency issues. Only growing understanding of how and where these apply will help mitigate their impact for enterprise users.
- Capabilities for managing HVDs remain incomplete, in part because we are waiting for the emergence of convergent management tools (expected to become available in 2H09 or 2010) and in part because current initiatives to “componentize” HVD images are not yet able to address the “personalization” requirements of user images (see "Skip Windows Vista for Hosted Virtual Desktops").
- There is lack of ability to componentize Windows images and dynamically rebuild them to the last user state. We refer to this requirement as “persistent personalization,” and we do not expect it to be fully addressed before the end of 2009. These capabilities will likely be the center of competition in the HVD market during 2009.
- Performance of HVDs is not adequate for all users or all applications. For now, HVDs are best-suited for structured task workers and not suited at all for users of media-rich applications. Technical improvements during 2009 will help grow the addressable user audience, but for most organizations, we believe that no more than 60% of current desktop users will be addressable by the end of 2009 (up from 40% now). With many suppliers and channel partners overplaying the viability of the approach, the scope for user disappointment remains high during 2009.
- The PC industry has a natural tendency to position new client computing capabilities, including HVDs, as a panacea — a solution for all problems. This leads to too much hype around HVD and unrealistic buyer expectations. Organizations that believe HVDs

will be applicable to their full user population will be disappointed, thus fueling some skepticism about HVDs in the years ahead.

- The initial cost of deployment is higher for HVDs than for traditional PCs because of additional costs associated with server and network capabilities, and offline support costs. Based on the latest total cost of ownership (TCO) numbers published in August 2008 for HVDs versus standard PCs, capital expenditure for companies could increase from $1,226 to $1,341 per user with the move to HVDs.
- Additional costs will be associated with training/recruiting IT support personnel knowledgeable about HVDs, because these are not the skills that most organizations have in the client PC support team. However, the streamlining of many IT organizations and in PC companies because of IT budget cuts in 2009 could allow companies to do the required shift in skills more easily in the next six to 18 months.

6.0 Impact on Users and Markets

- HVDs offer the following advantages versus existing alternative PC delivery models:
- The transition to HVDs will be easier than the transition to server-based computing, which has been around for a while, because there is no need to re-engineer user applications for the multiuser server environment.
- HVDs are not tied to dedicated hardware (unlike blade PCs), and so a user's virtual machine could be run on any server.

Deployments of HVDs in 2008 were still limited, with the highest adoption seen in the banking and financial segments. Application provisioning within HVDs is often done via application virtualization and application streaming, technologies that are also still maturing, and which also require additional back-end infrastructure investment.

Technical limitations will restrict HVD viability to selected types of users in 2009. In most cases, users will be either structured task workers (call center and data entry workers) or users who need secure remote access to a fully locked PC environment (who are working from a home PC or for outsourcers from remote locations). Improvements in HVDs in 2009 will enable organizations to consider a wider range of users for HVD deployment, such as some knowledge workers, engineers, software developers, trainers, administrative assistants and some senior executives. Interest in HVDs is growing among businesses across vertical markets. Segments such as healthcare, education, utilities and services are looking at HVD deployments, and we expect to see HVD deployment expand to a broader set of users through 2012.

The market entry of outsourced service providers (such as CSC, which announced its Dynamic Desktop offering in September 2008) could also drive new demand. For such providers, which already have a significant footprint in managed desktop services, the business case for migrating customers from traditional desktops to HVDs is strong. If these offerings gain market traction, the overall boost to HVD sales could drive new levels of competition, economies of scale and reductions in price.

From a revenue point of view, the size of the HVD market in 2009 is expected to be about $1.3 billion to $1.5 billion, which is less than 1% of the worldwide professional PC market revenue. So in 2009, the HVD market will be a small and profitable market for a few vendors. The HVD market is expected to increase to $65.7 billion in revenue by 2013, which will make it an attractive and sizable market. Because of a dramatic increase in the revenue, the HVD market will be equal to more than 40% of worldwide professional PC market revenue by 2013.

The current players in the HVD market come mainly from thin-client and virtualization IT areas. None of the largest PC vendors currently offer HVDs; however, some of them, such as HP and Dell (with its Flexible Computing Initiative), are looking at expanding their presence in that segment beyond acting as hardware OEMs. Gartner expects that the HVD market will be heavily influenced by market leader VMware through 2012.

HVDs will be adopted more rapidly across mature markets because of better network connectivity, high capital cost of entry issues and better understanding of large-scale client computing deployment and its cost. For many HVD deployment decisions, TCO is not a driver, because organizations tend to look at return on investment (ROI). That is even more critical in the current economic conditions, and because many companies are looking for a faster ROI, many HVD deployments planned for 2009 will be postponed into 2010 and 2011.

Hardware-level improvements — such as Intel's Virtualization Technology and AMD virtualization, and improved processor performance — have made virtual-machine-based tools much-more reliable and responsive. The entry of Microsoft, Citrix and Symantec (Altiris) into the streaming markets through acquisition, development, and partnerships has brought long-term viability to the various product categories. Gartner expects that Microsoft will become an HVD supplier in the next 18 to 24 months through its partnership with Citrix, which has the ability to offer a growing number of HVD components. This will drive further reductions in the cost of implementation for HVDs and increase of standardization in this market.

The commoditization of PCs and the fact that desktop computing is not regarded as a strategic capability within most enterprises today is creating more challenges for PC vendors — increasingly, they compete only on price. The shift to HVDs could allow them to enter into the strategic part of the infrastructure — networking, servers and software.

7.0 Possible Extreme Scenarios

Traditionally, PC vendors primarily sell hardware devices (PCs) and, in some cases, associated services and support for those devices. HVDs will force enterprise PC vendors to rethink what they sell. For an HVD installation, suppliers must sell much more than devices — they must sell the capability to access a corporate bubble of software from any capable device — a thin client, thick client or even from a private PC in a remote location. The accessing device is the least critical component — almost a "don’t care" item.

This has a significant impact on the strategy and execution of sales. For example, consider an organization migrating 1,000 desktop PC users to HVDs. Previously, they might have purchased 1,000 enterprise-grade desktop PCs, but now they require only 1,000 thin clients for those users. A PC vendor that looks only to the user-device end of the deployment will regard this as buying down: It will either accept a revenue reduction in the account or seek to dissuade the organization from HVD deployment. However, in addition to the 1,000 thin clients, the buying organization will also require about 25 blade servers, additional storage, virtualization software and perhaps some networking equipment. From the revenue point of view, 1,000 enterprise desktop PCs will bring a PC vendor $614,000; however, the deployment of 1,000 HVDs could result in more than double that revenue, or about $1.3 million. A PC vendor that is able to address the overall HVD sale will likely achieve revenue uplift. Unfortunately, most PC vendors will struggle to do this today — their business unit structure and compensation mechanisms will not help them address the overall sales requirement.

The new requirements that HVDs bring to the PC market are also in conflict with the current rules of competition, in which the focus is on the lowest price, operational excellence and supply chain efficiency. The channel partners for leading PC vendors are not set up to sell HVD solutions, because they often focus on pure hardware distribution or certain vertical markets and don’t have

the incentive to sell HVD solutions. Virtually none of the current leading PC suppliers, such as Dell or HP, are acting as suppliers for HVDs now, so their positions as the leading suppliers of the enterprise client computing hardware may significantly diminish in the next four to six years, as the adoption of HVDs will accelerate. This will likely lead to significant strengthening of positions for VMware and Citrix, which are currently leaders in offering HVD solutions. Indeed, in hundreds of discussions with enterprises deploying HVDs or considering HVD deployments, it is clear that PC vendors are not currently considered HVD suppliers — instead, they supply a component that is increasingly regarded as highly commoditized.

To emphasize this point, we have had an increase in the number of inquiries from our clients about VMware, Citirix and Wyse, but the number of inquiries about Dell and HP are down. This indicates which vendors end users consider to be the main providers of new methods of PC architecture (see "Customer Insights Trends: Highlights for Hardware, 3Q08").

8.0 Recommendations

HVD is an adolescent alternative client computing delivery model. In 2008, HVDs saw only limited deployments, but Gartner expects that the HVD market will accelerate in its development in 2010. PC vendors must prepare for the growth in demand for HVDs by adjusting sales strategies and compensation models to include the entire architecture rather than individual components, or they risk losing share in the professional desktop market.

8.1 Short Term — Now

- PC vendors need to become solution providers and understand that the HVD solution is not only about hardware sales. To become an HVD supplier, PC vendors need to offer multiple components (server virtualization software to host desktop software, brokering/session management software to connect users with their desktop environment and tools for managing the provisioning virtual desktops).
- PC vendors don't have to own/create all the components themselves, because they can look at the appropriate partnerships. However, with HVDs they need to be able to sell solutions and not just a "bag of bits," so they must be responsible for individual components and the solution implementation. The revenue growth opportunities are in enterprise hardware, software and implementation services.
- HVDs are part of a bigger shift in client computing from traditional thick-client distributed PCs toward more-manageable, secure and centralized client computing environments among many large and midsize companies. Enterprise PC vendors must recognize this trend or they are in danger of losing their positions to new players in that market.
- PC vendors playing in enterprise and midsize business space should create a new business, sales, product and support strategy for the changing client computing market.

8.2 Medium Term — Next Six to 18 Months

In the next six to 18 months, focus on the following:

- HVDs are not appropriate for all business applications and/or users. To deliver successful HVD implementations, vendors should proactively work with organizations and their IT departments to identify appropriate user groups for HVD deployments.
- To successfully provide HVD solutions to clients, PC vendors need to educate their direct sales force about the technology and difference in value propositions versus traditional desktop PC sales.

- To move from shifting boxes to providing HVD solutions, PC vendors need to re-educate their channel about components of HVD and selling HVD solutions. They must also adjust the structure of channel compensation to ensure that HVDs are not seen as competition for PC sales.
- Vendors must set alliances to promote and provide proper education about HVD solutions. This will help drive demand and growth for those solutions among business organizations.

RECOMMENDED READING

"Hype Cycle for PC Technologies, 2008"

"Hosted Virtual-Desktop Deployments Are Set to Accelerate"

"Dataquest Insight: Alternative Delivery Models and Revised Professional Client Device Forecasts"

"Skip Windows Vista for Hosted Virtual Desktops"

"Total Cost of Ownership Comparison of PCs with Hosted Virtual Desktops"

“Bubbles and Footprints: Redrawing the Rules of Client Computing”

"Customer Insights Trends: Highlights for Hardware, 3Q08"

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