

An alternative to thin clients for the Enterprise

The primary purpose of this document is to familiarize organizations with Microsoft Windows Thin PC. The secondary purpose is to evaluate the value of thin client computing in the enterprise and explain the options available from Microsoft as a complete management solution.

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Thin Client Computing

Drivers for Thin Client Computing

As desktop virtualization becomes more prevalent and getting deployed in larger numbers, organizations are evaluating the option of hosting desktops on servers in the datacenter using either VDI or Session Virtualization, thereby reducing the footprint and simplify the management requirements at the edge of the network. Some analysts predict that Virtual Desktop Infrastructure (VDI) may become a 1.7B market in 2014, with around 16M seats of VDI deployed at enterprises. Once the desktop is in the datacenter, the next logical step is evaluating the devices that users will use to connect to desktops in the datacenter. Full PC functionality isn't required at the local end point, since most of the compute happens remotely. This provides organizations with the opportunity to deploy devices that are thinner and have longer lifespans, or enable users to connect to their hosted desktops using the latest consumer devices and platforms. As organizations adopt Windows 7 and Desktop Virtualization solutions, it is a good time to evaluate hardware platforms and computing options for today and into the future.

What is a Thin Client?

Thin Clients have been around for many years, but enhancements to hardware platforms and maturity of VDI and Session technology have enabled a richer desktop-like experience for thin client users. A Thin Client is an always connected device that has an extremely low hardware and software footprint, since it is intended for use only in remote desktop scenarios. Typically, a thin client has smaller CPU and lower RAM than PCs, with extremely limited local storage. Thin clients usually run an embedded operating system (such as Windows Embedded Standard 7), that is specifically designed to use lower CPU cycles, with local application execution typically restricted to security and management. Today, thinner and smaller devices have emerged that have no local OS or storage, relying on a server for all processing (including input translation and graphics rendering). These devices are called "Zero Clients", and are nothing but I/O redirectors. For the purposes of this paper, the term "thin clients" will refer to both traditional thin clients as well as zero clients.

Why Thin Clients?

Thin clients provide many benefits to organizations, including lower hardware TCO, higher reliability, reduced end point management, and higher levels of data security on the local device. Thin clients are applicable for a subset of users that rely only on a server based desktop. Below is a list of some specific benefits that should be considered when evaluating Thin Client computing in an environment.

Benefit	Details
Longer life of device	Thin clients have less moving parts and components, and hence are generally more rugged than PCs. They can be refreshed at longer intervals (typically 5-7 years), as opposed to shorter cycles for the PC (typically 3-4 years).
Security	Since all computing is done in the datacenter, there is no need to store data locally. This enables greater levels of security.
Reduced management	Thin clients can be setup quickly, as they are typically configured by the OEM. They require fewer security and management updates, since local data and applications are limited.
High reliability	With fewer moving parts, thin clients are less prone to failure and have longer lifespans.
Energy consumption	Thin client devices require much less power than traditional PCs, due to less hardware per device and limited amount of compute done locally.
Lower cost of ownership	Combining all the benefits of longer lifespan, increased reliability, reduced energy consumption and management, along with greater levels of security equate to a total lower cost of ownership of the end point. However, increase in data center costs and additional licensing for VDI may negate this advantage.

When are Thin Clients a good choice?

With all of the benefits of thin clients, they should be part of all hardware refresh discussions today. However, when looking at the current use cases that exist in your organization, it becomes obvious that not everyone can use a thin client, as many workers need local compute resources, or have mobility requirements. Also, companies that don't currently have a VDI or Session based infrastructure or have limited capacity in their current solutions will need to include that in their planning for thin clients. The following questions should be asked when planning how many thin clients to deploy:

- Are the targeted users connected to the network at all times?
- What is the current capacity of VDI and Session Virtualization infrastructure?
- What features do targeted users of thin clients require (USB, full video and audio, 3D, etc.)?
- Do users require running local productivity based applications when not connected to the corporate network?
- What are my contingency plans in case of a network outage?
- Do my existing vendors supply thin clients, or do I need to forge additional partnerships?

As with any technology not all thin clients are created equally; there are currently models from several hardware companies that support different features, based on different operating systems, support only specific solutions, and come at different price points. Based on the answers collected above, organizations can begin to evaluate how many and which thin client devices will support their user needs. Consider the following when evaluating thin client devices:

- **Zero Clients:** New form factors such as Zero Clients which are just I/O terminals with no local operating system or storage, and depend on the server for all of its computing and translation capabilities.
- **Functionality:** Traditional and Zero thin client devices must always be network connected, not designed to run local productivity applications. They are essentially single purpose devices.
- **Management:** While thin clients require less management than a PC, they are not "zero management" since they also require firmware and security updates. Choose a thin client that can integrate with your existing management strategy and tools.
- **Cost:** Although traditional thin clients reduce management and operational costs, they are not free since there is an upfront acquisition cost. Depending on the device and the capability, a thin client could cost as much as a low end PC. Additionally, all traditional thin clients and zero clients require VDA licensing for VDI.
- **Multimedia capabilities:** Many VDI vendors use the graphical processing power of the end point device to render multimedia for the remote desktop to improve the user experience. Not all thin clients or zero clients are able to execute high fidelity graphics locally, and those with built in multimedia capability may cost more than those without this functionality. Evaluate the costs of these devices and weigh them against your business requirements to ensure you choose the right one(s).
- **Strategy:** A thin client cannot be repurposed for other purposes. Essentially, once a thin client, always a thin client. Ensure that you have evaluated and decided on server based desktops as a strategy, and have planned for the corresponding improvements on you datacenter, storage, and network infrastructure to support a good desktop experience remotely.

An example of a great use case for thin client computing is task based workers. These users typically run a small subset of applications that can be easily managed in the datacenter thru VDI or Session Virtualization solutions. Today, with advances in both thin clients and the supporting infrastructure, additional users that require more resource intensive applications, like CAD based applications, or require high fidelity audio and video can also utilize thin client computing. In both cases thin client computing makes the most sense if they are connected on the company LAN to ensure the bandwidth requirements for their computing needs are met.

Windows Thin PC (WinTPC)

The need for WinTPC

By now, we have established that thin clients offer various benefits, such as improved security due to no local data storage, reduced power consumption, higher device reliability, and lower device TCO. However, customers have to purchase new hardware via the OEM channel, as many customers don't have thin clients lying around. Many thin clients can cost as much as a low end PC, making this an extremely tough choice for IT. As pressure from the economic climate continues to increase, IT has much less budget for new device purchases than in previous years, and would like to defer the purchase of thin clients as much as possible.

In addition to the cost of purchasing new hardware, IT also needs to consider the cost of Windows Virtual Desktop Access (VDA) licensing for VDI scenarios. Windows VDA (Virtual Desktop Access) is a device based subscription that allows devices that do not qualify for SA (such as thin clients) to access a virtual copy of Windows in the datacenter. It also provides the licensed device with full SA benefits, including the rights to access up to 4 virtual machines concurrently and the rights to use the Enterprise Edition of Windows.

The increased cost forces many IT personnel who are evaluating thin client computing to consider repurposed PCs as access devices to centralized desktops. Although this reduces CAPEX spend by delaying thin client purchase, IT does not get the reduced management, longer lifespan, or data/application restriction benefits of a thin client. There is a need for a product that will enable IT to lock down repurposed PCs, thereby enabling thin client like functionality without actually purchasing thin clients.

An Introduction to WinTPC

Windows Thin PC is a low footprint version of Windows 7, that enables organizations to repurpose their Windows 7 capable devices as thin clients. WinTPC enables organizations with an excellent thin client experience, through features of thin clients like write filters (preventing users from modifying the operating system), rich remote desktop experience with RemoteFX, and the familiar Windows 7 interface (reduced training). WinTPC has been designed to leverage existing management investments, since it integrates easily with System Center Configuration Manager. WinTPC is a benefit of Software Assurance (SA) and does not require the Windows VDA license that other thin clients require to access VDI desktops. This provides IT with significant cost savings for their thin client computing model, but still gives administrators the ability to have a locked down computing device. This also gives organizations the flexibility to postpone PC hardware refreshes while enjoying most of the benefits of Thin Client devices today.

Features and Benefits of WinTPC

WinTPC enables organizations to enjoy the benefits of thin client computing on their existing PCs. In a nutshell, Windows Thin PC is designed to provide the following benefits to organizations:

- 1) Reduce the cost of VDI
- 2) Provide an excellent thin client experience
- 3) Enable enterprise ready manageability and security

Reduce VDI Costs

WinTPC allows organizations to reduce upfront CAPEX, since no new device purchases are necessary. Since it is a benefit of SA, WinTPC is free for organizations that currently have SA on their PCs. Since SA includes virtual desktop access rights, WinTPC devices do not need the additional VDA licenses that other thin clients require to access a Windows VDI desktop in the datacenter.

WinTPC includes the Windows 7 device driver framework, and hence is compatible across all Windows 7 capable devices. Customers can also repurpose laptops, since WinTPC has full wireless stack integration. Other capabilities include USB and printer support, thereby ensuring that your existing investments in hardware and peripherals can be leveraged, further optimizing costs for your thin client environment.

Essentially, Windows Thin PC lowers the barrier of entry for thin client computing by enabling a "try before you buy" model. Security and management investments in Windows 7 and WinTPC today can also be extended to Windows Embedded thin clients in the future.

Excellent Thin Client Experience

Windows Thin PC offers powerful features that enable a rich remote desktop experience on locked down devices. Essentially, WinTPC inherits lot of the functionality that makes Windows Embedded one of the best platforms for thin client computing.

As part of the Windows Server 2008 R2 SP1 release, Microsoft introduced RemoteFX technology that provides users with an extremely rich remote desktop experience by virtualizing GPUs on the server. This enables each virtual machine to leverage graphics capability on the server, and allows for 3D graphics capability, bidirectional audio for VOIP, and support for multiple monitors. RemoteFX also provides redirection capability for USB, thereby enabling users with a local-like experience for their VDI desktops. WinTPC supports RemoteFX out of the box, integrating very well into the Hyper-V based VDI environment.

Another key technology that WinTPC inherits from the Windows Embedded platform are write filters. A write filter allows IT to lock users from accessing certain parts of the device, such as the hard disk or keyboard strokes. WinTPC includes the following filters:

- 1) **Enhanced Write Filter (EWF):** The EWF helps keeps the WinTPC image pristine, by preventing all writes to the hard disk. The EWF creates a virtual hard disk layer in RAM onto which all writes are redirected. This virtual disk is then destroyed upon every reboot, returning the WinTPC to its original image. This provides an added layer of security, ensuring that the WinTPC can easily be cured of any issue with just a simple reboot.
- 2) **File Based Write Filter (FBWF):** While the EWF prevents all writes to disk, the FBWF allows writes to certain sections of the disk, such as certain files. This is useful in scenarios where you need writes to persist across multiple reboots, such as an antivirus definitions file.
- 3) **Keyboard filter (KBF):** The keyboard filter allows IT to lock certain keystroke combinations (such as ctrl+alt+del). This is especially useful in scenarios where the WinTPC is a shared desktop, and IT wants to prevent a single user from locking other users out of the desktop.

Just like Windows Embedded, WinTPC supports international keyboards, allowing users to interact with virtual desktops that are localized in other languages. However, as of the writing of this whitepaper, WinTPC is available only in English.

Enterprise Ready Platform

Windows Thin PC provides organizations with an Enterprise grade platform that's highly secure and easily manageable. WinTPC is built off the highly secure and robust Windows 7 Enterprise platform, and hence inherits all of the enhancements made to the security and communication models. While designing the product, it was important to ensure that WinTPC would leverage existing investments in security and management, to minimize the onboarding cost for IT.

WinTPC is an extremely secure platform. In addition to write filters that prevent writes to disk, WinTPC also includes other security tools that help improve security of the environment:

- 1) **Forefront Endpoint Protection (FEP):** Organizations that use FEP to protect against malware can now extend the tool to protect the WinTPC devices as well. FEP support will be available to WinTPC in Q3 2011, and will allow organizations to standardize on a uniform security tool across the enterprise.
- 2) **BitLocker:** Organizations have the ability to encrypt the WinTPC hard disk using the same BitLocker technology that's available in Windows 7 Enterprise. BitLocker helps data loss due to lost or stolen laptops, as data on the laptop is encrypted and not compromised. WinTPC also supports BitLocker To Go, which extends the same level of encryption and protection to USB-based flash drives.
- 3) **AppLocker:** Organizations that choose not to protect the WinTPC with the Write Filters have an additional tool to help prevent users from installing unauthorized applications. AppLocker allows IT to publish either a whitelist or black list.
- 4) **Direct Access:** Users that are using WinTPC on laptops while outside of the corporate network can now get access to corporate resources without the need for a VPN. DirectAccess uses IPSEC and IPv6 to present a secure VPN tunnel to devices while roaming.

Managing Windows Thin PC

Managing Thin Client devices often has specific tools for the specific device. With Windows Thin PC, organizations can leverage their existing Windows management solutions like Configuration Manager, Windows Update, WSUS, Group Policies, and PowerShell scripting to manage devices from installation to patch management.

WinTPC integrates into your existing image deployment and management infrastructure, with in built support for System Center Configuration Manager. Configuration Manager can be used to deploy and manage WinTPC images to end point devices. Customers can also extend their investments in PowerShell to WinTPC devices as well. OS patches and updates can be delivered to WinTPC using Windows Update (WU) or WSUS.

Additionally, customers can use the Windows Embedded Device Manager (WEDM) product to manage WinTPC in addition to other Windows Embedded devices within their environments. WEDM helps manage updates and patches to devices that have the write filters enabled, simplifying the process for IT admins to update WinTPC devices. Windows Embedded Device Manager 2011 enables an integrated solution for managing Windows Embedded devices and extending the management capabilities of Configuration Manager. Utilizing device manager Enterprises can now easily and quickly apply changes, while maintaining security through efficient management of Microsoft Write Filter. For more information on WEDM visit: <http://www.microsoft.com/windowsemerged/en-us/evaluate/windows-embedded-device-manager.aspx>

Differences between WinTPC and Windows Embedded Standard 7 (WES7)

After validation of the thin client computing solution, and as WinTPC devices need to be replaced, Microsoft completes the thin client computing solution with Windows Embedded technology. Windows Embedded is the basis of WinTPC and the existing management investments made for WinTPC can be repurposed for Windows Embedded devices.

Windows Embedded platforms for thin clients provide the familiarity of the Windows environment, the rich user experiences expected from Windows platforms, and ease of interoperability with existing Microsoft infrastructure to enterprises looking for a security enhanced environment and easier manageability while delivering a product that helps reduce overhead associated with desktop hardware and software. The newest platforms available for your thin clients include Windows Embedded Standard 7 and Windows Embedded Compact 7.

Both Windows Thin PC and Windows Embedded are based on the Windows 7 platform. Although WinTPC is a derivative of the Windows Embedded platform and the products share quite a few common features, there are some differences:

- **Availability:** WES7 is only available for purchase from an OEM, and ships directly on thin client devices. WinTPC is available as an SA benefit through the Microsoft Volume Licensing (VL) program, and is available for download from the VL website..
- **Pricing:** WES7 is sold by the OEMs, who present a combined price for the device and the Embedded OS. WinTPC is free of cost to SA customers, while non-SA customers will have to buy SA, Windows VDA, or Windows Intune to get WinTPC.
- **Flexibility of features:** WinTPC is a fixed image, and organizations cannot add or remove components of the OS to customize the image. However, organizations that want a custom build Windows Embedded image can order a specific thin client from the OEMs, who may offer image customization services for WES7.
- **Image size:** WinTPC has a fixed image size, while WES7 images are flexible, and can be configured by the OEM. This may result in WES7 images having either smaller or larger footprints than WinTPC devices, depending on the configurations defined by the OEM device.
- **Hardware efficiency:** WES7 thin client hardware is usually more locked down and power efficient than WinTPC devices, which are repurposed PCs.
- **Enterprise features:** Windows 7 Enterprise features such as BitLocker, AppLocker, and DirectAccess are built into the base WinTPC image, while these features are available to WES7 devices only on request from OEMs.

Windows Thin PC Availability and Licensing

As of July 1st 2011, WinTPC has been released and is available from the Microsoft Volume Licensing site. Customers with active SA coverage on their PCs will be able to install WinTPC on those devices. Customers without active SA coverage on their PCs can get SA through one of the following products:

- 1) Windows Virtual Desktop Access (VDA) subscription,
- 2) Windows Intune

Both products provide SA benefits on devices with an existing Windows client OS (Professional / Business, Enterprise, Ultimate) licenses.

Beyond WinTPC licensing and coverage for VDA licensing agreements, SA benefits include; access to new product versions, deployment services like planning, training for licensed products, enhanced support, and other benefits including spreading payments over time to fit with today's IT budgets.

Windows Thin PC also provides support for both KMS and MAK activation mechanisms. Hence, organizations can continue to use the activation mechanisms they are familiar with today to ensure that their copy of WinTPC is genuine.

Microsoft's recommendation for Thin Client adoption in your organization:

With your choice of PC, thin clients, and WinTPC, how do you decide what technology to adopt for your users? It depends on your use cases, your business drivers, and maturity of your thin client computing strategy.

- 1) Start by identifying use cases that make sense for pure server based desktops. Examples of workers that may not need local applications or data include task workers. For these use cases, deploy Microsoft's VDI technology, thereby enabling a rich remote desktop experience, while centralizing the management of physical and virtual desktops.
- 2) For customers that are still evaluating thin client computing, start off by repurposing existing PCs using Windows Thin PC. This helps reduce the upfront costs for VDI, while still providing you with an excellent thin client experience. As an added advantage, customers still have the option to revert the devices back to a PC, in case they feel that thin client computing is not for them. WinTPC can easily be managed by the same System Center tools that you use to manage your physical and VDI desktops, thereby standardizing management processes for IT. Additionally, as customers get more comfortable with thin client computing, and the PC hardware is decommissioned, customers can replace the WinTPCs with new Windows Embedded devices without having to change the security and management tools and processes.
- 3) For customers that have already decided on thin client computing, and want the lower power consumption and hardware efficiency of thin clients, consider buying Windows Embedded Standard 7 thin clients from OEMs such as Wyse and HP. WES7 offers the same benefits as WinTPC, such as easy integration into existing security and management frameworks, while providing a rich remote desktop experience.