How Thin Clients Aid Healthcare Virtualization

CİTRİX Ready

The healthcare industry is under enormous pressure to adapt to new technologies. The needs to reduce costs, increase operational efficiency and comply with government mandates are compelling healthcare organizations to keep up with the times. Though many technological tools address some of these needs, one form of technology addresses all of them: virtualization.

Virtualization improves clinician workflows, enabling them to see more patients in less time while accurately recording and maintaining valuable information. It provides security and access to the data necessary to maintain HIPAA compliance and conform to audit requirements.

HP Thin Clients combined with Citrix solutions provide a full range of virtualization benefits to healthcare organizations. This paper discusses how HP Thin Clients improve clinician and administrator workflows using Cloud-based virtualization in the healthcare industry. It describes how HP Thin Clients work with Citrix VDI to enable a secure, centralized solution that optimizes productivity, enhances HIPAA compliance and ensures a positive user experience for healthcare workers of all types.

CİTRIX Ready

Business Challenge Summary

The *HIPAA Journal* reported no industry sector in recent years has been more resistant to technological change than healthcare.[1] While it may seem healthcare workers are especially old fashioned, there are significant reasons for the industry's resistance to change.

Problems arising from the adoption of new technologies in other industries cost money. In the healthcare industry those same problems can impact patient health and well-being. Clinician workflows are highly structured. Disruptions to those workflows can result in reduced patient care and adverse results. Any change with the potential of disturbing the regimented routine of clinician workflows is likely regarded with great reluctance.

But reluctant or not, the healthcare industry finds itself compelled to accelerate the rate of technology adoption. Government mandates have forced the issue. Healthcare organizations must leverage advancements in technology to remain HIPAA compliant and to maximize efficiency and productivity in the face of soaring costs and shrinking budgets.

During this time of technological change, healthcare leadership frequently looks to the future while conforming to present needs and mandates. The goal for leadership is that technological adoptions will anticipate and address future demands while fulfilling today's needs. Wise healthcare administrators will seek solutions that provide future-proofing against needs that will arise during the next several years.

Thin clients are part of that future-proofing solution. Thin clients address the need for increased efficiency, productivity, manageability and compliance. Thin clients optimize clinician workflows, help protect sensitive patient and organizational data, enable true Cloud mobility and improve the user experience for clinicians and supporting staff.

[1] http://www.hipaajournal.com/the-slow-pace-of-technology-adoption-in-healthcare-explained-8261/

Overview of HP Thin Clients

HP Thin Clients provide clinicians with the usability and capability of desktop PC devices, and the mobility and security no desk-based solution could possibly match. The following are among the top HP Thin Client features valued by healthcare organizations:

- **Strengthened Security:** HP Thin Clients help protect business and patient information by enabling and supporting the centralization of data to the Cloud. Data never leaves the data center, but rather is accessed from remote devices anywhere and at any time. No longer stored on random drives in desktop and laptop PCs deployed throughout the organization, data is secured and backed up according to regimented procedures and protocols. The built-in security features of HP Thin Clients work in association with HP software in the data center to maintain multiple layers of protection. Lost, stolen or damaged thin clients present little risk to sensitive data. The centralization of data helps to make the process of maintaining HIPAA compliance more viable and auditable.

- **Advanced Access:** Models can be configured to connect with a wireless Wi-Fi network. When deployed in a fixed location, the HP Thin Client features an internal Wi-Fi antenna for efficiency and reduced clutter on the desktop. When the thin client needs to move around from room to room while checking on patients and recording information, it can be equipped with an external antenna to ensure optimal connectivity when roaming from access point to point, or when the client is installed in an enclosure such as found on many mobile hospital carts.

- **Enhanced Productivity:** HP Thin Clients offer clinicians the ability to do more with less. Features such as remote access capability, Cloud-optimized operating system options and multi-display technology support maximum productivity from anywhere, at any time. Reduced management costs and complexities also translate directly to increased productivity for IT administrators. Certified single sign-on solutions increase user efficiency.

- **Improved Reliability:** HP Thin Clients are designed as state-less devices: no moving parts, zero noise levels, low heat and power consumption. Unlike PCs, HP Thin Clients are passively cooled; dust or other small contaminates do not get pulled into the device as part of its ventilation system, and there are no rotating media drives to generate heat or acoustical noise. All this translates into lower operating costs through savings on energy and longer longevity of the device.

- **Advanced Deployment Options:** HP Thin Clients are small, lightweight devices by design, and they include an embedded VESA mounting system to support a number of deployment scenarios. These quiet Cloud computing devices are easily mounted behind modern displays using the VESA mount, or incorporated into mobile carts that are moved from room to room by the clinician to record patient information in real time.

- **Easy Management:** HP Thin Clients include exclusive management and performance enhancement software tools such as HP Device Manager and HP Easy Shell. These valuable apps reduce the IT administrator's management costs by providing the ability to set up, manage and monitor thousands of thin clients remotely from a single screen.

CİTRIX Ready

HP Thin Clients help to fulfill all the key objectives of the Citrix Ready Healthcare Program:

1. Making IT More Agile and Flexible

Always-on mobility gives clinicians the freedom to use any device at any time; they are not required to use *only* their thin client. Subsets of consumption data can be accessed by tablet, phone or kiosk. These devices function as auxiliary devices while thin clients serve as central contribution devices, whether they are stationary or mobile. Regardless of the device they are using, healthcare professionals simply log on to a Citrix virtual desktop and securely access their applications and patient records, permitting greater mobility throughout the facility.

The **centralization of data and management** enabled by HP Thin Clients increases the efficiency of operations for IT and makes it possible for IT to secure sensitive organizational and patient data. Deployment of HP Thin Clients results in significantly reduced end-user hardware expenses and management costs. Proprietary tools such as HP Device Manager and HP Easy Shell help streamline IT tasks and easily support a customized experience for each user.

2. Improving Clinician Access, Workflow and Experience

HP Thin Clients are always on and standing by to support **availability and process flow**. Data is stored and accessed from the Cloud; nothing resides on the local devices. If a clinician leaves one thin client and logs in to another, the session continues uninterrupted. Efficiency of workflow is improved because the clinician is not required to repeatedly pull up redundant tools at different terminals.

HP Thin Clients **apply awareness** to the roaming session process. If a doctor enters an exam room with a patient and logs on to the device in that room, the doctor's current session — and possibly even the patient's data — will automatically display on that device. The user experience can be modified contextually so more or less detailed information is displayed on a given device based on locational and situational needs.

3. Enhancing Data Security and Compliance

Thin clients are **inherently secure**. No data is stored on the local device; compromised or lost devices pose no risk to the organization. HIPAA compliance is ensured. Data centralization enabled by HP Thin Clients provides a singular and significant boost to data security. Additionally, other HP capabilities work to further enhance data security and ease of use, including single sign-on, secure roaming and contact-less

smartcard user authentication. These features strengthen security while providing fast and flexible access required by healthcare professionals. HP Thin Client security innovations, including secure USB ports and built-in firewalls, protect data and assist with maintaining HIPAA compliance.

HP Thin Clients **securely support the mobile and remote access** capabilities healthcare practitioners require for in-home health, tele-health and remote consulting applications.

HP Thin Clients are designed to interface seamlessly with Citrix solutions such as XenDesktop, XenApp and XenMobile. The teaming of Citrix and HP Thin Clients provides healthcare users a PC-like experience through the Cloud from any location, whether on-premise or not.

HP Thin Clients integrate with other tools and applications commonly used in healthcare environments and support inter-application communications between these tools as needed. This capability enhances the PC-like experience, whether organizations use Imprivata, Caradigm, Healthcast or other solutions. A user's transition to an HP Thin Client will be easy and stress free, resulting in a familiar PC experience with access to all necessary productivity applications and data necessary for the task at hand. When looking at the display, a routine click on any desktop icon yields the same results as if the task was running locally.

CITRIX® Ready

Unique Features and Integrations

HP actively engages with Citrix on pre-production work. Updates and new products from Citrix are integrated with HP products as they are introduced, assuring that user and administrator experiences are not disrupted.

HP Thin Clients' feature exclusive value-added software to increase productivity and minimize user hassles. Features unique to HP Thin Clients include:

HP Device Manager: This tool is included with every HP Thin Client device. HP Device Manager makes it easy to configure, manage, maintain and update an install base and security certificate assignments all from one interface.

Benefits of HP Device Manager include:

- **Remote Management:** An entire HP Thin Client install base can be viewed and managed from anywhere via a network connection.
- **Streamlined Maintenance:** Add-ons, drivers and updates can be quickly and easily deployed across an entire thin client environment with just a few clicks.

- **Intuitive Usability:** HP Device Manager's easy-to-use GUI provides conveniently visualized details of every HP thin client on the network, whether deployed on site or remotely.
- **Customized Administration:** Administrators may be assigned to manage select groups of thin clients and may be granted granular control all the way down to managing user permissions for individual tasks.
- **Multi-Functionality:** HP Device Manager provides an extensive range of management and reporting functions.

HP Easy Shell: HP Easy Shell permits customers to control, customize and protect their Windows-embedded user experience with intuitive, easy-to-deploy settings.

Benefits of HP Easy Shell include:

- **Speedy Deployments:** HP Easy Shell enables quick deployments into new or existing thin client environments while avoiding costs, training and hardware requirements.

- **Customized Control:** Access to apps and common Windows components, i.e. web browsers, task manager and the control panel, may be denied or limited based upon organizational security needs.
- **Convenient Flexibility:** HP Easy Shell provides absolute user experience flexibility with simultaneous support for Cloud infrastructure, web browsers and single-purpose applications.
- **Port Authority:** HP Easy Shell enables easy control of the USB devices or device classes to be used on an HP Thin Client.
- **Dependable Defense:** HP Easy Shell helps prevent unauthorized updates and viruses with an integrated write filter that immediately reverses any changes written by unauthorized users. The operating system reverts to its original configuration upon reboot.

CITRIX® Ready

HP Velocity: HP Velocity improves the user experience for virtualized applications by addressing common network bottlenecks such as packet loss and Wi-Fi congestion.

HP Velocity benefits include:

- Clear voice and smooth video for unified communications and streaming video
- Higher video frame rates
- More fluid mouse and keyboard interactions
- Faster data transfers

HP Velocity helps the IT Administrator maintain system performance standards by providing metrics and insights that include:

- Per-flow end-to-end packet loss, latency, data and packet rates
- Network type and current link speed
- CPU and memory utilization

HP Desktop Thin Clients

Series	ThinPro, Smart Zero and Windows Embedded*			
Platforms	t420	t530	t630	t730
Processor and memory				
Processor	AMD GX-209JA SOC features a 1.0GHz dual-core APU[7]	AMD GX-215JJ Dual-Core APU SoC with Radeon™ R2E Graphics (1.5 GHz base frequency, up to 2 GHz burst frequency, 1 MB cache)[7]	AMD GX-420GI (2.0GHz - 2.2 GHz quad-core[7]) APU with a Radeon R7E based graphics core	AMD R-Series RX-427BB (2.7GHz– 3.6 GHz quad-core[7]) APU with a Radeon HD 9000 based graphics core
Flash/RAM[8]	Up to 16GB flash/ 2GB SDRAM[20]	Up to 512GB flash/up to 16 GB DDR4-1866 SDRAM[20]	Up to 512GB flash/up to 32 GB DDR4-1866 SDRAM[20]	Up to 128GB flash/up to 16GB SDRAM[20]
Video and audio (All HP desktop thin clients support widescreen resolutions and headphone/mic)				
Maximum resolution[9]	1920 x 1200	3840 x 2160 via DisplayPort™ 1920 x 1080 via optional VGA output	3840 x 2160 via DisplayPort™ 1920 x 1200 via optional VGA output	3840 x 2160
Monitor support[11]	1 x DVI-D; 1 x VGA	2 x DisplayPort™; 1 x VGA (optional)[24]	2 x DisplayPort™; 1 x VGA (optional)	4 X DisplayPort™; 6 x DisplayPort™ (optional)[22]
Networking				
Embedded Networking Interface	LAN: Gigabit Ethernet (RJ-45) WLAN: Intel® 802.11ac wireless with Bluetooth® (optional) [13]	LAN: Gigabit Ethernet (RJ-45)WLAN: Intel® Dual Band Wireless-AC 3168 Wi-Fi/Bluetooth® combo (optional)[13] Intel® Dual Band Wireless AC 8265 Wi-Fi/Bluetooth® combo (optional)[13]	LAN:Gigabit Ethernet (RJ-45) WLAN: Intel® Dual Band Wireless-AC 3168 Wi-Fi/Bluetooth® combo adapter (optional)[13] Intel® Dual Band Wireless AC 8260 Wi-Fi/Bluetooth® combo adapter (optional)[13] Allied Telesis Fiber Optic NIC (optional)[13,23]	LAN: Gigabit Ethernet (RJ-45) WLAN: Intel® 802.11a/b/g/n/ac PCIe[13] Allied Telesis AT-27M2/SC M.2 Fiber Fast Ethernet Network Interface[13] Allied Telesis Fiber Optic NIC (optional)[13,23]
I/O and expansion				
Serial	0	0	1 (2nd port optional)	2
Parallel	0	0	0	1
PS2	0	0	2	2
USB	4 USB 2.0	Total: 6 3 USB-A 3.1 2 USB-A 2.0 1 USB 3.1 Type-C™	Total: 7 2 USB 3.0 1 USB 3.0, hidden 4 USB 2.0	Total: 9 2 USB 3.0 6 USB 2.0 1 USB 3.0, hidden
Slot expansion options[14]	No	Yes 1 configurable port (choice of serial, VGA or coaxial port)[24]	No	1 x half height PCI Express expansion slot x16 physical slot wired as a x8 (rear)
HP cable lock slot	Yes	Yes	Yes	Yes
Environmental certifications				
ENERGY STAR®	Yes	Yes	Yes	Yes
EPEAT® [15]	Yes	Yes	Yes	Yes
Low Halogen[21]	Yes	Yes	Yes	Yes

CITRIX Ready

HP Thin Client Solution Detail

HP Thin Clients have been selected to participate in the Citrix Ready Healthcare Program because they provide value to healthcare organizations using Citrix environments. HP Inc. is dedicated to assuring healthcare clients transitioning to HP Thin Client deployments enjoy a seamless, non-disruptive experience. HP representatives can visit a prospective deployment site before the client has committed to purchasing HP Thin Clients to fully understand the client's Citrix environment. This level of commitment not only supports a seamless transition, but assures the best possible experience for both users and administrators.

The initial roll-out of an HP Thin Client deployment is a non-issue for users in a Citrix environment. Though all of their work transitions from a local device to a virtual session, the change is transparent for users. No disruption to normal workflows occur; whatever tasks the user performed yesterday on a local device can be performed today in the same way, using the same tools and applications. However, users certainly will notice the convenience of mobility as their Citrix session follows them across multiple devices distributed across multiple locations.

All of these benefits were illustrated when a regional healthcare provider with more than 3,000 employees transitioned to HP Thin Clients. The organization needed to speed the adoption of electronic health records by streamlining access to information. They were also seeking to reduce hardware and management costs. They wanted to install an automated identity management solution to provide staff with fast and secure access to healthcare records and applications. For most of the organization's users, each application accessed required a unique login and forced users to endure a frustratingly long wait.

The organization chose to deploy HP Thin Clients along with Imprivata's single sign-on solution, and the results were dramatic. Hardware costs were cut by $500,000; $500 for each HP Thin Client device deployed. The organization's physicians gained an estimated 30 minutes per day of additional productivity. Doctors were able to treat an average of four additional patients every day. The extra revenue generated from enhanced productivity represented a net sum sufficient to pay for the entire thin client / single sign-on installation.

HP Thin Clients integrate seamlessly with Citrix environments on a one-device / one-user basis, but also on a multi-tenant, multi-endpoint-device basis. HP Thin Clients also offer the ability to integrate with the full range of SaaS applications commonly utilized in modern healthcare environments. HP Thin Client integration with Citrix is simple for both large and small organizations.

For large healthcare organizations such as hospitals, HP Device Manager makes it easy to deploy and manage a thin client installation in a Citrix environment through a single, central point of control. After customizing the device image for the organization's needs and preferences, the administrator can use HP Device Manager to deploy that image throughout the organization. HP Device Manager can be used to easily replicate future updates from a central location. Smaller healthcare organizations find it easier to simply deploy HP's point-to-point imaging tool in copying and replicating device images.

For all healthcare organizations, HP consultants are available to visit and evaluate the organization's Citrix environment, and make recommendations as needed for assuring a seamless integration with Citrix.

CITRIX Ready

A Proven Partnership that Delivers the Security, Productivity, and HIPAA Compliance Benefits of Thin Clients

While the healthcare industry has long been slow to adopt new technologies, that mentality is changing. A survey of healthcare executives revealed nearly half of healthcare organizations intend to invest in technology over the next year to provide workflow improvement for clinicians.[2]

Further evidence of healthcare's accelerating adoption of current technologies can be found in the number of healthcare organizations seeking to centralize data and operations in the Cloud. According to a *Healthcare IT News* report, the global market for Cloud services in healthcare is expected to nearly triple in the span of just a few years, growing from less than $4 billion in 2015 to nearly $10 billion expected by 2020.[3]

More than ever before, healthcare organizations are under extreme pressure to reduce costs, increase operational efficiencies, and comply with government mandates that enforce the protection of patient data. New technologies such as Cloud computing and endpoint mobility provide healthcare organizations the tools to accomplish all of these goals.

HP Thin Clients integrate with Citrix environments to provide a Workstation or PC-like user experience from Cloud-based sessions, whether from a local setting or half a world away. Healthcare organizations benefit from increased security, improved workflows for clinicians, reduced operational and management costs and significant reductions in hardware costs.

HP Thin Clients have been proven to integrate seamlessly and easily with the Citrix environments so commonly deployed by healthcare organizations worldwide. HP's selection to the Citrix Ready Healthcare Solutions Program provides healthcare organizations with a proven, reliable solution for accessing the many benefits of thin client devices.

For more information about HP thin clients for healthcare, please visit: http://www8. hp.com/us/en/thin-clients/healthcare. html?jumpid=in_r11260_us/en/psg/hp_thin_ clients/industry-healthcare-solutions-learn- more

For more information about Citrix application and desktop virtualization, please visit: https://www.citrix.com/virtualization/

[2] http://www.healthcareitnews.com/news/2017-year-ahead-healthcare-information-technology
[3] http://www.healthcareitnews.com/blog/Cloud-today-and-tomorrow-why-hospitals-are-tripling-use-Cloud-services

Appendix

Learn more about the Citrix Ready Vertical Solutions Program for Healthcare at: http://citrixreadyprogram.com/2017/citrix_ready_vertical_solution_programs/

To learn more about the Citrix Ready Program partnership with HP, please visit: https://citrixready.citrix.com/hp-inc.html

To learn more about virtualization solutions for healthcare enterprises, contact Citrix and HP.

Citrix Ready Healthcare Program Overview

The Citrix Ready Healthcare Solutions Program has been launched with the sole objective of building and sharing a library of white papers and case studies that portray the best integrated joint solutions for healthcare. Each of these documents illustrates the teaming of a Citrix partner and Citrix solution in helping healthcare institutions further enhance seamless, instant and secure access to patient information and optimized patient care.

This program will serve to identify and showcase partner technologies such as single sign-on, voice dictation and zero clients. All spotlighted partner technologies work to seamlessly enhance healthcare solutions that help clinicians become more productive and provide a better patient experience, without compromising regulatory compliance. All solutions selected to the Citrix Ready Healthcare program support smooth and reliable integration with the latest Citrix XenDesktop and XenApp versions. These solutions address one or more of the below key objectives that have been identified as essential needs for healthcare institutions today:

1. Making IT more agile and flexible
2. Improving clinician access, workflow and experience
3. Enhancing data security and compliance