



# Optimizing Patient Care with Citrix XenApp and XenDesktop

Empowering user-centric access to virtualized  
applications and clinical desktops

Healthcare organizations place a high priority on providing employees with seamless access to the applications and data needed to deliver optimal patient care. This focus is often driven by government mandates to adopt technology, beginning with electronic health records (EHR) and subsequent add-ons – ambulatory EHR, computerized physician order entry (CPOE), departmental modules, medical imaging and more. Innovations like these enable clinicians to review and document every aspect of patient care, including medical histories, treatment orders, prescriptions and test results.

Managing this high level of IT service is not easy, but it is essential, especially when availability and speed can literally impact someone's life. Meanwhile, limited budgets and workforce reductions are forcing healthcare IT departments to find greater operational efficiencies as they implement and upgrade their systems and applications under rigid business and government guidelines and related deadlines.

This white paper explains how virtualization can help organizations solve the IT management in healthcare dilemma. The pages that follow outline the ways in which Citrix® harnesses 25 years of expertise and market leadership in application and desktop virtualization to help providers deliver mission-critical clinical and business apps and desktops to any device – enabling IT to put the power of healthcare IT transformation to work.

### **Current challenges for healthcare IT leaders**

A number of trends are driving change in healthcare IT, challenging leaders to balance many critical – but often competing – mandates and priorities, including the need to:

- Comply with regulatory requirements and enforce policy related to:
  - The American Recovery and Reinvestment Act of 2009 (ARRA), which provides incentives for the adoption of EHR technology, CPOE and health information exchanges (HIE)
  - The Health Information Technology for Economic and Clinical Health (HITECH) Act, a new extension of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) that covers privacy breaches
- Ensure data security and compliance in the face of:
  - Rising threats of cybercrime
  - Increasing use of mobile computing and mobile access to patient information
  - Growth in bring-your-own-device (BYOD) programs
  - Ever-increasing frequency of security audits

- Streamline clinical workflows and information access to achieve:
  - Delivery of critical information at the point of care
  - Greater efficiency from the replacement of paper-based workflows
  - Reduced medical errors
- Rapidly deliver picture archiving and communications systems (PACS) images
- Contain or reduce the time, resources and personnel costs associated with:
  - Maintaining complex IT infrastructures
  - Accommodating evolving regulatory requirements, mergers and acquisitions and changing business demands related to new specialty services, affiliate programs, remote clinics and offices or other innovative initiatives such as wellness programs
- Ensure business continuity and disaster recovery
  - Emergency systems must run 24/7 because patients could be at risk
- Perform patch and update management affected by:
  - Maintaining aging PC and laptop fleets that require labor-intensive troubleshooting and support
  - Migrating to Microsoft Windows 7, along with new requirements for multimedia and collaboration, making older PC fleets obsolete

### **The importance of application and desktop virtualization in healthcare**

As healthcare continues to transform, application and desktop virtualization increasingly plays a central role in supporting clinical workflows. Virtualization will continue to grow to address several of the emerging needs that follow.

#### **Investment protection for large and expensive EHR deployments**

In the United States, Meaningful Use regulations require healthcare providers to adopt EHRs in order to obtain Medicare and Medicaid reimbursements. Meaningful Use has been (and will continue to be) a major driver of health information technology (HIT) investment. Virtualization provides huge efficiency and cost benefits by allowing IT to centrally manage, deliver and update complex and rich clinical applications to anyone and any device.

#### **BYOD deployments**

To be successful, EHR modules must be delivered to a variety of devices – including thin clients, laptops, tablets and some healthcare-specific devices – across hospitals and other care settings. Moreover, it's critical for clinicians to be able to use whatever device they choose – personal or corporate – without increasing management headaches or security risks. Virtualization enables device choice by empowering employees to work how and where they prefer, making everyone more mobile, productive and satisfied, and ultimately helping healthcare organizations attract and retain valuable employees.

#### **Consumerization of IT**

Many of today's clinicians want to use their personal devices to access the data and applications they need, regardless of whether they're working from home, the hospital, the clinic or a nearby coffee shop. Virtualization accommodates the consumerization of IT, granting clinicians the freedom and flexibility they want while addressing the IT department's need to ensure information security and access control.

### Improved security

Virtualization continues to be a major technology consideration whenever security and compliance are being reevaluated or there are concerns over data breaches. Through centralized application management, data storage and maintenance, IT gains more control over content and can remotely ensure a strict separation between healthcare data and personal data on BYO devices. Security and compliance are simplified by leveraging virtualization to keep all electronic protected health information (ePHI) in the data center rather than on the device itself, thereby significantly shrinking the overall potential threat of attack. Access rules can be enforced to limit the risks of full exposure to databases, and systems can be isolated from the virtualized apps to keep malware from spreading. In addition, with virtualization, security software and critical application patches can be centrally deployed to all user-facing application infrastructure at once.

### Centralizing the IT function

Many healthcare companies are looking to consolidate, simplify and cut costs in IT through virtualization, which helps eliminate IT silos across regions to avoid redundancies and inefficiencies. Virtualization also enables rapid and consistent delivery of core IT services and applications to acquired hospitals or physician practices, making it possible to get new facilities and employees up and running quickly while providing secure services to business partners or individuals who need temporary access. In addition, virtualization enables healthcare organizations to deliver IT services to the greater community, for example, large providers offering software-as-a-service (SaaS) to affiliated hospitals or smaller physician offices that lack the capability to locally install and manage enterprise software.

### Remote work or remote care initiatives

Virtualization also improves work-life balance for doctors. For example, using virtualized apps and desktops, physicians can finish their documentation and sign off on charts at home, instead of having to perform these tasks on site at the hospital or office. If a patient's status changes, the clinician can even log into the EHR from the home computer, check the updated patient chart and recommend treatment next steps from home.

### Getting ready for Stage 2 Meaningful Use mandates

Application and desktop virtualization enhance the efficiency of new IT initiatives such as building a health information exchange (HIE) with other local healthcare providers or offering hosted IT services to affiliation groups, smaller physician group practices or outpatient centers. Virtualization also helps healthcare IT prepare to step up to Stage 2 Meaningful Use requirements, which include demands for a larger number of electronic transactions. In Stage 2, many Stage 1 optional requirements, such as adding lab results to EHR systems and providing patients with access to their medical records will become mandatory. Virtualization can help IT quickly implement new applications and core system upgrades to meet these requirements.

So the big question becomes: How do you as a healthcare IT professional enable the "meaningful use" of EHR technology and provide users with seamless access to all the other client-server applications that run your business? Implementing a comprehensive EHR strategy is not an easy task, especially in a distributed PC environment that is both increasingly complex and costly. Virtualization helps simplify this complex task, offering greater functionality without compromising data security.

### Desktop and application virtualization powered by Citrix XenApp and XenDesktop

While healthcare organizations have several desktop and app virtualization vendors to select from, Citrix has long been the industry's preferred choice. Citrix is a trusted solution provider to more than 90 percent of the largest healthcare organizations and all the US News & World Report top hospitals. Citrix also partners with the leading health information technology vendors. For example, XenApp® delivers 84 percent of Epic Hyperspace and Cerner Millennium offerings. Based on its solutions' ability to enable fast and successful EHR deployments, reduce desktop and app management costs and improve patient data security, Citrix comes highly recommended by top healthcare organizations and every major EHR vendor.



Figure 1: Transform healthcare IT with Citrix XenApp and XenDesktop\*

XenApp and XenDesktop transform healthcare IT by centralizing Windows applications and desktops, securely delivering them to users on any device in any location and streamlining updates and administration. With XenApp and XenDesktop (see Figure 1), you can:

- Implement a comprehensive and successful mHealth strategy that centralizes desktop, app and data management, thereby lowering your risk of a security breach and reducing operational costs.
- Deliver customized desktops, EHR apps and other critical business and clinical apps on demand, thereby simplifying the overall cost of ownership, reducing or eliminating PC refreshes and strengthening security while significantly improving the user experience.
- Provide secure access to your critical clinical apps with a high-definition user experience from any device, over any connection, thereby delivering information immediately to enable providers to make fast, informed decisions related to patient care.

- Centralize your IT department to serve clinicians and staff in distributed locations across the country or state, and to reduce the time and effort required to manage layers of technological complexity. Centralization enables faster onboarding of new users, efficient, system-wide distribution of new apps and upgrades and faster disaster recovery plan execution to ensure business continuity.
- Enable greater productivity and increase clinician mobility by permitting desktops and applications to follow users from device to device. By reducing the time required to launch applications on successive devices, providing a consistent experience from device to device and delivering actionable information right at the point of care, virtualization enhances both workflow and quality of care well beyond other application deployment methods.

These IT benefits can dramatically improve the way clinicians provide care. With real-time access to data, apps and desktops that offer a high-definition experience on any device, today's healthcare professionals spend less time logging in and more time seeing patients, reviewing comprehensive medical records and listening to their concerns. The result? The patients and the healthcare organizations themselves benefit.

### How do XenApp and XenDesktop work?

With XenApp and XenDesktop, IT can mobilize healthcare by delivering either full desktops or the apps alone to a range of devices, while reducing costs by centralizing the control and security of apps and data. The unified XenApp and XenDesktop virtual delivery platform permits users to accomplish their workflows on any PC, Mac, laptop, tablet or smartphone – both on premise and in the cloud – while enabling IT to secure information and manage varied mobile workspaces.

Secure, mobile healthcare workflows are made possible by a number of features built into the XenApp and XenDesktop solution. A summary of these features and capabilities follows.



Figure 2: Providing seamless access to mission-critical and life-critical applications

### Anonymous login

As healthcare organizations leverage remotely hosted EHR systems, anonymous login allows a simplified delivery mechanism that requires much less infrastructure interaction between the healthcare organization and the hosting provider. Anonymous login provides additional flexibility for healthcare organizations to support specific use cases.

### Desktop roaming and application prelaunch

Clinicians can speed access to their applications and information by eliminating application launch times with Citrix desktop roaming and application prelaunch features. The quicker a clinician can access needed information, the more efficient that provider can be.

In addition, sessions can be set up to prelaunch and wait in an active or disconnected state, giving users instant-on access to an already active app session. This setting option further reduces the wait time for clinician access. For example, if doctors begin seeing patients promptly at 9 a.m. every day, the virtual app and desktop sessions can be set to spin up at 8:55 so there is no wait for them to launch.

### Provisioning Services

Clinicians demand both speed and consistency from their IT systems so they can focus on the patient, not their computing experience. By using Citrix Provisioning Services™, IT administrators can ensure a fast, consistent user experience on a large scale. With virtual desktops that are rebooted, and therefore re-imaged, when a user logs off, and application servers that are re-imaged on scheduled reboot, the user environment continues to perform as well as the day the “gold” images were released.

IT staff also benefit from Provisioning Services single image methodology to build, maintain and troubleshoot desktop and application environments. IT can configure, update and apply patches to a single XenApp or XenDesktop image that is delivered to thousands of users, further reducing administrative time and risk due to human error. In addition, scaling out both desktop and application environments is simplified to an extreme degree, allowing incredibly fast expansion to support hundreds or thousands of users. Simply boot more virtual machines and Provisioning Services provides the desktop or application server image.

### Self-service app store

Clinicians and staff can access authorized apps easily through a secure and powerful self-service Microsoft Windows app store. Users may subscribe to applications, desktops or data services from any device to gain access to those same services from any other device for a simple, seamless experience. Connections with running apps are maintained so that users may move from device to device and return to continue the task at hand, right where they left off.

### Secure by design

Because apps, desktops and data are managed within the data center, IT maintains data protection, compliance, access control and user administration as easily on BYO devices as on corporate-owned endpoints – within the same unified environment. Protected data, including ePHI, never leaves the data center. Used with XenDesktop, XenApp or Citrix XenMobile®, Citrix NetScaler Gateway™ secure access technology increases security, better enables mobile user

access and reduces costs when compared with alternatives. NetScaler Gateway provides a single point of control and tools to help IT administrators ensure compliance with regulations and protect corporate information. It empowers users with a single point of access – optimized for roles, applications, devices and networks – to the enterprise applications and data they need.

The latest versions of XenApp and XenDesktop are compliant with Federal Information Processing Standards (FIPS), which is a common reference standard for the U.S. federal government, healthcare organizations and other regulated industries. Being FIPS compliant provides a head start when auditing time comes around.

### [High-definition user experience](#)

With Citrix HDX™ technologies, which feature capabilities that deliver a high-definition experience to users of Windows applications and desktops – on any device and over any network – the user experience rivals that of a local PC, even when using apps featuring multimedia, real-time voice and video collaboration, USB peripherals and 3D graphics. For example, XenDesktop can stream PACS to workstations in diagnostic departments instead of deploying the software on each device.

Healthcare IT organizations are under more pressure than ever to be relevant in supporting and driving business objectives. Turning traditional IT organizations into internal service providers demands flexible infrastructure and streamlined, automated processes. Both XenApp and XenDesktop are available as on-premise installations and are built to be hypervisor, storage and network agnostic. They can be deployed on popular cloud management platforms including Apache CloudStack® or the CloudStack-based Citrix CloudPlatform™ or Amazon Web Services. Alternatively, customers can choose to use hosting services provided by a Citrix partner or reseller.

### [How your peers use XenApp and XenDesktop to improve patient care](#)

Award-winning Citrix application and desktop virtualization solutions have a long history of market leadership in healthcare. Millions of caregivers and staff enjoy real-time access to virtualized applications from any device, including zero and thin clients, mobile workstations and other endpoints. The case studies that follow spotlight business benefits that customers have achieved by adopting XenApp and XenDesktop to solve their application and desktop delivery and management challenges.

#### [Miami Children's Hospital](#)

As a world-class pediatric hospital, Miami Children's Hospital (MCH) has unrivaled expertise and information to guide the care it provides to patients. The challenge is to make this content – from patient data and lab reports to surgical best practices – available when and where it's needed.

MCH built a telehealth infrastructure that helps doctor access, share and collaborate around patient and medical information, wherever they are. XenApp and XenDesktop make virtual desktops and applications, including electronic medical records, available securely on any device.

[Read more](#)



### [Kindred Healthcare](#)

Already a top-150 private employer in the United States – with nearly 77,000 employees in 46 states – Kindred Healthcare is fueling rapid growth, in part, by the acquisition of complementary healthcare organizations. To operate efficiently while ensuring a seamless healthcare experience as patients move among its facilities and divisions, the company must work quickly to bring these acquisitions into a unified computing environment.

Kindred recently relied on XenDesktop and XenApp to successfully integrate RehabCare, a \$1.3 billion rehabilitation company with 37 hospitals in multiple states. The Citrix solution delivered virtual desktops and applications to these new users so they would have the resources they needed, from Adobe Acrobat to SAP, available immediately upon commencement of Kindred's operational ownership. The centralized control and management provided by XenDesktop and XenApp made it simple for Kindred to give new users access to the systems their work depends on while enforcing company policies regarding how and where these resources can be used. Further, by providing access to virtualized applications rather than actually assimilating the networks of integrated companies into its own network, Kindred ensures that its systems remain isolated from threats (such as malware or outdated security patches) that may be present in the other environment.

[Read more](#)

### [Seattle Children's Hospital](#)

As a world-class healthcare organization, Seattle Children's Hospital makes extensive technology resources, from electronic medical records to databases of clinical information to real-time patient monitoring systems, available to its staff. But its healthcare professionals were constrained in their ability to put these resources to work for their patients. As practitioners moved from offices to team rooms to patient bedsides to shared computers-on-wheels, differences in configuration among the 4,000 to 5,000 workstations in the organization made for an unfamiliar and unpredictable computing experience.

To provide its practitioners with a faster, more mobile and fully transparent computing experience, Seattle Children's Hospital selected a hosted virtual desktop infrastructure (hosted VDI) desktop delivery model powered by XenDesktop. With Citrix desktop virtualization, practitioners now use single sign-on to log into their desktop and applications in a matter of seconds, then spend the rest of their preparation time discussing the patient they are about to see. Once in the clinic room, they can log into the exact same desktop state they just left, with the full information and patient context already displayed, in 10 to 15 seconds.

[Read more](#)

### [Emory Healthcare](#)

For years, Emory Healthcare has relied on XenApp to deliver a virtual desktop of clinical applications to caregivers and other staff. Application virtualization has been far more efficient than deploying and maintaining large, complex software solutions on 10,000 devices spread across multiple campuses. Importantly, the SmoothRoaming technology in XenApp allows doctors and nurses to move from one workstation to another and pick up their session where they left off, simply by entering their credentials.

As the organization grew, the IT team recognized the need to scale up the virtual desktop environment on demand. By implementing XenDesktop, Emory enabled exceptional patient care by streamlining delivery of healthcare information to caregivers anywhere, on any device. Citrix virtualization solutions support this goal by providing faster access to the virtual desktop, improving IT's ability to monitor, troubleshoot and resolve issues that might interfere with clinician access, and enabling the IT team to address users' requests to maintain the familiar experience of their desktop.

[Read more](#)

### Additional resources

Review the resources that follow to learn more about how Citrix is helping to transform healthcare with desktop and application virtualization.

### Web:

Citrix XenApp: [www.citrix.com/xenapp](http://www.citrix.com/xenapp)

Citrix XenDesktop: [www.citrix.com/xendesktop](http://www.citrix.com/xendesktop)

Citrix Healthcare Solutions: [www.citrix.com/healthcare](http://www.citrix.com/healthcare)

**Corporate Headquarters**  
Fort Lauderdale, FL, USA

**Silicon Valley Headquarters**  
Santa Clara, CA, USA

**EMEA Headquarters**  
Schaffhausen, Switzerland

**India Development Center**  
Bangalore, India

**Online Division Headquarters**  
Santa Barbara, CA, USA

**Pacific Headquarters**  
Hong Kong, China

**Latin America Headquarters**  
Coral Gables, FL, USA

**UK Development Center**  
Chalfont, United Kingdom



### About Citrix

Citrix (NASDAQ:CTXS) is a leader in mobile workspaces, providing virtualization, mobility management, networking and cloud services to enable new ways to work better. Citrix solutions power business mobility through secure, personal workspaces that provide people with instant access to apps, desktops, data and communications on any device, over any network and cloud. This year Citrix is celebrating 25 years of innovation, making IT simpler and people more productive. With annual revenue in 2013 of \$2.9 billion, Citrix solutions are in use at more than 330,000 organizations and by over 100 million users globally. Learn more at [www.citrix.com](http://www.citrix.com).

Copyright © 2015 Citrix Systems, Inc. All rights reserved. Citrix, XenApp, XenDesktop, Citrix Provisioning Services, XenMobile, HDX, CloudPlatform, NetScaler Gateway and CloudStack are trademarks of Citrix Systems, Inc. and/or one of its subsidiaries, and may be registered in the U.S. and other countries. Other product and company names mentioned herein may be trademarks of their respective companies.