Virtualizing Healthcare IT to Increase Productivity, Patient Satisfaction and Compliance

Citrix Solutions for Healthcare

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Introduction

The evolving healthcare industry is shaped by a variety of factors and challenges, including government mandates for staff efficiency in order to save lives; a need for more stringent security measures to comply with the increasing regulations governing privacy and security of patient information; a high demand for improved customer service due to increased public scrutiny of quality of care and patient safety; and a growing need to solve the fiscal dilemma of meeting the significant care demands of an aging population with diminished government reimbursements. Customer satisfaction and loyalty, along with sales and profitability, determine the winners and losers. An IT infrastructure that enables secure, reliable access to mission-critical applications and valuable information, such as patient records, helps address these requirements and challenges, so that healthcare organizations can meet with success today and are also fully poised to address the industry landscape of tomorrow.

This white paper examines the challenges in today's healthcare industry, the implications for organizations, and the benefits delivered by a strategic approach to effective delivery of desktops and applications. It provides guidance about how to create a cost-effective IT infrastructure that can enhance patient safety and quality of care by giving clinicians secure, easy and flexible access to electronic health record (EHR) systems and other applications needed for informed decision-making, while safe-guarding the privacy and confidentiality of patient data.

Challenges facing healthcare organizations today

Minimizing IT cost and complexity while improving patient care

Traditionally, healthcare has spent less of its resources on IT than most other industries. Although still trailing other industries in spending, a typical healthcare IT organization now consumes an average of 3 percent of total operating funds, and budget for IT continues to be a major concern for healthcare providers. To weather the recession, most healthcare organizations are looking to extend the life of existing IT infrastructure and only invest in strategic projects.

To date, many healthcare organizations have automated their financial and administrative functions, but many hospitals have not fully adopted the new electronic information and records systems yet. For example, only about 40 percent of U.S. hospitals have adopted clinical information systems or electronic medical records in at least one facility and less than 3% have clinical decision support systems. In view of budget constraints, organizations need a solution that enables IT modernization without the complexities and costs of upgrading the entire infrastructure to support new clinical applications. The ability to continue using existing desktop hardware, operating systems and networks is critical to controlling total cost of ownership. Further, a solution that allows desktops and applications to be deployed and managed centrally from the datacenter instead of on each device can make a huge difference in IT administration costs.

Leveraging network infrastructure is an important consideration because it is essential to support the concurrent functionality of EHR systems, now considered mission-critical. Network infrastructure may cover a wide variety of aspects, from bandwidth to encryption and from mirrored servers to a hot site for disaster recovery. When the point of care expands into the community, it is important to be able to deliver desktops and applications on demand via the public Internet, so associated treatment facilities can collaborate on medical records, clinicians in the field can access information, and physicians can connect from their offices and homes. This requires a solution that can securely deliver on-demand access to full-featured desktops and applications, even over low-bandwidth connections.

Along with cost considerations, healthcare IT departments must take computing complexity into account when looking for an EHR delivery solution. Although the industry's focus today is on acquiring clinical systems to support direct caregivers, administrators, operational support staff and financial staff, external users – patients, payers, and other providers – also need fast access to these applications. Each person who requires access has different needs, and the solution must be able to accommodate them without overtaxing IT staff.

Ensuring privacy and confidentiality of patient information

Complying with government regulations has been top of mind for healthcare providers for the last several years. For example, with the HIPAA Security Rule in the U.S. and similar regulations in other countries, providers are continuing efforts such as maintenance, auditing, and process improvements to ensure ongoing compliance. Centralization of patient data, encryption of communications and reduction of data on client devices are ways that IT departments can reduce the security exposure of their organizations and meet compliance regulations.

Healthcare organizations have realized authentication methods must be more specific, authentication measures stronger, and audit trails established and used for evidentiary purposes. Associated with these controls must be support for managing access authorization for users who may serve multiple roles and have multiple relationships with patients. For example, a nurse normally working a shift in an intensive care unit may also occasionally be called for duty in the emergency department on a second shift. Physicians who do not have a treatment relationship with a given patient may need access to that patient's health information for quality assurance purposes, research, or in an emergency situation. Some healthcare professionals may need access to the records of virtually all patients currently treated in the provider setting, but should not be provided access where a patient may have invoked a restriction or where a conflict of interest exists (for example, a relative as a patient). Such access requirements are highly complex and require very sophisticated internal control mechanisms that can only be effectively managed through the use of sophisticated security technology.

Consistent access interfaces with data control mechanisms that can be efficiently managed, along with password security and single sign-on access to Windows, Web, proprietary and host-based applications on a variety of desktop clients, are critical to the healthcare organization's success.

In addition to security controls for data "at rest" in databases or device memory within a provider setting, the healthcare industry needs security for data "en route" that is being used by an increasingly mobile workforce. Some providers want the convenience of accessing patient information from home, the office, or in transit. Such remote access contributes to patient safety by allowing providers to verify lab values or findings on radiological studies as rapidly as possible. In return, the ability to digitally transmit information back to a care setting from a remote location ensures that the communication is legible and timely.

An outsourced transcription, coding, billing, or customer-service company may employ other professionals that work for healthcare providers. Although in some cases, mechanisms can be used to encode or mask patient identification, this is neither safe nor effective in all scenarios — once again requiring secure remote access and transmission controls that blend with the technology at the outsourcing location. Finally, as more healthcare services are rendered outside of the traditional provider setting, such as in a home, ambulance, school, job site, etc., the ability to securely communicate health information to and from a base station and often across multiple platforms and venues is essential. New technologies that bundle security services, making them transparent to the user and permitting easy administration, are keys to building appropriately secured information systems and assuring compliance with government mandates.

Gaining clinician acceptance of new technology

An EHR strategy based upon IT modernization can still fail if doctors and nurses do not feel comfortable using online applications and information. Ease of use, simplicity, and a consistent, reliable experience, whether in the office or while roaming, can help win over staff members to a new IT system. Physicians are the lifeblood of healthcare organizations, and it is critical to ensure overall ease and satisfaction with IT systems, because that directly translates into productivity.

Potentially the greatest barrier to clinician adoption of IT systems is the human-computer interface. Today more than ever, clinicians focus on productivity and the ability to see a greater number of patients in a day. Introducing new technology can slow this process down and result in pushback. Successful adoption of technology by clinical staff depends upon providing the best access experience, including such desirable capabilities as: support for wireless and mobile technology; simplified access to desktops and applications with single sign-on; support for roaming access; ability to quickly switch users on shared workstations; consistent performance regardless of location, device or network type; and the ability to use the computing device that best fits the patient care scenario.

Clinicians are generally mobile professionals; they must go to their patients at the bedside, on the gurney, or in the examining room. They are taught to address the patient face-to-face. Data entry devices that do not permit clinicians to direct their attention to the patient, or consume more time than the clinician spends speaking with, examining, or administering to the patient, or else are heavy and cumbersome to use, will not be used. It is for this reason that wireless and mobile devices are becoming very popular. They are unobtrusive to use and permit direct access to applications and data. With larger screens, tablet PCs are also becoming popular — both in wireless and docking mode. Today, many physicians are using personal digital assistants (PDAs) for communications and have started to request access to EHR systems. The key is

finding desktop and application delivery solutions that support wireless or wired access on a wide variety of devices so that clinicians have a choice.

Another factor that can encourage clinician adoption of EHRs and other applications is simplicity. As doctors and nurses move from one computer to another, they expect to see the same interface regardless of whether it is displayed on a terminal, an office PC, a wireless tablet or a laptop. These busy professionals do not have time to learn and adjust to a different view or access method for each device. Similarly, caregivers must be able to move rapidly from one device to another without elaborate or time-consuming login and logoff procedures, while still maintaining security.

High performance is another critical factor, especially for remote and mobile workers. Healthcare demands speed, and clinicians need quick response from their applications so that they can complete reports and documentation in a timely manner. To ensure user satisfaction, organizations must find a desktop and application delivery solution that can provide high performance of powerful data or graphics-intensive applications, even over low-bandwidth connections.

Achieving clinical modernization to optimize productivity

The challenging healthcare environment has spawned an interest in modernizing clinical IT systems to support healthcare goals. According to the 20th Annual HIMSS Leadership Survey, over half of health IT professionals indicated clinical systems as the top priority for IT over the next two years, with a specific focus on EMR and computerized physician order entry technology. Healthcare IT organizations that want to implement or expand EHR technologies will be faced with the typical challenges of clinical modernization: costs, clinician acceptance, and patient information security.

Improving patient safety requires flexible, on-demand access to confidential information about current medical histories, medications, allergies and test results, from any location – in particular, where care is given or decisions are made. In addition to patient records, clinicians need access to applications such as computerized physician order entry (CPOE) that not only streamline orders, but also include reference databases and alerting mechanisms.

Many providers are now looking to modernize their clinical information systems to support patient safety initiatives, but this process involves several potential roadblocks: the cost and complexity of implementing, managing and deploying powerful new EHR applications; persuading clinicians to use the new systems on a consistent basis; and making sure that electronic patient information is secure and compliant with government mandates. Developing an effective IT strategy that addresses these key challenges is essential for a successful EHR implementation.

Delivering EHR as a service

The IT environment in healthcare organizations is often highly complex and diverse due to gradual acquisition of different systems and applications that do not always work smoothly together. Add to this complexity the increasing number of user variables – different devices, connections, locations and preferences – and it becomes clear that organizations need a high-level, holistic approach. They need a

simple, transparent way to connect information supply (IT resources) with information demand (user needs) that supports IT modernization, while providing the simplicity that users demand and the data security that HIPAA and similar regulations in other countries mandate.

To bolster effectiveness of information technology, some healthcare CIOs are consolidating IT for greater management efficiency and cost savings. Some are standardizing on fewer technologies. Others are outsourcing the management of their systems. However, this trend represents only half the cycle of information use. No matter how efficiently information is managed, it is useless and valueless if clinicians cannot access exactly what they need, precisely when they need it, from any location. For this reason, CIOs need to make virtualized access a priority in their strategy to improve patient safety and quality of care.

Specifically, healthcare CIOs need to address how to:

- Cost-effectively deploy desktops and applications across all users and locations, while leveraging existing IT infrastructure.
- Provide secure, flexible, real-time access to clinical information for physicians and other clinicians at the point of care.
- Improve clinician satisfaction by delivering convenient access to systems using single sign-on and role-based access to authorized desktops, applications, and information.
- Enhance the security of patient records by providing access safeguards that include industry-standard encryption and support for strong authentication.
- Support the mobile work style of clinicians with roaming access support.

A comprehensive desktop virtualization solution can address these challenges. This solution enables delivery of EHR as a service, making information resources securely available in real time, regardless of the clinician's work scenario. It provides:

- Easy and fast access over virtually any trusted or non-trusted network and device to any desktop, application or resource — whether centralized on the server, distributed on the desktop, or both.
- Information security that authenticates users and allows access appropriate to their clinical role and access scenario.
- A consistent high definition user experience when roaming from one device to another.
- Flexible access from offsite physician offices, home offices, remote locations and mobile devices, as well as across the healthcare campus.

A comprehensive solution

As the global leader and most trusted name in desktop and application delivery solutions, Citrix enables healthcare organizations to deliver desktops and applications to users with the best performance, highest security, and lowest cost. Citrix has established a strong presence in the healthcare industry, with the top 5 global healthcare organizations and the top 15 U.S. healthcare organizations among its customers.

Citrix was the first company to understand how organizations use desktops and applications to operate efficiently and effectively, and to develop virtualization solutions based on the needs of the customer and the industry. Instead of limiting IT solely to modernizing systems and optimizing business processes for better operating efficiencies, Citrix solutions make IT relevant to the business, giving them the flexibility to change on demand and over time across technical, physical, and organizational dimensions. Without changing the overall environment, IT gains an agile infrastructure that connects desktop and application delivery directly to business value, enabling IT to keep pace with the business, to handle multiple challenges concurrently, and to drive productivity and profitability initiatives across the company and across business units.

> "Citrix is a foundation partner in almost everything we do. We must have a secure, reliable, robust and flexible infrastructure so our clinicians can access information anywhere and on any device. Citrix plays a huge role in making that happen."
>
> - Dee Cantrell, CIO of Emory Healthcare

Citrix today is relied upon by IT teams and their strategic executives at more than 200,000 organizations throughout the world, including 100% of the *Fortune* 100 companies and 98% of the *Fortune* Global 500.

Delivering desktops and applications as a service

Citrix desktop and application virtualization transforms healthcare IT into an on-demand service by centralizing the management and delivery of EHR applications and clinical desktops, facilitating the organization's transition to clinical automation. It simplifies IT operations by managing a single image of desktops, applications, and servers, accelerating application rollouts and reducing IT operating costs up to 50 percent.

Citrix solutions optimize delivery by integrating network optimization with desktop, application, and server virtualization to make it easy for users to work productively from anywhere with the best desktop and application performance and security, regardless of location. The components of the Citrix desktop delivery solution for healthcare are as follows:

- **Citrix XenDesktop** - the clear choice for virtualization that securely delivers virtual desktops and applications as a service to users anywhere. With XenDesktop, clinicians have on-demand access to

their desktops and applications across any network, through any device, in any location. By implementing this desktop and application virtualization solution, healthcare organizations can reduce desktop TCO up to 40 percent and the cost of management by 50 percent by centralizing resource management in the datacenter and simplifying the traditional desktop lifecycle. IT administrators also benefit from having a single point of control to manage access and actions based on both the user and the endpoint device, providing better risk, security, and regulatory compliance management.

XenDesktop is the only virtual desktop solution that delivers a high definition user experience over any connection – including low-latency access on the local corporate network to virtual desktops and high-latency wide area networks (WANs) for remote desktop access using Citrix HDX technology.

> "Desktop virtualization is really taking off. Our help desk has been using hosted virtual desktops with thin devices for months with great success, and now, of course, we are implementing streamed desktops as well. I would say that cost savings is a benefit of the Citrix solution, followed by flexible delivery to remote users. We showed that with Citrix, employees can get their applications and desktops anywhere, even during a hurricane."
>
> - Landon Winburn, Software Systems Specialist, University of Texas Medical Branch

Windows 7 migration - For healthcare organizations planning to upgrade to Microsoft Windows® 7, Citrix XenDesktop dramatically simplifies the migration process. With XenDesktop, because all desktops are installed, managed, and maintained centrally in the datacenter, the migration is handled centrally by IT staff and then virtualized and delivered to users, so no installation, configuration, or maintenance is required on end-user devices. Because there are far less physical machines to upgrade, healthcare organizations benefit from minimizing the need for travel and accelerating time-to-completion for migrating to a Windows 7 environment.

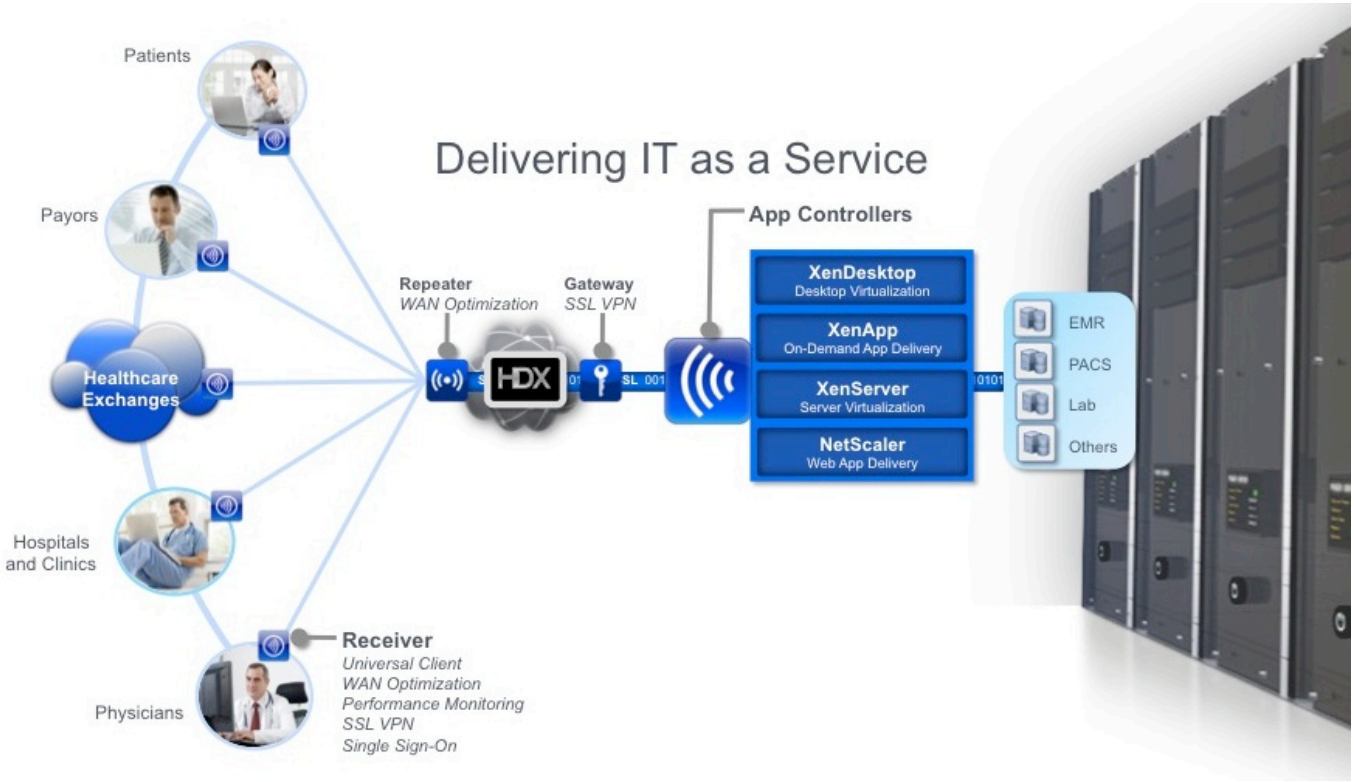
- **Citrix Receiver** - a lightweight software client that makes accessing virtual applications and desktops on any device easy. Citrix Receiver allows IT organizations to deliver clinical desktops and applications as an on-demand service to any workstation, laptop or tablet, such as an Apple iPad®, thin client, or mobile and smart phone devices, in any location with a rich, high definition experience. When organizations use Citrix Receiver for providing desktops and applications on-demand to their workers, from branch office workers to mobile device road warriors, they experience the benefits of a unified management strategy, including optimal desktop and application performance and substantial cost-savings.
- **Citrix Essentials for XenServer** - an open and powerful server virtualization solution that radically reduces datacenter costs by transforming static and complex datacenter environments into a more dynamic, easy to manage IT infrastructure.

- **Citrix NetScaler** - a Web application delivery solution that accelerates performance, provides Layer 4-7 traffic management, offers an integrated application firewall, and offloads servers to ensure application availability, increased security, and substantially lower costs. It reduces TCO of Web application delivery, optimizes the user experience, and makes applications run five times faster.

- **Citrix Branch Repeater** – a WAN optimization solution that accelerates application delivery to distributed users while dramatically reducing bandwidth costs and simplifying remote office infrastructure. Citrix Branch Repeater solutions reduce IT costs, increase user productivity, and save time by simplifying remote office start-up and management, improving network utilization, and providing high definition experience to users.

  The Repeater Plug-in that runs within Citrix Receiver reduces the amount of traffic sent over the network, generating cost savings on bandwidth while improving end-user performance for healthcare organizations that have large numbers of remote clinics without dedicated IT staff. For larger healthcare facilities, Branch Repeater appliances enable you to use your existing bandwidth to serve more users and sessions, providing additional ROI immediately.

  The following diagram illustrates how these Citrix products work together to provide your healthcare organization with a comprehensive desktop and application delivery solution.



Reducing cost and complexity to remain competitive

Citrix solutions provide powerful management tools and a centralized architecture that streamline implementation, administration, and support of new healthcare applications such as EMRs and CPOE, as well as upgrades and patches. Because desktops and applications are centrally installed, configured, and maintained on the server instead of on each clinician's computer, IT teams can deploy them in a fraction of the time and at significantly less cost compared to traditional desktop-based deployment. Citrix provides intelligent orchestration of healthcare IT infrastructure resources to meet all hospital and physician needs.

Reduce operations costs up to 50 percent: With Citrix solutions, IT updates and patches a single desktop and application package in the datacenter, rather than having to manage desktops and applications on hundreds or thousands of individual user devices spread across the enterprise. Centralization of desktop and application management drastically reduces operations costs by making IT staff more efficient and virtually eliminating the need for IT support to travel to users. With desktop and application virtualization, it's fast – new desktops and applications are delivered in minutes not months, and updates complete in seconds not weeks.

> "With XenDesktop, we don't have to spend time building each desktop or worrying about adding a new resource—everything is automated, and the correct desktop is dynamically assembled each time the user logs in."
>
> - Dave Bennett, Director of Technical Support, Alameda County Medical Center

Reduce infrastructure costs: Citrix solutions easily integrate with your existing servers, PCs, networks and storage, making your infrastructure more efficient. For networks, Citrix solutions can reduce bandwidth needs by 75 percent through compression, caching and optimizations; for servers, Citrix can reduce Web server overhead by 60 percent by offloading SSL and TCP connection functions; for storage, Citrix minimizes storage and image management requirements through on-demand image streaming; and for PCs, Citrix solutions can double their useful life through desktop and application virtualization.

Enable agility – do more with less: By delivering desktops and applications as a service, IT can respond to new business requirements much faster, with much lower capital cost requirements. The centralized desktop and application delivery approach inherently enables clinicians to work anywhere, so connecting remote physicians and outsourcing is accomplished with a simple point-and-click. Adding new remote offices or integrating an acquired hospital is also a straightforward expansion of the existing infrastructure — not a separate, new system with new hardware, software, training, and integration. Compliance and Business Continuity projects are much easier and less costly, by leveraging centralized Citrix solutions.

Proven support for major EHR vendors: Hundreds of healthcare customers have used Citrix solutions to deliver EHR systems. Citrix continuously collaborates and innovates with all major EHR vendors to

deliver efficient and effective solutions for healthcare. Healthcare organizations can significantly reduce cost and time to implement EHR technologies with Citrix. For example, Emory Healthcare has benefitted from significant savings using Citrix solutions.

Optimizing user experience to improve patient care

Citrix solutions enable organizations to optimize both the practitioner and the patient experience. Whether the user is a nurse entering patient data at an office, a doctor roaming the halls of a hospital visiting patients, a nurse providing home healthcare, or a medical supply worker who spends the majority of his time in transit, he or she is more efficient and effective when given the appropriate tools to remain connected to the mission-critical data they need. When the point of care expands into the community, Citrix solutions provide on-demand access to full-featured desktops and applications via the public Internet, even over low-bandwidth connections, so associated treatment facilities can collaborate on medical records, clinicians in the field can access information, and physicians can connect from their offices and homes.

A positive user experience – combining convenience, speed, simplicity, consistency, flexibility and performance – is the key to clinician adoption of online systems that replace paper files and orders. Citrix solutions allows you to accelerate adoption of new systems by providing optimized user experience and access to desktops and applications from any device, in any location, on demand, dramatically increasing clinician productivity, and thereby improving the quality and increasing the quantity of patient interaction and care. Citrix solutions for healthcare provide:

- **A consistent access method and interface regardless of location, device or connection:** With Citrix solutions, clinicians connect to desktops and applications using exactly the same procedure whether they are in the hospital, a private-practice office, a home office, or a satellite clinic. Typically, the doctor or nurse simply navigates to the hospital's Web site and authenticates using a password (or a password and authentication device such as a biometric) to receive secure access to the desktop he or she is entitled to. The system interface remains the same each time, allowing physicians to use the device that is most appropriate for the situation – PC, thin client, mobile cart, tablet, PDA, and so on.

- **Persistent application sessions from one device to another:** Citrix desktop delivery solutions include SmoothRoaming™ technologies that provide an "always-on" connection to enterprise resources as clinicians roam from one computer, location or network to another. Healthcare workers log in only once to access their desktop, and as they change devices, locations, networks, and printers, the platform automatically reformats the desktop interface for any new devices. It also ensures persistent access as users move between wired and wireless networks, even across wireless dead zones.

- **Fast access on shared workstations:** In many hospitals, clinicians use the closest workstation instead of being given their own device. The Hot Desktop feature allows users who share workstations to switch in seconds instead of going through a time-consuming, full Windows or Novell logon/logoff procedure.

- **Single sign-on to password-protected applications:** Many applications containing confidential or sensitive information require a password for access. Citrix enables clinicians to access all their password-protected applications with a single logon instead of having to remember and enter separate passwords for each application. This saves time and streamlines the access process for busy caregivers.
- **High performance of data- or graphics-intensive applications:** The Citrix architecture keeps the "heavy lifting" of application processing on the server and sends only minimal data over the network. Therefore, remote and mobile users enjoy high application performance that can boost productivity and leave more time for direct patient care.
- **Secure remote access to hospital systems:** Citrix desktop and application delivery solutions enable physicians to securely access the EHR from anywhere with the same high-quality user experience as in the hospital. Physicians get fast performance with the optimized delivery of virtualized EHR applications and clinical workstations, even over the public Internet.

Strengthening compliance to meet government regulations

Providing security that is a built-in property of the desktop and application delivery infrastructure from the datacenter through the network to the clinician, rather than something you bolt on at every tier of computing is an essential component of a healthcare organization's compliance program. Citrix solutions enable IT to control access to information residing behind the firewall, while giving users the ability to connect securely over the public Internet. The following features support compliance:

- **Desktop and application processing behind the firewall:** The desktop and application delivery architecture is secure by design, keeping desktop and application data behind the corporate firewall instead of exposed on the end-user device. Centralizing desktops and EHR applications in the datacenter makes them easier to secure – confidential patient information remains in the secure datacenter and not on the worker's local device.
- **Standards based encryption:** High performance, standards-based encryption security for all data on the network.
- **SSL VPN access with Advanced Access Control:** Using Access Gateway with the Advanced Access Control option, administrators can configure Action Rights that remotely control what data can be accessed by each clinician, and what actions he or she can perform, such as print, save, launch, and view. Therefore, if a user is on an un-trusted device such as a kiosk, the hospital's IT team can restrict the degree of access that is allowed to prevent a security breach.
- **Password expiry management:** Administrators can force regular and transparent password changes on applications that do not have password change functionality.
- **Enhanced event logging:** Expanded logging of events such as data signing helps enterprises further increase IT security and demonstrate regulatory compliance.

- **Multi-factor authentication:** Support multi-factor authentication including dynamic token, RADIUS, Kerberos, SmartCards and biometrics.
- **Web application firewall:** Application firewall protects Web-based EMR apps and clinical portals from application layer attacks such as SQL injection, cross-site scripting, forceful browsing and cookie poisoning.

Conclusion

The demands on healthcare organizations to ensure patient safety and quality of care have resulted in an increasing focus on IT modernization with the latest clinical solutions. And, in some countries like the U.S., there are financial incentives for providers and hospitals to integrate EHR technologies into their organizations. Current studies show that online systems such as CPOE and EMRs, if made easily accessible, can have a significant impact on improved decision-making and error reduction. At the same time, online access raises the possibility of security breaches and compliance issues that carry stiff penalties.

Citrix has partnered with thousands of healthcare organizations worldwide to provide desktop and application delivery solutions that enable them to achieve patient safety goals through secure access to new IT systems, coupled with fast, cost-effective administration of those systems. Citrix desktop virtualization is the easiest and most cost-effective way for healthcare providers to accelerate implementation of new software, provide a satisfying clinician user experience, and safeguard confidential patient information.

To learn more about how Citrix can help your organization transform healthcare IT, visit http://www.citrix.com/healthcare.

About Citrix

Citrix Systems, Inc. (NASDAQ:CTXS) is the leading provider of virtualization, networking and software as a service technologies for more than 230,000 organizations worldwide. Its Citrix Delivery Center, Citrix Cloud Center (C3) and Citrix Online Services product families radically simplify computing for millions of users, delivering applications as an on-demand service to any user, in any location on any device. Citrix customers include the world's largest Internet companies, 99 percent of Fortune Global 500 enterprises, and hundreds of thousands of small businesses and prosumers worldwide. Citrix partners with over 10,000 companies worldwide in more than 100 countries. Founded in 1989, annual revenue in 2008 was $1.6 billion.