

## Enhancing health care IT performance and data reliability

This paper examines the specific network infrastructure challenges of moving health care data to a purely electronic format for access by internal and external health care workers.

Challenges to making this digital conversion include increasing network performance, preserving data reliability, and maintaining security compliance. Traditional methods of addressing these challenges are reviewed, as well as solutions that may better address the unique IT needs of health care organizations.



### Imaging Associates of North Mississippi

*As an integral part of the health care system in northern Mississippi, Imaging Associates provides radiological services to major hospitals, clinics, and physicians throughout the region from its facility in Tupelo. These regional and remote health care providers access medical images with a variety of devices over many connection types. "Many of the sites are using the only WAN technology offered and face real speed barriers," said Cavett Otis, IT director for Imaging Associates. "We had been frustrated numerous times by not being able to acquire faster Internet connections and desperately needed a solution. Circadence® offered to provide a two-week test within our network, and when this was operational, I was completely blown away by the speed increases attained."*

*According to Mr. Otis, two digital X-ray images equate to just over 20 MB of uncompressed data, and to send the images from Tupelo to a site in Corinth via a cable Internet VPN took two minutes. When the Circadence MVO™ 1200 WAN Optimization suite was added to the circuits, this time dropped to less than 20 seconds, a reduction of 83-percent.*

*"In months of use, these results have remained consistent," Mr. Otis said. "Jaw-dropping performance with an attractive price point makes the Circadence MVO solution a solid investment, one which fills our need for faster connections."*

*"With the rise of access to health care data from outside an organization, significant challenges must be overcome to ensure performance, reliability, and security."*

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Health care IT is undergoing enormous change. Most of the impetus for health care IT modernization is driven by the need to cut costs while improving service, but important government mandates and regulations also place significant burdens on these IT organizations. Besides HIPAA, the U.S. government is proposing a nationwide Electronic Healthcare Records (EHR) initiative that will require health care IT organizations in many cases to completely re-engineer their information system infrastructures to comply with online records requirements.

In addition, Congress is proposing the Health Information Technology for Economic Clinic Health (HITECH) Act, which offers funds for improving health care through IT, but provides few, if any, guidelines for achieving this goal.

The EHR system, in theory, will streamline health care management, improve the quality of patient care, and cut costs by providing a universally accessible online repository for patient records. In reality, many health care IT administrators must now upgrade their hardware and software infrastructures to accommodate the new system. Beyond the significant issue of infrastructure upgrades, many health care workers themselves will

need to be trained, retrained, and provided with unfamiliar technology to perform routine tasks, such as physician order entry or moving from bedside charting to electronic recordkeeping.<sup>1</sup>

These changes will cause organizations to add more endpoint devices such as PDAs, PC carts, and laptops, as well as require a substantial rise in connectivity to their data from outside the organizations.

### The need for optimizing performance

As a result, the requirement for ubiquitous electronic access to data may put many health care IT infrastructures under severe stress. As more workers are required to access data exclusively in electronic form, LAN, WAN, and storage subsystems will see a tremendous increase in traffic – and congestion. This congestion, however, can be mitigated with hardware upgrades, optimization of existing connectivity, or both. In many cases, IT administrators will have little control over the manner in which electronic data is accessed from outside their organizations and will need to provision their systems accordingly.

Beyond the baseline stresses of converting records to a purely electronic format, the move toward pervasive computing in health care is already creating additional IT demands on health providers and facilities. The increased use of handheld devices, wireless laptop connectivity, and remote site access to data is becoming the norm for many health care workers as they see technology providing direct benefits for patient care.<sup>2</sup> Pervasive computing in health care is cutting costs and improving the quality of care, but in many cases, it may adversely affect the performance and reliability of the overall existing network infrastructure.

The most severe stress on health care IT infrastructure is the secure storage and transmission of medical images across the network. Imagery will be increasingly accessed by handheld and wireless devices and shared across WAN and campus-wide connections. The sheer size of the images generates a great deal of network traffic, and this increase is erratic and unpredictable.<sup>3</sup>

### Challenges to reliability and performance

For health care IT organizations to meet the demands of EHR and pervasive computing, they must take a fresh look at their underlying network connectivity infrastructure. In many cases, the quality of the connection to the health care data may be beyond the organization's direct control. As remote offices, clinics, and health care workers connect to the system over a variety of wireless, broadband, and cellular networks, the health care IT organization must still maintain a reliable connection for the delivery of critical health care data. Cell and wireless access in particular is subject to dropped connections, yet is beyond the direct control of IT.

Similarly, health care workers must have consistent access to data, regardless of their connection to the network. The delivery of medical images may require a level of performance that cannot be adequately achieved by an organization to many remote users with the existing infrastructure. Additionally, because IT organizations cannot predict the level of traffic on a consistent basis, "over provisioning" of the network often occurs. Nonetheless, EHR requirements will set expectations that this data will be available to any number of authorized workers, regardless of their means of connecting to it. In some cases, the quality of care will depend directly on how timely the data is delivered to the remote health care worker.

### Traditional approaches to optimizing distributed data access

With the rise of access to health care data from outside an organization, significant challenges must be overcome to ensure performance, reliability, and security. Traditional optimization technologies require nearly complete control over every endpoint that accesses the data to guarantee sufficient quality of service (QoS). Traditionally, these endpoints must be individually configured in these systems. However, these solutions are impractical in an EHR-enabled facility, where access may come from a variety of outside sources.

<sup>1</sup> Mearian, Lucas. "Teaching Old Docs New Tricks." Computerworld, February 9, 2009.

<sup>2</sup> Bardram, Jakob. "Pervasive Computing in Healthcare". CRC Press, 2006.

<sup>3</sup> Valentin, Dante. "Next Generation Radiology." Image, March 1, 2004.

## Cost and complexity of traditional hardware and software solutions

Hardware solutions are the most costly. Typical WAN and LAN acceleration devices must be carefully configured and tuned properly to provide the best performance when integrated into an existing environment. With most of these products, this project is not a simple one. QoS and traffic priorities on both WAN endpoints and the internal LANs have to be reconfigured in many cases. Most of the major WAN acceleration switch providers recommend anywhere from one to five days of administrator training to get the most out of the equipment. Furthermore, hardware-only solutions do not provide end-to-end application acceleration. Mobile applications will see little or no performance or security improvements. Similarly, traffic along the local segment may see little performance gain unless further LAN tuning occurs. Optimization stops at the acceleration hardware. In short, many acceleration products require major reconfigurations of both the WAN and resident LAN routings. Some may require moves and changes to existing switches and routers.

Software-only solutions may solve some mobile application requirements, but do little for security. Software solutions, too, may require extensive testing and configuration to be effective. Software-only solutions may also need large amounts of server and client resources, making them impractical or too costly for health care facilities to deploy without server upgrades. Some may only address a limited platform, such as Windows, or only laptop and desktop computers, leaving other access devices un-optimized.

As a result, health care IT organizations may be forced to "mix-and-match" acceleration products, as some cover specific mobile devices, while others cover only switch-to-switch performance.

## Performance and reliability made easy

Circadence offers the Circadence MVO 1200 WAN Optimization suite that requires far less configuration than existing solutions on the market. Because Circadence MVO solutions do not depend on specific network devices to achieve performance acceleration, reliability, and security, they require virtually no configuration. The Circadence MVO product line is available as a software-only client-server solution, as a hardware-based appliance, and as an embedded add-in to virtualization and other applications. Regardless of the Circadence MVO optimization solution, the product dynamically adjusts to changing conditions on the WAN or even the LAN to provide peak performance, with no complex settings or parameters to set. The Circadence MVO 1200 WAN Optimization suite also offers solutions for smartphone and PDA health care workers connecting to the WAN. All products work together. Organizations can choose the solution that fits their optimization requirements, and no reconfiguration of existing LAN or WAN equipment is ever needed.

Health care IT organizations may find that even with the increase in traffic generated by internal and external use of electronic records, they may not need significant hardware upgrades after all. Furthermore, centralized management through Circadence MVO solutions can prioritize specific applications, data types, and remote sites for even greater performance and reliability.

## Intuitive set-up

Circadence has worked closely with its customers to produce an easy-to-install solution. Circadence MVO installations require no prior training, and most organizations need less than 10 minutes to set up a Circadence MVO Appliance. Server software consumes only 1 MB of space, while the 200 KB Windows client software for desktop and laptop computers installs in minutes with no configuration necessary. Client users are totally unaware of the software, and no intervention or training is required on their part.

## Performance

Circadence MVO acceleration technology improves WAN performance by at least 50-percent, depending on the application and connection type. In independent testing by a major U.S. cellular carrier, some remote applications experienced an increase in performance ranging from 100- to 1,000-percent over a CDMA cellular network.

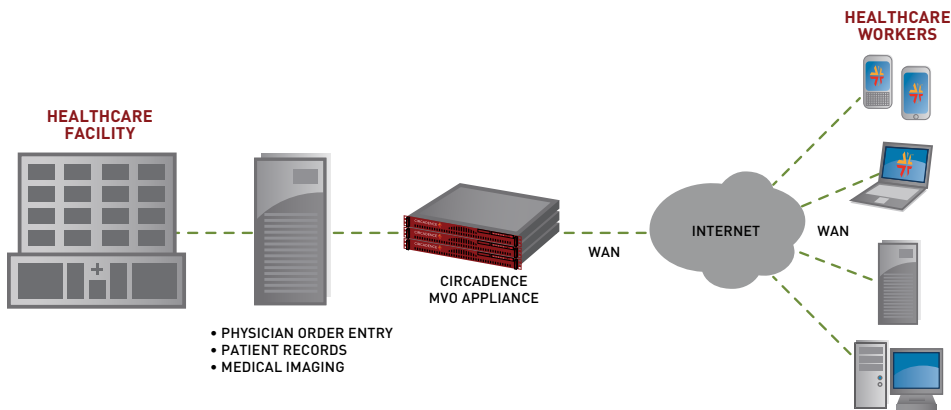
Circadence MVO performance is achieved through Circadence's patented optimization protocol that tunnels through network congestion. Because Circadence MVO solutions do not depend on the native network devices for provisioning, Circadence's protocol achieves superior speeds regardless of switch equipment brand or type. Since Circadence's protocol responds dynamically to Circadence MVO traffic, denial of service attacks and severe network congestion are minimized with no intervention.

## Security

Circadence MVO acceleration algorithms also provide default data security from end-to-end with no configuration needed. Because Circadence MVO solutions maintain high-level security protection directly to the client, Circadence MVO optimization is fully HIPAA compliant. Circadence MVO security, in fact, has withstood the scrutiny of customers such as the U.S. government and U.S. Department of Defense (DoD).

## Ease of management

All Circadence MVO products are managed through an intuitive web interface. Regardless of which Circadence MVO product is installed, the management console provides a unified view of all connected software and hardware agents. Administrators can access the Circadence MVO management console from any location.



## Resilient Circadence MVO connection

Circadence MVO solutions provide the additional benefit of a resilient connection. In extremely congested or intermittent carrier conditions, Circadence MVO solutions keep endpoints connected. Mobile applications in particular require this resiliency to avoid timeouts and data retransmissions. Resilient connections keep users productive and minimize the risk of missing or corrupted data. Medical records and large medical image files are delivered more quickly, reliably, and securely.

## The Circadence MVO 1200 WAN Optimization suite

Circadence MVO suite components can be mixed and matched to provide a complete WAN optimization infrastructure without reconfiguring existing networks. Because all components are modular, the system can adapt to the needs of the health care organization as it grows. Circadence MVO is available in the following products:

- Circadence MVO Software suite**  
 This software package supports Windows and Linux, and is portable to almost any POSIX-compliant operating system.
- Circadence MVO Appliance**  
 This hardware solution not only centralizes Circadence MVO connections, but also ensures survivability during denial-of-service attacks. The Circadence MVO Appliance is DoD-certified for classified installations.
- Virtual Circadence MVO**  
 This solution provides support for Oracle VM, VMware, Microsoft Virtual Server, Xen, and other virtualization solutions and can serve as a virtual gateway.

## Conclusion

EHR and pervasive computing will place increasing demands on health care IT network infrastructures. Administrators in these environments must not only address the demands of this increase in WAN traffic by remote sites and by a myriad of remote devices, but also improve the reliable delivery and security of their organizations' medical data. Significant changes to existing infrastructures and training of outside health care workers may prove too complicated and expensive to undertake, however. Circadence offers a solution that minimally impacts existing hardware and software systems, while providing higher performance, greater reliability, and compliant security for the sharing of medical data.

## About Circadence

Since 1993, Circadence has leveraged the power of advanced technologies to pioneer smarter, faster, and more cost-effective solutions for improving IT performance. What started with an innovative platform for making massively multiplayer online games run faster has quickly grown into the most capable suite of optimization solutions available. Based in Boulder, Colorado, Circadence continues to expand today's possibilities with tomorrow's technologies – addressing new, growing concerns with dynamic, high-performance solutions. Only Circadence offers the most capable IT innovation solutions available – proven to outperform some of the world's most demanding challenges.

For more information on Circadence, visit [www.circadence.com](http://www.circadence.com).

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