The Benefits Of IT Convergence In Healthcare

This article explores how IT convergence can help hospitals reduce costs, while boosting patient care and service levels.

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Information technology (IT) infrastructure convergence is a ‘hot topic’ across many industry sectors, but is especially relevant in the healthcare industry today. In these times of tight budgets and scarce resources, many healthcare facilities are looking toward IT convergence as a means to achieve cost reductions coupled with higher patient satisfaction and staff productivity.

A ‘simplified architecture’ is a key element of IT convergence. This article discusses the four levels of convergence and explains how a well-designed, converged wired/wireless infrastructure saves time and labor costs, improves patient safety and care, and increases the efficiency of healthcare professionals and hospital staff.

CONVERGENCE REDUCES SYSTEMS COMPLEXITY

In the pre-internet protocol (IP) world, hospital communication systems were primarily devoted to telephone systems and life safety and monitoring applications such as nurse call systems and fire alarms. Because of their life safety implications, these systems were strictly regulated by building codes and public safety agencies and even today are required to have their own dedicated infrastructures.

However, most healthcare facilities have added applications and systems that do not have life safety requirements, but which are nonetheless helpful in promoting more efficient processes and better patient care. For example:

- Computer-based practitioner order entry (CPOE) systems and clinical decision support systems (CDDS)
- Interactive patient information and entertainment services
- Building automation systems (e.g., security, climate control, lighting) and closed circuit television (CCTV)
- Real-time locating systems (RTLS) for tracking of personnel and equipment
- Picture archiving and communications systems (PACS)

Many of these applications have been installed over time, each with its own dedicated infrastructure. Some are managed by the facility management engineers, some by various clinical groups, and some by the IT department. This multiplicity of infrastructures and management systems has led to increased complexity for network professionals responsible for maintaining and troubleshooting the systems.

In addition, vital medical equipment and data-intensive clinical and/or diagnostic systems are placing huge demands on hospital communication infrastructures. While attempts have been made to build “bridges” that allow data exchange between applications, too often the bridges themselves create inefficiencies and potential points of failure.

In its quarterly newsletter, the global management consulting firm McKinsey & Company notes that electronic health records (EHR) and computerized physician order entry systems will likely be mandated at U.S. hospitals over the next several years —and that one of the conditions necessary to implement EHR is simplification of the IT architecture. The article states, “Diverse IT applications and platforms, common among providers today, create a significant degree of complexity, raise costs, and lengthen implementation time….A radically simplified architecture, which eliminates the complexity and reduces the cost of large-scale system implementations, can be a critical prerequisite to success.”

FOUR LEVELS OF IT CONVERGENCE

The converged network requires an open, standards-based foundation that can tie all the healthcare applications and systems together along one or more infrastructures. It must provide the bandwidth and signal performance required by current applications and be scalable to meet future additions.

The four levels of IT convergence for healthcare facilities include:

- **Infrastructure Convergence**: a common communication platform allows information sharing across both wired and wireless systems. This shared infrastructure allows information flow between medical equipment, systems, and related applications throughout the facility.
- **Network Convergence**: leverages a common network and switches, allowing the coexistence and utilization of telephone, video, and data communications. This can enable
typical enterprise voice/data/video systems, as well as specialized systems such as security, paging and asset tracking.

**Data Convergence:** common data formats reside on a centralized network, enabling timely, efficient sharing between applications. The goal of data convergence is to get the right information to the right people — when, where, and how they need it.

**Operational Convergence:** the integration of multiple systems data will yield a synergistic data flow, enabling optimum hospital staff cooperation and collaboration and an improved patient care experience.

IT convergence can be planned and accomplished incrementally over time, beginning with the infrastructure foundation. The goal, however, is to ultimately achieve the level of convergence that best meets the organization's needs, timetable and budget.

The advantages of IT convergence include:
- Better accessibility of information for mobile clinicians and caregivers
- Optimized information flow across functional areas
- Easier installation of new patient care or facility management applications
- Mitigation of duplication among communication infrastructures
- Simplified command-and-control via an open network, secure and non-proprietary protocol
- Lower operational and administrative costs, and lower total cost of ownership

**CAREFUL PLANNING KEY TO SUCCESS**

There's no doubt that IT convergence is driving a dramatic transformation of the healthcare industry. Careful and collaborative planning and design of the communication infrastructure — whether new construction or a modernization project — can save millions of dollars over the long term, and will help to ensure that the applications and systems supported will perform reliably for years to come.

High-performance, IP-based Ethernet networks are the standard for infrastructure convergence, primarily because they provide an integrated connectivity platform for real-time collaboration, monitoring and control, along with myriad voice, data, video and multimedia applications.

Typically, the ideal Ethernet communication framework will include an optimized mix of copper and fiber-based cabling and connectivity, with a wireless overlay. The two should be designed to work together to fulfill mission-critical functions within each network area, while taking into account patient safety, network performance, mobility, reliability and cost factors.

In specifying infrastructure components, the following elements will ensure optimum integration and efficient operation of the various applications and systems:
- Holistic, end-to-end system design based on established industry standards
- Superior quality components, engineered for network optimization
- A robust and reliable cable management system to facilitate maintenance
- Installation by skilled and certified field technicians
- Networking system certification and long-term warranties from the manufacturer and certified system vendor

The network's cabling infrastructure design should be flexible and scalable to allow the network to grow and evolve over time as needs dictate, without significant changes to the backbone. In selecting cabling and other components, planners must consider the required transmission speed (expressed as Gb/s or Gigabits per second), and the bandwidth or capacity (expressed as MHz or megahertz), to be sure the system meets current requirements while providing headroom for future expansion.

With digital convergence, demand is growing for healthcare networks to incorporate internal communications systems, monitoring/control of clinical equipment, VoIP, fire and life safety systems, security systems, environmental control, and wireless and mobile communications. Larger hospitals and campuses may also want to plan for video conferencing and training, as well as telemedicine, which involves data-rich applications such as remote consultations and digital image transfer of X-rays and other diagnostics.

**WIRELESS ON THE UPSWING**

Wireless networking has become a critical aspect of the hospital IT environment, so staff members can remain connected to critical systems regardless of their location. IP-enabled wireless connectivity enables access to the most current data at the point of care, thereby providing much-needed workflow efficiencies. One international survey revealed that healthcare workers can recover approximately 39 minutes per day through the use of mobile applications within a hospital or campus, allowing them to spend more with patients.

To be effective, a hospital’s wireless network must provide ubiquitous, uninterrupted wireless connectivity and centralized management, as well as an architecture that delivers 99.999% uptime, security safeguards that exceed HIPAA privacy requirements, and full interoperability with Wi-Fi-enabled products. Hospital Wi-Fi systems are used primarily to support internal communications systems, campus-wide access for highly mobile clinicians and caregivers, and patient/guest access to the Internet.

**A COUPLE OF EXAMPLES**

Wheaton Franciscan Healthcare, one of the largest healthcare providers in the Midwest, with approximately 100 facilities in Wisconsin, Illinois and Iowa, installed a system-wide wireless network enabling voice over Wi-Fi throughout their facilities. The system also supports electronic medical records (EMR), patient monitoring, surgery management and clinical applications allowing the use of hand-held devices to record patient
notes.
Hartford Hospital, an 867-bed teaching hospital in New England, uses wireless to support paperless prescribing, patient intake interviews via a portable device, EMR via a mobile computer, and on-demand interpreters for deaf patient interviews via a camera.

Wireless systems can also support real-time locating systems (RTLS) which allows accurate location-based tracking of patients, staff and medical equipment. This application alone can provide significant time and cost savings. According to Frost & Sullivan, a typical 500-bed hospital can expect to save up to $260,000 per year by using a wireless RTLS to reduce the misplacement and theft of hospital resources, and limit the time spent searching for missing equipment.\(^2\)

**IT CONVERGENCE: THE WAVE OF THE FUTURE**

With an infrastructure convergence strategy built solidly on an open architecture, industry standards and best practices, healthcare organizations can avoid the pitfalls of infrastructure obsolescence and reduce the complexity caused by multiple proprietary protocols and systems. With convergence, simplicity and efficiency become the hallmarks of a new and more sustainable infrastructure.

Once the infrastructure is converged, additional levels of IT convergence can be accomplished incrementally based on an organization’s needs and budget. Some healthcare facilities have realized up to a 20% savings in time and labor costs simply by implementing a converged network infrastructure to replace a legacy suite of dedicated infrastructures.

So whether you are planning a new hospital construction or modernization of an existing facility’s technology architecture, infrastructure convergence is proving to be an effective strategy to reduce IT and administrative costs, improve the quality of patient care, and increase efficiency and productivity — not only for the IT organization, but for the entire hospital staff.

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2. Frost & Sullivan, December 2008