

Getting Great Reception — in Peoria

A holistic solution helps unify this hospital's wireless infrastructure, improving coverage and data flow.

By Kristoffer Stewart, Associate Editor

Efficient communication impacts the speed and quality of healthcare decision making in hospital enterprises. To improve data and voice communication both internally and beyond the boundaries of the hospital, providers are increasingly leveraging wireless local area network (WLAN)-based technologies. In turn, increased exchange of clinical intelligence drives the need for more ubiquitous, open and reliable wireless coverage.



In-building, distributed antenna solutions address this need through a new approach that integrates patient monitoring devices, communications networks and IT systems. Utilizing smartphones, mobile computing devices and point-of-care solutions, patient information becomes accessible throughout the facility.

In addition, telemetry and bedside monitors can transmit information in real time to electronic medical records (EMR) and clinical decision support systems. When Methodist Medical Center of Illinois (MMCI) recognized the need to unify its network, it discovered an integrated solution that enabled its people to connect to each other and the information they needed for improving patient care.

The Issues

MMCI is a 353-bed hospital in Peoria, Ill., founded in 1900 that today, provides a full range of services such as a nationally recognized heart program, pioneering cancer treatment and some of the area's most advanced imaging services. With approximately 600 board-certified physicians backed by a dedicated team of healthcare professionals, MMCI combines high-tech medicine with compassionate care.

In late 2005, MMCI sought to upgrade the limited, maintenance-intensive wireless data/telemetry infrastructure in use at the hospital since 2000. At the Health Information Management Systems Society conference, MMCI administrators discovered a scalable, in-building wireless platform that could serve as a single backbone system and potentially reduce continual wireless system maintenance and infrastructure clutter.

Previously, cellular coverage and wireless access across the MMCI campus were unreliable, making accessing patient information throughout its facilities difficult. Clinicians in high-acuity environments and elsewhere needed reliable and timely access to critical patient information; however, MMCI found traditional patient monitoring systems unable to keep pace with the growing demands of increasing numbers of chronically ill patients, limited availability of skilled healthcare workers and mounting regulatory demands.

Wireless dead spots were common, even though the hospital utilizes several wireless carriers. Rob Miller, manager of infrastructure services, says their main facility is built into a hillside, putting the rear of the first floor nearly 25 feet underground and preventing cell phone usage. Additionally, surgery department staff located on the second floor had no wireless reception. "We currently have four cellular carriers providing coverage throughout the facility," says Miller. In addition to increasing wireless coverage, MMCI also sought to increase data access for mobile computing devices, add Voice-over-IP (VoIP) applications and augment its existing telemetry system.

MMCI performed a cost analysis comparing deployment of as many as five disparate solutions with one. "We compared the installation costs of an 802.11 data solution, a telemetry solution and at least one third-party cellular solution, and compared those with the single-install cost of the GE CARESCAPE Enterprise Access solution."

The analysis showed that although the install cost-savings was only approximately 10 percent for the integrated solution, the true benefit lay in being prepared for the future. "If another cellular carrier comes onboard, all we'd have to do now is provision a port in our main system to allow them access," says Miller. "With the internal distributed antenna system already in place, there's no re-engineering of anything and no need to install another antenna system."

Implementation

From the outset, MMCI's IT/IS leadership, including Miller, regarded the implementation as an enterprisewide project, rather than an IT department-driven initiative. "IT had a large role to play, but we went into this project by establishing a partnership with our clinical engineering, nursing, facilities and construction departments, in order to provide maximum benefit to everyone," says Miller. In addition to that multi-department collaboration, MMCI also aligned the vendors of the wireless applications that would run over the network.



"The vendors and department managers were brought together to agree upon implementation objectives and to identify any inconsistencies, incompatibilities or uncertified network designs." The implementation began with a wireless site survey identifying approximately 650,000 square feet for network coverage, and additional contractors were brought in to assist the hospital with cabling.

MMCI added a Cisco wireless infrastructure layer along with 450 VoIP phones from Ascum, used by nursing and ancillary staff. Last December, the phones were integrated with the enterprise bed tracking and patient transport systems. "Now, our EVS and patient transport staffs are alerted on their VoIP phones when patients are discharged," says Miller. In addition, MMCI added wireless devices such as several different computers on wheels (COW) solutions, tablet PCs and other mobile devices for caregivers.

Applications running on the network solution include bedside point of care, clinical documentation, medication administration and emergency department (ED) registration,

all of which utilize COWs to access the network. Physicians and other clinicians moving around the facility access the network with tablets and laptops, while others use smartphones to access the hospital EMR and computerized physician order entry system.

"The pilot took us about two and a half months to get up and running, which tested the core infrastructure and took place in a new acute Med/Surg nursing unit," says Miller. "It lasted for four months and included telemetry, wireless data access and VoIP phone systems."

Nurses were taught the VoIP phone system, including a new process for using the phones that replaced centralized, overhead paging from the nursing station. "The VoIP system reduced all of the overhead nurse calls and paging that happens on a unit," says Miller. "The patient simply presses a button now on their pillow speaker to call their caregiver, who might be anywhere in the facility, to have a two-way communication."

Results

The expanded telemetry coverage in surgical care areas enables patient monitoring in step-down units rather than in resource intensive and high-demand ICbeds. This has reduced costs at MMCI.

The increased telemetry coverage throughout the hospital also provides patients with improved mobility, giving them more freedom to move and expanding their rehabilitation options. Better telemetry also ensures that clinicians can monitor patients upon entering the ED; during transport and throughout the inpatient care process.

Expanded and more reliable wireless coverage helps the organization meet its goal of responding to all patient requests within two minutes, leading to higher patient satisfaction rates. Powered by the MobileAccess Wire-it-Once universal wireless network, GE Healthcare's CARESCAPE Enterprise Access solution enables MMCI to coordinate and manage data within a single wireless network across its entire enterprise; including data on hand-held devices, COWs, laptops and tablet PCs.



The distributed antenna system also enables the IT staff to manage potential interference issues before they occur, and enables them to quickly add new services without disrupting operations.

"For the first six years of wireless at our hospital, I had very good network engineers who could do anything with an IP-based network, but they really struggled when it came to issues such as db loss, or determining frequency coverage areas that were out of service in the facility," says Miller. "Now, with this network providing demarcation points between wireless technologies, we can readily determine if an issue is data network-related or RF-related."

The system is designed to run any wireless signal from approximately 600 MHz upwards of 6 GHz, which means Miller can run all of MMCI's data applications across it, along with telemetry applications and emergency radio systems. "I have only one infrastructure to manage, instead of seven or eight," he says.

In addition, IT staff no longer has to access the ceilings to deploy antennas or expand access points in the facility. "All of that work is now done in a datacom closet, which also gives the system good environmental control, secures the equipment, and ensures it's kept cool and fire protected. If we decide to upgrade the wireless network, to 802.11n, for example, the IT department would simply swap equipment in the main closets."



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The nurse call system and wireless phone integration also reduced nurse response times when patients call.

Response-time tracking is now an option using the system, and the phones are reducing nurse work loads because they use the VoIP phones to triage patients to CNAs and other clinicians who can respond immediately. Overhead paging in the units now is minimal, leading to a significant reduction in noise. "The only thing going out on the overhead paging system now is organizationwide alerts," says Miller.

The old clinical communication process required nurses to page physicians when there were questions, who would later call back to the nursing station, triggering an overhead page for the nurse who had paged the doctor. Now, the nurses page the doctors with their VoIP phones and the result is a much more streamlined, direct form of communication.

Final Thoughts

"I would tell anybody looking into this system or one similar to it, that this is an enterprise solution — not an IT-only solution," says Miller. "Inclusion of other departments, including clinical, engineering, nursing and facilities, is important to a successful implementation and adoption."

Bringing its entire portfolio of wireless services together on one comprehensive infrastructure created an all-encompassing network at MMCI, and helped the organization to view its communications environment from an entirely different perspective.

Having real-time wireless monitoring for continuous patient telemetry that simultaneously delivers clinical intelligence enterprisewide also is improving patient safety and quality care. Equally important, the support it's getting from the new solution for communication devices and technologies such as in-building cellular and VoIP phones is optimizing MMCI's communications and directly impacting both the speed and quality of care decisions, helping the provider to keep pace with the increasing demands of 21st century American healthcare.

Meeting the Challenges of Wireless Healthcare: The Evolution of WLAN

Virtually all large enterprises recognize that Wireless LANs (WLAN) have the potential to enhance the productivity of their employees and the profitability of their business. Some organizations are preparing to take WLAN to the next level by making the leap to a pervasive WLAN network — a system that provides consistently strong signal coverage throughout every square foot of the facility.

However, implementing a pervasive WLAN is a major undertaking — one that can rapidly consume the resources and budget of an organization's IT department.

Deploying a VoIP-capable WLAN throughout a large enterprise can require hundreds of

WLAN access points (AP). In addition to the initial equipment cost, the IT department will need to overcome other issues associated with a large-scale WLAN deployment, such as infrastructure investment, high operational expenses, security risks, and aesthetic issues. A less comprehensive deployment will greatly diminish the viability of mobile applications, such as VoIP phones, which must work reliably throughout the facility before employees will fully commit to them. Likewise, location services will be marginalized if coverage holes exist, and advanced network security services are unreliable without complete access to the facility's wireless airspace.

Facilitating A Pervasive WLAN Deployment

Specific applications, such as Wireless Patient Monitoring are part of an array of wireless services that are expanding rapidly. Somewhat ironically, wires are needed to make all these wireless services work inside a facility. The heavy construction materials used in most enterprise structures tend to impede the propagation of RF signals, resulting in weak signal coverage in some or all areas of a facility.

In-building wireless infrastructure overcomes these limitations using a cable-based transmission system that distributes RF signals from their sources, such as a carrier-provided base station or WLAN APs, throughout the desired areas of the facility. An adaptable, in-building wireless infrastructure is ideally suited for the rapidly evolving wireless requirements of large healthcare enterprises by providing an extremely flexible platform that supports virtually any combination of wireless services. Its hybrid fiber/coax backbone is inherently broadband, supports diverse wireless applications, and can readily accommodate future, perhaps unanticipated, wireless service requirements.