

Networked Infusion Pumps Improve Patient Safety

NorthEast Medical Center deploys a Cisco Unified Wireless Network to support its deployment of networked infusion pumps.

EXECUTIVE SUMMARY
<p>NORTHEAST MEDICAL CENTER</p> <ul style="list-style-type: none"> • Healthcare • Concord, North Carolina • Number of Employees: 4200 <p>BUSINESS CHALLENGE</p> <ul style="list-style-type: none"> • Track and control medication infusion pumps over the wireless network • Provide ubiquitous wireless network access to medical staff • Computerized dispensing of medicine improves patient safety • Offer superior wireless voice over IP
<p>NETWORK SOLUTION</p> <ul style="list-style-type: none"> • Upgraded wireless LAN to a Cisco Unified Wireless Network, part of the Cisco Medical-Grade Network infrastructure • Expanded wireless coverage to the entire hospital • Connected the hospital's infusion pumps to the network • Readied the network for advanced wireless voice and location-based services
<p>BUSINESS RESULTS</p> <ul style="list-style-type: none"> • Centralized management of access points saves time for the IT staff • Ability to locate networked assets saves time for the medical staff • Computerized dispensing of medicine improves patient safety • Guest Internet access improves patient experience

Business Challenge

NorthEast Medical Center is a regional, 457-bed, nonprofit medical center located northeast of Charlotte, North Carolina. Its main campus contains the new Jeff Gordon Children's Hospital, which includes a cutting-edge pediatric/neonatal intensive care unit as well as a renowned children's advocacy center. Besides its national reputation for a talented medical staff that provides compassionate care, NorthEast is known for keeping up-to-date on advanced technology.

In mid-2006 the hospital acquired an inventory of 600 infusion pumps, expensive devices that intravenously deliver nutrients and medication to patients. Known as "smart pumps," they enable the medical staff to program the correct medication dose and the correct time of delivery, greatly reducing manual error. These pumps are mobile, and without a tracking system, they got lost easily.

"We'd have to walk around and find them," says Susan Wilfong, director of technical services for information systems at the hospital. This would result in unnecessary expense, because the hourly service fees the hospital paid to maintain the pumps would often include the time needed to locate them.

The hospital IT staff decided to remedy the situation by connecting the pumps to a wireless LAN and tracking them with location-based services, a system that would allow the pumps to be monitored from a central management console. Furthermore, the medical staff wanted the ability to administer drug libraries in the pumps remotely.

Meanwhile, hospital administrators wanted to provide Internet access to patients and guests without compromising the security of the corporate network, which the medical staff utilized to both send and access confidential patient data on the corporate network.

The hospital's existing wireless network of autonomous access points provided basic network data access to medical staff members with notebook computers. But the network didn't have the location capabilities, security standards, quality of service (QoS) features, or centralized management tools necessary to support Wilfong's advanced network plans.

Wilfong also wanted a simple way to manage the access points on the WLAN. The existing system lacked central management. This meant the staff had to physically touch each access point for every software upgrade, and this was time-consuming. Early in 2006, the IT staff set out to find a wireless system that met its needs.

Network Solution

Wilfong determined that the hospital's management, location, and security needs would be best met by a centralized WLAN in which the access points were controlled by a series of controllers using the Lightweight Access Point Protocol (LWAPP). In March 2006, the IT team decided to deploy an 802.11a/b/g unified wireless network consisting of three Cisco® 4400 Series Wireless LAN Controllers, approximately 200 Cisco Aironet® 1200 Series Access Points, a Cisco Wireless Control System (WCS) management software system, and a Cisco 2700 Series Wireless Location Appliance.

In addition to centralized management of all the access points, the controllers provided the Layer 3 roaming necessary for an uninterrupted connection as users and infusion pumps moved throughout the hospital. The Cisco WCS software, combined with the location appliance, provided the tools for tracking the infusion pumps.

Furthermore, the Cisco unified network allowed for separate Service Set Identifiers (SSIDs) within the WLAN. This meant the IT staff could configure guests for access to one subnet and the medical staff to another, protecting confidential patient information from unauthorized parties. The system also allowed a separate subnet for voice-over-IP wireless applications, which prepared the hospital for an eventual deployment of Wi-Fi phones.

To further ensure network security, Cisco also provided the hospital with the Cisco Security Monitoring, Analysis and Response System (Cisco Security MARS). This appliance allows network and security administrators to monitor, identify, isolate, and counter security threats with a variety of vectoring and analysis tools. "With Cisco we had a one-stop shop," Wilfong says.

The hospital worked with Stalwart Systems, a local systems integrator, to oversee the deployment. Led by company principal Jim Guido, the Stalwart team performed an initial site survey that made sure the wireless network would not interfere with any medical equipment, such as imaging equipment. The site survey also ensured that every part of the hospital would be covered by the wireless network, including the basement, which was full of complicated corners and crannies.

Stalwart also made sure that the deployment of the new access points ran in parallel with the removal of the previous ones, so that the staff would not be inconvenienced by network downtime. "There was full-time wireless connectivity throughout the migration," Guido says. "In a hospital you can't take four or five days of downtime; the network has to be up constantly."

To prepare the system to track the infusion pumps, Stalwart imported design files of the hospital's floor plan into Cisco WCS and the location server. Then the team hooked the pumps up to the network. Stalwart held a few knowledge transfer sessions with the hospital's IT staff. The new network was fully operational by October 2006.

Business Results

The hospital's wireless network now supports about 1000 clients. In addition to the infusion pumps, there are networked EKG carts, computers on wheels, several wireless IP phones, and notebook computers.

Medical staff can now keep track of the contents of the pumps from a central server in the hospital's data center, which includes a drug library. "The ability to download the information to the pumps makes things safer for the patients," Wilfong says.

PRODUCT LIST

- Cisco Aironet 1200 Series Access Points
- Cisco 4400 Series Wireless LAN Controllers
- Cisco Wireless Control System
- Cisco 2700 Series Wireless Location Appliance
- Cisco Security Monitoring, Analysis and Response System (MARS)
- Cisco 7921 Series Wireless IP Phones

Meanwhile, the ability to track the location of the pumps has saved the hospital both time and money, especially in terms of maintenance. "If the pumps are on the network, we're able to find them," Wilfong says. "Before we'd have to spend time walking around, just trying to find pumps. Now, with the wireless tools we have, we can always see where they're located on the network—what floor and what unit. This saves us time, but more

importantly, it's safer for the patients when we can keep track of their pumps."

The same applies to access point maintenance. "With the controller-based wireless network, it's easier to manage everything from one place, as opposed to having to touch every access point," Wilfong says. "In the past it would take all day to make a configuration change to the wireless network. With the unified wireless network, a change to the network has gone from an all-day thing to no more than an hour."

The secure guest network, launched in January 2007, has already received a great deal of positive feedback from both patients and their families, Wilfong says.

Next Steps

With the tracking system in place for the infusion pumps, the next step is to enable the medical staff to change medication in the pumps over the wireless network by the end of 2007. The ability for the staff to make important changes immediately, even when they can't be by the patient's bedside, will further ensure patient safety. The hospital also is considering using radio-frequency identification (RFID) tags to track thousands of hospital assets over the wireless network.

For More Information

To find out more about the Cisco Unified Wireless Network, visit:

<http://www.cisco.com/go/unifiedwireless>

To learn more about Cisco mobility solutions, visit: <http://www.cisco.com/go/mobility>

To learn more about Cisco healthcare solutions, visit: <http://www.cisco.com/go/healthcare>



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