

**The health-care provider is employing a hybrid infrared-RFID system to track patients' locations and status, and to streamline the process of assigning each a bed.**

By Beth Bacheldor

Dec. 12, 2007—In an effort to ensure beds are available whenever they're needed at its two hospitals, [Christiana Care Health System](#), in Wilmington, Del., has integrated its real-time tracking system (RTLS) with bed-management software.

In its emergency wards, the health-care organization has been using an RTLS that includes Amelior EDTracker software from [Patient Care Technology Systems](#) (PCTS) and hardware from [Versus Technology](#). The hardware consists of patient badges containing both active 433 MHz RFID tags that communicate via a proprietary air-interface protocol, and infrared transmitters, used in conjunction with infrared and RFID sensors that receive the signals from the badges. The RTLS is designed to enable emergency departments to monitor and analyze patients' physical locations and care status, then display that data in charts and graphs via LCD screens and computers. The newly integrated bed-management system was provided by [Premise](#).

The RTLS was first installed in 2004 in Christiana Hospital, the larger of the two hospitals, located on a suburban campus south of the City of Wilmington. The hospital deployed about 500 reusable tags to help track and monitor the care of the approximately 100,000 patients that come through its emergency department each year. In 2006, Christiana Care installed the system at Wilmington Hospital, in the downtown business district of Wilmington. There, it employs about 300 tags for the approximately 50,000 patients treated at its emergency ward annually. In addition, the staff uses the badges as well.

Upon arrival at one of the emergency departments, a patient receives a fluorescent-green disc-shaped plastic badge with a clip for attachment to clothing. Each badge's RFID tag has a unique ID number, which is input into the system and correlated with the patient's information. The tags communicate their unique numbers by transmitting signals to about 300 infrared and RFID sensors situated through the emergency departments. In a typical deployment, the RFID sensors are spaced about 60 to 90 feet apart, while the infrared sensors are placed wherever an exact location is needed, such as in a room.

When a sensor receives a signal from a tag, it passes on the tag's unique ID number and its location to a collector, which forwards that data to a concentrator. In a typical implementation, there are 24 sensors to one collector, and four collectors per concentrator (which can typically cover a hospital floor). The concentrator shares the collected data with Amelior EDTracker, which staff can access via computers to track patient locations anywhere in the emergency and radiology units. Usually, the tags communicate via infrared signaling. The infrared technology, however, requires an unobstructed line-of-sight between the tag and the sensor; if a clear line of sight is unavailable, a badge uses its active RFID transponder to transmit its ID number.

The health-care organization implemented the RTLS to make it easier to track patients in its emergency

rooms. Prior to the RTLS deployment, the staff needed to make numerous phone calls and physically canvass rooms to locate particular patients. But there was still an opportunity to leverage the RTLS to streamline other processes, says Chris Konen, project manager for both the Amelior EDTracker and Premise implementations— particularly the cleaning and assigning of beds to patients.

Premise's bed-management software, which the organization began implementing in phases in September 2005 and finished installing in June of this year, enables nurses and housekeeping staff to communicate when a bed is needed for a patient, requires cleaning or has been cleaned and is ready for a patient. "Prior to this bed-management system, there was no process for getting a bed cleaned, as ridiculous as that sounds," says Konen, adding that it would often take a half-dozen calls to get a bed cleaned and assigned. "The new process allows for automatic notification of a bed being dirty, and an automatic assignment of a housekeeper to go clean that bed."

The integration of the bed-management software with Amelior EDTracker allows the emergency departments to communicate more easily with housekeeping. When a patient is checked in and requires a bed, staff members can use a computer to access the Amelior EDTracker software and input a bed request. Amelior EDTracker passes that request to the bed-management system, and when a bed becomes available, the Premise software automatically sends a page alerting the ER nurses.

When a patient is discharged or moved to another room, the nurse can pick up the room phone, dial an extension and enter a number indicating that a specific bed needs to be cleaned. The Premise software automatically assigns a housekeeper to that room by sending a page to the appropriate worker. Once the task is done, the housekeeper uses the room phone to inform the bed-management system that the bed is now available. The bed's status is then automatically updated in Amelior EDTracker. Thus, a nurse can receive a page or access Amelior EDTracker to determine which beds are available, then locate—in real time—the appropriate patients to assign to those beds.

"With these systems, the goal is to get the patient in the right bed the first time," Konen says, adding that the integration is saving the hospital time and money. With more accurate patient tracking, a better understanding of where each patient is located and the status of that person's care, as well as better management of beds, the hospital staff has more time to spend directly with patients because they require less time for performing administrative tasks.

Christiana Care Health System would like to expand its tagging to additional patients in other departments, as well as assets. But the organization does not want to use the infrared/RFID tags, in large part because such a deployment would be too expensive. "IR works pretty well in the emergency departments," Konen notes, "but there are some issues with line-of-sight reads that are problematic—plus, the infrastructure costs to put the system in across the entire hospitals would be cost-prohibitive."

For now, Konen and his team are not convinced other tracking technologies—such as conventional RFID tags or ultrawide-band (UWB) technology—are quite ready. "We haven't seen yet the technology

we think is mature enough to get us there," he says.