

A ZigBee-based system lets the California hospital continually monitor the location and condition of high-priced equipment throughout its nine-building campus.

By Claire Swedberg

Sept. 23, 2009—[Frank R. Howard Memorial Hospital](#), a nine-building facility in Willits, Calif., has begun employing a ZigBee-based system to help it track where items are located, when they require repair or cleaning, and when they are being removed from the buildings. The system was provided by medical equipment solutions firm [Skytron](#), with hardware, complying with the IEEE 802.15.4 standard, from [Awarepoint](#). According to Tom Peterson, Howard Memorial's plant operations manager and safety officer, the system was installed in the spring of 2009, and has thus far reduced the incidence of lost items from up to 30 per month, down to zero.

Some of the nine buildings are attached via hallways, Peterson says, while others stand alone. The rural hospital needed a system that would help its biomedical department and other staff members gain immediate information regarding which building an item is in—and in which location within that building—as well as the maintenance and cleaning status of any specific assets, such as wheelchairs, wheeled workstations, portable thermometers and X-ray image intensifiers.



Howard Memorial's Tom Peterson

"We were having inefficiencies in locating equipment when it was time for servicing our assets," Peterson says. After seeking solutions approximately one year ago, the hospital chose Skytron's ZigBee-based system—in part, he notes, because the company was already a contracted vendor for the facility's health-care alliance, [Premier](#).

The challenge for Skytron, Peterson says, was to complete the project in about two weeks in March, because Howard Memorial's CEO intended to showcase the solution at an Adventist Health West conference for hospital CFOs and CEOs. "Their team was very efficient in setting up a timeline," he says, "and we were able to get it up and running in two weeks."

There were several challenges related to the installation, Peterson reports. The hospital needed the system to operate within all nine buildings. Because assets were often moved from one building to another for servicing, they would occasionally leave the ZigBee coverage area. Consequently, he says, the system needed to allow for that activity, while also being able to recognize any unusual asset movements that could indicate a theft was underway.

Skytron installed approximately 90 ZigBee sensor units, which function similarly to RFID interrogators, throughout the facility's nine buildings, and the hospital attached about 300 Awarepoint battery-powered tags to the assets. Each tag stores a unique ID number that it transmits to those sensor units, says Bryant Broder, Skytron's senior product manager. It also comes with a slide switch that workers can

move from one side of the tag to another, thereby changing the transmission data to indicate a change in the asset's condition, such as needing to be serviced.

With the system in place, Broder says, a tag is usually in read range of at least 15 sensor units within the vicinity—to help pinpoint its location—which, in turn, transmit back to a bridge unit. The bridge unit calculates the tag's location within several meters, then sends that information, along with the tag's ID number and status (such as requiring service), via a wired LAN connection to the hospital server, which uploads it to Skytron's network operations center. Skytron software then interprets and displays the data on a Web site accessible only by authorized users.



Skytron's Bryant Broder

Employees must sign onto the system using their user name and password, and are granted access to predetermined amounts of data regarding the asset's location and status. Staff members can utilize the system to locate an item, determine its status and history, and learn when that asset may need servicing in the future. The system can also send alerts to authorized users when an unexpected action occurs, such as a specific item leaving at an unscheduled time or through an unexpected doorway, thus indicating a possible theft.

An integrated optical sensor can detect if a tag has been removed from the item to which it is attached, causing the tag to send an alert. A built-in accelerometer then helps the system determine whether that tag is moving or stationary.

The system is also self-healing and self-calibrating, so that if one sensor node goes down, data is still transmitted through the others. Skytron software monitors the nodes' health, and sends an alert in the event that one of the sensors is not operating properly.

Currently, Peterson says, the hospital's staff uses the Skytron Asset Manager software to search for items an average of 750 times per month.