

By using a ZigBee-based RFID system to track equipment, the California hospital expects to save more than \$158,000 annually through increased through labor-savings alone.

By Claire Swedberg

Mar. 3, 2010—When [San Joaquin Community Hospital's](#) employees met for their daily bed-meetings to discuss the day's issues and concerns, the nursing staff had a common problem—they often wasted time searching for IV pumps, or a bed, and patients were sometimes left waiting for a bed or other medical service. Sam Itani, VP of support services at the hospital—which is part of the [Adventist Health System](#), in the Bakersfield, Calif., area—knew there were solutions available. He had read enough about real-time location system (RTLS) technology, and seen brochures mailed by vendors, to know there were options based on active RFID, Wi-Fi and infrared technologies. Most importantly, though, the hospital wanted a system that would be affordable, and not require the installation of cable or place demands on the IT department with another software system to oversee.

The hospital chose the Skytron Asset Manager (SAM) system, provided by medical equipment and software firm [Skytron](#), using [Awarepoint's](#) technology and server. The Awarepoint ZigBee-based sensors (access points) plug into power outlets, and transmit and receive information to network to Awarepoint ZigBee-based active RFID tags attached to assets. A server hosted by Awarepoint manages that data, and can be accessed via the Internet. By July 2009, Skytron had installed between 300 and 350 sensors throughout the hospital's 330,000-square-foot, 255-bed facility, which encompasses several buildings, including an immunization center and a biomed area in separate buildings.



Sam Itani, VP of support services at San Joaquin Community Hospital

Skytron used nylon ties to attach the RFID tags to the hospital's own IV pumps, beds, wheelchairs, pacemakers, speech amplifiers (to assist patients unable to speak) and other items. The facility is also tagging its rental equipment until each item leaves the facility, at which point its tag is removed and placed on another asset.

Awarepoint's active RFID tags transmit their unique ID number at 2.48 GHz over the 802.15.4 (ZigBee) communications protocol—to each other, as well as to the sensors, which are plugged directly into standard 120-volt AC wall outlets. The tags and sensors function as nodes in a mesh network, and forward a tag's ID number, along with the strength of the signal as received by other network nodes, to a device called a bridge.

In that way, each tag's ID number and signal strength, as well as the time of the tag read, is sent to a bridge that receives all of the tag and access point data, and routes it to the Awarepoint server via an Ethernet connection. The server calculates a tag's location using a proprietary algorithm, based on that tag's signal strength.

Approximately 1,300 items have been tagged at San Joaquin to date. On the server, the software was configured to issue alerts whenever an asset tag's signal is received by sensors installed at the hospital's exits, such as on the first floor, in the main lobby and in the emergency department. If a tag is read by access points in these locations, the software sends an alert to the assigned hospital staff. In addition, Awarepoint set up alerts to notify workers if a specific number of soiled items remained in the utility room for a specified amount of time, as well as an alert for tags on operating room equipment if the software determines, based on the access-point reads, that an item is leaving the OR.

The system pinpoints the location of tags within approximately 3 meters (9.8 feet), Itani says, though if a tagged item is leaning against a wall, the system sometimes mistakenly indicates that item is in the next room. He says that staff haven't had a problem with that glitch, however, because they check the next room if they can't find an item where the software instructs them to look.

"Now, as people get comfortable with it, we will tag more assets," he adds, noting that staff members are finding new ways to utilize the tags.

Since being installed last summer, the system has reduced shrinkage (lost or stolen items), increased the staff's work satisfaction (they no longer complain about missing equipment at daily bed meetings) and freed clinicians to focus on clinical care (since they no longer spend as much time searching for missing equipment). The increased utilization of equipment has also been noteworthy, he adds. In the three months that the system has been in use, utilization has risen from 50 percent to nearly 80 percent for patient-controlled analgesia (PCA) pumps, and from about 40 percent to more than 60 percent for IV pumps. Searches for items that previously took 23 minutes, on average, now take around five minutes, thereby saving the hospital a total of 1,663 work hours from August to November 2009. That, Itani says, equates to approximately \$52,700 in savings, or a projected \$158,200 annually. What's more, a report determined that 40 assets had not been moved for more than 90 days—an indication that the hospital possibly has more equipment than it requires.

Once the asset-management portion was underway, the hospital began looking into temperature tracking in its refrigerators and freezers. While [Joint Commission](#) requirements dictate that the coolers be checked daily, it wasn't always feasible for San Joaquin's staff to do so manually. In this case, the challenge was in obtaining daily temperature readings of coolers in the hospital's immunization department and catheter labs, which can often be closed and locked during weekends. In November 2009, the facility began utilizing Awarepoint tags with probe-temperature sensors that could be inserted inside each cooler. The software was then designed to transmit an alert if temperatures varied beyond the acceptable threshold for more than a specified number of minutes. Currently, Itani says, between 20 and 30 coolers are being tracked.

The hospital paid nothing for the system's installation, according to Itani, but simply pays a monthly fee to use the hardware and software.

San Joaquin Hospital Boosts Asset Utilization

Topics/Verticals: [Sensors](#), [Operations](#), [More...](#)