

**The Nesconset Center for Nursing & Rehabilitation will use hardware from Time Domain Corp. and software from Sysgen to monitor individual dementia patients based on their needs.**

By Beth Bacheldor

Aug. 27, 2008—The [Nesconset Center for Nursing & Rehabilitation](#), located in Nesconset, N.Y., is implementing a real-time location system (RTLS) that utilizes ultra-wide band (UWB) technology to track patients, staff and equipment. The system, which includes hardware from RTLS provider [Time Domain Corp.](#) and RFID tracking software from [Sysgen Data Ltd.](#), will help the center keep patients safer by tracking their whereabouts and alerting staff if they wander off.

A few years ago, Robert Heppenheimer, executive director and owner of the Nesconset center, began seeking a real-time, RFID-enabled wander-prevention system for a smaller nursing facility he also owns (which, to date, has not yet deployed the system). But after investigating the technology and discussing options with Raphael Feldman, Sysgen's CEO, Heppenheimer says he realized the technology was not quite ready. Therefore, he settled for existing wander-prevention technology similar to electronic article surveillance (EAS) security systems employed in retail stores, that simply issues an alert, such as an audible alarm, or locks a door whenever a resident wearing a wristband gets too close to any doorways secured by special gates.

"This existing wander-prevention technology is static," Heppenheimer says. "There's no way to differentiate patients. Nursing homes are all about individualizing care. So if I'm a low-risk resident and I walk by that door, the alarm is going to ring every time. For us, though, it really is important to know which resident is walking by that door, and then tailor our responses to each resident's needs."

Heppenheimer, continuing his quest for real-time tracking, stayed in touch with Feldman and assisted with the development of tracking software. In 2007, Heppenheimer began considering several RFID RTLS vendors, ultimately choosing Time Domain's system for Nesconset, a 240-resident facility with a special-care unit for Alzheimer's disease and dementia patients. The center began implementing Time Domain's UWB hardware in January of this year.

Time Domain's PLUS platform consists of active UWB RFID tags, interrogators, ceiling-tile antennas, synchronization distribution panels and software. UWB tags emit a series of extremely short signals (billionths of a second or less), with each signal spanning a wide band of frequencies ranging from 3.1 to 10.6 GHz. The pulsed signals act much like sonar waves, enabling the system to determine distance by measuring the length of time it takes a pulse to travel from one point (such as a tag) to another (an interrogator, for instance), and by using time distance of arrival (TDOA) technology to calculate location.

At Nesconset, patients in the dementia unit are being outfitted with UWB tags known as Smart Buddies. The tags are attached to bands that can be worn on the wrists or ankles, or placed on wheelchairs. Interrogators and antennas placed throughout the unit capture each tag's unique identification number,

and the system determines each tag's location by room, as well as by zones defined in the unit's hallways.

The nursing center also implemented Sysgen's TracPoint location software, which Heppenheimer helped develop, and which has been designed specifically for use in long-term care facilities, to locate patients and equipment, and to set rules based on each patient's needs. Rules can be set, for instance, to allow specific patients access to freely roam the facility during the day, but to require them to remain in their rooms at night. If they do wander out of their rooms during nighttime hours, the staff would be notified; notifications and alerts can be transmitted in a variety of ways, including via e-mail, text messages, cell phones, alarms and flashing lights.

At any given time, employees can go to one of four touch-screen computers set up throughout the dementia unit, then log into the system using their Smart Buddies and search for a particular patient, or for equipment that has been tagged. (Nesconset is also tagging beds, wheelchairs, medication cart keys and other costly equipment, such as pulse oximeters that measure the oxygen saturation of a patient's blood.)

Whenever a patient wearing a Smart Buddy violates a rule assigned to that person, the system alerts the proper staff members via a Windows Mobile 6 device that immediately communicates the violations to attendants. The device can display a map of the center with blinking icons representing residents, staff members and the patient who broke the rule at their exact location.

Nesconset is implementing the latest version of Time Domain's platform, PLUS 2.0. Among other features, this platform now includes tags with integrated buttons that staffers and patients can use to instantly call for help.

"If a staff member is in a room with a resident and they need help," Heppenheimer explains, "they are typically faced with a judgement call: 'Do I leave the resident and go to the door to call for help, or do I stay with the resident?' Now, the staff can just press a call button."

In addition, PLUS 2.0 now enables interrogators to store their calibration constants, making it easier for customers to use and reboot their RTLS in the event of a power outage (see [Time Domain Enhances Its UWB Location System](#)). TDOA systems such as PLUS require calibration at the initial setup stage, necessitating that all readers and reference tags be positioned in a known grid. The system reads the tags and combines that information with tag location data manually input into the system. The readers then tune themselves for optimal performance. Most reference tags can be removed, but some must typically be left in position for re-calibration if there is a power outage or some other problem, such as a hardware failure or reader replacement.

Now, however, each interrogator within the RTLS can tell the back-end PLUS software its stored, initial calibration points. "This is the most important piece," Heppenheimer says. "Nursing facilities operate twenty-four hours a day, seven days a week. If a system goes down, you can't wait for an hour or day or

week for someone to bring it back up when it is supposed to be keeping patients safe all the time. You can't say, 'Oh, well, we had a power outage and the system didn't reset, so Mom got outside and got hypothermia, or worse.' [The ability to automatically re-calibrate] was absolutely a line in the sand that had to be breached."

Not only will the RTLS and TracPoint software allow Nesconset to track patient locations in real-time, but they will also provide the center with historical location data. According to Heppenheimer, this information will help the staff better understand patient movement, as well as provide data during any alleged or potential resident abuse investigations, as required by law.

"One of the goals I have for the system is that we will now have the ability to go back and see residents' behavior and movement," Heppenheimer says. This will provide the center with an historical picture of where the resident was located, and with whom that person interacted. "We'll be able to create resident behavioral profiles to better tailor staff interaction with them. If every morning at 10 a.m., a particular resident starts to wander, we'll then know that every morning at 10 a.m., we need to get that resident involved in an activity to divert the wandering."

Nesconset expects to have all patients and staff members in the dementia unit using the RTLS by year's end. In addition, the center plans to implement a less granular version throughout the facility—which, rather than determine a patient's precise location, will provide location data in various zones, such as the east end of a facility wing.