

The company's PLUS 2.0 system, which uses active ultra-wide band RFID tags, costs less but comes with increased performance and scalability, more options and better management tools.

By Beth Bacheldor

June 25, 2008—Real-time location systems (RTLS) provider [Time Domain Corp.](#) has upgraded its ultra-wide band (UWB) system for tracking assets and people to include new features that boost performance and precision and make it easier to implement and manage the system. The Huntsville, Ala., vendor has also redesigned the reader to cut its manufacturing costs and ultimately reduce the cost of its system.

PLUS 2.0 advances Time Domain's PLUS platform, first announced in December 2007. "Our initial version, 1.0, had a baseline set of features. But we learned a lot from our beta customers about what they'd like to see in PLUS, and we've rolled all of that into this release," says Greg Clawson, VP of sales and marketing at Time Domain. This [PLUS 2.0] represents the first real commercially ready version of our system."

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 shorter), with each signal spanning a wide band of frequencies between 3.1 to 10.6 GHz. The pulsed signals act much like sonar waves, enabling the system to determine distance by measuring how long it takes a pulse to travel from one point (such as a tag) to another (such as an interrogator), and using time distance of arrival (TDOA) technology to calculate location.

PLUS 2.0 includes an updated interrogator (that's backwards-compatible with PLUS 1.0) that has more accurate reading capability—about a 10 to 15 percent increase in read ranges over the first version of PLUS—according to Clawson. The updated device has enhanced fault-tolerance capabilities that help the customer determine if and when the RFID system isn't operating properly. These include the ability of the reader to monitor the detection of corrupt packets of tag data, which can be used to assess the amount of RF interference in its environment; the ability of the reader to provide a reboot notification to alert when a power failure has occurred or some other error condition, and the ability of the system to provide reader and tag timeout warnings if the reader or tag haven't been heard from in a preset amount of time. In addition, the reader can now store calibration constants, making it easier for customers to use and reboot their RTLS in the event of a power outage.

"We made the readers so that they can store calibration constants that are used in the initial setup of the RTLS. TDOA technology requires calibration at the initial setup; basically you lay out readers in a known grid and then place [reference] tags in those grids. The system reads the tags, and you input the tag locations as well, and then the readers tune themselves for optimal performance," Clawson explains. "But most technologies have to have some reference tags left out in field and require calibrations on a regular basis, either because of poor levels of performance or because there may be a loss of power. We've eliminated that."

Now if there is a power outage or some other problem, such as a hardware failure or reader replacement, each reader within the RTLS can tell the back-end PLUS software its initial calibration points. "That means you can get the system up and running quickly and be sure it will operate as it did before the power went down," Clawson says.

In addition, Time Domain has added new algorithms to its location engine, which calculates tag locations. The first version was only able to locate tags within a defined zone and via two-dimensional calculating that could determine a tag's whereabouts within a room. Version 2.0, on the other hand, uses an algorithm that chooses the best four readers to determine not only where in room a tag is but also which floor the tag is on. Time Domain calls this multi-floor capability 2.5-D, or two-and-a-half dimensions. It is almost 3-D, but it isn't as process- or memory-intensive as 3-D calculations, says Clawson. "We didn't want to add more processing or memory requirements on the system, because that can slow the system down, and we want to be able to process location quickly and process more tags," he adds.

In addition, Time Domain has added algorithms for linear calculations; to take advantage of these algorithms, a user needs to install two readers so they are lined up with each other and no more than 90 feet (such as in a long corridor or on a manufacturing line) to calculate tag positions within that linear space. "You can accurately predict, within a meter, along a line where a tag is. So if a tag is on a car as it moves down a manufacturing line, you can predict if the car is 22 feet along the line, or at a point at 23 feet along the line. And then you can determine where the car is within the manufacturing process," Clawson says. "This is all designed to reduce the amount of infrastructure required. Customers want the minimal amount of hardware that will still allow them to meet their needs. Some may only care if the asset is or isn't there, so zone-based tracking with just one reader works fine. In other cases they may only want to track assets along a line, and you can do that with two readers."

Time Domain has also improved the scalability of its RTLS. With version 1.0, customers had to deploy distribution panels that power the readers and basically set the readers' internal clocks so that they are timed synchronously—a requirement for TDOA-based systems. But one six-port panel could only cover up to 36,000 feet, and one 24-port panel could only cover 120,000 to 200,000 square feet, so PLUS was limited in the square feet it could cover. Now, Time Domain has engineered the distribution panels so multiple panels can be integrated, enabling PLUS to scale up to cover facilities that are much larger.

Finally, Time Domain has cut the manufacturing costs so it can price its readers more competitively. "Something we've heard is that people will say UWB is really expensive. We've heard it is the best type of system for precision location, and we've also heard that it is the most expensive and therefore only useful for those business processes that require precise tracking," says Clawson. "That perception had some truth because [UWB RTLS] typically requires 20 to 30 percent more readers than a Wi-Fi-enabled RTLS. So we redesigned our readers so our manufacturers can make them more cheaply, and we are passing those savings on to our customer. We've lowered the total cost of ownership by 50 percent so even though it requires a few more readers than Wi-Fi, our costs are on par."

Time Domain Enhances Its UWB Location System

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A new PLUS 2.0 reader is \$995, with volume discounts available. Time Domain's UWB tags cost \$40 apiece, with volume discounts also available.