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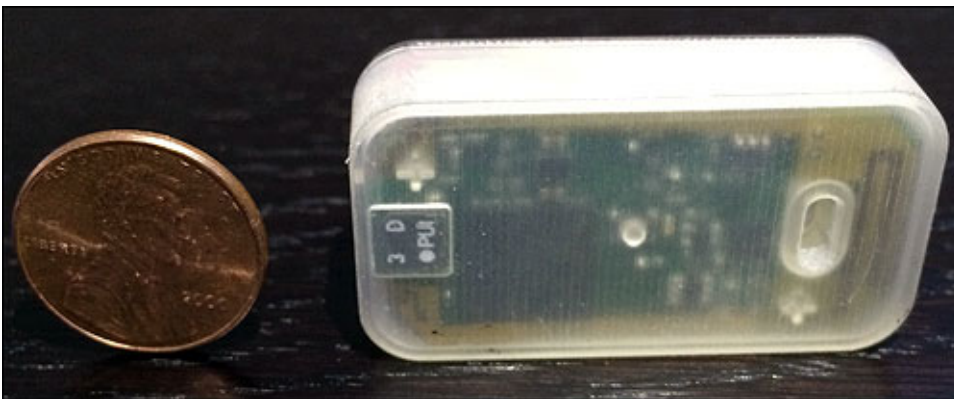
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Iotera Develops Active RFID Tag With 4-Mile Read Range

California RFID technology startup Iotera will begin marketing a new active radio frequency identification tag that can transmit location- and sensor-based data at a distance of more than four times that of most active tags. The tag—part of Iotera's Wireless Sensing and Tracking Platform—includes a GPS

unit, a temperature sensor and an accelerometer so that it can send its longitude and latitude, along with its temperature or movement status, to a reader located as far as four miles away.

The platform, which the company expects to make commercially available during the fourth quarter of this year, will be offered in two versions: a consumer-based model for tracking pets, individuals and personal items from people's homes, and an enterprise-based solution for monitoring assets or personnel at worksites and storage yards. On the enterprise level, Iotera expects several pilot projects to launch sometime during the next few months. A railroad company will use the technology at a rail yard, a school district will use it to track students arriving on campus or traveling to and from school, and a ski resort is considering a test of the system's ability to provide emergency support by identifying the location of a skier wearing the tag in a badge while on the slopes.



The consumer version of Iotera's tag measures 25 millimeters by 40 millimeters by 11 millimeters.

Ben Wild, Iotera's CEO and cofounder, says he began looking into active RFID solutions with a longer read range than those of passive or other existing active RFID systems several years ago. Iotera, he adds, has been developing its tag and reader ever since.

Wild initially cofounded Wirama, a company that provided

technology to track passive RFID tags in such locations as warehouses or stores, in 2007 (see Startup Brings Locationing to Passive RFID). That firm was acquired by Checkpoint Systems in 2009. At that time, Wild says, he began researching other solutions.

“After the Checkpoint acquisition, since mid-2009, I decided to start looking at active RFID,” he states, noting that passive technology poses problems for users that have a large space in which to track goods or individuals. To ensure the tags are read frequently, a large infrastructure of readers is necessary, which can be expensive. Existing active RFID tags on the market, he says, offered read ranges closer to a few thousand feet, which was still too short for some applications.

What Iotera developed is a 900 MHz battery-powered tag that employs a proprietary air-interface protocol to transmit signals with a low data rate—sending several hundred bits per second—and thereby enabling a longer range. The technology also features a specially designed radio that processes signals in such a way that it can accomplish a very long read range.

To enable users to determine an item’s location, the company added a GPS chip to the tag. The GPS chip determines the tag’s location to within about 5 to 10 meters (16.4 to 32.8 feet), and the tag transmits that data to the reader. Both the consumer and enterprise versions of the tag come equipped with a temperature sensor, as well as an accelerometer so that the software receiving information from the reader can determine when a tagged object has been picked up or moved.

For both the enterprise and consumer versions, Iotera provides a hosted, cloud-based server that receives data from the Wi-Fi-enabled reader and interprets that information, as well as sending notifications if so required by the user. A geofence

could be set up in the software, for example, and if the tag were to move outside of that geofence, a text message or e-mail could be sent to an authorized party.

In the case of the enterprise solution, a rail company—which has asked not to be named—will pilot the technology by attaching tags to railcars. The enterprise version of the tag varies in size, according to the particular battery used. The dimensions of a tag that can operate for 10 years before its battery requires recharging, for instance, is 120 millimeters by 30 millimeters by 30 millimeters (4.7 inches by 1.2 inches by 1.2 inches). The tag transmits a signal that beacons at preset rates—such as every few hours—or when the tag senses it is moving. Iotera's software can store business requirements, such as which cars should be attached to which engines, and in what order. In that way, if the vehicles are being attached to the wrong engine or in the incorrect order, an alert can be triggered.



Iotera's
Ben Wild

A systems integrator working with Iotera is currently in discussions with its existing and potential customers in the construction and agriculture markets to plan a pilot. A construction firm, for instance, could attach the tags to assets or issue them to workers. In that way, it could locate tools or equipment as needed, or ensure that no one strays into a hazardous area. The applications for Iotera's active RFID technology in agriculture are twofold, Wild says. The tags could be attached to equipment in order to track their movements and locations within farmyards. They could also be integrated with sensors buried below the surface of fields

that track moisture levels, the presence of chemicals or other soil conditions (a method known as precision agriculture), in order to help farmers wirelessly learn when a section of a field requires watering, fertilizer or other adjustments necessary to improve that soil's ability to grow crops.

The consumer version of the tag is smaller, measuring 25 millimeters by 40 millimeters by 11 millimeters (1 inch by 1.6 inches by 0.4 inch). Under normal conditions, Wild says, the consumer tag should be able to operate for approximately five months before its battery must be recharged. As with the enterprise solution, perimeters can be set on the Iotera cloud-based server, such as the size and location of a geofence within which the tag is expected to remain. The consumer version of Iotera's reader—a device that stands less than a foot high—receives transmissions and forwards them to the server via a Wi-Fi connection. Iotera is developing an application for both the Apple and Android platforms that will enable users to access a tag's location data via their mobile phones or tablets, or receive alerts.

Both the consumer and enterprise tag models come with a buzzer that would allow the tag to identify itself if a user comes within close range. For example, when the Iotera app, running on a person's phone or tablet, indicates that the tag is within 30 feet, he or she could use the app to instruct the tag (via the reader) to buzz audibly.

Not only can the reader sold with a specific tag interrogate that tag's ID, Wild says, but it can also read the IDs of other Iotera tags within its vicinity, and then forward that data to the server. Therefore, he says, not everyone would require a reader but could use data culled from others within the vicinity, such as in a neighbor's living room. If a tag were to move beyond the 4-mile read range, other readers nearby could also send location data, thereby making it possible for users to track something—a missing pet, for instance—as long as it was within range of any Iotera reader.

In March of this year, Wild reports, Iotera expects to offer the consumer solution (a tag and a reader, as well as server access) for \$100 and \$150 on Kickstarter, in order to raise investment money. The goal, he explains, is to commercially release the consumer version during this year's fourth quarter, about six months after the Kickstarter campaign ends. The enterprise solution is expected to also be made commercially available around the same time, following several pilots. Wild says he expects to work with multiple systems integrators that already offer solutions to customers that might benefit from this technology. The price of the enterprise solution will vary, he says, though the tags are expected cost less than \$100 apiece, depending on the sensors included. According to Wild, his company is presently working on a version of its solution that does not require Internet access to operate, and that will be released shortly after the cloud-based enterprise system becomes commercially available.



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