

After testing the new active 433 MHz tags for electromagnetic interference, the U.S. military has placed orders for the devices, which could cost half as much as their predecessors.

By Claire Swedberg

Oct. 22, 2009—The [U.S. Department of Defense](#) (DOD) has placed its first order for RFID technology compliant with the ISO 18000-7 standard for a November 2009 delivery, to be provided by [Unisys](#), [Savi](#), [Systems and Processes Engineering Corp.](#) (SPEC) and [Northrop Grumman](#). Previously, all four companies had been chosen by the DOD to compete for orders under its RFID-III contract, which calls for active 433.92 MHz RFID tags and readers compliant with the ISO 18000-7 standard.

The newly ordered battery-powered 433 MHz tags were tested and approved this summer by the DOD's [Product Manager Joint-Automatic Identification Technology](#) (PM J-AIT) office, after passing electromagnetic interference (EMI) testing in August at [Wright Patterson Air Force Base](#). The previous RFID-II contract for 433 MHz was based on Savi's proprietary 433 MHz RFID technology, while the new RFID-III contract requires 433 MHz products compliant with the ISO 18000-7 standard and supplied by multiple vendors. By using ISO 18000-7-compliant RFID hardware, the DOD and other U.S. and allied agencies will have a broadened interoperability of their technology.



Dash7's Pat Burns

PM J-AIT placed orders with all four vendors for tags to be delivered in early November—altogether ordering approximately 128,000 data-rich tags that can store large amounts of information, and 40,000 license plate tags encoded simply with a unique ID number. All four RFID-III vendors received a portion of this award. In 2007, Savi—which owns intellectual property necessary for complying with the ISO 18000-7 standard—granted licenses to other vendors so they could manufacture products compliant with that standard (see [Seven Companies Sign Up for Savi IP License](#)). Savi says its portion of the new order for ISO 18000-7 hardware totals \$6.6 million and includes the Savi ST-654 data-rich tag, widely used to track shipping containers, vehicles and other large assets, as well as the Savi ST-621, a license plate tag.

In December 2008, the DOD granted the four prime contractors the opportunity to compete for orders under its RFID-III contract—an indefinite-delivery, indefinite-quantity (IDIQ) contract established by the U.S. Army on behalf of all U.S. armed services (see [U.S. Defense Department Picks Four for RFID-III](#)). The contract, administered by the PM J-AIT office, entitles the four firms to compete for purchase orders from any authorized organization supporting the Defense Department, the [U.S. Coast Guard](#), the [North Atlantic Treaty Organization](#) (NATO), coalition partners and other foreign military agencies. The purchase orders, however, were contingent on passage of the EMI testing, which was intended to determine whether RFID technology in airplanes or helicopters would interfere with onboard avionics, such as radios, navigation or flight instruments.

"The test procedure is used to verify that radiated spurious and harmonic emissions from transmitters do not exceed the specified requirements," says John Zentner, an electromagnetic environmental effects engineer at the [Air Force Research Laboratory's](#) Sensors Directorate.

Because the four vendors' tags passed aircraft testing, they were granted inclusion in the military's EMI certification, which lists specific devices—such as laptop computers and audio-visual equipment—that have been approved to operate while aboard military aircraft.

The tags were tested in a lab to simulate the environment in which they would operate—namely, helicopters, as well as large and small fixed-wing aircraft—to determine whether they met the requirements of the DOD Interface Standard 461F (an RF standard used by the U.S. military, according to Zentner). In theory, he says, a tag's power supply could generate RF noise. All of the vendors' tags now operate within the military's 461F specifications, though at least one model needed to be modified before it could pass the test. Helicopters are the greatest risk for this interference, he adds, since they have more apertures (openings through which RF transmissions could leak out) than other small or large aircraft.

Ultimately, Zentner says, the RFID hardware provided no interference concerns. "RFID devices seem fairly innocent," he states. The tests were undertaken in a metallic room without actual aircraft, and the tags were set to continually transmit. The researchers measured the electromagnetic fields that resulted.



Unisys' Michael Saunders

For Savi, says Mark Nelson, the company's director of corporate communications, "it means that we now have an authoritative source that has tested active RFID at the 433 MHz range, and has found that it does not interfere with the aircraft that is carrying the tags. This certification can now be used to show civilian airlines that the tags are safe to carry."

The DOD and other government agencies use aircraft as a means of transporting RFID-tagged cargo. In the case of the 18000-7 tags, most will be utilized on shipping containers that would be transported by ocean, so few will actually be placed within an aircraft. However, the EMI certification indicates the tags can be safely transported by air, if necessary.

The switch to ISO 18000-7 hardware is opening up opportunities for the commercial use of active RFID technology for tracking supplies that will be transported to or by the military, says Patrick Burns, the president of the [Dash7 Alliance](#), a coalition of 30 companies and organizations from multiple industries focused on supporting the adoption of the ISO 18000-7 standard. The alliance was launched this year, in part due to the DOD's plans for the RFID-III contract using ISO 18000-7 (see [Dash7 Alliance Seeks to Promote RFID Hardware Based on ISO 18000-7 Standard](#)).

The DOD has been an advisor to the alliance, helping the organization to develop testing and certification procedures for interoperability of the technology, as well as planning the next stages, including encryption plans and outreach work to publicize the active RFID standard. Products purchased by the DOD in this order have earned Dash7 1.0 Interoperability Certification, indicating they have successfully completed baseline interoperability testing for DOD-specific deployments.

The use of ISO 18000-7-compliant technology in the RFID-III contract, Burns says, could lead to the use of the same technology by DOD suppliers. This would enable the companies to then track products through the supply chain, both for their own purposes and for the Defense Department.

The DOD employs approximately 30,000 active RFID tags per month for its shipments, the bulk of which travel to the Middle East. That number will vary, depending upon the movement of troops and supplies into and out of the war zones of Iraq and Afghanistan.

On Sept. 30 of this year, Unisys received the first order for the new active tags, and was given 45 days to deliver them, according to Michael Saunders, the company's federal system partner for the DOD and the U.S. Army—though he declines to indicate the exact number of tags ordered, or whether they were data-rich or license plate tags. "Unisys believes we can supply about 50 percent of the military's needs," he says.

The DOD's adoption of the ISO 18000-7 standard is saving the agency money. Saunders says the new tags provided by Unisys will cost about half as much as the previous Savi proprietary tags. "It makes good sense for the government," he indicates. Although Savi does not discuss pricing, Nelson says, "it's reasonable to assume that the costs of [these ISO 18000-7] tags are highly competitive with historical prices. As more active RFID technologies based on the ISO 18000-7 standard become even more ubiquitous and innovations arise from it, we fully expect that active RFID tag prices will continue to move downward over time."

If the current RFID-III vendors wish to provide new tags other than those already approved for the DOD, that hardware would require EMI testing, says Lieutenant Colonel Cary Ferguson, PM J-AIT's product manager. All ISO 18000-7 interrogators will only read tags that are compliant with that standard. Therefore, to become ISO 18000-7-compliant, previous tags must be upgraded through an update to their firmware.

In order for Savi's older proprietary interrogators to read the new ISO 18000-7 tags, they must be upgraded to support dual mode, enabling the reader to interrogate not only Savi's proprietary 433 MHz tags, but also tags complying with the ISO 18000-7 standard. PM J-AIT has upgraded its Radio Frequency In-Transit Visibility (RF-ITV) infrastructure so that it is capable of operating in a dual-mode environment. The RF-ITV is a system designed to assist in the implementation and integration of RFID technology into the DOD's supply chain.

According to Ferguson, the RFID-III contract has a maximum potential value of \$429.4 million for

DOD Tests, Buys New ISO 18000-7 Tags From Four Companies

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products, services and maintenance. Unisys selected RFID hardware vendors [Hi-G-Tek](#) and [Identec Solutions](#) to serve as the subcontractors that would supply the actual tags. SPEC is using hardware from Identec Solutions, Northrop Grumman utilizes [Evigia](#) hardware, and Savi manufactures its own tags.