

**The group has introduced a new specification, known as Mode 2, for ISO approval, that would allow the integration of 433 MHz active and 13.56 MHz passive RFID on a single tag. It would also enable tag-to-tag transmission, and make possible a range of new applications.**

By Claire Swedberg

July 30, 2010—With the release of a new specification for the ISO 18000-7 standard for active 433 MHz RFID tags and readers, technology providers may be able to build a 433 MHz solution onto an existing passive 13.56 MHz tag, design a system in which ISO 18000-7-compliant active tags transmit to each other, and program such tags to send sensor data automatically if they detect an event, such as passing an acceptable temperature threshold.

The new specification, known as Mode 2, was developed during the past 12 months by the [Dash7 Alliance](#), a nonprofit consortium formed to advance the use of RFID technology compliant with the ISO 18000-7 standard. The organization submitted the Mode 2 specification to the ISO 18000-7 standards committee for its approval earlier this month, and pending that approval, some alliance members—technology vendors—are currently working to build the new RFID systems for a variety of applications. In addition to enabling tag-to-tag communications and sensor event triggers, as well as hybrid active/passive solutions, the Mode 2-compliant tags would provide over-the-air configuration, and higher data rates than technology built under the original ISO 18000-7 specification—now referred to as Mode 1—while also using less power.



*Leon Vandenberg, Rights  
Commerce's CEO*

"End users gave us pretty clear direction as to what they needed—security and privacy, as well as location granularity," says Patrick Burns, the Dash7 Alliance's founder and president, adding that end-user support for Mode 2 "is pretty overwhelming when we talk to people."

According to Burns, Alliance members hope that review and any comment and ratification by the ISO 18000-7 standards committee will be completed by the end of 2011.

"The alliance today has nearly 60 participants from 23 countries, nearly all of whom are participating in their national standards body that votes in [ISO](#) [the International Organization for Standardization]," Burns says, "so we expect the ISO process to move more swiftly than if, say, a single company or country were submitting a new work item to ISO on its own, since the alliance votes as a bloc within ISO. Many of the same organizations who would otherwise vote independently in ISO are members of the Dash7 Alliance, so the specification we submitted is pre-vetted by ISO members, unlike most work items submitted to ISO. Our goal with the Dash7 Alliance is to make the ISO process work better—not to replace it—and Mode 2 is a good example of this."

In the meantime, Burns predicts, the Mode 2 specification will become available to the public in mid-2011. "We make the specification available to Dash7 Alliance members immediately," he explains, "and at some point during the ISO ratification process, it will be available [to non-members] via ISO through their normal public distribution of standards documents and proposed modifications."

Mode 1 active technology is most commonly used by the [U.S. Department of Defense](#), though active [Savi Technology](#) solutions are also in use for logistics purposes, developed prior to the establishment of the Dash7 Alliance.



*Patrick Burns, the Dash7 Alliance's founder and president*

Alliance members first began conceiving of Mode 2 this year, as a solution to existing shortcomings of the ISO 18000-7 standard. One shortcoming is the location granularity—end users have been seeking an active RFID solution that could function as a real-time locating system (RTLS), something currently accomplished only with a wired infrastructure that often includes an exciter (also known as a signpost) that transmits an RF signal to awaken ISO 18000-7 active tags, as well as provide greater location identification of those tags. While Mode 1 tags can send sensor data, such tags typically transmit information at a preset beaconing rate, which must then be interpreted by the software to determine the sensor data and, at that time, detect an event, such as a change in temperature or motion. Mode 2 offers to resolve that problem, Burns says, by allowing the tag to automatically send sensor data if an event occurs, such as movement being detected by a motion sensor, or a temperature threshold being exceeded.

In addition, Mode 2 addresses the RTLS challenge by enabling one active tag to transmit to another—that is, peer to peer. For example, vendors are now working on ISO 18000-7 tags that can receive a transmission from another tag, and then forward that information to a reader. With this capability, users could, for example, attach tags that support received signal strength indication (RSSI) functionality to a building's walls or ceilings—RSSI tags can measure the power of a received RF signal—and when individuals wearing or carrying a Mode 2 tag enter that building, the strength of the badge tag's signals received by the wall-mounted tags could be used to determine the location of an individual as he or she moves about a floor or building. What's more, Mode 2 tags could be placed on assets, and RSSI-enabled tags in a building could track the location of those items throughout the facility. A system could also track who has been in or near certain assets—for instance, which employees have been in the vicinity of a specific server or forklift—based on their location data.

Providers of high-frequency (HF) 13.56 MHz passive RFID tags will also be able to utilize the Mode 2 specification to add active RFID 433 MHz transmission capabilities to their existing products.

"Four hundred thirty-three MHz and 13.56 MHz are sort of like peanut butter and chocolate—they just go well together and can share the same silicon and antenna, apart from the addition of a single two-cent Dash7 circuit," Burns explains. "We are about to see some terrific stuff from the HF RFID

community, who have been selling 13.56 MHz devices successfully for many years in many markets, and for a broad range of applications."

By adding a coin cell battery, along with a Dash7 circuit, to a 13.56 MHz passive proximity tag, for example, that tag could begin sending active 433 MHz transmissions that could allow the tracking of an individual in a building based on that person's proximity badge, Burns says, or by using a previously passive-only RFID-enabled ID card to download data from a distance using the longer read range of the 433 MHz transmission, such as information encoded to a 13.56 MHz embedded in a smart poster.

According to Burns, the Mode 2 tags will be smaller than their ISO 18000-7 Mode 1 predecessors, since they will come with smaller batteries, and will be able to transmit at eight channels rather than just one. That increased number of channels enables the RTLS and hybrid passive/active transmission. Moreover, the data rate will also be higher—up to 200 kilobits per second, as opposed to Mode 1's 27.8 kbps.

Companies are already designing hardware and software based on Mode 2, Burns says, and may release these new products prior to ISO's ratification of the standard. Among the technology vendors that have Mode 2 products in the works are [Confidex](#), which currently produces only passive RFID tags operating at either 13.56 MHz or at 840 to 960 MHz, as well as Dash7 tag and reader companies such as [Identec](#) and Savi. [Melexis](#), a Belgian firm that manufactures ISO 18000-7 (Mode 1) tag chips and 13.56 MHz RFID reader chips, is developing silicon and Mode 2 sensor tags for automotive applications, including tire-pressure monitoring.

In addition, international security company [Rights Commerce](#), based in Adelaide and Sydney, Australia, as well as in Hong Kong and the United Kingdom, is developing a Mode 2-compliant RFID-enabled SIM card to be used with mobile phones for such applications as remotely tracking health-care for patients. "With medical telemetry, you could use a standard consumer handset to send data to your physician," says Leon Vandenberg, Rights Commerce's CEO, CTO and founder. The firm is working to interface RFID technology with a [Texas Instruments](#) chip on a SIM card, in order to allow phones to be used not only for health-care tracking, but also as payment systems. Vandenberg says he hopes to begin piloting the Mode 2 RFID-enabled SIM card within six to nine months, with commercial availability expected between 10 and 15 months from now.