The Great RFID Debate: HF or UHF?

With interest in item-level tagging on the rise, end users are trying to figure out whether to use high-frequency or ultrahigh frequency tags on individual products. Millions of dollars ride on the outcome.

By Mark Roberti

March 27, 2006—Not too long ago, the radio frequency identification industry was split between those who supported ultrahigh frequency protocols created under the aegis of the International Organization for Standardization (ISO) and those who supported the Electronic Product Code UHF protocol developed under the aegis of EPCglobal. Eventually, the two sides came together and created a second-generation EPC UHF protocol, and all was good. Now, the industry is facing a new split—this time, over what frequency to use for item-level tagging.

Some high-frequency RFID tag vendors firmly believe HF offers many advantages for item-level tagging. They say HF works better around water and metal, that it penetrates materials better and that it is easier to define the read field with HF than with UHF. (With UHF, radio waves can bounce off objects farther away, causing the interrogator to pick up tags you didn't want to read).

On the other hand, there are makers of UHF technology who feel UHF can work just fine for item-level tagging. On March 29, at noon EST, one of those companies—Impinj—will make the case for UHF item-level tagging in an RFID Journal webinar entitled Item-Level Tagging Using UHF Gen 2. Judging by the large number of people who have preregistered, there is a lot of interest in this subject.

This promises to be a major issue for the RFID industry, much bigger and more important than the split over ISO and EPC UHF protocols. Why? Two reasons. First, end users overwhelmingly backed the EPC protocol, at least in the United States, while in Europe, few companies adopted the ISO 18000-6A and -6B protocols. So vendors were faced with the choice of either jumping on board the effort to create the Gen 2 EPC protocol, or being left out of the market.

There is no such unity of views in the end-user community when it comes to HF or UHF. In the pharmaceutical industry, for instance, Pfizer is using HF tags in its pilot, in which it is tagging all bottles of Viagra in the United States this year. Peggy Staver, Pfizer's director of trade product integrity, tells me the company is very happy with the decision. The system works well and is what many pharmacies feel is best for them, because they need to read a lot of unique items at close range.

Purdue Pharma is using UHF tags on bottles of OxyContin shipped to Wal-Mart. Purdue chose UHF because that's what Wal-Mart wanted to use. The system works well—Purdue and its supply chain partners are now reading 100 percent of the tags on bottles of pills.

The split is not just among pharmaceutical manufacturers. Some DVD and computer game retailers are looking at high-frequency and even low-frequency systems, because they work better on unique items containing metal (the aluminum layers on DVDs and CD-ROMs interfere with RF signal and cause problems

for UHF systems). Clothing manufacturers, on the other hand, seem to prefer UHF systems because they offer faster read rates and longer read ranges, with no water or metal in their products to interfere with the radio waves.

EPCglobal did an evaluation of the performance of UHF and HF tags in seven item-level tagging scenarios last week (see EPCglobal Focuses on Item-Level Tagging). We hope to have a report on how the evaluations went this week. ODIN Technologies, a systems integrator in Dulles, Va., has done its own evaluation of HF and UHF (which it is keeping under wraps because it's selling the results). Still, I don't expect this issue to be resolved any time soon.

I'm often asked whether I think HF or UHF is better for item-level tagging. I wish I had a simple answer, but I don't. HF's advantages for item-level tagging are well known. UHF was originally embraced for longer-range supply chain applications, and its ability to be adapted for item-level tagging is less well known. (The Impinj webinar will raise some interesting points that might surprise some people.)

I also understand that one benefit of using UHF for item-level tagging is that end users can purchase a single type of interrogator for reading tags on pallets, cases and items. This reduces cost because they can get volume discounts on interrogators, and it is easier to maintain one type of system than two.

Personally, I would like to see EPCglobal create a standard for HF (or simply adopt one of the existing ISO standards as an EPC standard). Once end users know there are standards for both HF and UHF, they will consider which is best for their needs. That means the free market can decide which technology is best, or it may decide one technology is good for some applications and the alternative is good for other applications.

Competition between the two RFID technologies is as healthy as competition among vendors of a single type of technology because it gives end users a choice, encourages innovation and fosters adoption. If the market chooses one frequency over another, there will be winners and losers among vendors—but the RFID industry, as a whole, will be better off.

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