

**The Initiative Office for Government RFID Applications is presently studying RFID's ability to track the whereabouts of hikers, the harvesting and shipment of mushrooms, the processing of mangos and the injection of medication.**

By Claire Swedberg

Oct. 9, 2008—The Initiative Office for Government RFID Applications, part of Taiwan's [Ministry of Economic Affairs](#) (MOEA), has been conducting a series of projects intended to drive the use of RFID technology in major sectors throughout that nation. The agency has already completed seven RFID studies in the past two years, and is currently conducting five more, involving the use of RFID to track legal evidence, chemotherapy drugs, mushroom harvesting and shipment, hikers on a forest trail and duty-free shopping.

The initiative first launched in 2006, when the MOEA Industry Strategy Review Board began considering how RFID technology might benefit the Taiwanese government and commercial sectors, and how to spur RFID pilot programs throughout the country. "At the time [2006], there was a lot of interest in RFID," says Jimmy Li, deputy director of MOEA's Initiative Office for Government RFID Applications. MOEA entered talks with numerous industries, he says, "and the conclusion we came to was that the government could help by testing applications first." The newly formed Initiative Office for Government RFID Applications committed to four or five six-month RFID-related studies, annually, of a variety of applications that would provide sufficient insight to lead to commercial and government-led pilots.



*Jimmy Li*

The agency focuses on RFID use in five areas, Li says: medical, seaport cargo, airline cargo, food safety and the "living environment" or daily life improvement. The objective in many of these cases, he notes, is to focus more on safety improvements than on financial benefits, and to conduct feasibility and proof-of-concept studies with three stages—assessing hardware, putting the pieces together and operating them, then testing the technology in the field.

In 2006, a group consisting of the Initiative Office's RFID researchers, as well as mango producers and shippers, launched a project to study the use of RFID to track the fruits' processing and shipment for export. The group attached EPC Gen 2 passive UHF tags to crates of fresh mangos destined for Japan's high-end consumer market. The participants read the tags on mango-filled crates prior to placing them in steam ovens to kill any insects, then read the tags once more before the crates were shipped to Japan. The goal was to test whether tags could be read at several points in the supply chain, including at the time of packing and after the mangos and tags had gone through the rigors of steam ovens. According to Li, researchers were able to prove the tags would function properly after being heated in the ovens.

The second 2006 study pertained to labor safety, and involved tracking employees' movement at a paper mill in Taiwan. Participants carried active 433 MHz RFID tags, while interrogators were placed at locations where workers' movements needed to be regulated. This application, Li says, would be of importance for manufacturers where outside contractors often pass through the facilities. Their presence, he explains, must be monitored to ensure they are in the proper location in the facility at the designated times. The researchers proved the hardware worked in this scenario, Li says, and that data could be collected and accessed on a server for review by, for instance, the factory management.

A third application in 2006 involved the study of RFID on large steel beams used in building construction. In this case, government employees placed EPC Gen 2 tags on the beams at a government-owned construction site, then read them consecutively as they were used in building construction. By tracking the sequence of unique RFID tag numbers, the research proved constructors could employ the technology to ensure building material is utilized in the appropriate sequence.

In 2007, Initiative Office researchers tested RFID for tracking cut flowers at a Taiwanese flower auction. The system would be used to provide real-time control of fresh flowers as they arrive at the auction, then are sold to a floral vendor and picked up from the auction facility. The researchers affixed UHF Gen 2 tags to boxes in which flowers were packed, then collected read data from interrogators installed where boxed flowers passed on a conveyer belt toward the auction floor. The researchers were able to use the reads to determine where flowers were located in the auction house, as well as when they were delayed before or after an auction. This scenario, Li says, would provide users with the kind of real-time location data that companies such as [FloraHolland](#) utilize for their flowers in the auction house (see [Dutch Horticultural Company Sends Flowers via RFID](#)).

In addition, the agency tested RFID for painkillers and other medications. The research group tagged small boxes loaded with approximately 10 containers of medication with UHF EPC Gen 2 tags, and also tagged some medicine containers themselves with high-frequency (HF) 13.56 MHz passive tags (complying with the ISO 15693 standard), in order to test a real-time e-pedigree system to verify the drugs' authenticity. They then tested whether they could track the pharmaceuticals' movements as they passed from the point of manufacture to the retailer, using interrogators to capture ID numbers at the item level, as well as on boxes. According to Li, the system worked appropriately.

The Initiative Office for Government RFID Applications also conducted a document-management study at [Taiwan's National Archives Administration](#). For this study, Gen 2 RFID tags were placed on the sides of binders containing government documents such as memoranda sent within the office. The National Archives conducts annual inventory studies, and in this case, workers used handheld RFID interrogators to scan the tags' ID numbers to determine if they could more easily conduct that inventory, or locate documents that had been filed. Participants found they could save many hours of the inventory process by utilizing the handheld reader to scan folders without removing them from the shelf.

What's more, the agency tagged trees for a forest sample zone investigation. In this case, Taiwanese forestry employees regularly travel through the nation's dense forests to monitor tree growth, writing

down on paper such details as a tree's height and diameter. The agency placed HF and UHF passive RFID tags on the sides of trees in metal plates. The tags included a unique ID number that could be linked to data about the tree, such as its height and diameter, and at what date it was measured. The agency was testing how the tags could be placed on the trees in such a way that they could withstand weather and remain on the trees for decades, without the trees growing over the tags. Employees then used handheld PDAs with built-in readers to scan and record information regarding each tree. After experimenting with tag placement, researchers found forest workers could read the tags with handheld interrogators from a short range, saving hours of paperwork previously required when handwriting data about each tree.

This year, the group is studying evidence tracking for [Taiwan's Ministry of Justice](#). In this case, court evidence such as computers, jewelry and weapons are loaded in boxes, which are then tagged with EPC Gen 2 RFID tags. When evidence is moved from one location to another, their tags are read once more. The group is presently examining how the tags can be used to track the items' movement from and into storerooms, as well as at police departments when they are initially seized and processed.

For another project currently underway—the tagging of chemotherapy drugs—researchers at Taipei's [Taichung Hospital](#) have been placing HF 13.56 MHz passive ISO 15693 tags on syringes intended for specific patients. The tags are then linked to an RFID tag on the syringe's containing bag, also listing the drug recipient's name. Thus, employees can use the system to ensure medication is neither lost nor administered to the wrong patient.

To track the harvesting and shipment of mushrooms, the group employs EPC Gen 2 tags attached to sensors that measure and log temperatures. Because they are sensitive to temperature changes, newly picked mushrooms are being placed into tagged containers to track the temperatures of the mushrooms during shipment, and to transmit that sensor data to an interrogator via the RFID tag. Mushrooms have a very short shelf life, Li says, so the EPC Gen 2 tags could also be used to record the times when shipments leave the farm and arrive at the retailer. In this way, the group can better track the supply and demand of mushrooms, preventing more mushrooms than needed from being picked (so that they do not spoil before being purchased by consumers).

Additionally, the agency is tracking hikers in mountainous trails, allowing the forest service to know, in real time, where hikers are located in the event that someone gets hurt or lost, or the weather turns bad. RFID readers have been installed at specific points along the trail, in order to track each time a hiker passes by. At the trail head, hikers pick up cards with embedded HF 13.56 MHz ISO 15693 RFID tags, then scan the tag at each reader as they continue along the trail. Each interrogator transmits the data via a GPRS cellular connection to a back-end system, where users can view a computer screen and determine the number of people at particular portions of the trail at any give time.

Finally, a research group is studying the use of RFID to track purchases at Taiwan's duty-free shops, where the nation's citizens are permitted every six months to buy, exempt from customs duties, up to NT\$30,000 (US\$1,000) worth of products such as cigarettes and liquor. Tracking the number of

duty-free products a shopper has purchased at multiple locations, however, is difficult. The solution, in this case, would be an RFID-enabled ID card that Taiwanese shoppers would obtain to grant them access to duty-free products. The card's ISO 15693 RFID inlay would be scanned at each purchase, with the ID number linked in the back-end system to the shopper himself, along with a tally of the money spent during that six-month period.

"Once the tests are completed," Li states, "our objective is to show how we put together a system, and this is how well it worked." The studies, he says, make it possible for potential users "to see if the technology is ready, if the benefit is clear. Once they realize the benefit is good, then we hope they can kick off a research and pilot project."

"We feel this is not only a good educational process for the government, but for the commercial market and for technology vendors," Li says. The projects have not yet led to full deployments, but Li expects some of the projects will do so in the future.

The Initiative Office for Government RFID Applications has begun talks with government agencies in other countries to consider teaming on studies for international supply chains. Li says he is presently in discussion with Japanese officials, and hopes to speak with other governments as well, including the United States. The greatest challenge involves funding, he says, noting, "Both sides have to have funding at the same time. Sometimes, it's a matter of waiting for that to occur."