

**RFID promises to improve baggage service and save airlines millions of dollars. Here's what's being done to help make that a reality.**

Oct. 10, 2005—RFID is nothing new. The technology has been around for many years, first surfacing in 1945. Even in the world of aviation, we've been playing with the idea of an RFID baggage tag for 15 years. The [International Air Transport Association \(IATA\)](#) is driving efforts to move forward the use of RFID for baggage management, as part of its 'Simplifying the Business' program—an industry-wide initiative designed to simplify travel and reduce annual industry costs by \$6.5 billion. RFID alone would generate \$800 million of those savings, while also significantly improving baggage service.

What has given this application such appeal, and why do passengers still suffer baggage delays when the problem has been examined for so long? There have been many trials of RFID technology in the aviation world, usually run by the airlines' IT departments. Naturally, this has led to a technology focus. When the operations side of businesses has subsequently looked at RFID, however, concern about the cost has put a halt to implementation.



Although IATA launched its current RFID project in 2004, the association first became involved in RFID through the IATA Baggage Working Group in 1997. This group is comprised of experts well versed in the problems airlines and airports face when it comes to baggage handling. It was clear that in order for RFID to be successfully deployed, a common standard between airlines would be required.

Standards and costs are two challengers IATA is used to dealing with. The first issue the working group confronted was deciding upon a frequency, between the then-available 125 KHz and 13.56 MHz tags. To that end, more trials were conducted. Of course, RFID was changing nearly as rapidly then as it is now, and soon the 2.45 GHz tags arrived on the scene. The first frequency, chosen in 1999, was 13.56 MHz, based on successful trial results undertaken the previous year.

There were immediate issues in the United States, where it was impossible to use the frequency at the necessary power level to achieve a sensible read range. At the same time, the preferred frequency in the United States—2.45 GHz—was suffering exactly the same issues in Europe.

The implementation of RFID was stalled, as there was no point in having a non-global system in the airline industry. At the same time, the cost of RFID baggage labels was still prohibitive. Consequently, rather than exploring how to use RFID, airlines revisited the question, 'Why do bags miss flights?'

So, why *do* bags miss flights?

Basically, it comes down to the following four scenarios:

- The bag arrives too early, then is placed in storage and forgotten.
- The bag arrives too late and cannot be processed in time.

- The bag is delayed due to processing through security or other steps.
- The baggage-handling system breaks down and cannot deliver the bag to the departing aircraft.

## Technology Benefits

The appeal of RFID is that you can identify a tagged item without needing to see the tag—or indeed, the item itself. This provides some advantages over a traditional bar code label and allows us to address the reasons for delayed baggage.

The infrastructure needed to implement an RFID baggage-tracking system is relatively cheap. While a 360-degree bar code reader capable of reading labels traveling at 2 meters per second is a complex machine with many moving parts and read heads, the RF equivalent is quite simple by contrast. The RFID interrogator (reader) has no moving parts, just two or three antennas, and costs only a few thousand dollars. This means you can have many more read points in your baggage system, allowing an increase in the resolution with which to monitor your processes.

This increased resolution lends itself to process improvement and redesign, allowing the same infrastructure to deliver greater performance and capacity. As air travel grows, this will become an issue for every airport in the world, some much sooner than others.

A faster process also means bags on the cusp of missing their intended flight have a greater chance of making it to the plane on time, which translates to better service for passengers and savings for the airlines.

Let's take a closer look at the four reasons for baggage delay in an airport, and see how RFID infrastructure can mitigate each problem.

- *The bag arrives too early to be loaded onto a plane and must be stored:* At the entrance to the storage area, an RFID reader monitors the bag as it enters, and later when it departs. At the appropriate time, the storage room operator is notified that the plane is now accepting passenger luggage, and is instructed to collect the bag.
- *The bag is delayed due to processing through security or other steps:* When a bag is waiting in a queue for processing, there's no way for employees to know if the bags in front of it are more or less urgent. With RFID, it would be possible to know exactly which bags were urgent and which had a greater window for processing.
- *The baggage system breaks down and cannot deliver the bag to the departing aircraft:* When a baggage problem like this occurs, what matters most is the time to recovery. With RFID, you can read a number of bags, identify those that can still be dispatched to their intended flights and prioritize the return of the others. There is no point in reassigning bags for a flight that departs 12 hours from now while those that can travel straight away are left waiting.
- *The bag arrives too late and cannot be processed in time:* Even RFID cannot offer a time machine for

your bag, so if you have checked in too late, or if your inbound aircraft arrives too late for your bags to be transferred to your connecting flight, then RFID can not help you. But RFID would enable a faster overall processing, which means it might take less time to process your bag. As such, the opportunity to miss a flight would likely be reduced.

The RFID tag itself offers additional benefits. Bar-coded labels are normally attached to the handles on luggage. This poses a problem because the handle is also the ideal place to pick a bag up. The result is often a crumpled baggage label that is hard to read.

Additionally, automatic baggage-handling systems use 360-degree bar code readers and move pretty fast. The bar code reader has to track the movement of the bag, find the label attached to it and read it, all in a very short time. What's more, a bar code reader's moving components require regular maintenance. I have used prototype RFID readers in an airline environment that have not required any maintenance in over a year of operation. A crumpled RFID label is also still readable, though there are limits even for RFID: Fold the tag crisply in half, for example, and it will not read.

The RFID chips themselves are still costly, however, despite improvements in the manufacturing process. Recent developments in the production of write-read RFID tags based on [EPCglobal's Class 1 Gen 2](#) seem to offer an excellent promise of low-cost tags.

### **Business Case Challenges**

The business case for RFID is a very complex one, built around cooperation between airports and airlines in terms of providing the RFID infrastructure and realizing the benefits. It also involves analyzing the benefits across many different processes, often carried out by different departments. A cross-organizational view is needed to justify the investment. Another common problem is that many benefit areas seem to be discovered only during operation.

Systems able to report on the measured benefits are now available and will form an integral part of any RFID implementation. The change from bar code to RFID is not technically complex, but the move from the data-barren landscape of baggage handling today to the rich tapestry promised by an RFID-enabled system is a big one for any company.

**Aviation Standards** In order to achieve any progress with RFID, agreeing on a standard is essential. IATA has produced a recommended practice, first drafted several years ago, that provides a framework for RFID use for baggage. This recommendation was reviewed and amended last August, settling on UHF tags encoded under ISO rules. It will be approved at the next [IATA Passenger Services Conference](#) in November. There may still be hurdles—regulatory authorities in some countries are finding it hard to allocate a useable band, for instance—but these will be overcome.

### **The Remaining Steps**

Well, we have a standard, and we know there are many areas where it appears RFID will save airline

costs. So what still needs to be done before we are all traveling with RFID baggage tags?

First, the airlines and airports need to understand the immediate benefits, payback periods, infrastructure costs and timing of their move to RFID. IATA is assisting them in this regard through its Simplifying the Business program. The program provides leadership for the industry to drive cost savings in five key areas: e-ticketing, common user self-service, bar-coded boarding passes, IATA e-freight and radio frequency identification. For the first time, each airline can see how they compare with the rest of the industry, and get clear direction through IATA implementation guides. Moreover, the program makes matches between suppliers and airlines to drive timely implementations. For more information about the potential for an RFID-enabled baggage world, watch this space.

*Andrew Price is the RFID project manager at IATA*