



## INFLIGHT RFID

### USE OF RFID FOR MANAGING THE TRACKING, MAINTENANCE AND CONTENTS OF TROLLEYS

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## Executive Summary

The overall benefit to the industry of adopting RFID in the catering supply chain is estimated at around \$470 million dollars per annum, with a further one-time saving of \$48 million. This high level estimate is based upon savings for a single airline being scaled across IATA members. This benefit is available through the use of RFID for improving the supply chain processes in each of the areas of Trolley Maintenance, Trolley Contents and Trolley Tracking. This report describes where the benefits may be found, and recommends that IATA undertake a detailed study and trial to determine the best strategy for extracting this benefit.

Key problems facing the industry are gaining visibility and control of: trolley tracking, trolley maintenance and trolley content. Solving these problems will allow a reduction in the substantial drift between the inventories that airlines think they have for trolleys and the actual trolleys available for use and allow proactive maintenance of trolleys. In the field of duty-free the ability to know where items are is essential to maximising the revenue from sales, as well as compliance with complex global legislation governing the sale of items.

In an IATA workshop held in 2006 between major stakeholders from airlines, caterers and duty-free providers, each stakeholder identified that the target areas in this report would bring benefits of over \$1million to their companies.

The figures that this business case presents are indicative of the benefits to the industry in adopting RFID for inflight. A detailed business case, to follow this high level document, is necessary to validate the figures presented in this document. For instance, what type of RFID tag is best suited for use on catering trolleys and should one tag or several be used? These details will cause a variance between the detailed business case and those presented in this document.

Based on the work undertaken to complete this report, it is suggested that IATA analyses processes involved trolley maintenance, trolley tracking and contents verification in order to prepare a business case for the adoption of RFID to improve processes. Furthermore the expected benefits should be benchmarked against other industries and measured through a pilot within the aviation industry. If the outcome of these efforts indicate that the benefit of \$470 million is achievable then IATA, prior IATA Board of Governor's approval, should lead the industry in the implementation of RFID for tracking, maintenance and contents management of trolleys through the development of a recommended practice for the use of RFID on trolleys.

## Is there an opportunity for savings?

Airlines, particularly network carriers, are intensely customer-focused organisations. This attention to service has led to complexity in the provision of inflight services. This is particularly evident when the catering processes of a network carrier are compared to those of a low cost carrier. The table below leads to several conclusions:

- (1) Traditional carriers have a need for complex agreements with caterers and regular communication to ensure that each flight is equipped appropriately.
- (2) Traditional carriers have to carry a wide selection of food and serving items.
- (3) Traditional carriers must probably waste some of their catering provision.
- (4) Traditional carriers do not receive additional income from offering catering to their passengers. Low cost carriers instead, generate income from this service.

Stage	Traditional Carrier	Low Cost
<b>Customer Proposition</b>	A flight is a special experience, and the meal is a part of this.	We will get you from A to B.
<b>Catering promise</b>	<p>We will offer a choice from up to 3 menus, for up to 3 services.</p> <p>In addition, we offer:</p> <p>Special Meals selected at booking from (source: BA.com):</p> <ul style="list-style-type: none"> <li>➤ Asian Vegetarian</li> <li>➤ Lacto Vegetarian -</li> <li>➤ Vegan Vegetarian</li> <li>➤ Hindu</li> <li>➤ Muslim</li> <li>➤ Kosher</li> <li>➤ Children's Meal</li> <li>➤ Seafood Meal</li> <li>➤ Bland Meal</li> <li>➤ Diabetic Meal</li> <li>➤ Fresh Fruit Plate</li> <li>➤ Gluten Free Meal</li> <li>➤ High Fibre Meal</li> <li>➤ Low Calorie Meal</li> <li>➤ Low Cholesterol</li> <li>➤ Low Protein Meal</li> <li>➤ Low Sodium Meal</li> <li>➤ Low Purine Meal</li> <li>➤ Non-Lactose Meal</li> </ul>	Bring your own food, or buy from a limited selection onboard.
<b>Catering Order</b>	<p>Estimate the ratio of menu choices to ensure most people get their first choice.</p> <p>Special meals ordered.</p> <p>Details sent 24 hours in advance to caterer supplier for route.</p> <p>Additional items added to match expected demand.</p>	Standard purchase for all flights.

	Match between on hand items and plan made, additional items requested by supplier.	
<b>Catering Delivery</b>	Specific trolley content built for specific flights.	Standard trolley content for all flights.
	Trolleys loaded on aircraft.	
<b>Onboard Delivery</b>	Trolleys moved through aircraft – run between trolleys for out of stock items.	Trolley moved through aircraft.
	Individual special meals matched to passenger list, delivered to seat.	
<b>Post Flight</b>	Trolleys off loaded / returned to caterer.	Trolley swapped or re-stocked.
	Items removed, cleaned and stored.	Trolley cleaned and stored.

The array of choice, without even considering the time of the flight (should breakfast and dinner be served, a snack and a dinner, etc) or the class of travel is wide. In fact, this wide array of choices to passengers means further complexity for the catering process (extra step in logistics supply chain) and a possibility to disappoint the passenger should the process fail.

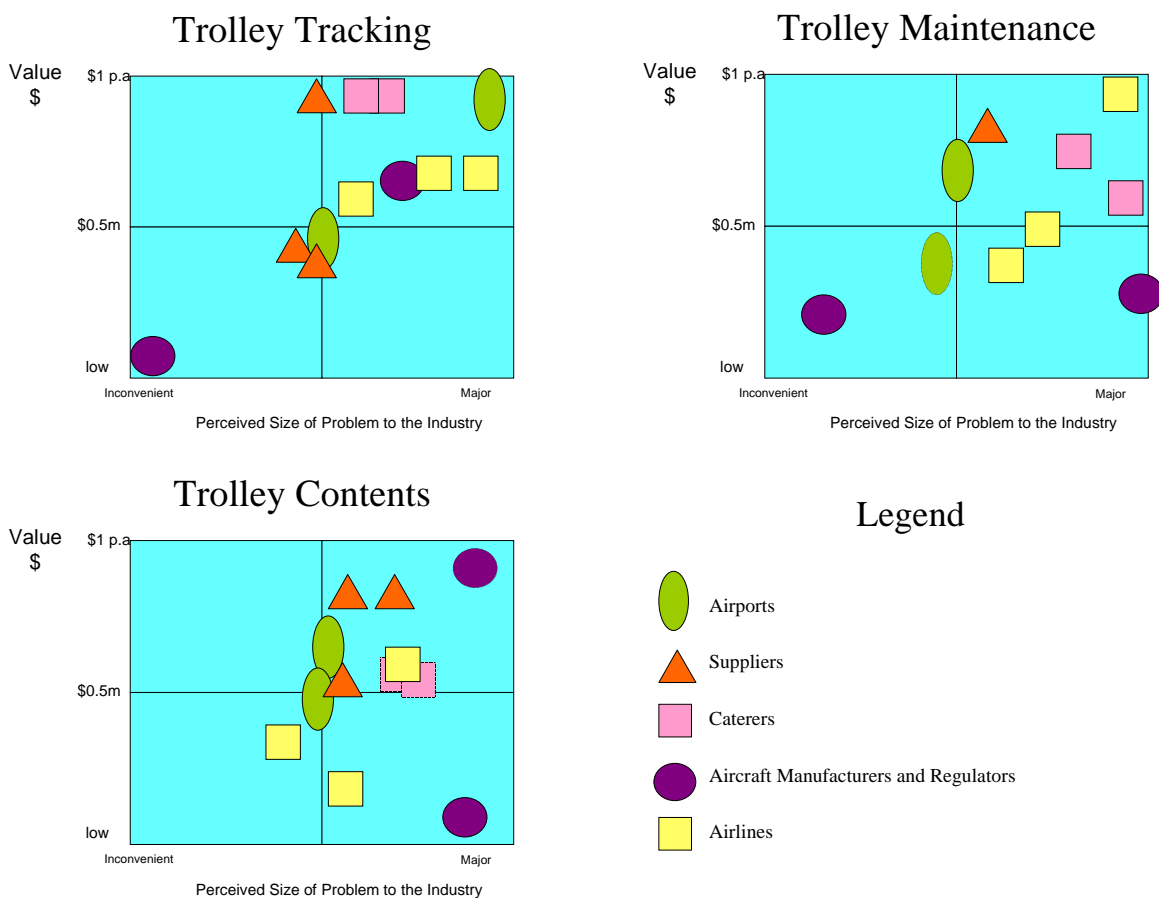
If the airlines are to maintain the present offering, gaining visibility and control of the supply chain is crucial to ensure product delivery is achieved with minimum cost and maximum efficiency. RFID is one tool that could increase visibility and control of the supply chain.

## Identifying potential areas

In April 2007, IATA brought industry stakeholders together to find out areas that could potentially benefit from the use of RFID. There were 23 attendees from 21 companies including: airlines, vendors, governments, caterers and catering specialists. The workshop's objective was to review the use of existing identification technologies (such as barcodes and optical character recognition) to build a baseline against which development can be measured.

The workshop attendees were asked to list a number of industry issues. These issues were then collected into broad groups. Groups assigned a nominal dollar value to indicate the importance of each issue to their particular business. Therefore an issue such as trolley maintenance may rate highly for airlines and caterers, but not at all high for regulators.

Below find the three issues that were ranked as most important:



As a result, immediate benefits could be derived from increased visibility and control of:

- Trolley Tracking
- Trolley Contents
- Trolley Maintenance

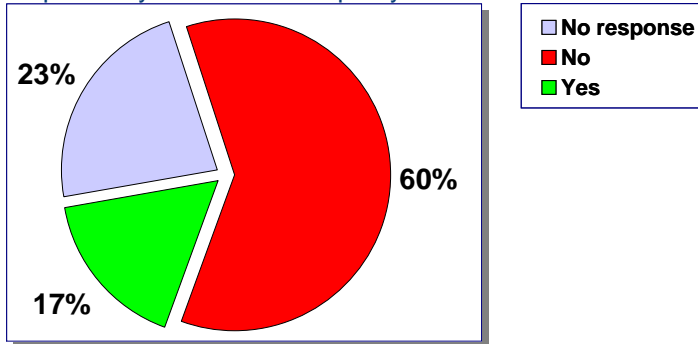
A possible by-product of increasing visibility and control of the above processes is managing the security of products, which would be of benefit to airlines.

## Definitions

- *Trolley tracking* is about knowing where the trolley is, either at all times or at key process stages.
- *Trolley contents* concerns information regarding the contents of the trolley, such as when it is being supplied to a flight as well as when the trolley is returned to the supplier, caterer or airline depot. Benefits extend to the supply of duty free goods.
- *Trolley maintenance* is more than just fixing a trolley when it is broken. Trolleys are supposed to be flagged as unserviceable by airline staff when the trolley is damaged, but this is a poor situation, as the staff may have to use a trolley with a defect for the duration of a flight. The catering supplier may also flag that a trolley is in need of repair, but the supplier then suffers the loss of the trolley for the order being prepared. There can therefore be a conflict between supplying the order and fixing the trolley. Proactive maintenance is a goal for this area, allowing trolleys to be serviced before they become damaged.

## Airline interest in inflight activities

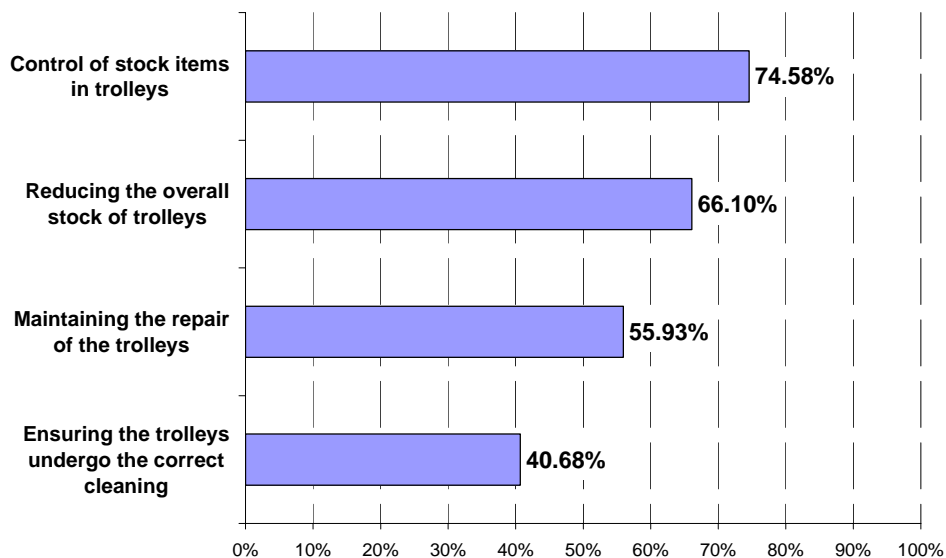
In June 2006, IATA surveyed 361 airlines on their interest of introducing RFID for catering trolleys. At the time of the survey, no industry benefits had been identified to share the potential to airlines. The negative response by airlines can be partly attributed to this.



Those airlines that indicated interest in using RFID for catering trolleys indicated interest in the following:

- Trolley tracking and control
- Contents tracking and control
- Maintenance of the trolleys
- Cleaning of the trolleys

The distribution of airlines responses is shown in the table below. The first three areas align closely with the areas identified at the IATA workshop.



Additionally, airlines consider that RFID could be extended to the following activities:

- Tracking of safety equipment
- Marking life vests and fire extinguishers on board with best date
- All loose equipment in cabin marked with RFID (problem with items disappearing)
- Onboard flight equipment for tracking maintenance schedules
- High price in-flight service items (ex. liquor), carrier box
- Frequent flyer membership cards to identify important passengers
- To be able to manage passenger information
- Identification of Passengers if used on boarding passes in order to steer gate personnel deployment
- Confirmation on weight and balance in the cargo bay
- Stock & inventory (global)

# Challenges

## Trolley Tracking

Knowing where assets are located is a fundamental issue for all businesses. At present, airlines do not have a precise picture of their trolley inventory:

- Quantity: How many trolleys they own?
- Location: Where these trolleys are located?
- Availability: Do they have enough trolleys for their day-to-day operation?

As a result, airlines overestimate the number of trolleys needed and purchase additional units. Given that each trolley costs about \$1000, the over-investment by the industry can be considerable.

In addition, purchase of new aircraft often goes accompanied by purchase of new trolleys needed to support that aircraft. It is quite possible that there is no need for airlines currently buying aircraft to purchase additional trolleys, due to the overestimates already inherent in the industry.

Increase visibility and control of trolley tracking (are the trolleys and storage units being cleaned, maintained, etc) can shed light to how well the service level agreement between airline and maintainer is being met. .

Trolley tracking is certainly the first step on the road to a more efficient operation. Trolley tracking is estimated to provide benefits of \$292,000 per annum to a single airline (SAS), with a one-off saving of \$270,000 through the reduction in stock.

## Trolley Maintenance

The area of trolley maintenance has a number of problems. In addition to a trolley needing maintenance, there are a number of side issues that impact the efficiency of trolley maintenance processing.

- Lack of proactive maintenance: Often unserviceable trolleys end up being used on board causing damage to the trolley and the cabin environment in addition to causing problems for onboard services. In addition, if the trolley is put aside during preparation prior to departure, it may cause delays and/or cause aircraft to depart without the proper catering load.
- Stock held by caterers: In order to avoid delays due to faulty trolleys, the catering supplier holds a stock of airline trolleys. This can be noticed as sometimes very old trolleys are issued and they are in fact in brand new condition. The airline funds the holding of this stock, but cannot control it. If the supplier had confidence in the condition of the trolleys then this holding would not be needed.

The ability to proactively maintain trolleys based on their use and know how many trolleys are being maintained at any one time provides estimated benefits of \$619,000 for a single airline.

## Trolley Contents

Reductions in shrinkage, customer satisfaction increases through reduced special meal unavailability and increases in duty-free sales are estimated to bring benefits of \$1.8 million per annum.

Ensuring that a trolley's contents are as specified and that the trolley is appropriate for the contents requested is another challenge for visibility and control of catering services. Specific challenges include:

- Appropriate equipment availability: To ensure that there appropriate equipment is available for the trolley and the contents to be stowed.
- Trolley retrieval: Larger aircraft have several galley areas and each galley contains several trolley stowage positions. The crew needs to be able to find items quickly and ideally would have access to a system telling them where everything is.
- Content inventory: Keeping an up to date inventory and related information for use by the crew. In the field of duty-free the ability to know where items are is essential to maximising the revenue from sales, as well as compliance with complex global legislation governing the sale of items. Typically the information needed would include: location of the trolley; location of special meals, meals, bar items and duty free items; the allocation of meals and special meals to customers (i.e. a do not use an item because it is allocated already); and, the ability to record items that have been used.

## The Opportunity for Savings

What benefits can the industry realistically expect to obtain from improved in-flight processes?

Due to the scarcity of information available (the total number of trolleys currently in use by the industry as a whole is unavailable); it is not possible to answer the question above with precision. Therefore we have taken a business case created by Peter Melander of Scandinavian Air Services for an existing installation and updated this model with costs based on the adoption of a passive UHF system, maintenance savings and contents tracking. Figures from annual reports have been used to estimate benefits.

### ➤ Trolley Tracking

SAVINGS				
Activity	Reduction	Yearly Savings	One Off Savings	Comment
Inventory	2%	\$280,000		Total cart inventory
Trucking (balancing)	20-50%	\$204,000		actual charges
Shrinkage	80%	\$213,000		losses
Inventory Count	100%	\$39,000		Audits
Inventory	100%		270,000.00	Lack of need to buy
<b>Total</b>		<b>\$736,000</b>	<b>\$ 270,000.00</b>	

One Off Costs	Qty	Unit	Total	
Tags	11,649.00	\$ 1.50	\$17,473.50	
Readers	325.00	10,000.00	\$325,000.00	Assuming shared by 10 carriers
MIS System	1.00	1,000,000.00	\$100,000.00	Industry shared system (10 carriers)
<b>Total</b>			<b>\$442,473.50</b>	

Costs are based on tagging each trolley with a robust passive RFID tag. IT costs are shared between a multiple carriers.

### ➤ Trolley Maintenance

Activity	Reduction	Yearly Savings	Comment
Maintenance	5%	\$ 39,000.00	
Extended life	20%	250,000.00	assuming 10,000 carts in stock
Crew injury	80%	330,000.00	
<b>Total</b>		<b>\$ 619,000.00</b>	

Given that trolleys would be already tagged and the information systems already in place for the above (trolley tracking) there would not be additional costs for the use of RFID in trolley maintenance. This is because when a trolley is tracked you are able to measure usage and hence start proactive maintenance.

Activity	Reduction / Increase	Yearly Savings	Comment
Customer Satisfaction Increased	36	\$72,000.00	1 pax / 10 days business retained
Efficiency Increased	1%	\$1,474,567.84	For a major carrier's reduction in wastage
sales	3%	\$301,500.00	Based on industry figures
<b>Total</b>		<b>\$1,848,067.84</b>	

The increased efficiency of 1% is a conservative estimate of the savings possible when total visibility is achieved. The introduction of new products (such as booking catering at time of ticket purchase online) would allow this figure to increase considerably. Generally when RFID is introduced, companies (such as Wal\*Mart, Marks & Spencer) have achieved over-stock reductions of 16%.

Costs	Qty	Unit	Total
Tags	\$ 116,490.00	\$ 0.15	\$17,473.50
Readers	325.00	4,000.00	\$130,000.00
5 areas per facility, Shared by 10 carriers			
<b>Total</b>			<b>\$147,473.50</b>

**Overall Cost Benefit for a single airline**

Costs	\$589,946.00
One off Benefit	\$270,000.00
Yearly Savings	\$3,203,067.00
<b>Total</b>	<b>\$2,613,121.00</b>

The costs above are for implementing RFID to track trolleys as well as the containers that trolleys carry. The one-off (one time) benefit comes from being able to delay purchases of new trolleys for fleet increases. The total benefit in the table above does not include the one-off saving.

In order to (upscale) scale this benefit to the industry, the benefit was applied across all IATA members (267 airlines) and reduced by 1/3 to account for different airlines accruing different benefits according to size. This would lead to benefits of \$470 million and one time savings of \$48 million through delayed purchases.

The figures presented are estimations. It is recommended that IATA undertakes a study to develop the business case.

## The catering supply chain

Mapping out the different players involved in the catering supply chain will assist in determining where costs will arise. The supply chain becomes more complex due to different operating environments. An airline handles catering very differently at a hub than at a small outstation. However, the modular structure below does not preclude the airline taking on the responsibility of other parties at hub airports.

Party	Responsibility	Inputs and Outputs
<b>Airline</b>	Order for catering / duty free	Flight schedule Passenger requests
	Provision of trolleys	Inventory of trolley stock at each location
	Reporting of defects	
<b>Caterer</b>	Delivery of trolleys	Delivery schedule from caterer Flight schedule inc. stand Caterer details Ground equipment
	Removal of trolleys	Ground equipment Flight schedule inc. stand
	Delivery for repair	Notification of defects
	Cleaning of trolleys	Trolleys Cleaning instructions
	Preparation of orders	Order requests from airline Delivery schedule Change notices
		Order from airline
		Trolleys
<b>Duty free store</b>	Preparation of order	Order from airline Trolleys
<b>Trolley maintainer</b>	Repair of trolley	Defect notification Trolley for repair Repair instructions

The flow of benefits to stakeholders and the costs to be borne will be part of the detailed IATA study.

## The Role of IATA

Today there are no industry solutions to the problems described in this report. The industry is therefore at an ideal level for the introduction of solutions (new solutions may be applied to an existing infrastructure of trolleys and processes).

IATA's role is to coordinate key stakeholders (already started through the workshop of April 2007) and bring consensus through feasibility studies and type trials. The purpose of these activities is to produce a comprehensive industry business case.

Once validated by the IATA Board of Governors, IATA would create the necessary standards and implementation plans, and facilitate matchmaking between industry partners in order to achieve an optimum distribution of costs and savings.

IATA's work on the use of RFID in other areas and its knowledge of the entire aviation infrastructure for RFID will also prove beneficial for this project.

## Timescales for Action

The IATA Board mandated a trial and detailed business case in December 2007. The project is now concerned with addressing:

- Which technology is best suited to use on trolleys.
- Developing the Recommended Practice for RFID use on trolleys.
- Producing the detailed business case for the use of RFID on trolleys.

One of the key activities has been the setting up of a trial of RFID on trolleys with KLM City Hopper and KLM Catering Services. This trial will be completed in the 2<sup>nd</sup> half of 2007.

### Key Milestones

- |                           |                           |
|---------------------------|---------------------------|
| 1. Taskforce Meetings     | March, June, October 2007 |
| 2. Pilot execution        | July – August 2007        |
| 3. Final report available | December 2007             |

The taskforce is comprised of stakeholder representatives from the airlines, caterers, duty-free providers and governments. The taskforce meets several times a year with IATA in order to guide the development of the project and to ensure that the development of RFID remains focused on driving the savings identified in this report.