RFRain

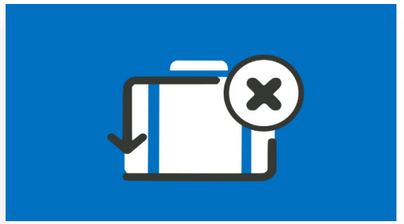
Real-Time RFID Baggage Tracking Solution

BAGGAGE MISHANDLING

The cost of mishandled bags for the airline industry is 2.7 billion in 2019 alone.
The reason of this is because of the following issues:

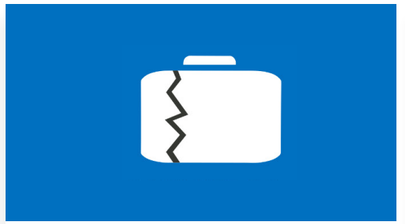
78% Delayed bags

- Bags sit on the tarmac for far too long waiting to be picked up by the ULD's.
- It takes a long time for the airport staff to locate bags that are sent to the wong terminal or wrong conveyor belt.
- Significant delay is encountered on bags that need to access the manual sorting station during transfer and arrival of bags due to poor reads by the barcode scanner.



47% Transfer mishandling

- The tag gets damaged and cannot be read propely by the barcode scanner.
- Bags are sent to the wrong terminal or conveyor belt.



17% Damaged or pilfered bags

- Bags that are top heavy or bottom heavy may get damaged during the transfer, and need to be routed differently.
- The airport does not know the location where the bag got damaged if any.

16% Failure to load

An airline or airport is not able to determine the exact time and date a bag is loaded or off-loaded from an aircraft.

15% Ticketing error bag switch

At times the tickets get placed on the wrong bag which results in the bag getting mishandled.

IATA RESOLUTION 753

Active and in effect since June 1, 2018. Initiated to motivate airlines towards transparency and to continue reducing the mishandling of baggage.

RESOLVE

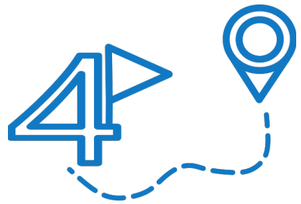
IATA members will maintain an accurate inventory of baggage by monitoring the collecting, and delivery of baggage.

PURPOSE

Accurate baggage inventories will have a series of checks and balances in place to prevent and reduce mishandling, fraud, and theft, while increasing passenger satisfaction, measuring service level agreement compliance, and providing evidence, during an inspection, that an automatic interline proration process is active and in effect.

MEMBER OBLIGATIONS

Members will demonstrate collecting and delivering of baggage during custodial changes, supply a complete inventory of luggage during flight departure, and exchange those events with additional airlines as needed.



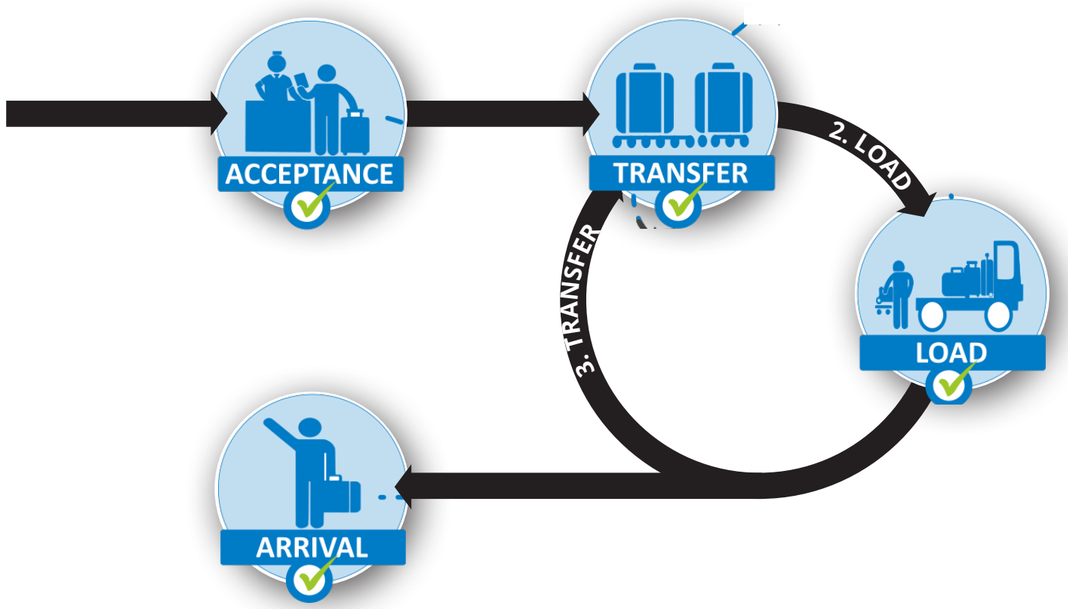
TRACKING REQUIREMENTS

The four-minimum set of tracking points shall be:

1. Collecting the bag from the passenger
2. Delivery of the bag to and on to the aircraft
3. Delivery and collecting the bag between members during carrier custodial changes
4. Delivery of the bag to the passenger or their agent

IATA R753: 4 TRACKING REQUIREMENTS

Mandated tracking points to ensure that bags are tracked through the entire baggage journey



ACCEPTANCE

When a passenger hands the IATA member or its agent their bag

LOAD

Delivery of the bag to the aircraft, by a handler ad collected by the flight

TRANSFER

Delivery and collection of the bag, from one carrier member to another.

ARRIVAL

Delivery of the bag to the passenger, by the handler, collected by the arrivals facility.

RFID TRACKING BENEFITS

Based on the IATA Resolution 753 and RFID technology, here are the benefits of using an RFID system with RFRain and how the solution is going to be used to significantly reduce the amount of bags that are mishandled on a yearly basis:

Delayed Bags

- On the tarmac: The RFRain Advanced Reader or Handheld sends the operator a message via WIFI or cellular with the precise location of the bags to avoid delays in picking up the bags on the tarmac.
- Misrouted bags in a teminal: Placing the RFRain Smart Reader on many endpoints in the terminal will allow an operator to quickly locate bags that are sent to the wrong baggage claim or wrong terminal to avoid delays.
- Manual coding: Dramatically decrease the number of bags going into manual coding. In effect the RFRain solution guarantees an RFID read rate of 99.9% versus 85-90% read rate using barcode scanners and ATR arrays.

Transfer Mishandling

- Transfer bags have a notoriously high rate of incorrect reads that can vary between 70% and 85% using ATR 360-270-90 arrays and barcode scanners. As a result the vast majority of these bags are sent to manual coding which cause delays.
- RFID tags are resilient and do not get damaged during the flight, because the data is stored digitally in an inlay chip versus printed on a piece of paper. Hence, the read rate increases to 99.9% and the need for manual coding is drastically reduced. The end result saves time and reduces labor cost.

Damaged or Pilfered Bags

- Determine the exact location and time when a bag is damaged or pilfered using RFRain image recognition technology. The RFRain solution takes a picture of the bag during the check-in process and is able to determine if a bag is damaged using the image of the bag at the check-in counter and the image at the endpoint in a process called finger printing.

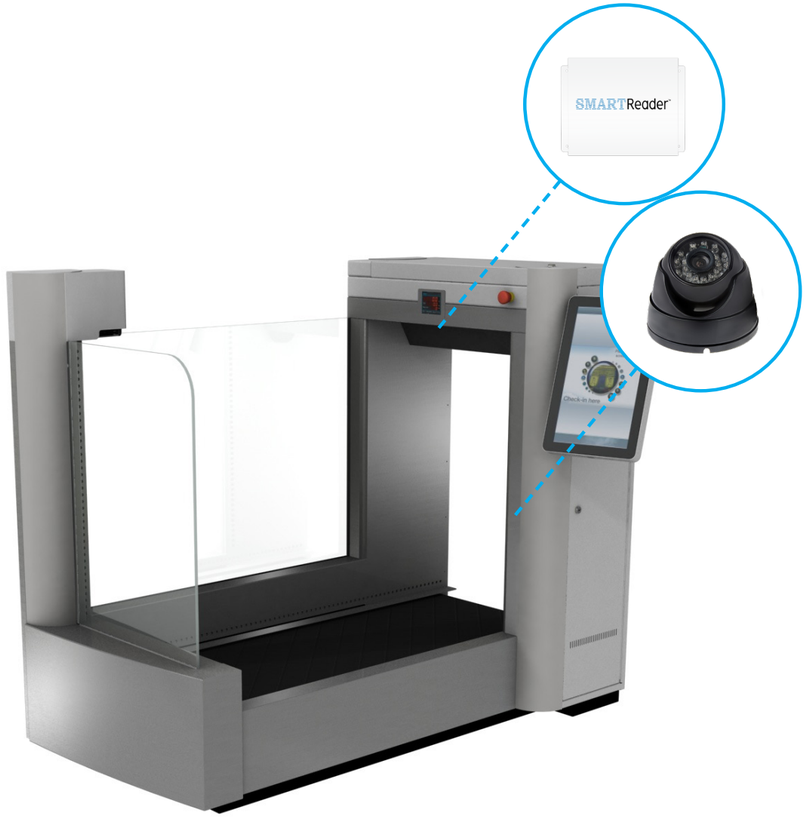
Failure to Load

- Determine the exact time the a bag enters or leaves the aircraft by scanning the bags using the RFRain Advanced Reader or Handheld on the belt loader.

Ticketing Error Bag Switch

- Using RFRain technology we will be able to associate a tag with a bag using machine learning and image recognition technology. The system will generate an error in case a tag is switched when a bag is scanned at any end point inside the terminal.

CHECK-IN IMPLEMENTATION



- An RFID tag is printed with the ten-digit BIN number.
- A bag is placed on the check-in counter conveyor belt. An RFRain Smart Reader with 2 antennas detects the tag.
- An image is taken of the bag and associated with the bag at this given point.

RFID CONVEYOR IMPLEMENTATION

- Each endpoint has an RFRain Smart Reader with 4 antennas. 2 antennas on the side, 1 antenna on top and 1 antenna below the conveyor belt.
- Proper shielding is installed around the antennas to avoid RF signal propagation.
- The Reader is connected to the PLC via ethernet cable. The Reader also connects to the Zone Manager Enterprise Server via WIFI.
- Typical installation at transfer and arrival (baggage claim) according to IATA R753

RFID BELT LOADER IMPLEMENTATION

RFR-RAIN-4-SMART-ADV

- Typical installation at the Load phase of IATA R753.
- The RFRain Advanced Reader is the only RFID reader in the market that comes with a built-in battery. This allows the reader to continue running without a power source.
- A belt loader is retrofitted with 2 antennas and an RFR-RAIN-4-SMART-ADV reader that connects via WIFI.

END-TO-END VISIBILITY WITH RFID DEPARTURE

1

2

3

4

DEPARTURE

1: **CHECK-IN**

SATO printers at the check-in print dual RFID and barcode labels. The RFID labels are affixed to travel bags.

2: **BAG DROP**

The RFRain Smart Readers are installed at various check-in keypoints.

3: **SORTING & BHS**

The RFRain Smart Readers are installed at various keypoints along the Baggage conveyor system.

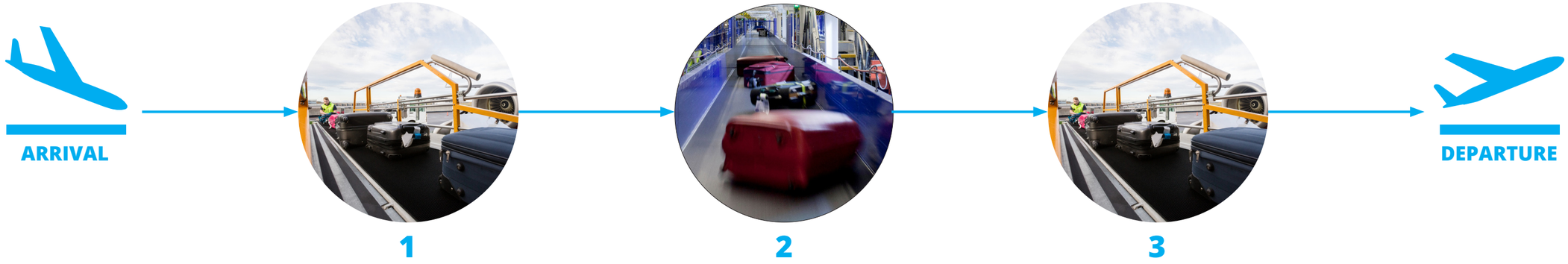
4: **LOADING**

The bags that are loaded onto the belt loader are detected by the RFRain Advanced Reader or Smart Handheld.

5: **DEPARTURE**

Each reader streams the data in real-time to the Airport Management System.

END-TO-END VISIBILITY WITH RFID TRANSFER BAGS



1: **UNLOAD**

Bags on the belt loader are detected by the RFRain Advanced Reader to determine change of custody. Optional: in case the bag is not pre-tagged with an RFID tag, the ramp staff places a pre-printed RFID tag on the bag and programs it with the BIN number printed on the barcode.

2: **BHS**

The transfer bags are re-entered in the BHS system. The RFRain Smart Readers are installed at various keypoints along the Baggage conveyor system.

3: **LOAD**

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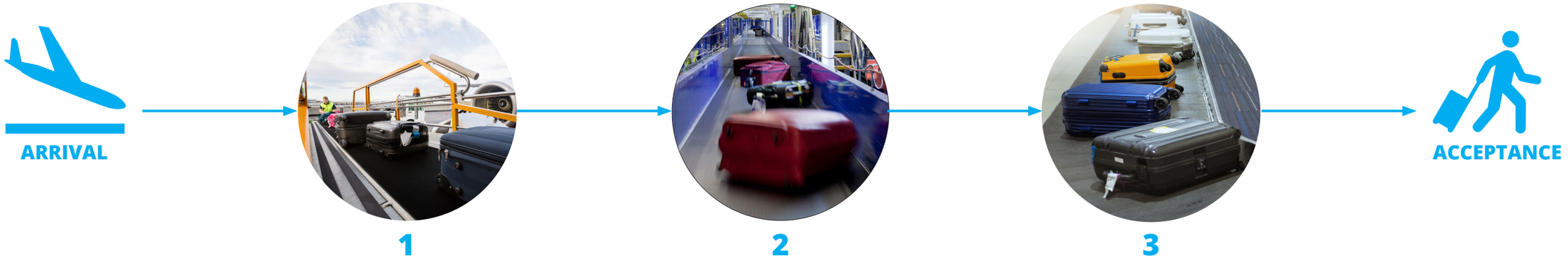
END-TO-END VISIBILITY WITH RFID
ARRIVAL



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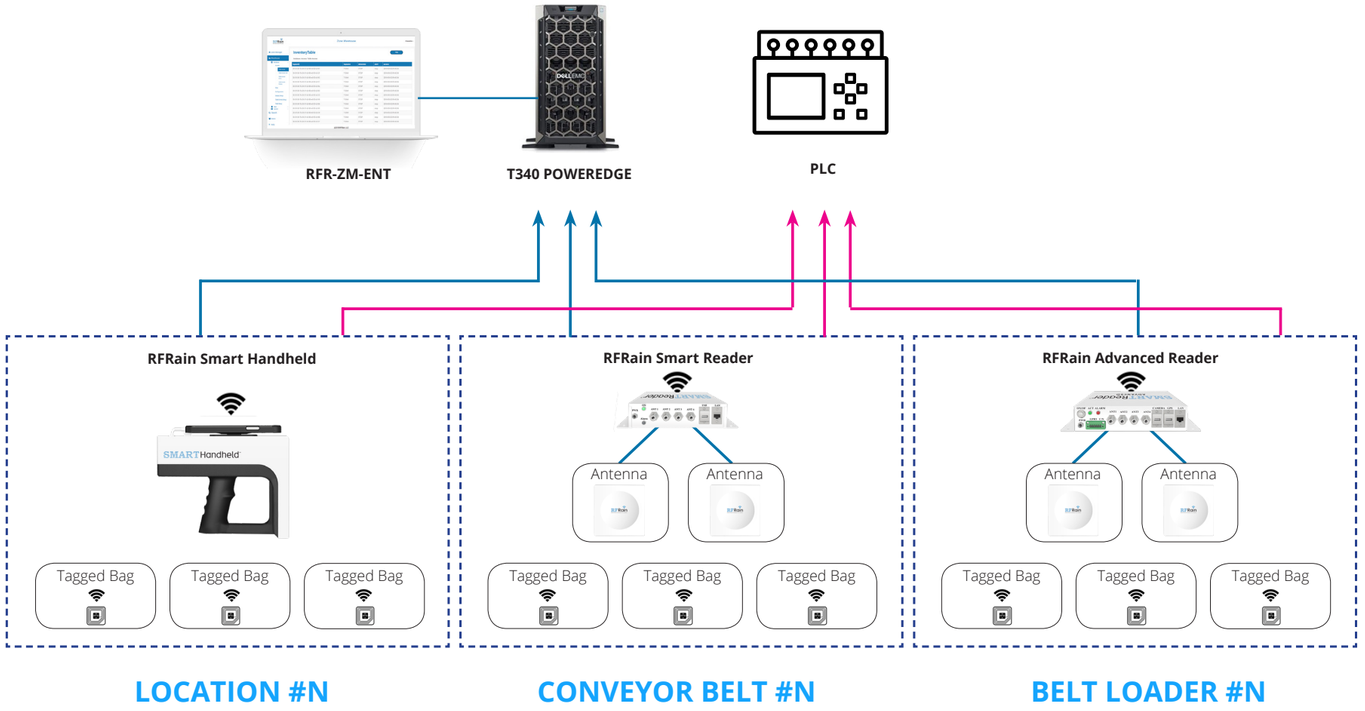
3: **BAGGAGE CLAIM**

Bags are recorded at the baggage claim with the RFRain Smart Reader.

RFRAIN COMMUNICATION NETWORK



1 Each conveyor belt, or belt loader reader connects to the PLC via ethernet or WIFI.

2 Optional: each RFRain reader connects directly to the Zone Manager Enterprise server to allow the user to manage, callibrate, check the status and upgrade the network of readers.

3 The RFRain Advanced, Smart and Handheld Reader integrate easily with the PLC controller using a simplified Rest API interface including start, pause, and read. This allows you to reduce the integration effort significantly.

4 Track each piece of baggage at any key checkpoint in real-time.

5 The data is always stored on the RFRain reader first to prevent data loss in case of a network failure or WIFI communication issues.

THE RFRAIN DIFFERENCE

COMPETITIVE ADVANTAGE

1. **Easy Setup**
   Plug and Play readers with built-in UI.

2. **Scalable solutions**
   Simply add antennas and readers to the RFR-ZM™ software platform.

3. **Patented Software Platform**
   Our software platform covers most customer needs in any industry. Little development needed to meet customer requirements.

4. **Cloud Access**
   The Smart reader automatically connects to the cloud.

5. **Development**
   RCI Compliant and Extended Rest API SDK support for System Integrators and Developers.

6. **Consultants**
   No system integrator or outside consultants required in most installations.

7. **Reduce Number of Vendors**
   Eliminate confusing matrix of piecemeal hardware from multiple vendors to install an RFID solution.

8. **Competitive Price**
   Lowest price of any reader on the market. We are very confident that we will continue to provide the lowest priced reader for years to come.

9. **Support**
   We developed the entire solution and stand behind our products 100%.

10. **Additional options**
    Access control, GPS on moving vehicles, Camera for location and added security, Image recognition, Alarm support and many more added features.

ABOUT US

RFRain is driven to continuously innovate and bring new advancements to the RFID industry with its Smart Reader technology, making RFID an easy-to-use and affordable technology.

In the couple of years that we have been in the RFID space,
we achieved the following:

- Created the World's First Plug-and-Play Smart Reader, Smart Reader Advanced and Smart Reader Handheld that are each unique in the industry
- Earned multiple patents on the Zone Manager software and Zone Manager Enterprise cloud platform for RFID
- Reduced the cost of owning a RAIN RFID system
- Simplified the installation and deployment of a RAIN RFID system
- Deploying hardware and software solutions years ahead of the market
- All our readers are FCC, CE certified
- We are proud members of the RAIN Alliance and Intel IoT Solutions Alliance Group

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