Hong Kong International Airport (HKIA)
RFID-enabled Self Bag Drop
Baggage Handling System for Hong Kong International Airport

- Arrivals System
- Intersorter lines with Hold Baggage Screening Level 1
- Check-in counters
- Secondary Sortation
- Delivery lines
- Central Transfer System
- In Town Check-in
- Manual Sorting Stations
- Primary Sortation
- Departures Laterals
- Hold Baggage Screening Level 3
- Early Bag Store
- OOG (Out of Gauge) Bag Handling

Hong Kong International Airport
Baggage Flow with RFID Technology

- **Barcode Reader**
- **Stick RF Gen 2 Label**
- **Read barcode LPN Encode in Gen2 Label**
- **RF reader**
- **No Read MCS**
- **X-ray**
- **Check-in Counter**
- **RF Printer to print and encode LPN in baggage tag with Gen2 inlay**
- **Transfer In-feed**
- **Primary Sorter**
- **Secondary Sorter**
- **DFS RF Reader**
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- **North/South Hall Pre-sort**
- **Inner/Outer Sorter Loop Pre-sort**
- **Track baggage loading into ULD by RF readers**
- **BMS**
- **Manifest**
- **Lateral RF Reader**
- **Lateral**
- **LPN and ULD number**
Development of HKIA RFID Project

**Timeline**

- **2003**
  - HKIA planned to apply RFID technology to enhance BHS operation
- **2005**
  - Full RFID mode Gen-1 operation in service
- **2008**
  - Rollout the 21” RFID integrated bag tag to all airlines in HKIA and migrated to Gen-2 operation
- **2010**
  - Rollout of RFID sortation readers for baggage capacity enhancement projects
- **2015**
  - RFID enabled automated Self Bag Drop implementation to the check in process
Check-in Counters
BHS Transfer Bag

- Barcode Scanner
- RFID antenna
- RFID shielding curtain

Belt Speed: 1.2m/s
Distance: ~1.2m
BHS Sorters

*Belt Speed: 1.2m/s
Distance: ~1.2m*
Baggage Make-up Area (Lateral)

- Baggage container
- Lateral RFID Panel Readers
- RFID readers
- Containers
- OFU: Operator Feedback Unit
RFID System Components

RF Readers, Antenna and Printer

- 200+ Readers
- 500+ Antennas (read points)
- 650+ RFID Bag Tag Printers
- 250+ Dual Mode /Barcode Handheld Terminal
Existing Check-in Facilities in HKIA

- 321 check-in counter in T1
- 56 check-in counter in T2
- 82 common-use self-service (CUSS) kiosks in T1
- Check-in facilities approaching capacity due to growing passengers
  – LONG QUEUE in peak hour
Automated Self Bag Drop Check-in System around the world’s airport

Not Best-fitted with HKIA
HKIA Self Bag Drop

- Existing design constraints limited space and zero impact to the operational flow

- Existing product is not best-fitted with HKIA environment
HKIA Self Bag Drop Feature

- Dual Mode (Normal Check-in Mode & Self Bag Drop Mode)
- RFID enabled (support home-printed bag tag)
Dual Mode

- Self Bag Drop Mode
- Normal Check-in Mode
# RFID Enabled Measures

<table>
<thead>
<tr>
<th>Tag</th>
<th>Equipment</th>
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<tbody>
<tr>
<td>Counter printed bag tag</td>
<td><img src="image1.jpg" alt="Equipment Image" /></td>
</tr>
<tr>
<td>Home printed bag tag</td>
<td><img src="image2.jpg" alt="Equipment Image" /></td>
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Challenges

• Limited Space
• Limited Power (USB source)
• Proposed RFID handheld reader is too heavy and not user-friendly
• Consistent with international standard and regulation i.e. IATA (Fast Travel Program) and EPC etc.
System Diagram

SELF BAG DROP MODE

Self Bag Drop Unit

Bag Drop Mode
Switching Panel

Check-in Operator
Control Panel

NORMAL CHECK-IN MODE

Baggage Handling System
PLC/Weighting Scale
Airport Authority & LSCM

SOLUTION

• Partnership with LSCM for the customized project upon this technical challenge in developing *hybrid handheld reader*

• Funded by Innovation and Technology Fund (ITF)
  – Provide 120 nos hybrid handheld reader for AA
Key Objectives

- Scan 2D barcode (Boarding Pass)
- Scan 1D barcode and encode RFID tags (Home Printed Bag Tag) in 1 step
- Handy and light weight
- Short reading range to avoid mis-encode of other baggage (within 50mm)
## Challenge

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
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<tbody>
<tr>
<td>Low power (USB interface)</td>
<td>LSCM developed a low power consumption chip</td>
</tr>
<tr>
<td>Limited Space for Reader</td>
<td>Customized case design</td>
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<tr>
<td>Different read range between barcode and RFID</td>
<td>Use special lens to fit the barcode read range matched to RFID</td>
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Hybrid Handheld Reader Architecture

• Core Components:
  – PC controller program (CtrlPg)
  – Integrated Barcode / RFID reader (IBRRRdr)
  – IBRRRdr PC driver / API (IBRRRdr driver)
ACHIEVEMENT

• Simplified the check in process of the bag drop with home printed bag tag

• Manual check-in processing time from 2 ~ 3 minutes down to around 1 min using auto self bag drop facilities

• To uphold the check-in services capacity with the continuous future growth of passenger traffic
LION ROCK SPIRIT
NEVER GIVE UP
THANK YOU