AGENDA

• The Value Proposition of RFID
• RFID Trends
• Industries and Application
• Zebra’s RFID Portfolio
• Zebra RFID API
WHAT IS RFID?

Auto ID Data capture (AIDC) technology, that uses radio-frequency waves to wirelessly transfer data between RFID tagged items and an RFID reader.
RFID VALUE PROPOSITION

VISIBILITY...RFID IS AN EASIER WAY TO COUNT AND TRACK

• RFID IMPROVES EFFICIENCY
• RFID IMPROVES PRODUCTIVITY
• RFID REDUCES LABOR COSTS
• RFID INCREASES ACCURACY
• RFID INCREASES SALES
# BAR CODE SCANNING AND RFID

## BAR CODE SCANNING

- Line of sight
- Visible
- One at a time
- SKU or class of goods
- Inoperable if visually damaged
- Operator intervention
- Read-only
- Affordable

## RFID

- Read many items at once
- Broad range
- Identifies unique items
- EPC or asset ID
- Wireless
- Harder to deface
- Automated
- Read/Write
- Harder to replicate

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NOT ONE OR THE OTHER – MANY CUSTOMERS USE BOTH TECHNOLOGIES SIDE BY SIDE
RFID BY THE NUMBERS

• The total RFID market for 2014 is $8.9 billion, up +13% from 2013
• The RFID hardware revenue is predicted to grow by up to as much as 20% each year
• 33% of the total US apparel market is engaged in RFID activity today and in 2015. Record UHF tag volume shipment in 2014
  • 35% CAGR from 2010-14
• Lower cost / higher performance

Sources: IDTechEx, IDTechEx, ABI Research, ChainLink Research
## TRENDS

- Adoption moving from Tier 1 to Tier 2 Companies (Mid-Market)
- Better Ergonomics / Purpose built devices / Advanced software and tools
- Higher performance + Smaller form factors + lower cost
- RFID enablement of mobile devices
- Drive toward full automation
  - Continuing to remove the human factor
- Integration of Technologies
  - One size does not fit all – UHF, HF, NFC, UWB, BLE
  - Driving multi-faceted solutions
- Data ---> actionable business information
  - Importance of software and data analytics
  - Data accuracy and integrity
- Retail adoption is driving RFID headlines – but so are other verticals: manufacturing, t&l, healthcare, hospitality, etc.
- Moving toward the Internet of Things (IoT)
BUSINESS ISSUES

OUT OF STOCKS LEADS TO LOST SALES
Upwards to 10–15% lost revenues
- Holiday shoppers left an average of $95 unspent per incident due to limited merchandise/out of stocks and limited employee assistance

NO FAST WAY TO COUNT FLOOR INVENTORY
Costly, time consuming, therefore, only done once or twice a year

POOR INVENTORY CONTROL LEADS TO INCREASED MARK-DOWNS

ASSOCIATES CAN’T FIND ITEMS FOR CUSTOMERS – SEARCH TIME EXTENSIVE

BUSINESS NEED:
A way to quickly take regular inventories to “balance the checkbook”
## RFID RETAIL PERFORMANCE METRICS

<table>
<thead>
<tr>
<th>Proven Business Benefits</th>
<th>Zebra &amp; Partner Implementations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction in OOS by</td>
<td>60% to 80%</td>
</tr>
<tr>
<td>Better Inventory Accuracy</td>
<td>Between 98% &amp; 99.9%</td>
</tr>
<tr>
<td>Reduction in Cycle Count Time by</td>
<td>75% to 92%</td>
</tr>
<tr>
<td>Reduced Inventory Carrying Costs by</td>
<td>30% to 59%</td>
</tr>
<tr>
<td>Reduced Receiving Time by up to</td>
<td>91%</td>
</tr>
<tr>
<td>Improved Conversion Rate by up to</td>
<td>92%</td>
</tr>
<tr>
<td>Increased Units &amp; $/Transaction</td>
<td>19%, 6%</td>
</tr>
<tr>
<td>Increased Sales</td>
<td>From 4% to 21%</td>
</tr>
</tbody>
</table>

**VISIBILITY** =
- *Customers can find what they want to buy*
- *Associates have more time to spend with customers*
- *Associates can find items customers want more quickly*
Comments on RFID and Omnichannel Fulfillment Strategies

Peter Longo – President, Macys Logistics & Operations
- RFID is our air supply - we can't live without it
- Macy's now fulfills $1B in web orders via its stores

Ken Duane – CEO, Heritage Brands and NA Wholesale, PVH
- RFID provides a significant advantage - if you can link omnichannel to in-store and can find and ship to the last unit we all win
- We have seen huge improvements in margins and accuracy with RFID...There are so many upsides
- I was a skeptic ... as a supplier I was counting my pennies wondering who would pay for this, but I am a believer now. It is a win-win for suppliers and retailers.
- RFID has become standard operating procedure at PVH. You have to be able to know where your inventory is at any time in any part of the supply chain.

Eileen DiLeo - EVP of Stores, HBC (Hudson Bay, Lord & Taylor, Saks)
- We feel strongly that RFID will be the key to improved productivity – it will enable us to click to the last unit...We have plans to be fully RFID enabled at department stores by 2016
- RFID continues to lead every single day into new use cases - we are still at just the tip of the iceberg in terms of its value.

*CONFERENCE SESSION: Monetizing Consumer Demand with Predictive Analytics & Real Time Inventory Visibility
RFID AND THE NEW ZEBRA

THE LARGEST PORTFOLIO OF RF AND SENSOR BASED TECHNOLOGIES AND SOLUTIONS

- **PASSIVE**
  - Low Frequency
  - High Frequency / NFC
  - Ultra High Frequency

- **ACTIVE**
  - Ultra Wide Band RTLS
  - WhereNet 2.4 GHz RTLS
  - Low Energy Bluetooth Beacons (mPact)

- **ZATAR DEVICE MANAGEMENT AND COLLABORATION PLATFORM**
- **ZEBRA’S SPORTS SOLUTION**
## UHF RFID SYSTEM COMPONENTS

<table>
<thead>
<tr>
<th>Tags and Printers</th>
<th>Readers, Antennas, Accessories</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label Providers</td>
<td></td>
<td>Software Development Tools</td>
</tr>
<tr>
<td>• Peel &amp; Stick</td>
<td></td>
<td>• ERP</td>
</tr>
<tr>
<td>• Disposable</td>
<td></td>
<td>• WMS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Custom</td>
</tr>
<tr>
<td>Hard/ Laminated or Encased Tags</td>
<td></td>
<td>Application</td>
</tr>
<tr>
<td>• Durable</td>
<td></td>
<td>• Asset Tracking</td>
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<tr>
<td>• Permanent</td>
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<td>• Inventory Management</td>
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<td></td>
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<td>• Shipping</td>
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<tr>
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<td></td>
<td>• WIP</td>
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<tr>
<td></td>
<td></td>
<td>• Fleet Mgmt</td>
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<tr>
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<td>• Healthcare</td>
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- **Connect**
- **Legacy**

**Printers**

**Readers, Antennas, Accessories**

**Software**
# ZEBRA’S UHF RFID READER PORTFOLIO

## INDUSTRIAL-CLASS
- Warehouse & Dist.
- Supply Chain
- Manufacturing
- Energy/Utilities
- Field Service

## BUSINESS-CLASS
- In-Store Retail
- Asset Mgmt.
- File tracking
- Healthcare
- Task Workers

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<tr>
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<th>FIXED</th>
<th>HANDHELD</th>
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<tbody>
<tr>
<td></td>
<td>FX9500</td>
<td>MC9190-Z WORKABOUT PRO 4 RFD8500 RFD5500</td>
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<td></td>
<td>Automatic</td>
<td>Fully Integrated Modular Two Piece</td>
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<tr>
<td></td>
<td>FX7500</td>
<td>DS9808-R MC3190-Z RFD8500 RFD5500 SLED w/MC55</td>
</tr>
<tr>
<td></td>
<td>Automatic</td>
<td>Fully Integrated Tethered Two Piece</td>
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</table>
RFD8500

**Technology**
- Bluetooth RFID Reader Sled / Gun form-factor
- Available with or without 1D/2D Barcode Imager with PRZM technology
- Longest battery life in its class
- Enterprise-class mount adapters & accessories

**Software Integration**
- Multi-Platform support: Android, iOS, Windows* with SDK, Developer Guide, demo apps & sample code
- Zebra Easy Text Interface (ZETI) can be used across many OS platforms, eliminating the need to utilize a SDK
- 123Scan Configuration Utility with an intuitive interface

**RFID**
- Current - Class 1 Gen 2 (ISO 18000 6C)
- Enhanced - Gen2 v2 (Enhanced security)
- Industry leading hand-held performance based on Zebra Radio technology
ZEBRA’S UHF RFID PRINTER PORTFOLIO

**CARD**
- ZXP Series 7
  - Efficient, low cost of ownership, extended read range

**DESKTOP**
- ZD500R
  - Simple setup and operation in a compact size

**INDUSTRIAL**
- ZT400 Series
- R110Xi4
  - Advanced features and connectivity
  - Maximum duty cycle and reliability
- ZE500R Print Engine
  - Automated print/apply, reliable, easy to service

- Card printers ZXP-3, ZXP-7, and ZXP-8 also support encoding of High Frequency “HF” RFID smart cards
Development
Zebra RFID System

- **Applications**
  - Customer applications in C, C++, .NET & Java

- **RFID 3 API set**
  - Zebra RFID3 API based on LLRP (Low Level Reader Protocol)

- **LLRP Protocol**
  - LLRP defines a communication interface between RFID Readers and Applications

- **RFID Server**
  - RFID Server running on the Reader in background

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*APPFORUM 2015*

*THE DEVELOPERS EVENT*
Generic LLRP Reader Interface

• Talks with LLRP based Zebra Readers via LLRP interface

• Allows applications to perform:
  • Connection Management
  • Knowing Reader Capabilities
  • Configuring the Reader
  • Managing Events
  • Managing Tags
  • Setting Filters and Triggers
  • Inventory & Access Operations
RFID3 API Interface Architecture

**EMBEDDED APPLICATIONS**
- Applications in Java
  - EMBEDDED RFID3 Java API
- EMBEDDED RFID3 C-API

**HOST BASED APPLICATIONS**
- Applications in Java
  - HOST BASED RFID3 Java API
- HOST BASED RFID3 .NET-API
  - HOST BASED RFID3 .NET-API
- HOST BASED RFID3 C-API

**DIRECT LLRP APPS**
- LTK Toolkit

**LLRP Protocol LAYER**
- RFID Reader Server

**APPLICATIONS IN C**
- EMBEDDED RFID3 .NET-API
- HOST BASED RFID3 .NET-API
RFID API3 – At a glance

• Provides Uniform API set for All Zebra Fixed & Hand-held RFID readers
• Support multiple readers access and is thread-safe
• Designed for fast application development to support both simple and advanced Reader Operations.
• Provide a Full-fledged user-friendly interface
• Java: Class interfaces are similar like .NET (to the maximum extent)
Reader Management Interface

• Talks over the custom interface as supported by Reader
  • Via xml over http (for XR Series, FX Series)
  • Via custom LLRP extensions (for MC3090Z, MC3190Z, MC9090Z)

• Allows application to perform
  • Login/Logout
  • Get Reader Information
  • Change Antenna Mode (only for XR Series)
  • Enable/Disable antenna port (only for XR Series, FX Series)
  • Update Software/Firmware
  • Import/Export Profiles (only for XR Series, FX Series)
  • Get System Info (only for XR Series, FX Series)
THANK YOU