DHL Exel 공급망 관점에서 본 RFID의 현재
Contents

- Introduction To DPWN/DHL & DHL Exel Supply Chain
- Brief Overview Of Wireless & RFID Technologies
- Current RFID Deployment Strategies & Future Considerations
- Real Examples Of RFID Deployments In The Supply Chain
- Summary & Closing Remarks
The New DPWN / DHL Organizational Structure

Group

Corporate Divisions

Brands

Brand areas

Mail
- Germany
- Worldwide

Express
- Worldwide

Logistics
- Worldwide

Finance
- Germany

Brands

- Deutsche Post
- Postbank

Brand areas

- Mail Communication
- Direct Marketing
- Press Distribution
- Philately
- In House Service
- Real Estate
- Pension Service
- Global Mail

Brands

- Express
- Freight

Global Mail

- SMART & Global Mail
  (Only USA)

Express

- Exel Supply Chain

Global Forwarding
Leadership Across The Logistics Market

- Reaching the top is the one thing ....Staying there, depends on your/our logistics know-how

### Ocean Freight
(Market Volume: 20.5MM TEU)
Market share percentages 2004

<table>
<thead>
<tr>
<th>Company</th>
<th>Market Share 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHL</td>
<td>9.8%</td>
</tr>
<tr>
<td>K+N</td>
<td>8.1%</td>
</tr>
<tr>
<td>Schenker</td>
<td>4.3%</td>
</tr>
<tr>
<td>Panalpina</td>
<td>4.2%</td>
</tr>
<tr>
<td>Exel</td>
<td>3.1% = 8.7%</td>
</tr>
</tbody>
</table>

### Air Freight
(Market Volume: € 23.0 bn)
Market share percentages 2004

<table>
<thead>
<tr>
<th>Company</th>
<th>Market Share 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHL</td>
<td>6.8%</td>
</tr>
<tr>
<td>Nippon</td>
<td>5.6%</td>
</tr>
<tr>
<td>K+N</td>
<td>3.2%</td>
</tr>
<tr>
<td>UPS</td>
<td>3.1%</td>
</tr>
<tr>
<td>Exel</td>
<td>4.8% = 11.6%</td>
</tr>
</tbody>
</table>

### Contract Logistics
(Market Volume: €156bn)
Market share percentages 2003

<table>
<thead>
<tr>
<th>Company</th>
<th>Market Share 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHL</td>
<td>1.2% + Exel 3.6% = 4.8%</td>
</tr>
<tr>
<td>TNT</td>
<td>2.6%</td>
</tr>
<tr>
<td>Wincanton</td>
<td>1.6%</td>
</tr>
<tr>
<td>UPS</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

- Increased buying power
- Re-shape the market
- Re-define the market
...much work remains to be done.

Source: Gartner Group
RFID Maturity Related To Specific Applications

- RFID-Enabled Dynamic Logistics Networks
- RFID Smart Consumer Appliances
- RFID-Centric Retail Operations
- Item-Level CPG Tagging
- Case-Level CPG Tagging
- Medical Equipment Tagging
- Pharmaceutical Tagging
- Mobile RFID Inventory
- RFID-Centric WMS
- Third-Party RFID Inventory
- Item-Level CPG Tagging
- RFID-Centric Retail Operations
- RFID Smart Consumer Appliances
- RFID-Enabled Dynamic Logistics Networks
- Port Operations Tagging
- Pallet Level CPG Tagging
- Pallet Transmission of ASN
- Passive RFID Controls on Factory Equipment
- Finished Vehicle Tagging
- Returnable Assets
- Active RFID Controls on Factory Equipment
- Military Field Equipment and Supply Tagging
- Automotive OEM Parts Tagging
- Bar-Code-Centric WMS, Manufacturing and Retail

Visibility

Current Phase

Key: Time to Plateau
- ○ Less than two years
- ● Two to five years
- ▲ Five to 10 years
- △ More than 10 years
- × Obsolete before Plateau

As of September 2003
Why Is DHL Exel Supply Chain Using RFID?

- **Customer Considerations**
  - New Market Vertical Solutions?

- **Operations Considerations**
  - Are There Efficiencies To Be Realized?

- **Integration Considerations**
  - How Does This Impact Existing And/Or Future Technology Integrations

- **Competitive Considerations**
  - Lead?
  - Lag?

- **Assisting Customers With Compliance / Mandates**
Future RFID Opportunities Considered?

Potentially, RFID tools and solutions can be used to address the challenges of supply chain

<table>
<thead>
<tr>
<th>Supply Chain Challenges</th>
<th>Representative RFID Solutions</th>
<th>Select Deployment Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased Complexity</td>
<td>• Real-time demand planning&lt;br&gt;• Item-level track and trace&lt;br&gt;• Reverse supply chain&lt;br&gt;• Automatic replenishment&lt;br&gt;• Real-time tracking of transportation&lt;br&gt;• Automatic goods receipt &amp; confirmation of proof-of delivery&lt;br&gt;• Automatic cross docking&lt;br&gt;• Item authentication</td>
<td>• Increased sales&lt;br&gt;• Reduced out-of-stocks&lt;br&gt;• Increased labour productivity&lt;br&gt;• Reduced shrinkage&lt;br&gt;• Reduced inventory levels&lt;br&gt;• Improved customer service</td>
</tr>
<tr>
<td>Lack of Visibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased Data Flow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased Collaboration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Why RFID Now?

- After 15 years of tests and trials RFID is currently experiencing a heightened level of attention and momentum due to the following factors:

**Price**
- Prices are falling fast
- Readers now less than $1,000
- Tag pricing in the range $0.50 falling to less than $0.10 on multi-million volumes
- New materials and processes are becoming available

**Industry Adoption**
- FDA recommendation for drug traceability
- USA Military announced that all suppliers must use RFID by 2007
- Wal-Mart has announced that it wants its top 100 suppliers to be RFID capable @ Pallet/Case by January 2005 and will have a total of 300 vendors using RFID as of January 2007. Wal-Mart is also working with pharmaceutical suppliers regarding the tagging of Class II products.
- Tesco introduce RFID at case level starting in 2005; all suppliers by 2006
- Directive 2003/94/EC lays down traceability requirements for investigational medicinal products (art.15).

**Performance**
- New Frequencies for chips & readers
- Longer read range, up to 15 Ft. USA 3 Mtrs Europe using ‘Passive low cost tags’
- Faster anti-collision – EPC Gen 2
- Faster data transmission – EPC Gen 2
- More memory available – EPC Gen 2
- Increased security – EPC Gen 2
- Advances in manufacturing techniques should produce better yields.

**Standards & Software Development**
- ISO 18000-6 UHF --- Just ratified!
- ISO 15694 HF
- EPC- Global Gen. 2 Standard
- EPC Network
End Users Have Many Wireless Technology Options

- **GPS / GLS**
- **Cellular Technologies**
- **Ultra Wideband – UWB**
- **Wi-Fi**
  - 802.11 Compatible
- **RFID (multiple frequencies)**
  - Active / Semi-Active / Passive
  - LF, HF, UHF ...

**Modes Of Transport**
- Pallets/ULDs
- Cases
- Inner Packs
- Items

**Frequencies**
- LF: 120-140 kHz
- MF: 13.56 MHz
- HF: 2.45 GHz
- UHF: 6.8 GHz
- Microwave: 868 MHz – 915 MHz
Considerations when choosing an RFID technology

Three factors to consider:

- Technology
- Legislation
- Cost

The spectrum is finite, crowded and subject to local regulations.

Matching performance with business requirements:

- Higher performance, e.g., reading range comes at a cost.

UHF (800-900 Mhz) applications are not the only choices available for RFID applications, prompting the consideration of other RFID solutions as well.
Wireless Convergence Also Is Taking Place

- Hybrid Solutions Are Evolving
  - Cellular Technology
  - RFID
  - GPS

- Examples of convergence:
  - Fluensee
  - PINC Solutions
  - Skybitz
  - @Road
  - Wherenet
Data Volumes Could Increase Significantly

Complex Issues:
- What happens when the item contains many RFID enabled components?
- How will one manage mixed pallets?

Key Challenges:
- This data will challenge system infrastructure, application performance and processes.
- Batch systems will limit benefit realisation.

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of Items</th>
<th>Number of EPC codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>1</td>
<td>1 EPC code</td>
</tr>
<tr>
<td>Inner case (holds 10 items)</td>
<td>10</td>
<td>10 items + 1 inner = 11 EPC codes</td>
</tr>
<tr>
<td>Case (holds 6 inneres)</td>
<td>60</td>
<td>60 items + 6 inner + 1 outer = 67 EPC codes</td>
</tr>
<tr>
<td>Pallet (holds 16 cases)</td>
<td>960</td>
<td>960 items + 96 inner + 16 case + 1 pallet = 1074 EPC codes</td>
</tr>
<tr>
<td>Pallet load (example 4 pallets)</td>
<td>3840</td>
<td>3840 items + 384 inner + 64 case + 4 pallets = 4292 EPC codes</td>
</tr>
</tbody>
</table>
IT Strategies Could Also Change

In The Future

ERPs, WMS, TMS, database, or other systems

Integration software

Device Mgt software

In The Future

Application Oriented Networking (AON)

ERP, WMS, TMS, database, or other systems

Infrastructure Layer

RFID Tagged Product
As firms are able to tag at the item-level, RFID benefits will become more substantial.

### Level of Benefit

<table>
<thead>
<tr>
<th>Reusable Containers</th>
<th>Inbound Receiving</th>
<th>Supply Planning / Production Scheduling</th>
<th>Pallet Location &amp; Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased asset utilization</td>
<td>Improved efficiency &amp; accuracy</td>
<td>Improved order fill rate / accuracy</td>
<td>Ability for product diversion</td>
</tr>
<tr>
<td>Reduced shrink</td>
<td></td>
<td>Reduced inventory &amp; WIP</td>
<td>Increased asset utilization</td>
</tr>
</tbody>
</table>

### Short-term

**Pallet / Case Tagging**

- Inventory Management / Visibility:
  - Increased asset utilization
  - Reduced inventory
  - Increased inventory availability

- Loss Prevention (Back room):
  - Reduced shrink

- Pick, Pack and Ship:
  - Improved order fill rate / accuracy
  - Improved labour efficiency

- Demand Planning (DC & Store):
  - Reduced out-of-stocks
  - Increased service levels
  - Reduced inventory

### Mid-term

**Pallet / Case Tagging**

- Demand Planning (Store shelf):
  - Optimized promotions & pricing
  - Elimination of out-of-stocks
  - Reduced inventory obsolesce
  - End-to-end demand chain visibility

- Inventory Counts:
  - Improved inventory accuracy
  - Improved pick/pack accuracy

- Loss Prevention (Store shelf):
  - Reduced shrink

- Safety & security:
  - Traceability of contaminated product (regulatory compliance)
  - Reduced counterfeiting

- Reverse Supply Chain:
  - Efficient product recalls/returns

- Self check-out:
  - Reduced labour cost
  - Improved consumer experience

### Long-term

**Item Tagging**

- Improved asset utilization
- Reduced shrink
RFID Adoption Drivers

- Metro
- Wal-Mart
- U.S. Department Of Defense
- Albertson’s
- Marks & Spencer
- PRADA
- Target
- Tesco
- U.S. Food & Drug Administration
- Best Buy
- Ace Hardware

Who’s Next? ASDA, Kroger, CVS, Home Depot..
Many different approaches are possible, each having different cost/benefit characteristics associated with the implementation results.

- **Slap & Ship**
  - Simple process of applying compliant tags to cases & pallets with no back-end integration or reading.

- **Third-party Logistics (3PL) Solution**
  - Outsourcing of order fulfilment for RFID-mandated products/operations to a 3PL for processing, tagging & shipping.

- **Pilots**
  - Design and build of a small-scale, controlled RFID tests in a live operating environment.
  - Leverage pilots as basis for full roll out.

- **Selected Deployments**
  - Prioritized deployments of working RFID solutions in a scaleable, pragmatic fashion with sound cost and benefit fundamentals.

### Integration(*) vs. ROI

<table>
<thead>
<tr>
<th>Level of Integration</th>
<th>3PL Solution</th>
<th>Selected Deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>High</td>
<td>End-to-end</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>Pilots</td>
</tr>
<tr>
<td>Slap &amp; Ship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do Nothing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(*) Supply-chain process and system integration

**Most popular application strategy**

---

**Return on Investment**

- Low
- High
Primary Driver Of Adoption – Compliance!

Operator Enters/Scans Pallet LPN and (Carton Barcode)

Operator Corrects Pallet Count (as required)

Print/Apply Case/Pallet Label (Manual)

RFID Readers/Antennas (Validate Portal RFID Label)

Visual Read Indicator

RFID Reader

Photo-eyes (Triggers barcode/RFID readers)

Typical “Slap & Ship” Solution
How Can A Slap & Ship Strategy Be Improved?

- Operator Enters/Scans Pallet LPN and (Carton Barcode)
- Buffer if bad labels
- RFID Encode(Print) Label Attach
- Photo-eyes (Triggers barcode/RFID readers)
- RFID Read/Write Antennas (Validate RFID Label)
- Visual Read Indicator
- Operator Corrects Pallet Count
- Print/Apply Pallet Tag (Manual/Auto)
- Pallet Line (Bad Labels)
- Pallet (Bad Labels)
- Pallet (Good Labels)
Does Slap & Ship Make Sense Long-Term?

What about RFID tags being applied at the plant?
Wireless & RFID Technologies Are Just The Tip Of The Iceberg!

- RFID & Wireless Technology
- Supply Chain Execution Applications
- Data Synchronization
- Collaborative Forecasting & Planning Applications
- Enterprise Resource Planning Applications
- Data Transfer / Visibility Applications
- Customer Resource Planning Applications
...but I already have a visibility solution!
Increasing Levels Of Data Collection Sophistication

Data Quality, Latency & Security

Different Types Of Data

Different Agencies/Companies Involved

Different Processes/Services Involved

Note: Products handled can be in bulk or discrete form and are shipped through different channels/verticals.
International Supply Chains...At A Glance (3/3)

Movement To Tag At Source / Tag At Origin

Different Agencies/Companies Involved

Different Processes/Services Involved

Note: Products handled can be in bulk or discrete form and are shipped through different channels/verticals.

Trans = Transportation
Beyond RFID Compliance & Asset Management

- Dock Door RFID Portal
- RFID Enabled Rack
- Garment On Hanger RFID Portal
- RFID Enhanced Stretch Wrap Machine
- RFID Enabled Yard Operations
- Fork-lift Mounted RFID
Customer Opportunity Assessment:

To reduce the costs associated with store deliveries by increasing vehicle fill. This needs to be achieved with minimal infrastructure requirements.

The driver needs to:

- be monitored whilst making the delivery (stock integrity)
- be safe whilst making the delivery (health & safety)
- deliver ideally to an unmanned store (reduce labor costs)
- deliver to a secure area (no public access)
- have easy access to the delivery area (no key/security issues)
Store secure and awaiting delivery.
Cameras act as ‘Airlock alarm system’ – Video Motion Detection (VMD).
Arrival of vehicle and driver releases the electronic lock and enables the CCTV to start recording locally. Also disables ‘Airlock alarm’; and sends a signal to central monitoring station to notify arrival.
Driver unlocks mechanical lock using standard key to gain full access to ‘isolation chamber’.
Retail Supply Chain RFID Deployment Example (5/10)

Sensor on door logs the time of entering ‘isolation chamber’.
All activity during the delivery is recorded locally in digital format by CCTV cameras. This is automatically time and date stamped.
Any situation that results in the driver being at risk, a ‘panic’ signal can be sent to the central monitoring station by the driver pressing a panic button on the key-fob.
Once delivery complete driver closes doors and secures the mechanical lock. Time of door closure captured.
Departure of driver and vehicle automatically locks the electronic lock, re-enables the ‘Airlock alarm’ and stops the recording. Signal sent to central monitoring station to notify of departure.
Sample shots from loading bay cameras
Executive Summary

In an effort to further explore the opportunities that radio frequency identification (RFID) technology might bring supply chain applications, an RFID enabled Yard Management System (YMS) pilot was recently initiated in Toronto, Canada.

The objectives of this trial include:
- Determine the impact to productivity and utilization of both direct and indirect labor using an RFID enabled YMS
- Quantify asset utilization of yard trucks and trailers in the yard
- Minimize demurrage, detention and fuel expended as part of the overall management and operation of the yard
- Investigate opportunities to improve customer service and/or better manage carriers.
Yard Management System Overview

→ Delivers value to trucking terminals, distribution facilities and cross-docks.
→ Visibility to equipment and inventory across all yards
→ Event-driven task dispatching
→ Carrier appointment scheduling
→ Dock door scheduling
→ Inbound / outbound gate management
→ Equipment location and inventory management
→ Productivity and utilization reports
→ RFID, GPS, bar code & sensor integration capability
RFID Enabled Yard Management (3/6)

System Features

- Intuitive graphic user interface that dynamically displays yard and dock configurations in real-time
- Technology & application diversity, support of different operational environments (web interface, mobile & hand-held devices)
- RFID, bar code & GPS enhance data gathering and equipment management
- Carrier / driver appointment scheduling
- Gate processing to enhance security of the yard and knowledge of what is arriving and departing
- Real-time information and visibility related to the equipment and product inventories located in the yard
- Facility door slotting & scheduling through the use of event management
- Integration with existing systems through standard interfaces
Guard House Functionality

➔ Inbound Equipment
  - Dedicated equipment is automatically identified
  - Non-dedicated equipment is checked-in and is RFID tagged temporarily
  - Equipment & load information is entered into Fluensee YMS
  - Gate arrival time is documented and yard location is assigned

➔ Outbound Equipment
  - All tagged equipment is automatically verified
  - Exit information is entered
  - Gate exit time is documented
Shunt Truck Functionality

- **Processing Equipment Moves**
  - System & driver directed moves
  - Shipping & receiving request moves through Fluensee YMS
  - Move requests are received and processed
  - Confirmations are updated automatically

- **RFID Drive-by Inventory**
  - Reconcile equipment location instantaneously
  - Validate equipment specific information

- **All trailer movement is tracked using RFID and GPS enabled shunt trucks**
EPCglobal Gen 2 Passive RFID Tags

- Symbol RFX6000 Hardened Cargo Tags
  - Attached on the front face of the trailers
  - Augmented with human readable text and bar code as a redundant identification measure

- Dedicated Equipment
  - The hard cargo tags are permanently attached to the equipment

- Non-dedicated Equipment
  - The hard cargo tags are temporarily attached to the equipment
Summary

- The “hype” may help us after all!
- Outside of RFID mandates or compliance initiatives, asset tracking is still the leading RFID application
- High value products will likely be the biggest near-term business case for RFID application (ex Pharmaceuticals, technology & aerospace)
- Additional mandates are anticipated, especially from the US government (Food & Drug Admin., Dept Homeland Security)
Summary

- LF, HF, UHF, active and semi-passive RFID technologies are all very active and undergoing further standardization and product development.
- The Americas & Europe have been heavily engaged regarding RFID. However, the APAC region is showing tremendous activity (e.g., Japan & Korea).
- Standardization efforts regarding RFID technologies will assist in making the technology more interoperable and less costly, thus enabling widespread adoption.
- Exel & DHL Exel Supply Chain has been and continues to be brought into RFID projects to assure operational viability and proper execution of RFID initiatives.

End