EVERY ASSET
EVERY ASSOCIATE
EVERY PERSON
EVERY PATIENT

VISIBLE

COMPELLING ROI

7x

MORE EFFICIENT COUNTING

99.5%

INVENTORY ACCURACY UP FROM 70%

14%

INCREASE IN SALES

WHERE TO START...

Where RFID adds the most value

High Number of Items

- High Selectivity
- Multitude of Sizes, Styles, Colors

High Intrinsic value

- Anything that is important not to lose
- Evidence, files, people, data tapes

High Velocity

- Fast Moving
- Seasonal
- Short Opportunity Window

Closed Loop

- No Trading Complexity
- Easier to implement than open loop

Reusable

- Totes | Carts Trolleys | Bins
- Able to re-use the tag and lower usage cost

Traceable

- Potential recalls
- Chain of custody
- Food/Cold Chain
- Pharmaceuticals

Tag Process

- Is there an exisiting tag process?
- How easy is the item to tag?
- Who will apply the tag?

RFID VALUE PROPOSITION

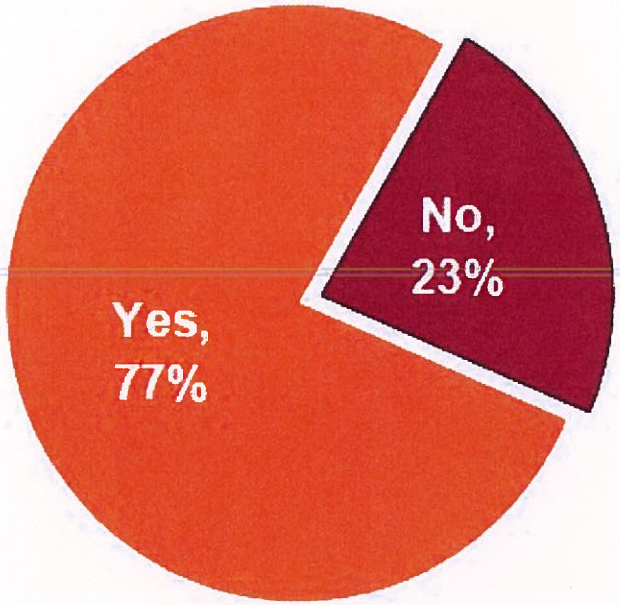
RFID IS AN EASIER WAY TO COUNT AND TRACK

- **RFID IMPROVES EFFICIENCY**
- **RFID IMPROVES PRODUCTIVITY**
- **REDUCES LABOR COSTS**
- **RFID INCREASES ACCURACY**
- **RFID INCREASES SALES**

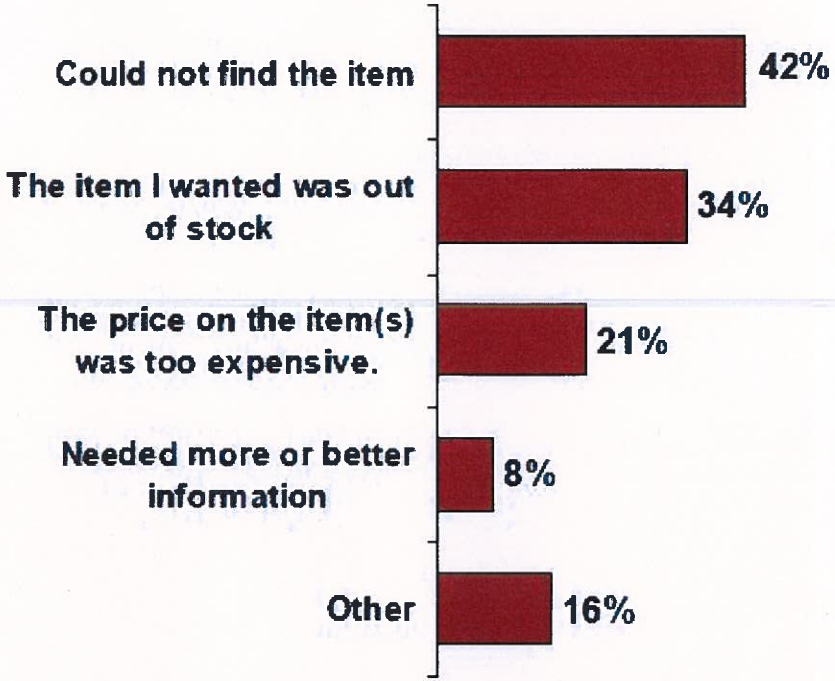
UNFULFILLED PURCHASES

Exhibit 2. 2008 Holiday Shopper Unfulfilled Purchases

Q: "Were you able to purchase everything you needed or that you wanted to purchase?



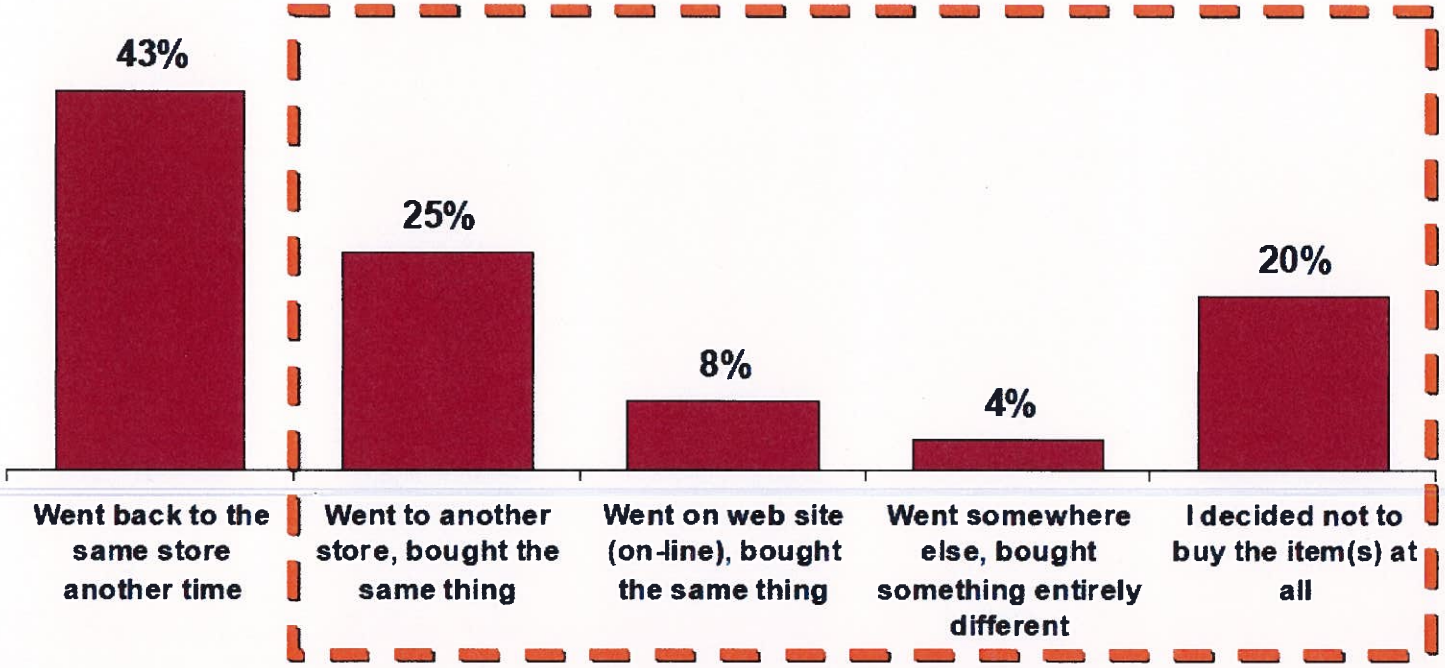
Q: What were the reason(s) that you were not able to find everything you wanted to purchase at this retailer?"



ABANDONMENT IMPACT

Exhibit 3. 2008 Holiday Shopper Abandonment Impact

Q: "When you walked out of a store because you didn't want to wait for service what did you do?"

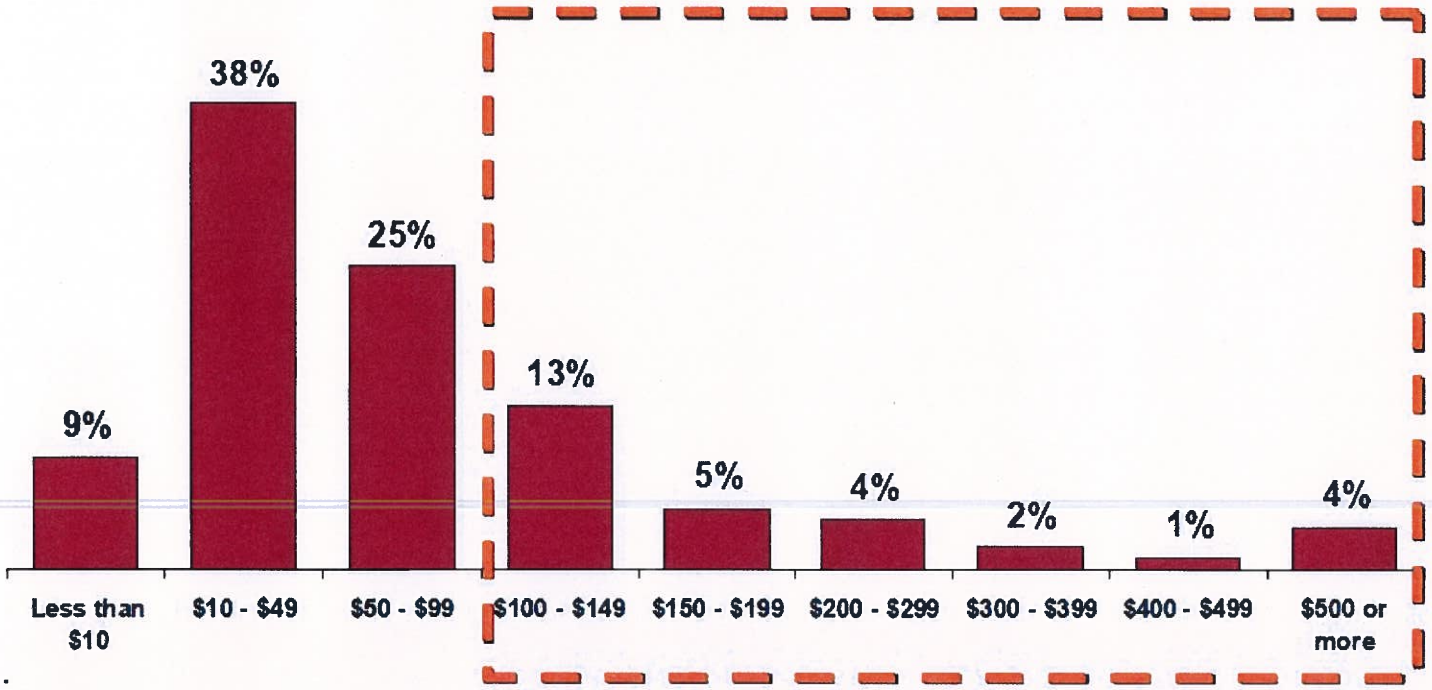


Once dissatisfied holiday shoppers abandoned a shopping experience, ***nearly six in 10 (57%) do not go back to the same retailer***

RESULT…LOST SALES

Exhibit 4. 2008 Holiday Shopper Abandonment Impact, Lost Sales

Q: "How much would you have spent if the retailer had carried what you wanted/needed to buy?"

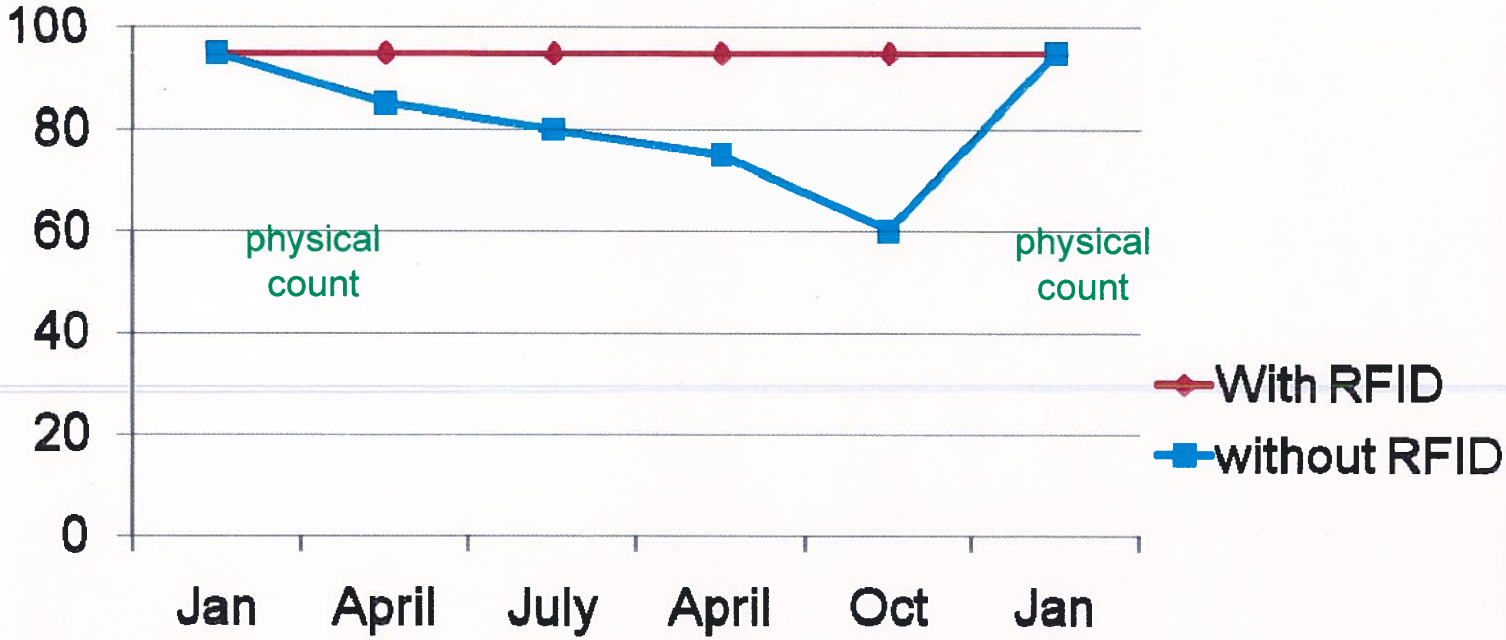


*Holiday shoppers **left an average of $95 unspent** per incident due to limited merchandise/out of stocks and limited employee assistance – **3 in 10 left without buying more than $100 in items they wanted**.*

INABILITY TO COUNT INVENTORY

EXACERBATES THE ISSUE

WITHOUT RFID –
TRADITIONAL YEARLY PHYSICAL COUNTS



WITH RFID –
INVENTORY AS OFTEN AS YOU LIKE

RFID IN RETAIL

OF ALL THE
BENEFITS OF RFID
IN RETAIL. . .

- AUTOMATED REPLENISHMENT
- INCREASED INVENTORY ACCURACY
- LOWER SAFETY STOCK
- LOSS PREVENTION
- REDUCED OUT OF STOCKS
- STREAMLINED RECEIVING/PROCESSING
- MORE EFFICIENT, FREQUENT & ACCURATE CYCLE COUNTS
- REDUCTION IN INVENTORY LABOR

THE
END GOAL IS SALES INCREASE

RFID IN RETAIL

Performance Metrics

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

RFID FOR ASSET MANAGEMENT

THE PREDOMINANT
ENTERPRISE BUSINESS ISSUE
TODAY IS THE
LACK OF ASSET VISIBILITY
AND RESULTING MISMANAGEMENT

CHALLENGE: KNOWING WHAT YOU'VE GOT AND FINDING WHAT YOU NEED WHEN YOU NEED IT

RFID CAN BE USED TO TRACK

Any asset that drives business value

- Retail Inventory
- Baggage
- Real Estate Files
- Recycling Bins
- Evidence
- Evacuees and their belongings
- Trucks
- Orders and shipments
- Work in process
- Food
- Oil Drilling Equipment
- Gas meters
- Voting equipment
- IT assets - data tapes, blade servers
- Returnable totes
- Pallets
- Students
- Weapons

Increased Visibility = Improved Efficiency & Productivity

RFID FOR ASSET MANAGEMENT

Performance Metrics

Proven Business Benefits	Moto & Partner Implementations
Improvement in inventory accuracy by	30% to 60%
Better Inventory Accuracy	Between 95% & 99.9%
Reduction in Physical Count Time by	50% to 90%
Reduced Inventory Carrying Costs by	10% to 35%
Reduced Counting Man Hours	20% to 45%
Reduction in Inventory On Hand	5% to 20%
Reduction in Expedite Fees	5% to 18%
Reduction in Operating Costs	From 1% to 5%

AGENDA

- Motorola Solutions and RFID
- Evolution of RFID
- Business Value
- **Adoption and Applications**
- Market trends

WALMART ANNOUNCEMENT 2010

BUSINESS TECHNOLOGY | JULY 23, 2010

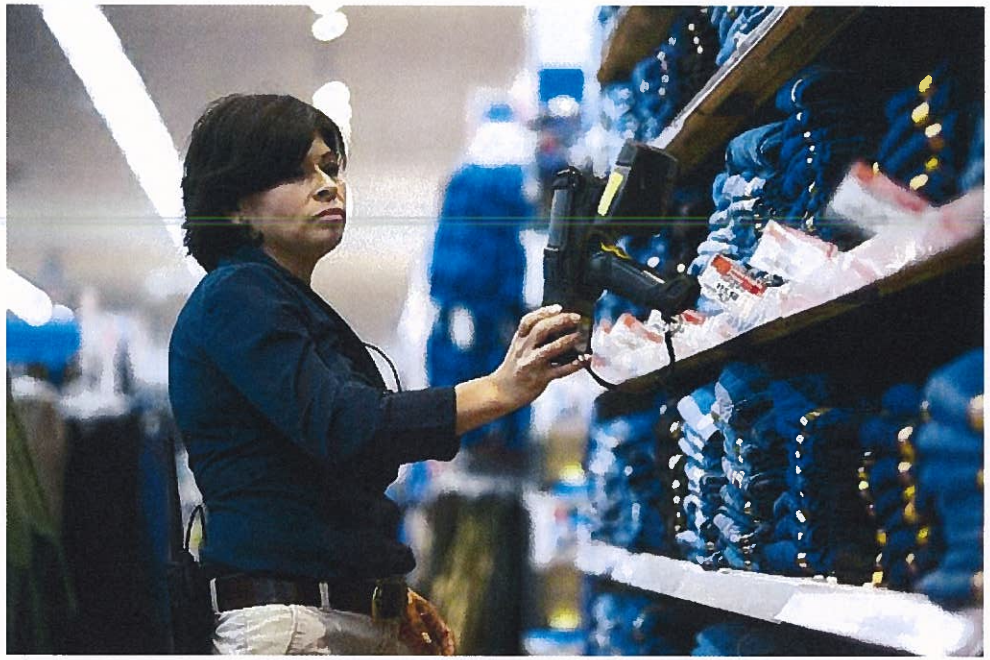
Wal-Mart Radio Tags to Track Clothing

Friday, July 23, 2010 New York 92°|75°

THE WALL STREET JOURNAL. | TECH

Walmart
Save money. Live better.

July 23, 2010…Wall Street Journal announces Wal-Mart's plan to roll out item level RFID on jeans and men's basics in all 3,750 U.S. stores



"This ability to wave the wand and have a sense of all the products that are on the floor or in the backroom in seconds is something that we feel can really transform our business." **Raul Vazquez, CEO Wal-Mart.com**

ITEM LEVEL TAGGING

MORE THAN 5,000 U.S. RETAIL STORES WILL CARRY RFID-TAGGED APPAREL IN 2012

NOVEMBER 2, 2011

For those that missed this week's issue of RFID 24-7, we've offered a summary here with a link to the full story. Over the past several weeks Macy's and JCPenney have provided a clear view of just how close RFID is to becoming ubiquitous in apparel retailing. Last week JC Penney revealed it is pushing [...]

Macy's Pledging Item-Level RFID Chain-Wide By 2013

Written by Evan Schuman
September 28th, 2011

...Retailer has quietly rolled out RFID in three categories at all 1100 of its US stores. . . .

SupplyChainDigest™
Your First Stop for Supply Chain Information

the magic of macy's

RFID TALK BLOG

JCPENNEY UPDATE: 100% DEPLOYMENT WITHIN FOUR YEARS

OCTOBER 26, 2011

jcpenney

"We are leveraging the basic premise that if you know where the merchandise is, you can get more sales. If you are able to take inventory every night, or a subset of inventory every night, there is a pretty high payback."

Dan Smith, CIO

ITEM LEVEL RFID INITIATIVE

NRF/NYC - JANUARY 11, 2011

Major retailers publicly advocated move to RFID

"The debate is over. RFID is here and it is time… frankly…we're a little bit late."

"Making endless decisions day after day based on corrupt data is unacceptable."

"RFID is a customer centric initiative."

"The efficiency of on-line ordering today does not support a 30-35% inaccuracy at store level."

"Early movers on RFID will be rewarded and late movers will be penalized."

KEY RFID APPLICATIONS

Asset Management is still driving most activity

APPLICATIONS	RETAIL	CPG	MANUF.	HEALTH	TRANSP	ENERGY	GOVT	FINANCE
Item level Inventory Visibility	●	●	●	●				
Supply Chain Management	●	●	●	●	●		●	
Asset Tracking			●	●	●	●	●	
File Management				●			●	●
IT Asset Tracking		●		●			●	●
WIP / Parts Tracking			●			●	●	
People Tracking				●		●	●	

BEST PRACTICES

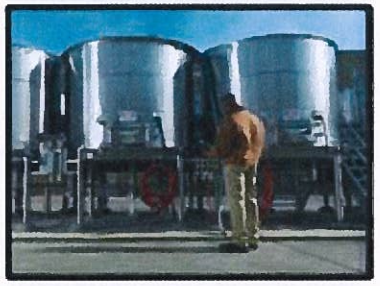
- Learn from what early adopters have done
  - they have often paved the way and done the heavy lifting
- Don't bite off more than you can chew
  - one project at a time, phased implementation
- Pick the right tools/technologies – UHF, HF, active, passive, combo?
  - RFID is often not one size fits all
- Pick the right partner for your use case
  - Application specialization? industry focus? geographic focus? skillset ?
- Pick the right project – pick the right business case
  - think about: tagging logistics, value of the assets, expected benefits, etc.
- Over communicate and ensure buy in from those who will use the system or benefit from it
- Avoid analysis paralysis – never ending pilot
- Avoid scope creep – focus, focus, focus

AGENDA

- Motorola Solutions and RFID
- Evolution of RFID
- Business Value
- Adoption and Applications
- **Market trends**

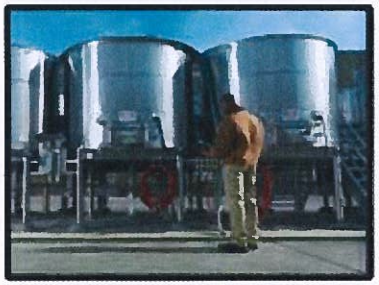
RECENT TRENDS

- **Growth Outside of Retail**
  - Other industries embracing RFID to streamline operations – GOVT, T&L, ENERGY
  - Assert Tracking, WIP, Inventory Management become early use cases
  - Industry groups forming to drive adoption
- **Performance Improvements**
  - Fourth generation tags and readers are much more sensitive for better performance
  - High variety of tags available
- **Increased Usability**
  - Out of Box
  - Ease of implementation
  - Multiple tag form factors
- **High Memory Applications**
  - Use RFID as a data storage device
  - Read Write and password security features



RECENT TRENDS

- **Industry consolidation**
  - This is healthy
  - Creates less risk
  - Larger vendors - more stable, more invested
- **New and Varied form factors**
  - Just as happened in barcode
  - Increasing number of products
  - Ability to address increasing number of business problems
- **Technology Convergence**
  - RFID, Barcode, Mobile computing, Locationing
  - Integrating across wireless networks
  - RFID as information platform
- **Cost / Benefit Improvements**
  - More cost effective solutions
  - Total cost of ownership decreasing

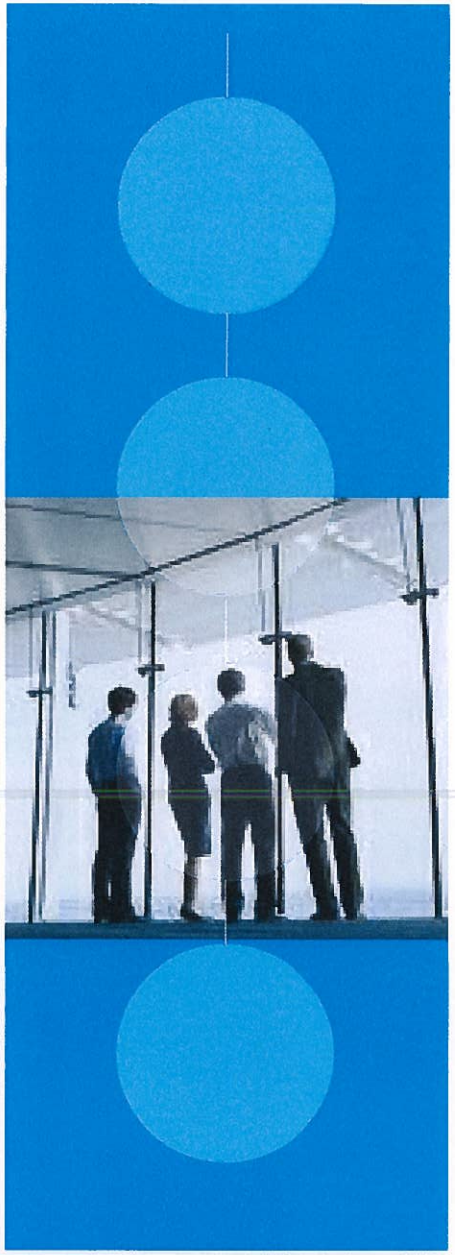


EVERYBODY'S END GOAL

Always on = *Minimal Human Intervention*

MOTOROLA AND RFID

- **Experience**
  - Long history in RFID
  - ISO 2000certified/ mature operations
  - Highest skilled applications engineers, engineering design, testing & support
  - Global industry experience and support
  - Best in class partner ecosystem
- **Innovation**
  - Over 75 years of technology innovation
  - Broad RF leadership
  - Many firsts in RFID: Portal, Mobile, Handheld, Multi-protocol, Customers Installations
  - Over 300 RFID Patents
- **Products**
  - Most complete suite of RFID readers
  - Industry/Application-Specific Product Line
  - Complete solutions: RFID, Wireless, Mobile, Scanning,



Thank you

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5

Disney quietly working on $1 billion-plus "next generation" technology project

January 17, 2010 at 6:46 am

The Kim Possible World Showcase Adventure, a wireless treasure hunt rolled out at Epcot last year, could be a precursor to some of the projects Disney is developing through its "next generation experience" project. (Courtesy of Walt Disney World)

The Walt Disney Co.'s theme-park division is quietly working on a major technology initiative that boosters hope could radically transform the theme-park experience. Details of the project, which has been dubbed within Walt Disney Parks and Resorts as "next generation experience" or "NextGen," are being closely guarded. But there is widespread speculation among former Disney executives and bloggers who follow the company that at least part of the project involves wireless-communication technology that could be used in concepts ranging from keyless hotel-room doors to rides and shows in which the experience varies based on an individual guest's preferences.

The budget for the program totals between $1 billion and $1.5 billion, according to former Disney parks executives who spoke only on the condition that they not be identified. The amount is roughly comparable to what Disney is spending to build a pair of 4,000-passenger cruise ships.

Just before Christmas, Disney assigned oversight of the project to Nick Franklin, the head of global business and real-estate development for the company's theme-park unit. Franklin's newest title is "executive vice president of next generation experience." At Walt Disney World, the project is being led by Jim MacPhee, a vice president who once ran the Epcot theme park. MacPhee's title was changed last month to vice president of park operations and next generation experience. Disney would not discuss specifics of the project. "Our company has a long history of leveraging technology to enhance the experience of our guests, and we are constantly exploring new opportunities to build on that legacy," spokeswoman Tasia Filippatos said.

Though Disney typically keeps a tight lid on projects in development, the strict silence surrounding the NextGen initiative has surprised some company veterans. Disney has required employees assigned to the project — "several dozen" people are currently working on it, according to one of the former executives — to sign confidentiality agreements forbidding them from discussing their work, even with colleagues. One former Disney manager described the climate surrounding the project as "super quiet." Yet another likened the hush-hush atmosphere to the silence that surrounded the development of Disney's Magical Express, the airport shuttle-and-luggage service introduced in Orlando in 2005. "Usually you hear a lot of different things leak out," added Michael Crawford, publisher of Progress City USA, a Web site devoted to Disney. "This has been really locked up." Several other people in and around Disney said they are aware of the NextGen initiative. But all said they were either unfamiliar with details or that they could not discuss them.

The secrecy, of course, hasn't stopped speculation. Though the "NextGen" work has multiple components, several Disney bloggers, including Crawford, have reported that a key part involves the development of radio-frequency identification microchips that could be implanted into park passes or wrist bands. Guests would supply personal information ahead of their arrival — from their names and credit-card numbers to their favorite Disney characters — that would be downloaded onto the RFID microchips, which would then interact with sensors deployed throughout Disney's resorts.

Disney has discussed the technology with Precision Dynamics Corp., a San Fernando, Calif.-based company that manufactures RFID wristbands. A representative for the company said he could not elaborate on those talks because Precision Dynamics has signed a non-disclosure agreement with Disney. RFID technology has "certainly been on Disney's radar as well as the other major [tourism] players in the Orlando area," said Tom Foster, sales manager for Precision Dynamics' RFID solutions group. Crawford said he has been told that Disney's work includes what is being called a "personal experience portal," which he thinks could be the online site that guests would use to provide personal details and preferences. The blogger noted that posts he has

written in recent months on Disney's RFID efforts have attracted unusually heavy Internet traffic from IP addresses associated with Disney offices in Orlando and California.

RFID technology is already used in many areas of everyday life, from the contact-information chips that pet owners have implanted in their dogs and cats to the bracelets that hospitals use to track patients and their treatments. The technology is spreading through the amusement industry, too. Indoor-waterpark operator Great Wolf Resorts now uses RFID wristbands manufactured by Precision Dynamics at seven of its 12 resorts in the U.S. and Canada. The wristbands function both as hotel-room keys and personal charge cards for guests, allowing them to buy food and souvenirs without carrying a credit card or cash. "Given this new technology, guests who otherwise may not have wanted to go all the way back to their room for their credit card or cash and be inconvenienced may now be making purchases due to the added convenience of having their wallet on their wrist," said Rajiv Castellino, chief information officer for Great Wolf Resorts. "The ease of use and convenience have proven to be big hits with guests at our properties."

Though Disney is also interested in both keyless hotel entry and cashless transactions, its full RFID plans are said to be more ambitious. Former employees and bloggers say Disney is looking at using RFID sensors in attractions, so that experiences could be tailored based on individual guest preferences. For example, as guests wander around a park or advance through a ride, their favorite animated character might appear and address them by name. Another goal, according to the former Disney managers, is to greatly reduce or eliminate lengthy wait times at popular attractions — waits that can top three hours on particularly busy days and which a current Disney World executive said are routinely cited as a "key negative" by guests who visit the resort. One possibility is to allow guests to select preferred ride and show times and then use RFID scanners at attraction entrances to verify that they are showing up at the correct time.

RFID tracking could also give Disney much more detailed data about its guests' spending habits and movements, which could in turn be a powerful sales tool. Disney might be able to tell, for instance, that a family wandering one of its theme parks in the evening has no dinner reservations, and so could contact the family by cell phone to suggest nearby restaurants with available seats or promotions.

"The back story of this is **they're going to be able to track everything you're doing**," said Al Lutz, editor of MiceAge.com and someone who also has written about Disney's RFID development efforts. The project isn't without risks. Some former employees have expressed skepticism about whether the technological advances would do enough to boost attendance or guest spending at Disney's theme parks to justify the $1 billion-plus price tag — or whether such money would be better spent on projects such as new resorts or attractions. Disney also faces questions about whether guests would want to put so much thought into planning their vacations — and how such advance planning by some guests might affect others who could conceivably miss out on a popular attraction because time slots have been reserved ahead of time by those who planned. Even eliminating attraction lines could be tricky: A theme park could actually feel more crowded if a certain percentage of people were no longer spending time waiting in ride queues.

Although Disney would not discuss its NextGen concepts, the company has said improvements to its guests' vacation experience will lead to bottom-line gains, because happier customers are more apt to make return trips. There can be other advantages, as well: After launching its Fast Pass ride-reservation system in 1999, for instance, Disney said guest spending in its parks rose as guests spent less time in queues and more in shops and restaurants.

GS1 México | Asociación Mexicana de Estándares para el Comercio Electrónico (AMECE)

COMUNICADO DE PRENSA

GS1 MÉXICO ABRE LAS PUERTAS DE LA TIENDA DEL FUTURO

** La Smart Shop de GS1, es un espacio interactivo de experiencia creado para que pequeñas, medianas y grandes empresas y para cualquier persona que quiera vivir la experiencia del EPC.*

Resumen de Noticias:

- GS1 México presentará la Tienda del Futuro, con la última tecnología enfocada a logística y retail.
- Empresas como Samsung, Calzedonia y Dalfiori hablarán de los beneficios que ha traído a sus negocios la implementación de la tecnología RFID.

México, D.F., junio 2014.- GS1 México, Asociación Mexicana de Estándares para el Comercio Electrónico (AMECE), abrirá las puertas de la Tienda del Futuro - Smart Shop, la cual será un espacio vivencial en donde las personas que así lo deseen, podrán ingresar de forma gratuita para aprender y vivir la experiencia de la tecnología RFID aplicada a toda la cadena de suministro.

La apertura de la Smart Shop será el próximo 25 de junio en las instalaciones de GS1 México ubicadas en Naucalpan, Estado de México.

El evento será encabezado por Flor Argumedo y Mario de Agüero, presidenta y director general de GS1 México, además ejecutivos de Samsung, Calzedonia y Dalfiori quienes compartirán su experiencia, sobre el impacto de la tecnología RFID en sus cadenas de suministro.

"*En los últimos años, las empresas han puesto especial atención en buscar soluciones que les permitan tener mejor visibilidad de sus productos en la cadena de suministro, desde la fabricación, pasando por la distribución y hasta el punto de venta. La Smart Shop sin lugar a dudas brinda una experiencia única en México, donde se conjuga la tecnología de última generación con un mayor dinamismo en los puntos de venta*" aseguró Flor Argumedo, presidenta de GS1 México. "*Estamos convencidos que será todo un éxito para los personas que decidan visitarnos*", finalizó.

La tecnología de identificación por Radiofrecuencia (RFID por su acrónimo en inglés) existe desde hace más de medio siglo, sin embargo, en los últimos años, su gran potencial ha sido aprovechado al máximo para otorgar nuevas soluciones relacionadas con la manera en la que operan tanto fabricantes como minoristas y detallistas dentro de sectores tan diversos como alimentos, productos de consumo masivo, textil, vitivinícola, farmacéutico, automotriz, entre otros.

Entre los beneficios que se tienen al utilizar esta tecnología son automatización de procesos, confiabilidad de despacho y/o recibo de mercancía, disminución de tiempos en toma de inventarios, trazabilidad y visibilidad del producto, además de una plena autentificación de producto.

GS1 México pone al servicio de las organizaciones el estándar de su sistema denominado Código Electrónico de Producto (EPC por sus siglas en inglés) y que representa la nueva generación de identificación en el comercio electrónico, empleando la tecnología RFID como base para su funcionamiento operativo. Aunado a este servicio y la Smart Shop RFID, GS1 México proporciona visibilidad completa en la cadena de suministro,

permitiendo dar seguimiento a los productos a lo largo del proceso de manufactura hasta llegar a su destino final en los centros de distribución y puntos de venta.

GS1 México, Asociación Mexicana de Estándares para el Comercio Electrónico (AMECE), está comprometida con el desarrollo del país y seguirá trabajando para lograr la eficiencia y seguridad en la Cadena de Suministro, así como ser punto de encuentro en donde diferentes sectores coordinen y logren soluciones que faciliten el comercio frente a las necesidades y retos que impone el mercado.

###

Acerca de GS1 México

Desde su llegada al país, GS1 México, Asociación Mexicana de Estándares para el Comercio Electrónico (AMECE), ha sido pionero y líder en la implementación y regulación de estándares internacionales de comercio. En un principio, con el Código de Barras y posteriormente, incursionando en otros temas de vanguardia como son la Trazabilidad, la utilización de tecnologías móviles en los procesos logísticos y la implementación de buenas prácticas colaborativas, buscando siempre impulsar el uso de la tecnología y los estándares en las empresas mexicanas y alrededor de todo el mundo.

Para más información visite: www.gs1mexico.org

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5560-1000

ISO Supply Chain RFID Standards

Richard Rees

Chair
British Standards Institution
TC IST 34
Automatic ID Techniques

ISO RFID Standards

Objectives for this session -

- *Scope of the ISO RFID standards*
- *How will RFID <u>really</u> be deployed in supply chains?*
- *The Big Picture - ISO in context with ETSI and EPC Global*
- *Bring perception into line with reality*

ISO RFID Standards

Richard Rees

- *President of Scanology - #1 EPCGlobal member in NL*
- *Chair of BSI IST/34 Automatic ID Techniques*
- *UK HoD to ISO IEC JTC1 SC31*
- *Smart Active Labels Standards program advisor*
- *Past member of EAN UK Supervisory Board*
- *Early advocate of passive UHF RFID*

- 30 years as maker and user of auto ID standards

ISO RFID Standards

"There are too many ISO RFID standards!"

- *Animals*
- *Road Transport Telematics*
- *Application and conformance standards*
- *Financial/transport cards – people related – SC17*
- *Item Identification*

- Only one ISO item RFID tag standard – ISO 18000

ISO RFID Standards

ISO 18000 air interface frequencies

- *<135 KHz*
- *13.56 MHZ*
- *2.45 GHz*
- *860-960 MHz*
- *433 MHZ (active)*

Why so many?

– Laws of Physics = different functionality

ISO RFID Standards

ISO 18000-2 >135 KHz.

- *Inductive*
- *Unaffected by presence of water*
- *Short range , few cms*
- *Fairly costly because of coil in transponder*
- *It works and you can buy it*
- *Underestimated*

ISO RFID Standards

ISO 18000-3 13.56 MHz

- *Inductive*
- *Lower cost c 35 cents*
- *Thin flexible form factor (smart label)*
- *Read / write capable*
- *Unaffected by water (but has to be tuned to item)*
- *Mid range, 70 – 125 cms*
- *Two flavours: Mode 1 (“15693”26 kb/s) and Mode 2 (PJM 848 kb/s)*

ISO RFID Standards

ISO 18000-4 2.45 GHz

- *Propagating*
- *Long range in active version (100 m+)*
- *Affected by water*
- *Read / write capable*
- *Moderate cost*
- *Passive tag currently out of fashion*
- *Small antenna*
- *Bluetooth, etc.*

ISO RFID Standards

ISO 18000-6 A/B 860 - 960 MHz

- *Propagating*
- *Long range 2-5 meters ….. but*
- *Low cost (but not 5 cents!!!!!!) – but net benefit is issue*
- *High data rates*
- *"Frequency agile"*
- *Read / write capable*
- *Relatively large antenna*
- *The future for mass application RFID*

ISO RFID Standards

ISO 18000-7 433 MHz

- *Active*
- *Long range - many meters*
- *High cost*
- *High data rates*
- *Read / write capable*
- *Manifest tags- DoD*

ISO RFID Standards

ISO Data Content Structures

- *ISO 15963 - Unique Tag Id*
- *ISO 15961/62 – Data protocols and encoding*
- *Multiple data objects – EPC – RTI problem*
- *Complex data - sensors*

- Data is the payload - timeless in nature

ISO RFID Standards

ISO RFID Performance/Conformance

- **ISO/IEC 18046** - *RFID tag and interrogator performance test methods*
- **ISO/IEC 18047** - *RFID device conformance test methods*

- These procedures will be used by EPCGlobal

ISO RFID Standards

Supply Chain Applications of RFID

- *ISO 17358 - Application Requirements, including Hierarchical Data Mapping*
- *ISO 17363 - Freight Containers*
- *ISO 17364 - Returnable Transport Items*
- *ISO 17365 - Transport Units*
- *ISO 17366 - Product Packaging*
- *ISO 17367 - Product Tagging (DoD)*
- *ISO 10374.2 - RFID Freight Container Identification*

ISO RFID Standards

Too many ISO RFID standards?

From user perspective,

there is only one ISO RFID tag standard for items

- **ISO 18000**

And it does exist!

ISO RFID Standards

ISO and EPC – what is the relationship?

- *ISO building blocks – Air Interface – Data Structure*
- *EPC a data content/access system – passive UHF carrier*
- *EPC started by MIT Auto ID Center – re-run of barcode*
- *Class 0 (RO) and Class 1 (WORM) developed under FCC rules*
- *EAN/UCC developed GTAG – adopted ISO 18000-6 (full function)*
- *EPCGlobal formed by EAN/UCC – HAG, SAG, BAG*
- *HAG developing UHF G2 – will lead to 18000-6 G2 (licence plate vs. full function)*
- *EPC data fits into ISO data carriers - complementary*
- *DoD and WTO demand ISO – 8000 lb Gorillas*
- *ISO RAND – EPC IP free (but user licence!)*

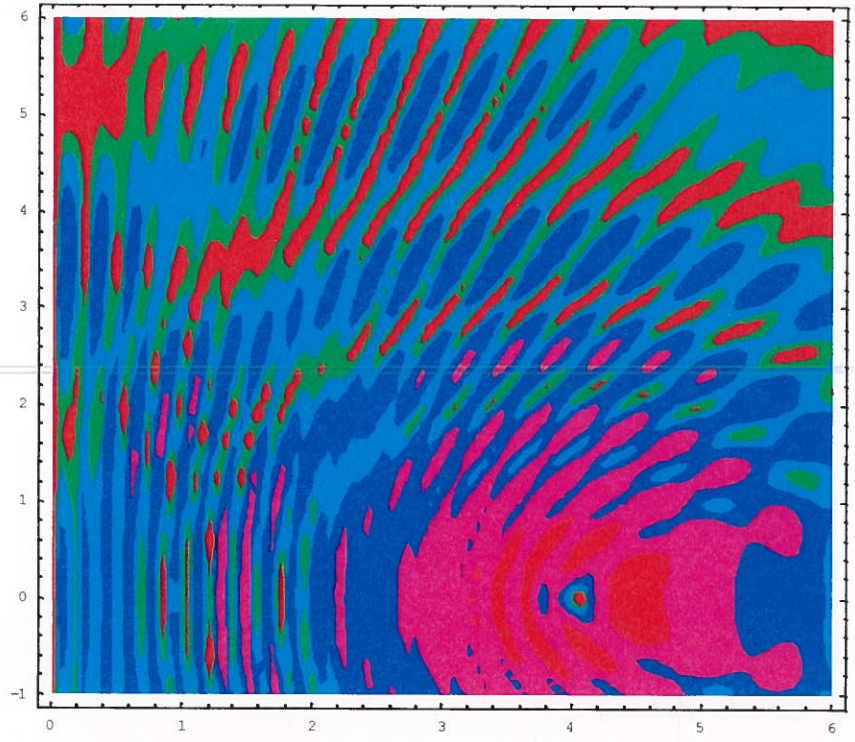
ISO RFID Standards

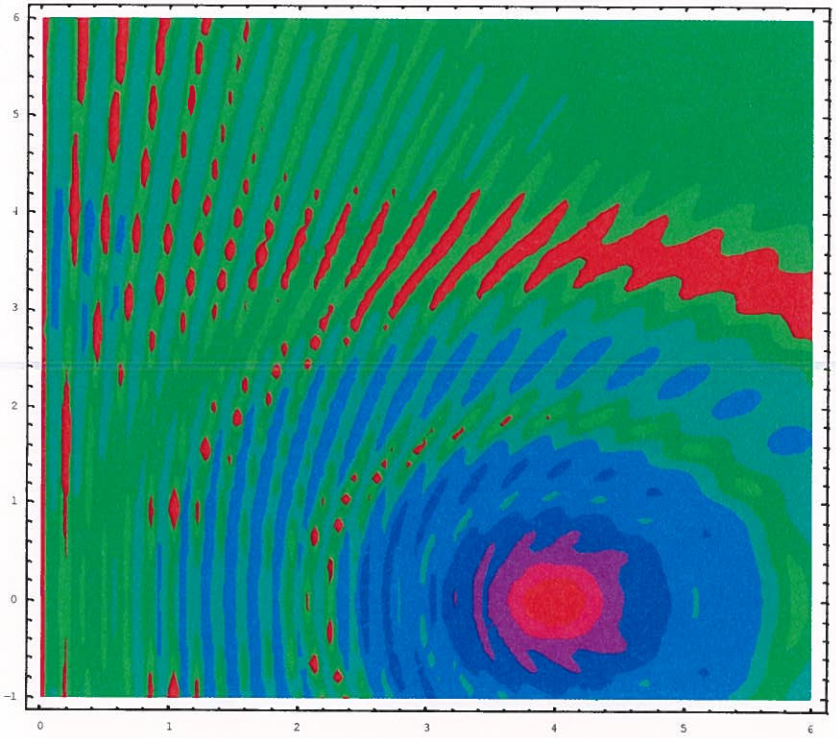
RFID – Hype, Misunderstanding and Reality

- ***Reliability, Reliability, Reliability!***
- ***Range – it's not a linear measure!***

ISO RFID Standards

UHF RFID – the reliability issue





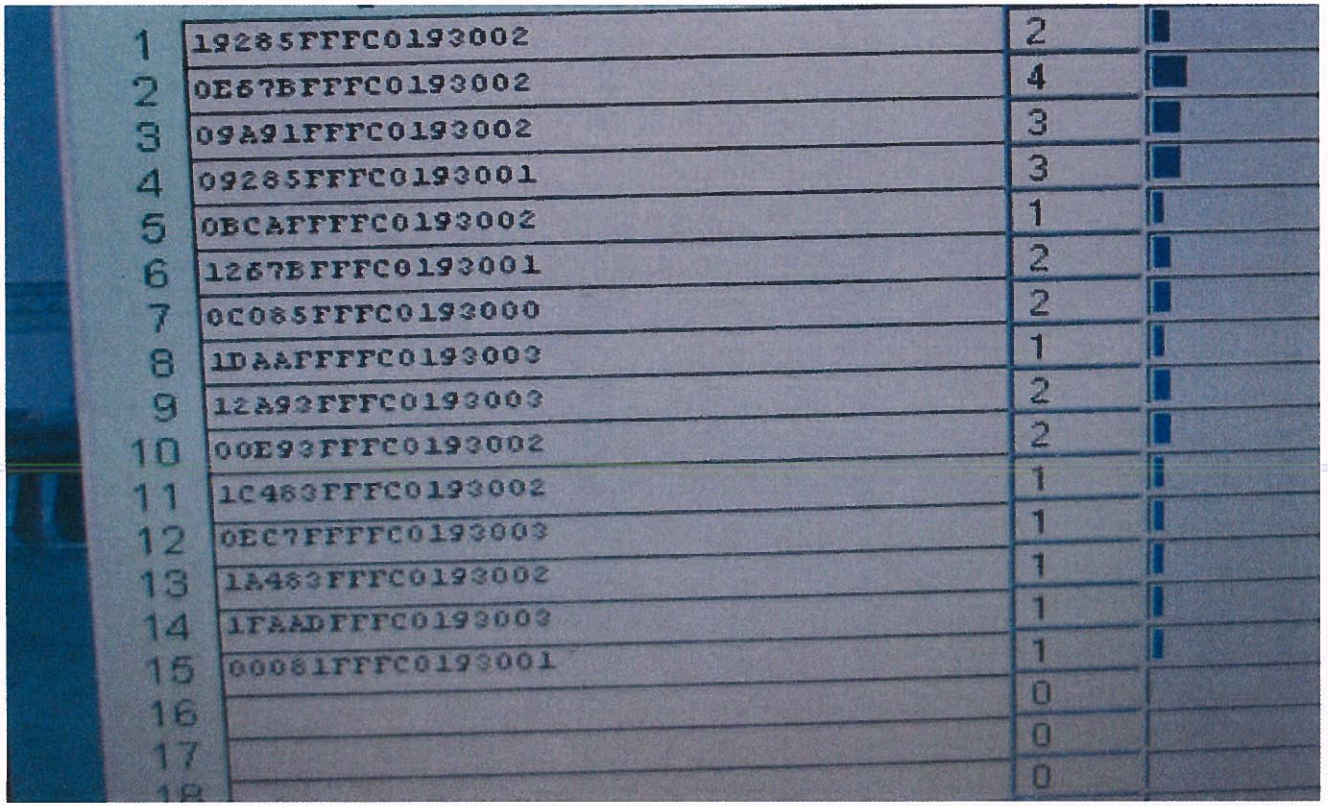
ISO RFID Standards

RFID – Hype, Misunderstanding and Reality

- *Reliability, Reliability, Reliability!*
- *Range – it's not a linear measure! It's a probability function*
- ***Long range creates problems as well as solutions***
- ***Speed – 500 tags/sec! It's about reliability not speed***

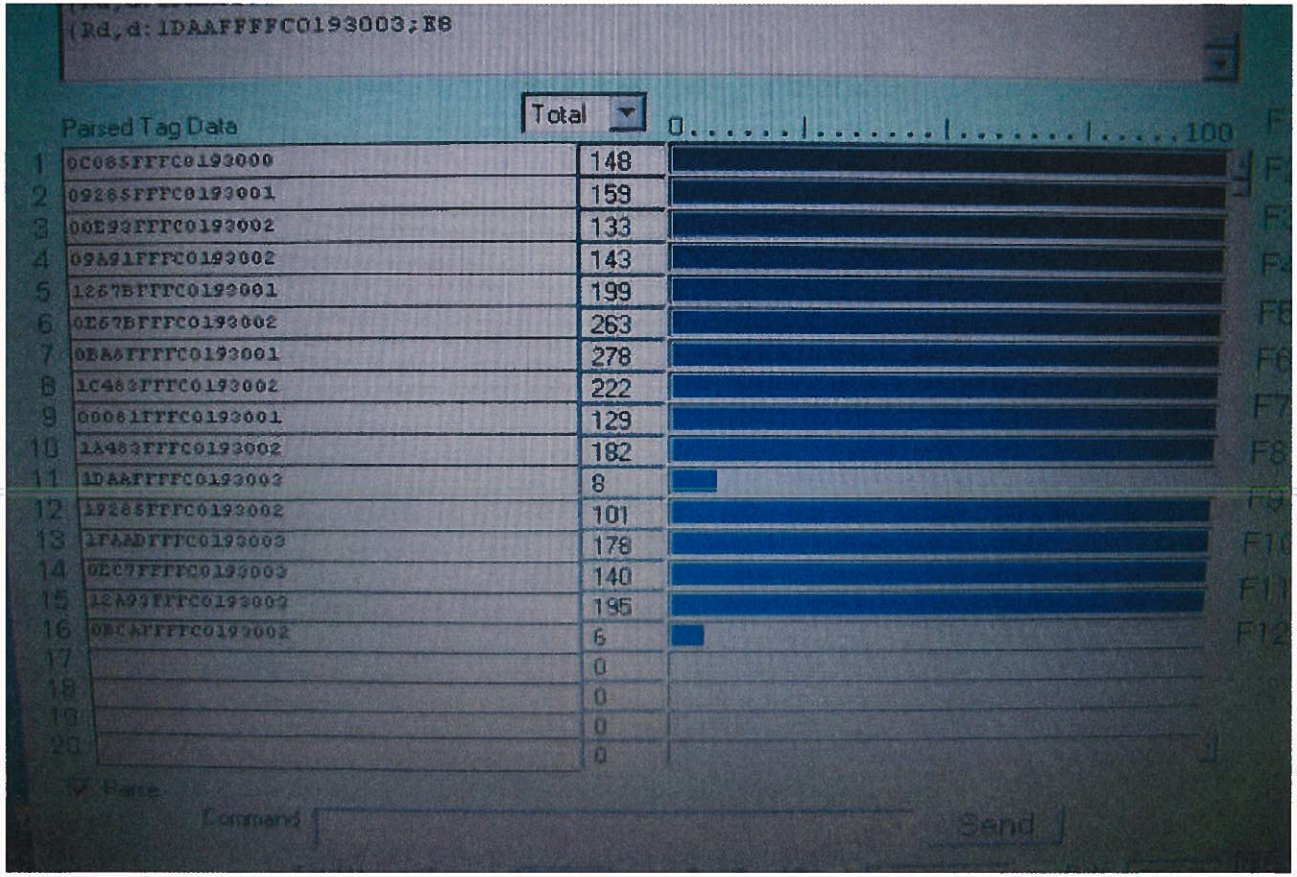
ISO RFID Standards

ISO RFID Standards



1	19285FFFC0193002	2
2	0E67BFFFC0193002	4
3	09A91FFFC0193002	3
4	09285FFFC0193001	3
5	0BCAFFFFC0193002	1
6	1267BFFFC0193001	2
7	0C085FFFC0193000	2
8	1DAAFFFFC0193003	1
9	12A93FFFC0193003	2
10	00E93FFFC0193002	2
11	1C463FFFC0193002	1
12	0EC7FFFFC0193003	1
13	1A463FFFC0193002	1
14	1FAADFFFC0193003	1
15	00081FFFC0193001	1
16		0
17		0
18		0

ISO RFID Standards



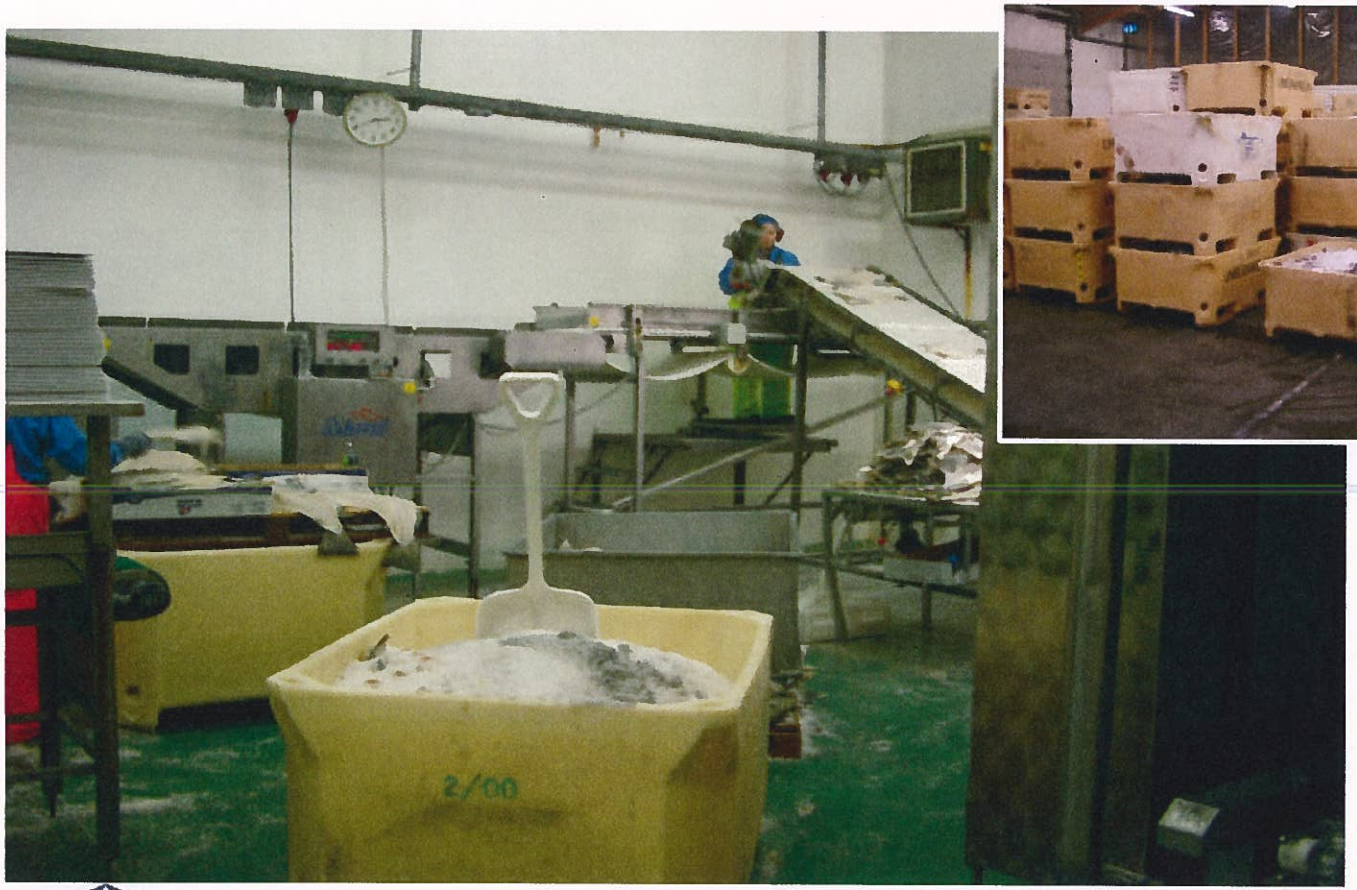
ISO RFID Standards

ISO RFID Standards

RFID – Reality

- *In general you cannot read cases on a pallet using UHF! (you have to read the cases on to the pallet)*
- *Will we need to read 500 tags in a short period?*
- *Will we operate at lower ranges – and with less power?*
- *Renewed interest in inductive (DHL) – and now dual frequency*

ISO RFID Standards



ISO RFID Standards

RFID – The user responsibility at UHF

- *ETSI has been imaginative in developing LBT as a pragmatic equivalent to duty cycle*
- *Spectrum remains precious - must be used wisely for your own and the common good*
- *Only 10 sub bands – likely to be many more readers than that in same radio 'space' (and not just in your patch). Real risk of system degradation and data loss if these sub-bands are not used responsibly.*

ISO RFID Standards

RFID – Golden rules for UHF

- *UHF reader default is standby – use a motion sensor for ON*
- *Operate at lowest power possible – dock door problem*
- *Avoid aiming energy towards open-air*
- *Minimise reader-on time by fast systems, limited data.*