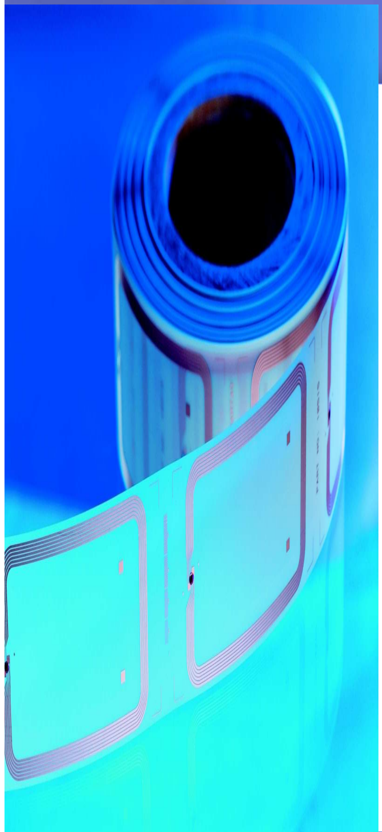


Business Consulting Services

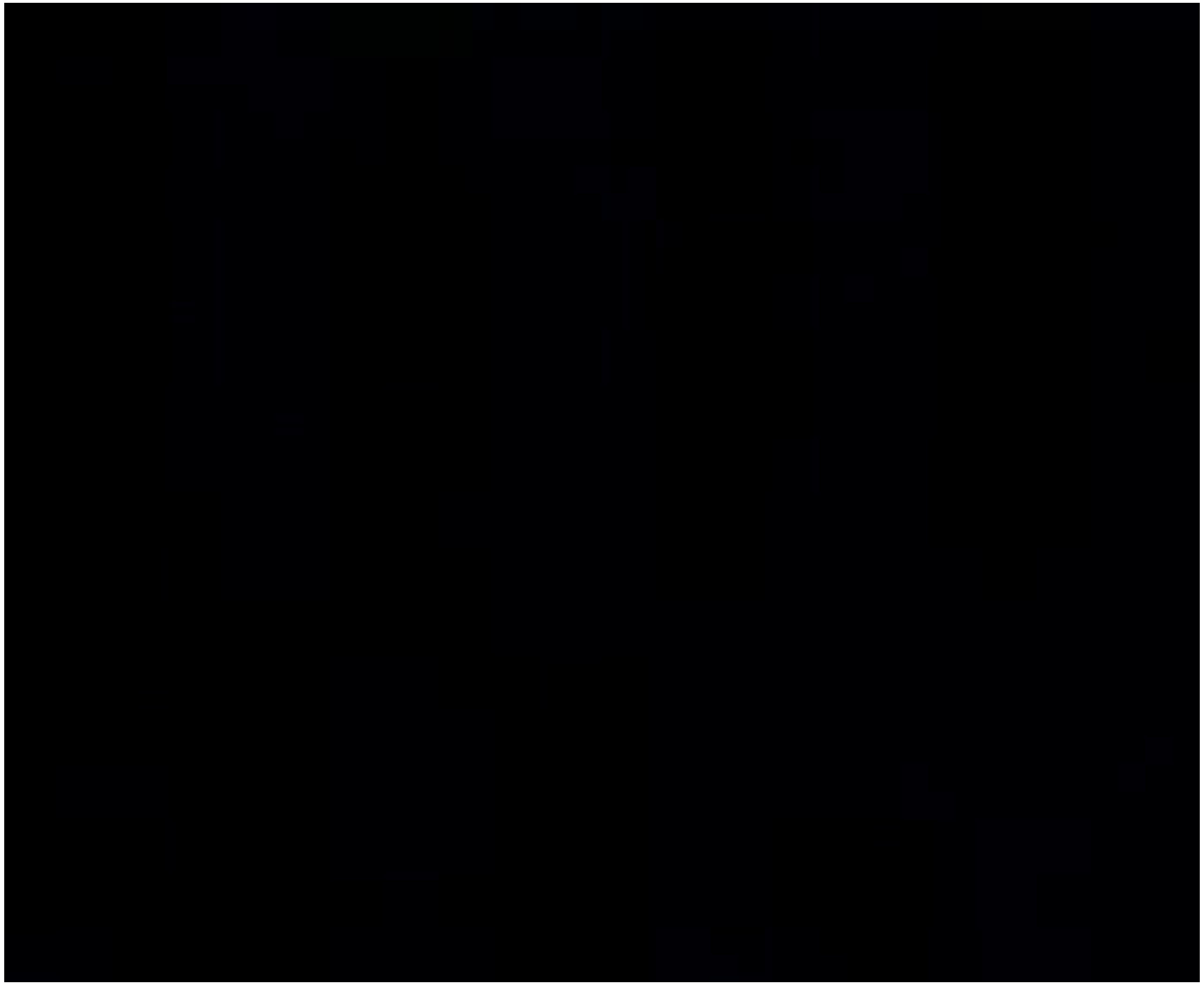
Radio Frequency Identification Standards, Regulations, Projects

Bremen,
26th of January 2006

IBM Business Consulting Services
Frank Schmid

ON DEMAND BUSINESS™

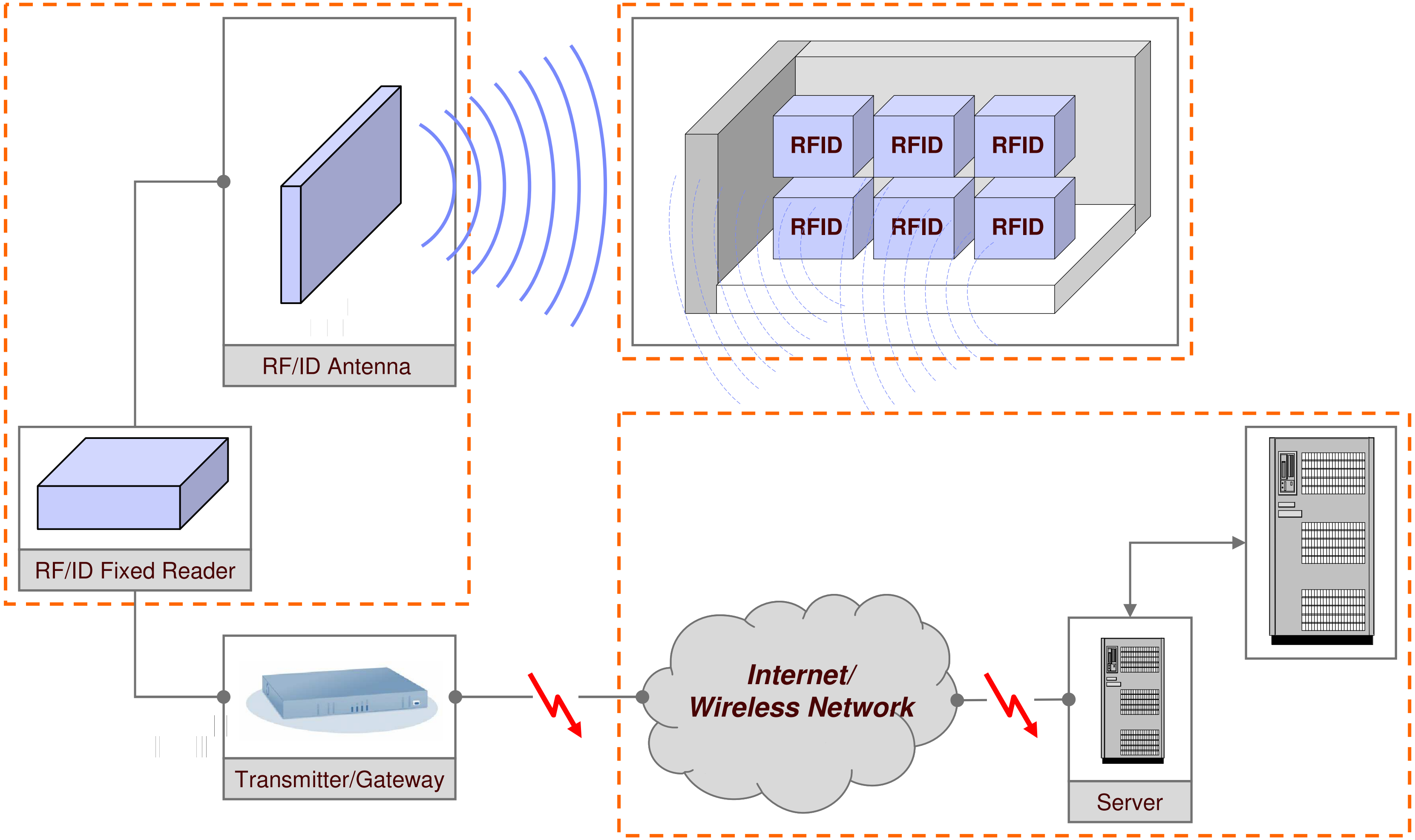
RIFD @ IBM



Agenda

1	Introduction to Radio Frequency Identification
2	Standards - EPC
3	Regulations - ETSI
4	Case Studies 1. Metro, 2. Secure Trade Lane
5	Summary

An RFID-System is based on four main components Label/ Tag, Antenna, Reader/Writer and Data Processing System



RFID Technology and Tag Basics

RFID Systems have three main components

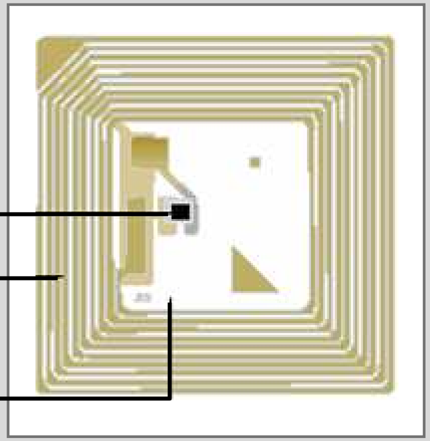
- The RFID **tag** with its own data, functions and physical characteristics
- The **reader** (fixed or portable) with its own functions and physical characteristics
- The **host** with its own hardware, functions and pre-defined tasks

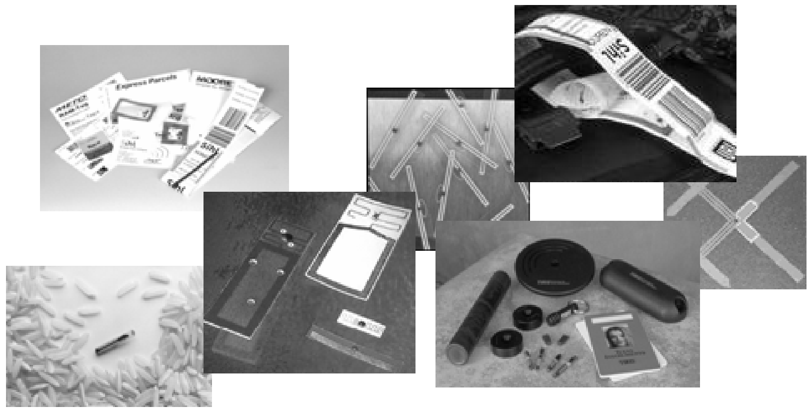
Tags use a variety of power sources

- **Passive tags** get power from the electromagnetic field
- **Active tags** constantly use a battery to emit
- **Semi-passive tags** battery boosted response

Tags are made up of three components

1. **Chip:** Holds information about the physical object to which the tag is attached
2. **Antenna:** Transmits information to a reader (e.g., handheld, warehouse portal, store shelf) using radio waves
3. **Packaging:** Encases the chip and antenna so that tag can be attached to physical object





Parameters for RFID Solutions

Capability/ Requirements

1 Structure
- Size
- Material
- Frequency
- Average Lifetime

2 Operation distance
- Short: up to 0.1 Meter
- Middle: up to 0.7 Meter
- Long: over 0.7 Meter

3 Functionality
- Coding (e.g. EAN)
- Passive/read only: 32 – 128 Bit
- Read/write (once): up to 1MB
- Mass data capture/anti collision

4 Temperature
- Sensivity (measure, store)
- Resistance against environmental influences

5 Cost
- Tag/Label: EUR 0.2 - EUR 10
- Reader: EUR 50 - EUR 1,000 * x

Selection of Frequencies

	Transponder-Frequencies								
Domain	**LF**		**HF**		**VHF**	**UHF**			
Frequency	125 KHz	134 KHz	8.2 MHz	13.56 MHz	433 MHz	868 MHz	915 MHz	2.45 GHz	5.6 GHz

125 KHz
- Animal Identification
- Credit Cards

- Up to 0.2 m

13.56 MHz
- Pallets/Container
- Product
- Labels
- Credit Cards

- Up to 0.7 m

862 – 928 MHz/UHF
- Readable on Metal
- Labels
- Pallets
- Cases

- Up to 7 m

2.45 GHz
- Readable on Metal
- Labels
- Pallets
- Robust Format

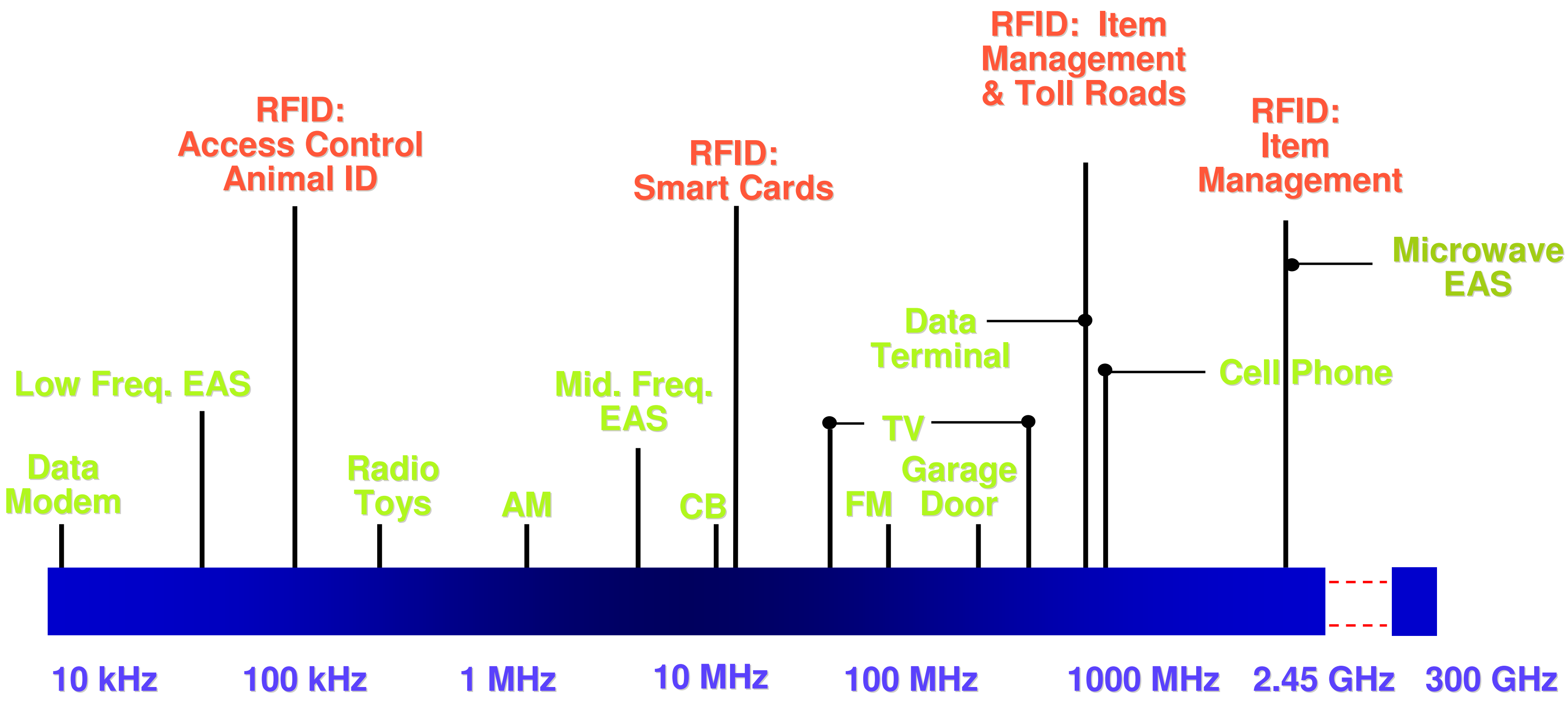
- Up to 1 m

- Prices for passive transponders vary depending on volume, design and feature between EUR 0.1 – EUR 10
- Active transponders can be priced up to EUR 150

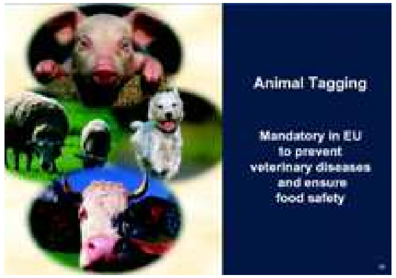
Worldwide Adoption of UHF Frequencies

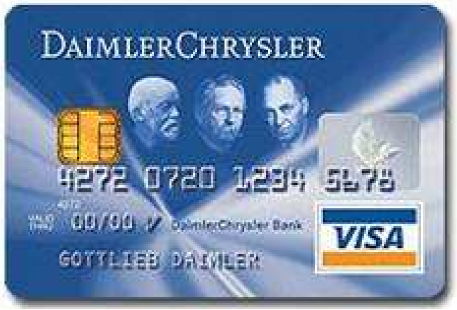
* Proposed by ETSI
** Approval currently required, likely available in 2004
**** Used in some projects

RFID-Frequencies

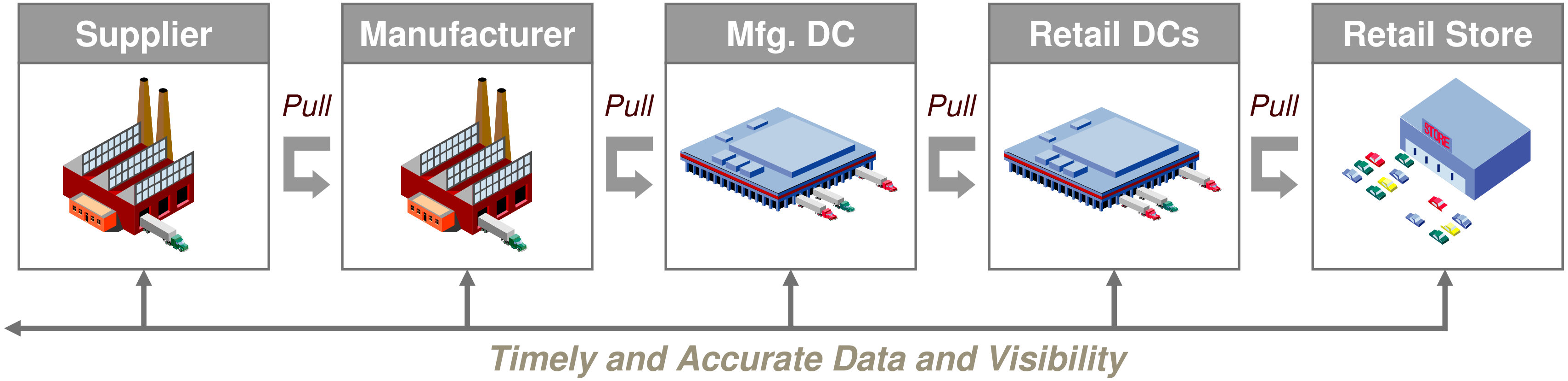


RFID is used already today in various industries





Today, we are developing RFID to make the retail supply chain more efficient



End-to-end real-time visibility and total traceability

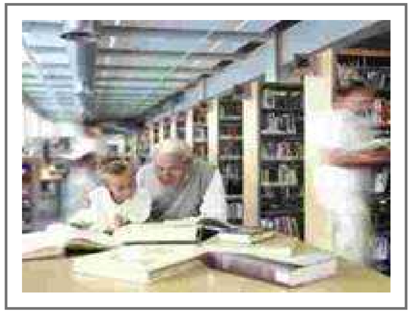
- Fundamental changes in every part of a value chain, e.g. retailers no longer own inventory goods as manufacturers take total responsibility in distribution to ensure goods availability, *i.e.*
- Businesses will need to respond to market demands in real-time

The essential vision is a seamless supply chain enabled by the integration of physical objects with the digital world through tagging

RFID labels can do what Barcodes can, and much more

RFID will complement (or replace) barcode where

- Higher level of automation increases efficiency
- High accuracy is needed
- Information is changed dynamically
- Security is required
- Physical environment favors RFID
- Higher convenience is important
- Customer relation management is needed

But … It is not just about tags and readers

- Tags + readers ≠ Transformation
- Tags + readers =

  Efficient data collection & New Visibility

  \+ Business Process Change

  \+ Proactive Decision Making

  \+ Integration to enterprise systems and infrastructure

  = **Transformation**

To achieve transformational results, RFID (EPC*) should be viewed as one enabler among many in an overall supply chain or business strategy

EPC = Electronic Product Code

Basic parameters for RFID Projects

Standards

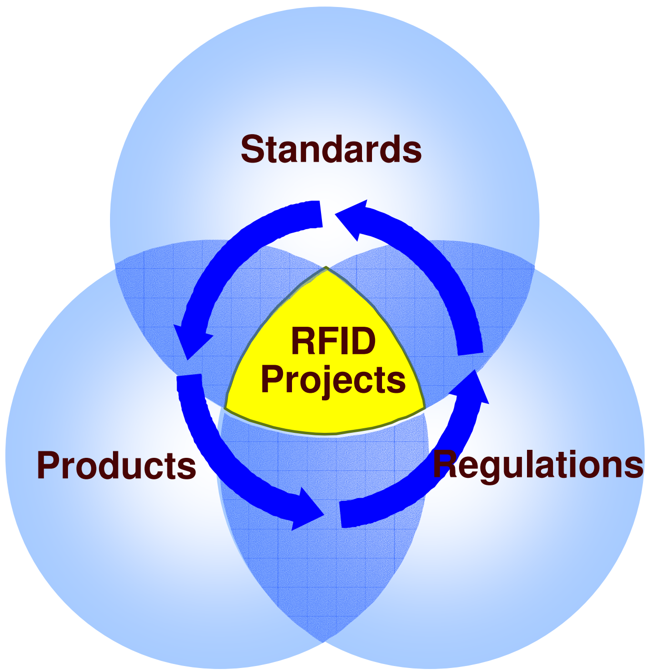
- EPCglobal
  Class 1 Version 1
  Class 1 Generation 2
- ISO
  18000-6B / -6C

Regulations

- ETSI 300 220
  RegTp Vfg 71 / 2003
- ETSI 302 208

Products
Reader
Antennas
Tags

AutoID Devices
Portal, Handheld, Stapler



Agenda

1	Introduction to Radio Frequency Identification
2	Standards - EPC
3	Regulations - ETSI
4	Case Studies 1. Metro, 2. Secure Trade Lane
5	Summary

International Consolidation Efforts for Standardization

Global Commerce Initiative (GCI)

ITWG
Intelligent Tagging Work Group

CCG (Central for Coorganization)

EAN (Electronic Article Number)

UCC (Uniform Code Council)

EAN/UCC

EAN/UCC Global Tag

EPCglobal Inc.

Techn. Suggestions

Auto-ID Lab

The sponsors of EPCglobal are come from multiple industries

Board of Overseers

- Abbott Laboratories
- Ahold, IS
- Best Buy Corporation
- Canon Inc.
- Carrefour
- Chep International
- Coca-Cola
- CVS
- Dai Nippon Printing Co., Ltd
- Department of Defense
- Ean International
- Eastman Kodak
- Gillette
- Home Depot
- International Paper
- Johnson & Johnson
- Kellogg's Corporation
- Kimberely Clark Corporation
- Kraft
- Lowes Companies, Inc.
- Metro
- Mitsui & Co, Ltd.
- Nestle
- Pepsi
- Pfizer
- Philip Morris USA
- Procter and Gamble Company
- Sara Lee
- Smurfit-Stone Container Corp
- Target Corp.
- Tesco Stores Ltd.
- The Gillette Company
- Toppan Printing
- Uniform Code Council
- Unilever
- United States Postal Service
- UPS
- Visy Industries
- Wal-Mart Stores, Inc.
- Wegmans Food Markets, Inc.
- Westvaco
- Yuen Foong Yu Paper Mfg. Co.

Technology Board Members

- Accenture
- ACNielsen
- Alien Technology
- Avery Dennison
- AWID
- British Telecommunications (BT)
- Cash's
- Catalina Marketing Corp
- Checkpoint Systems, Inc.
- ConnecTerra, Inc.
- Ember Corporation
- Embrace Networks
- Flexchip AG
- Flint Ink
- GEA Consulting
- GlobeRanger
- IBM
- IDTechEx
- Impinj, Inc.
- Information Resources, Inc.
- Intel
- Intermec
- Invensys PLC
- Ishida Co, Ltd.
- KSW Microtec AG
- Manhattan Associates
- Markem Corp.
- Matrics
- Morningside Technologies
- NCR Corporation
- Nihon Unisys Ltd.
- Nippon Telegraph and Telephone
- NTT Comware
- OATSystems
- Omron Corporation
- Philips Semiconductors
- Rafsec
- RF Saw Components
- SAMSYS
- SAP
- Savi Technology
- Sensitech
- Sensormatic Electronics Corp
- Siemens Dematic Corp.
- STMicroelectronics
- Sun Microsystems
- Symbol Technologies
- TAGSYS
- ThingMagic
- Toppan Forms
- Toray International, Inc.
- Vizional Technologies
- Zebra Technologies Corporation

The base of the Auto-ID system is the ePC – a robust labeling convention that is embedded into each RFID tag

The ePC can catalog over 1.3×10^{16} discrete items annually
(about the number of grains of rice consumed globally each year) …

21.203D2A9.16E8B8.719BAE03C

Version – 8 bits

Mfg. – 28 bits
(> 268 Million)

Product Class – 24 bits
(> 16 million)

Serial Number – 36 bits
(> 68 billion)

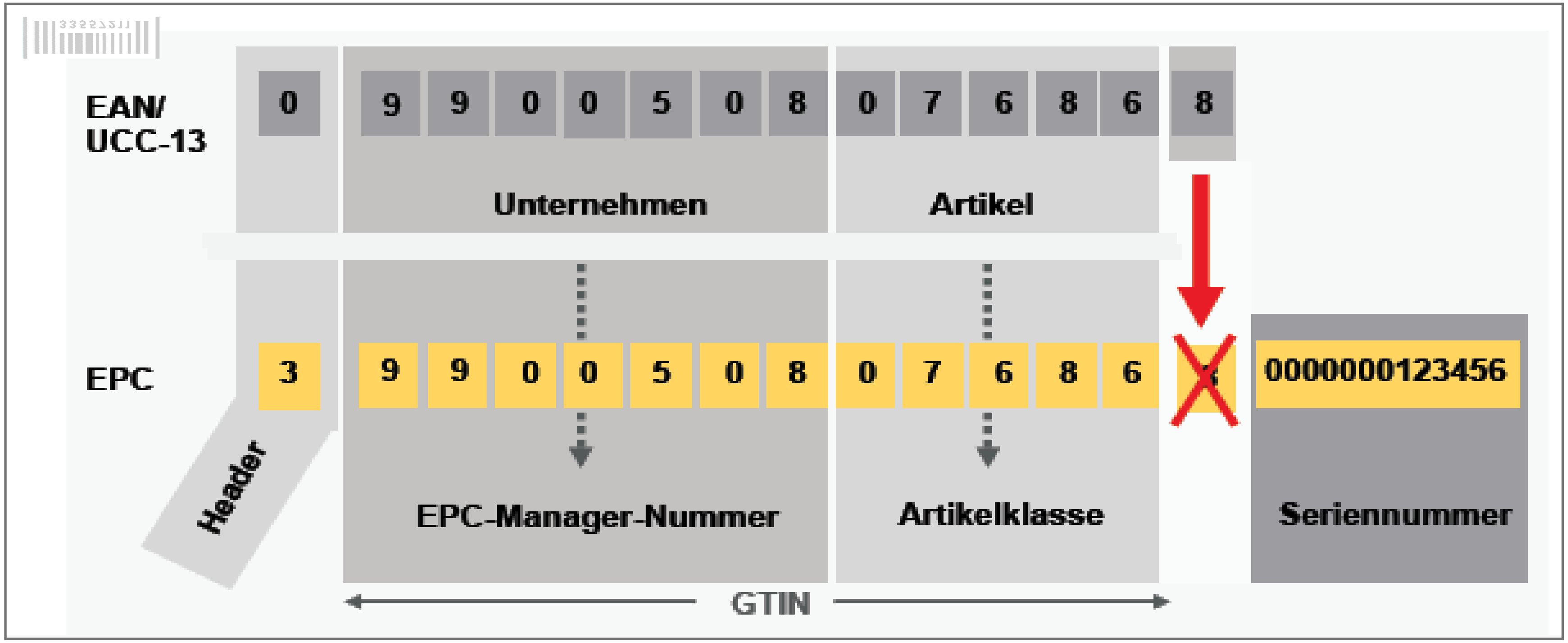
…and is flexible enough to capture identification information at any level

01.0016CA2.000104.0000005910	**ePC of each shipment**
01.00142F.001COE8.0010298730	**ePC of each pallet**
01.000142F.001COF3.0000319280	**ePC of each case**
01.000A571.003459.000E9FC61B	**ePC of each item**

EPCglobal: Barcode Integration (EAN/UCC-13) into EPC

Friday 30th July 2004 http://www.ean-int.org/

EAN International and Uniform Code Council name Chris Adcock President of EPCglobal, Inc. EAN International and the Uniform Code Council, Inc. (UCC) are co-partners in the EPCglobal joint venture



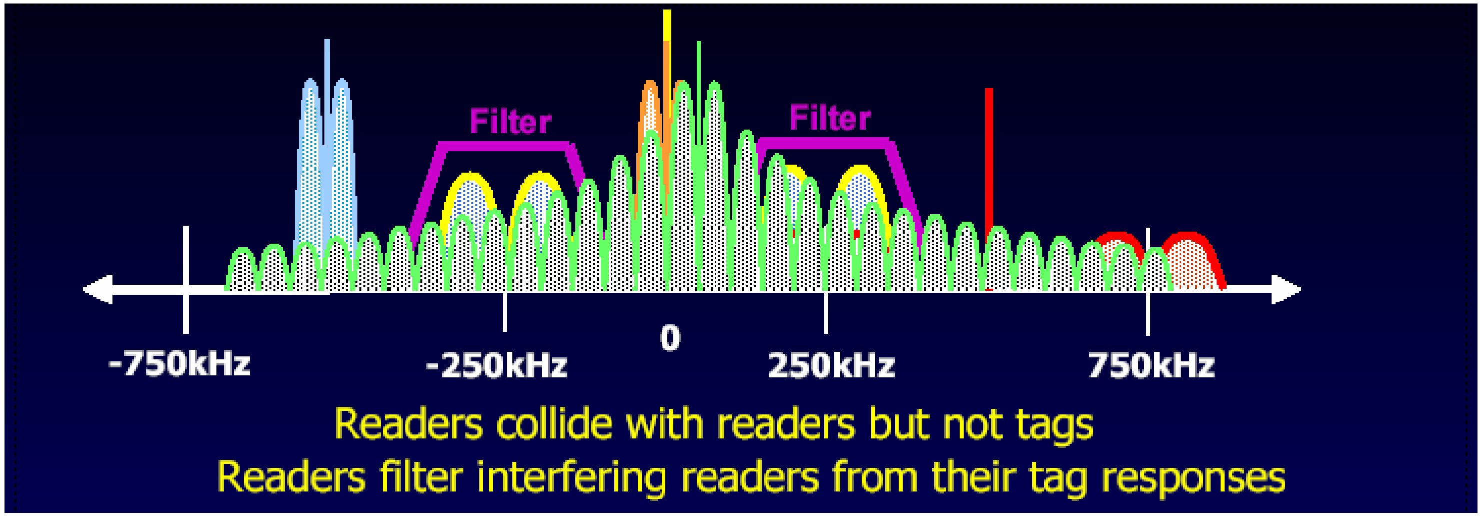
EPC – Electronic Product Code

EPCglobal: Tag-Standards

Parameter	Class 0	Class 1	Gen 2
Read Rate	US: 800 tags/sec EU: 200 tags/sec	US: 200 tags/sec EU: 25 tags/sec	US: 1700 tags/sec EU: 600 tags/sec
Rewriteability	Read Only	Write Once	Fully Rewritable
Privacy	24-bit Password	8-bit Password	-- 32-bit Password -- Concealed Mode
Security	-- Reader broadcasts OID, or -- Anonymous modes with reduced throughput	Reader broadcasts partial OID	-- Reader does not transmit OID -- Has authentication and encryption
Regulatory Compliance	North America	Worldwide	Worldwide
Multi-Reader Environment	-- Reader transmissions are spectrally separated from tag backscatter	-- Reader transmissions interfere with tag backscatter	-- Reader transmissions are spectrally separated from tag backscatter -- Guardbands prevent reader-on-tag collisions

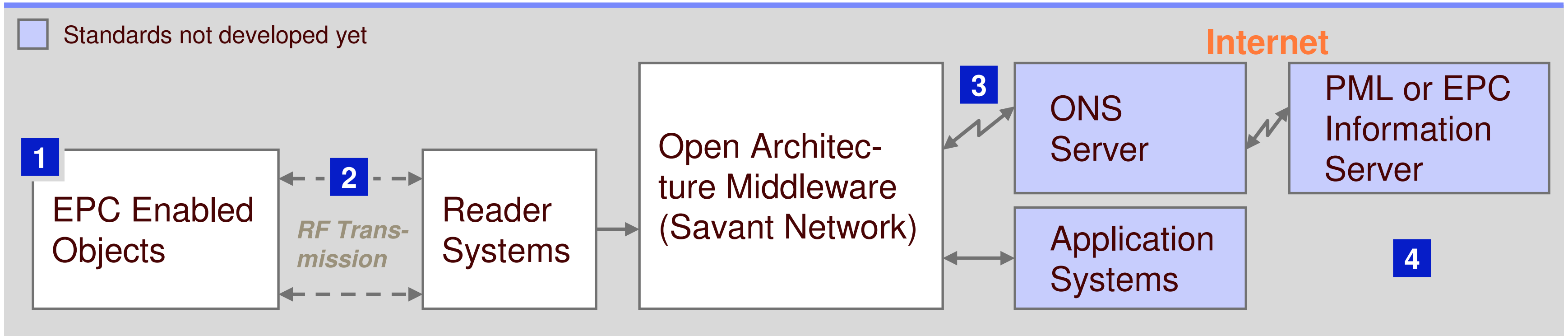
EPCglobal - Reader modes

- The Gen 2 standard allows readers to operate in three different modes: Single-reader mode, multi-reader mode and dense-reader mode.
- To function optimally, readers will need to operate in dense-reader mode when more than 50 readers are present within a building, such as within a distribution center. Dense-reader mode is designed to prevent readers from interfering with one another, which could be a problem if many readers are used in a confined space, particularly in Europe and other regions where only a small band of the UHF spectrum has been allotted for RFID systems.



Readers detect the EPC of each object, and then link it to a network where more detailed object information is stored

The EPC Network Vision



1 Electronic Product Code (EPC)

As every car has a Vehicle Identification Number, each item could have an EPC – a distinct, 96-bit code with the flexibility to track shipments, pallets, cases, or individual items

2 RFID Tags and Readers

Readers reach out for tags with radio waves, which activate the tag to send back its EPC

3 Object Naming Service (ONS)

A server that receives the EPC through middleware and links it to an internet address where much more detailed information about the object is located

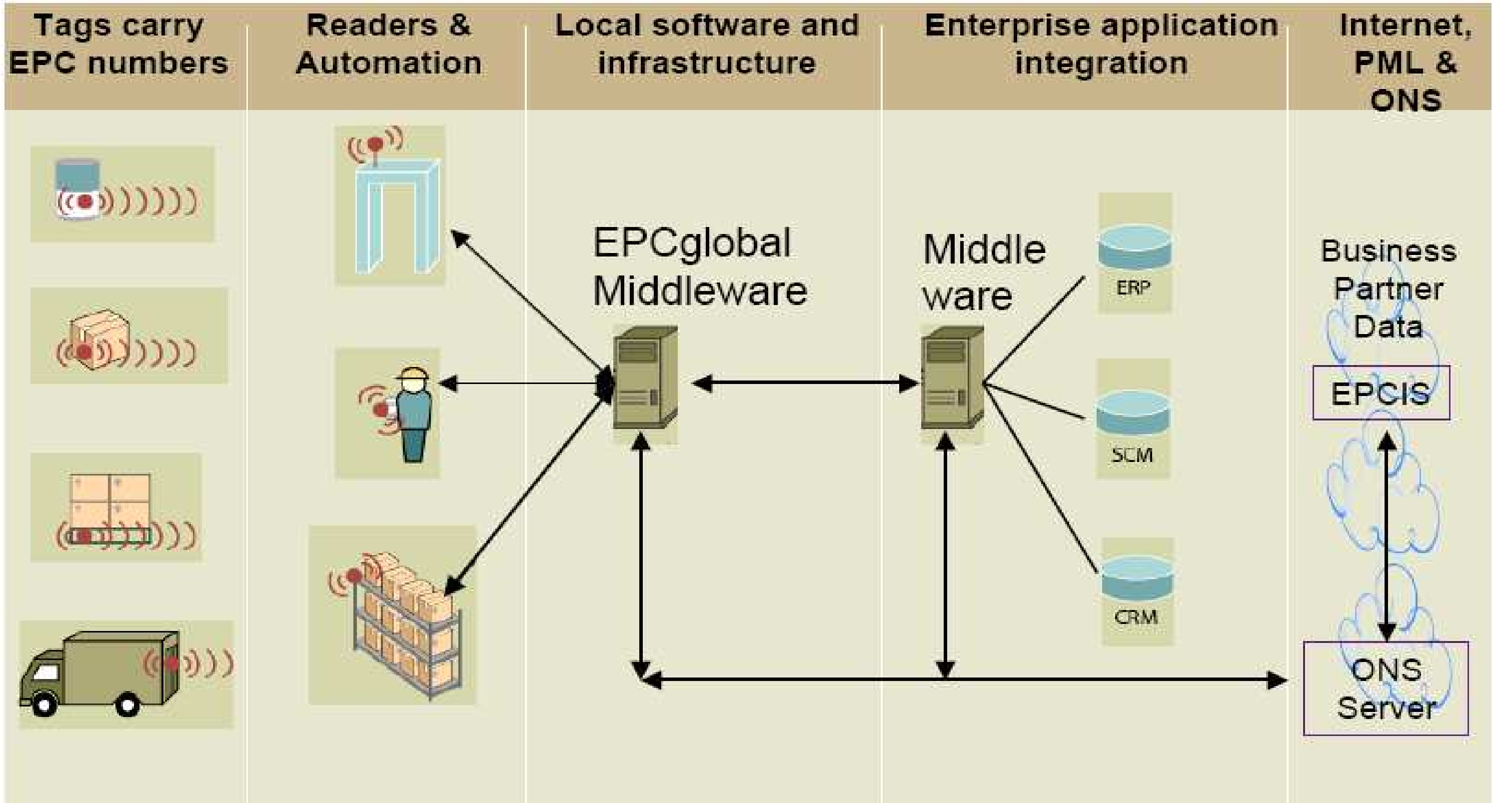
4 Physical Mark-up Language (PML)

A standard vocabulary for all product information – location, shipment history, interactions, movement, etc.

The Auto-ID system provides an open environment that facilitates collaboration among many business partners in the product value chain

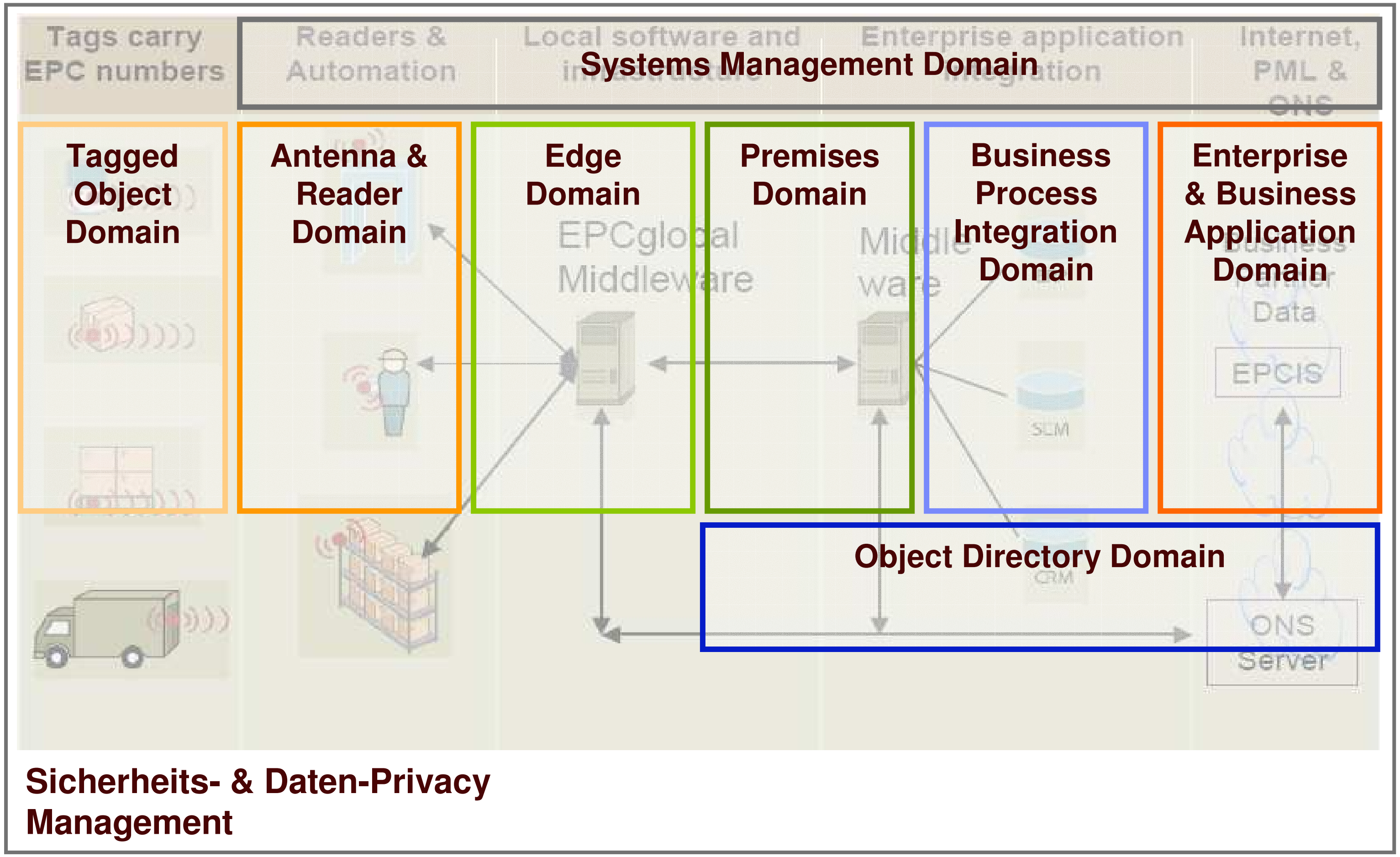
Sources: Auto-ID Center, IBM Business Consulting Services analysis

EPCglobal Network



Source: EPCGlobal

IBM Domain Model



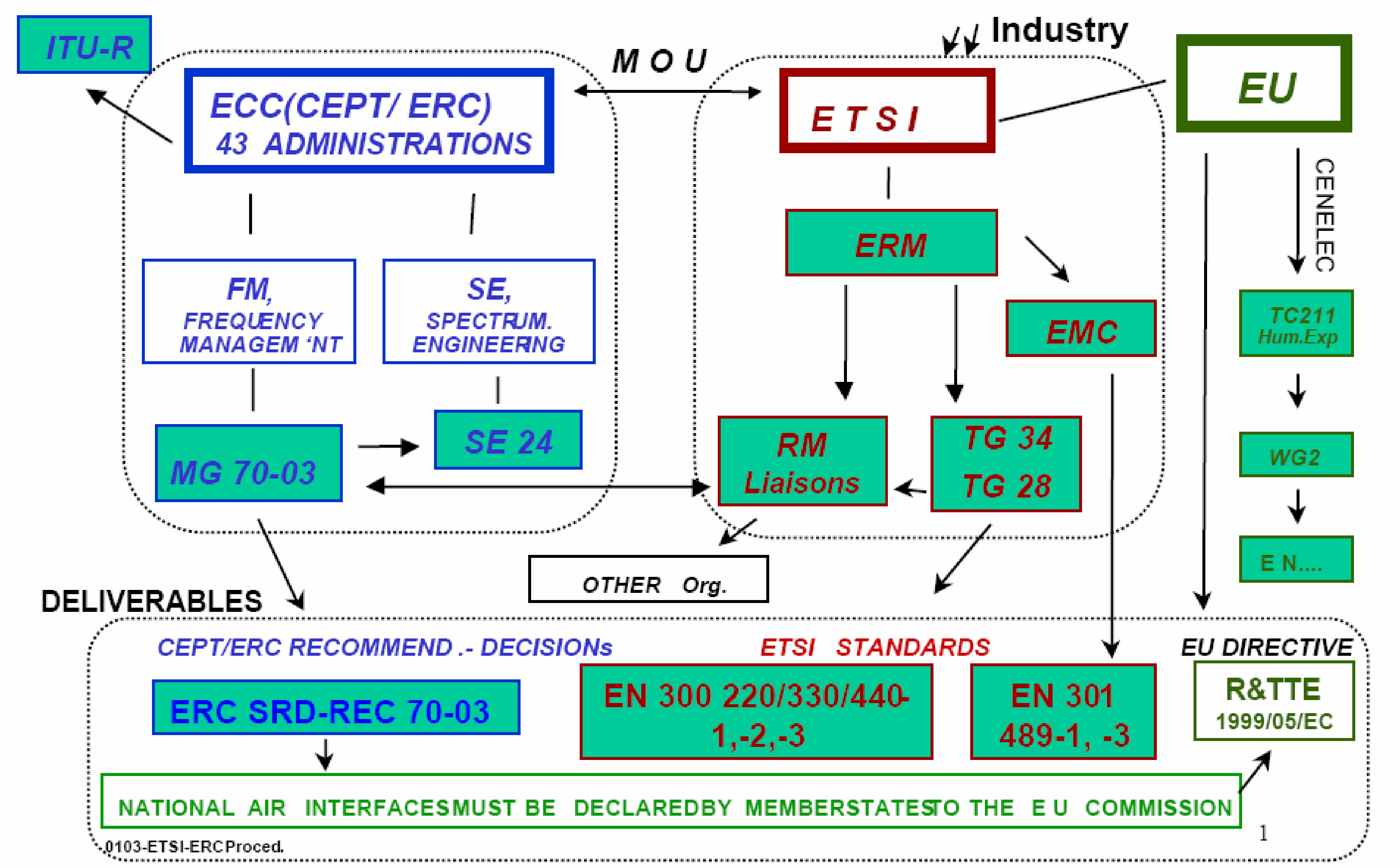
Agenda

1	Introduction to Radio Frequency Identification
2	Standards - EPC
3	Regulations - ETSI
4	Case Studies 1. Metro, 2. Secure Trade Lane
5	Summary

ETSI European Telecommunication Standards Institute

- ETSI is an independent, non-profit organization to produce telecommunications standards for today and for the future.
- Based in Sophia Antipolis (France), ETSI is officially responsible for standardization of **Information and Communication Technologies (ICT)** within Europe.
- ETSI unites **688 members from 55 countries** inside and outside Europe, including manufacturers, network operators, administrations, service providers, research bodies and users
- ETSI's Members determine the Institute's work programme, allocate resources and approve its deliverables.
- **The Benefits of Standardization**
- enables interoperability
- encourages innovation, fosters enterprise and opens up new markets
- creates trust and confidence in products, expands the market, brings down costs and increases competition
- standards must be produced at a speed that is consistent with market demand,
- standards must consider all interested parties, or they will not be widely acceptable.

ETSI - SRD Radio Regulation Organisations

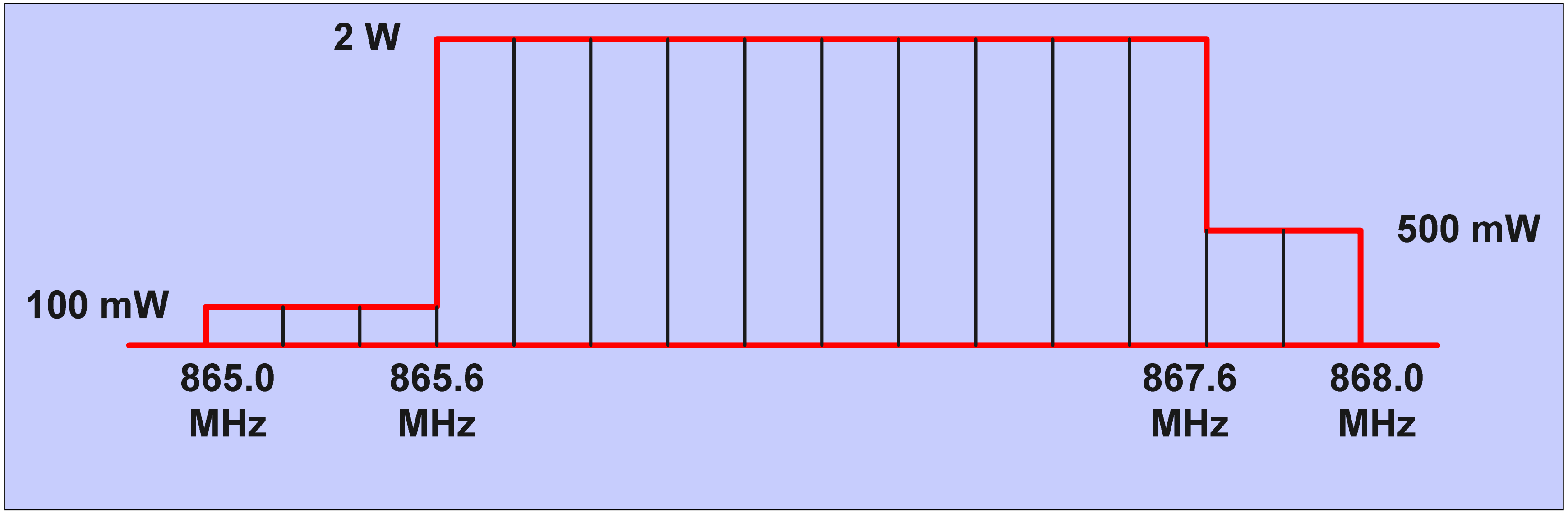


Recent ETSI Improvements

ETSI	EN 300-220 for SRD	EN 302-208 for SRD (new)
Frequency	869.4 – 869.65 MHz	865.6 – 867.6 MHz @2W (865-868 Mhz overall)
Bandwidth	0.25 MHz	2MHz -> 10 channels with 0,2 MHz
Maximum Power	0.5 watts ERP	2 watts ERP (3,2W EIRP)
Channels	1	15 -> 10 @2W, 3 @0,1W, 2@0,5W
Duty Cycle	10% (6 mins/hour)	100% -> LBT
Range	Approx 9ft Max	Approx 17ft Max

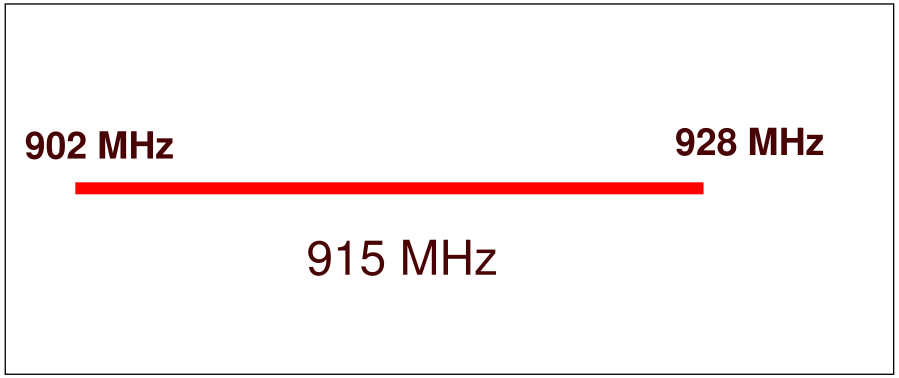
Impact - EPC will work well under the revised ETSI spec, albeit with a lower range when compared to US implementations.

RF Power Limits at UHF in Europe



ETSI EN 302 208

RF in USA vs Europe



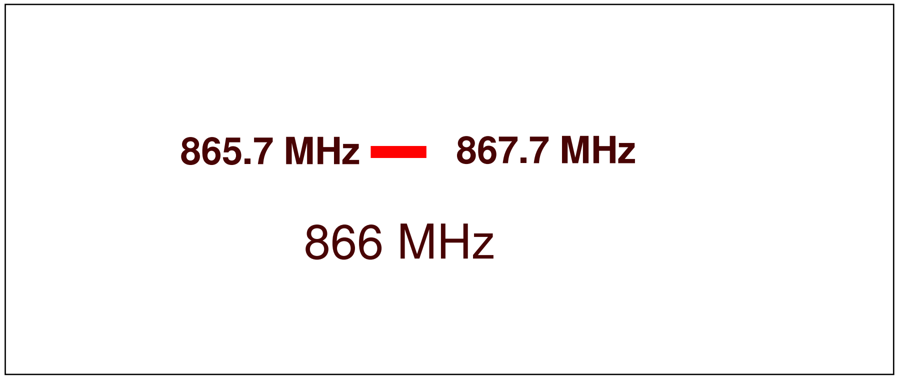
USA:

(2.4 W ERP) 4W EIRP Transmit

Frequency Hopping

63 bands 400KHz wide

25 MHz bandwidth total



Europe

(2W ERP) 3,2W EIRP

Mandatory Listen Before Talk

10 bands 200KHz wide

2MHz bandwidth total

Wave shaping

Lower data rates

Co channel existence

May still need site licence

ETSI: CEPT / ERC Rec 70-03

- International Recommendation defines general position on common spectrum allocations for Short Range Devices (SRDs) for countries within the CEPT
- Reference Document for national Regulations
- Definition of Power Limits for Frequency Bands for SRDs; Appendix 11: RFID @ UHF & GHz
- Rec 70-03 approved at last Frequency Management Group Meeting (22.9. – 24.9.)
- Published on ero server (www.ero.dk)

- Short range device maintenance meeting (SRD-MG) 24.-26.11.2004 (objections /national restrictions discussed)

- 24.1-28.1 FM Meeting - decision about national restrictions (Italy, France, Turkey and Spain expected) implemented in ERC Rec 70-03
- National Adoption by official publication
  - Germany: RegTP (Amtsblatt)

ETSI EN 302 208 Basics

- Interrogator has to stay within the defined frequency range / sub bands
- Ability to channel selection / hopping
- Listen before talk - LBT
  - To minimize interference to other users, the receivers of interrogators must be able to detect emissions from other radio devices
  - Prior to each transmission its receiver shall switch to listen mode and monitor a selected sub-band
- Threshold level = -96dBm
- If there are more than 10 interrogators active, the interrogators have to be synchronized !

ETSI EN 302 208: LBT Basics – technical challenges

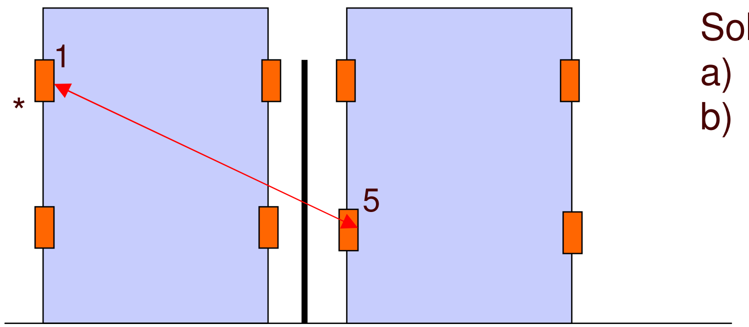
1. Neighbor channel distortion
2. Same channel distortion

   -96dBm treshold leads to „129dB Problem = 10km“

3. Broadband distortion (Breitbandstörer)

   TAGs *

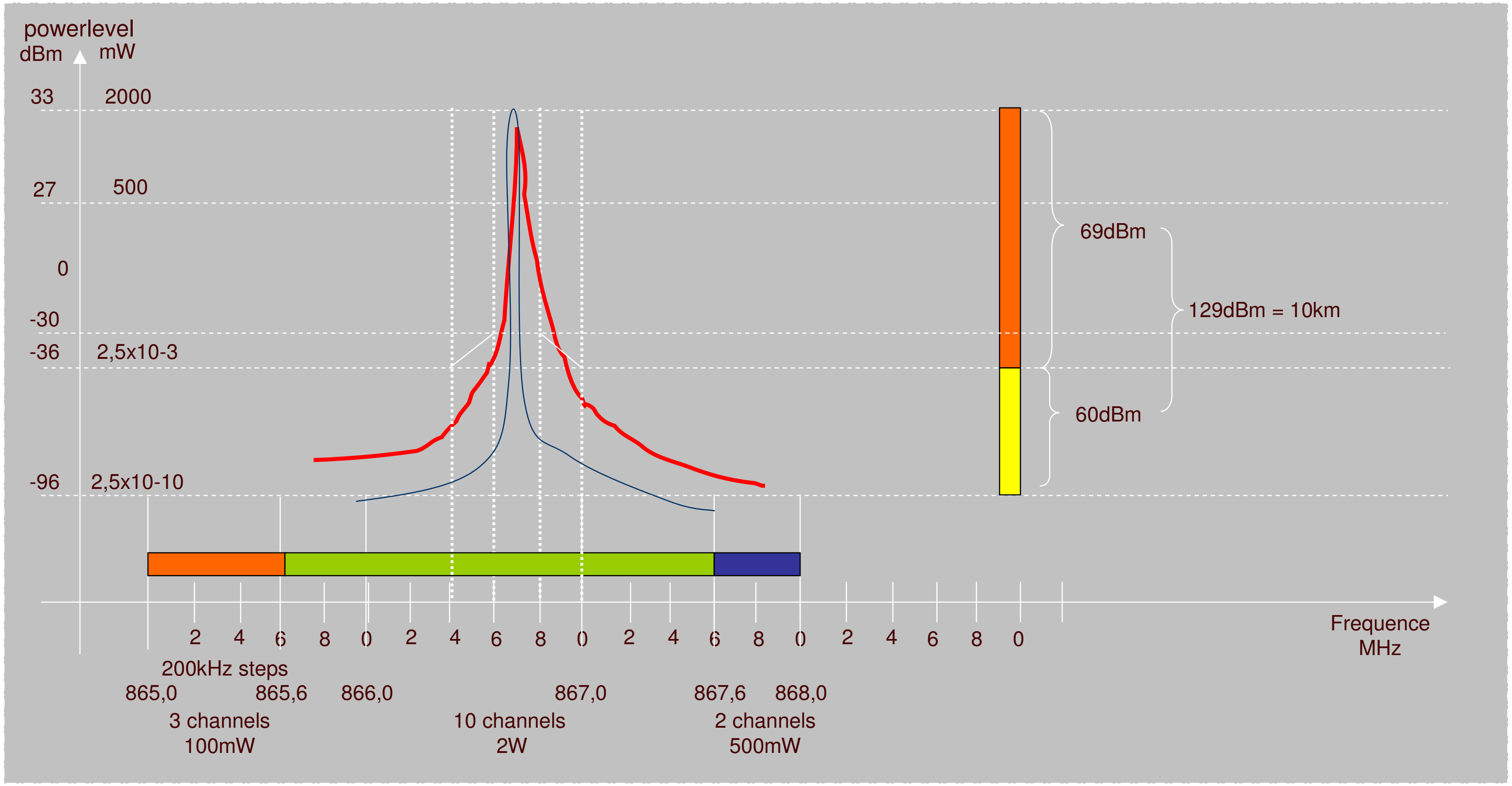
   other devices e.G. Forklift truck



Solution:
a) Antenna direction
b) Absorber

Ant.1 activates Tag
Ant. 5 reads Tag caused by broadband (wg. Breitbandigkeit)

ETSI EN 302 208: LBT Basics – technical challenges



-> Sharp signal is required, to work within the sub band accordingly

ETSI EN 302 208: LBT Basics

- Listen Before Talk: action taken by an interrogator to detect an unoccupied sub-band prior transmitting
- LBT timing parameters:
  - TX off time: min. time, a transmitter shall remain off following a transmission:
    - TX off >= 100ms
  - LBT minimum listening time: min. time, that the device listens for a received signal at or above LBT threshold level
    - tL = tF + tPS
      - tL = time listen = 5ms to max. 10ms
      - tF = time fixed = 5ms
      - tPS = time pseudo random listening = 0 – 5ms
        - If the channel is free = 0ms
        - If the channel is busy = 0 – 5ms / 0,5 steps
  - TX on time: max. time a transmitter is allowed to transmit continuously:
    - single transmission: < 1s
    - Multiple transmissions for a communication dialogue or polling sequence: < 4s

ETSI: TG34 chair: John Falck

- EN Regulations -> EN 300 220, EN 302 208
- „Code of pratcice“ for Installation and Operation of RFID Systems within the UHF-Band
- ETSI Dockdoor Plugtest,March 2005 -> results @ ETSI server
  - interrogator distortion
- ETSI EN 302 208 compliance test, Dec. 2005
  - LBT
  - Reader Synchronisation

Agenda

1	Introduction to Radio Frequency Identification
2	Standards - EPC
3	Regulations - ETSI
4	Case Studies **1. Metro,** 2. Secure Trade Lane
5	Summary

IBM RFID Projects / Activities – a selection

- 2002 - Partner der METRO Future Store Initiative
- 2004 P&G RFID Business Case
- 2004 - Delhaize Assettracking
- 2004 Gilette RFID Testcenter
- 2005 GS1 RFID Business Case Calculator
- 2004 METRO RFID Innovation Centers
- 2004 - VARENA – RFID Inhouse Solution
- 2004 Renault – Sparepart Management
- 2005 - Sernam – Supply Chain Management
- 2005 - REWE – RFID Consulting

- 2002 - active memeber of ETSI, EPCglobal, GS1

METRO Group has a turnover of € 56.4 Mrd., over 262,000 Employees in 30 Countries and over 2,400 stores

METRO Group Structure

Cash & Carry	Hyper-markets	Nonfood Specialty	Department Stores
METRO, makro	real,- extra	Media Markt, SATURN, Praktiker	GALERIA KAUFHOF
Sales: € 26 bn. Countries: 30 Outlets: 504	Sales: € 11 bn. Countries: 3 Outlets: 742	Sales: € 15 bn. Countries: 16 Outlets: 842	Sales: € 4 bn. Countries: 2 Outlets: 147

Service Companies

Group Buying	Invoice Settlement	Group Advertising	Group Logistics	GROUP IT
MGB METRO Group Buying GmbH	MGP - Metro Group Account Processing GmbH	MGA METRO Group Advertising	MGL METRO Group Logistics MDL METRO Group Distribution Logistics MWCS METRO WERTSTOFF CIRCLE SERVICES GMBH	MGI METRO Group Information Technology

Source: Metro Group Annual Report 2004

http://www.metro.de

The METRO Group Future Store Initiative – Shared Platform for the Future of Retail

- Cooperation Project of METRO Group together with SAP, Intel, IBM and T-Systems by integrating other partners of the consumer goods industry and information technology
- The initiative is the platform for technical and process-related retail developments and innovations

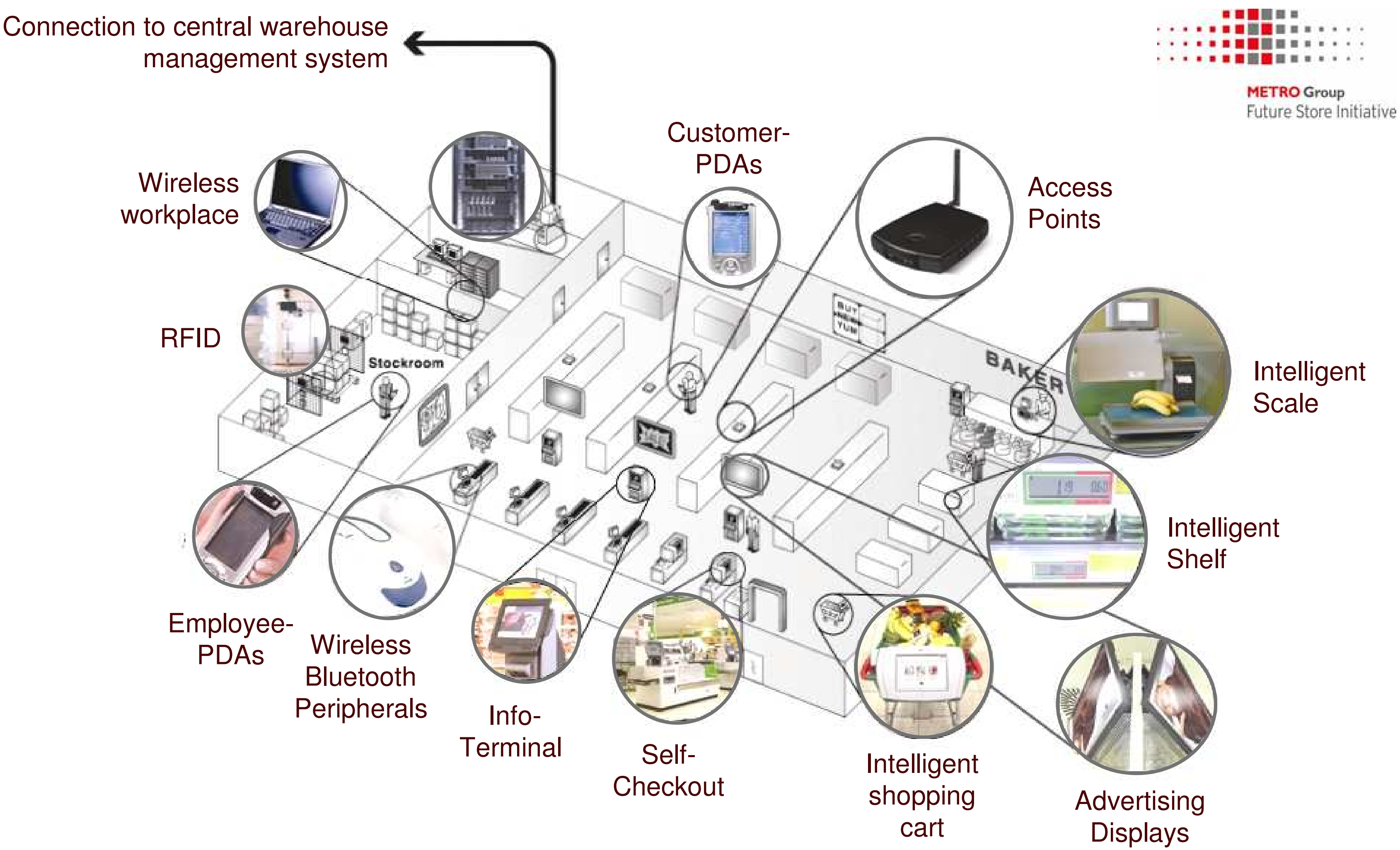
The Initiative sets Standards for Retail of the Future

IBM ■ INTEL ■ SAP ■ T-SYSTEMS

CISCO SYSTEMS ■ COCA-COLA ■ DHL SOLUTIONS ■ HENKEL ■ HEWLETT-PACKARD ■ JOHNSON & JOHNSON ■ KRAFT FOODS ■ L'ORÉAL ■ LOYALTY PARTNER ■ MICROSOFT ■ NESTLÉ ■ ORACLE ■ PHILIPS ■ PIRONET NDH ■ PROCTER & GAMBLE ■ SATO ■ SYMBOL TECHNOLOGIES ■ TRICON ■ VISA EUROPE ■ WINCOR NIXDORF ■ X-IDENT

ADT ■ ALGOTEC ■ ALPHA TONTRÄGER ■ AVERY DENNISON ■ BIZERBA ■ BOSTON CONSULTING GROUP ■ CFP BRANDS ■ CHECKPOINT SYSTEMS ■ CHEP ■ EYCKELER & MALT ■ FEIG ELECTRONIC ■ FUJITSU SIEMENS COMPUTERS ■ GILLETTE ■ INTERMEC ■ KURT SALMON ASSOCIATES ■ LIEBHERR ■ LOGOPAK SYSTEME ■ METTLER TOLEDO ■ MULTIQ ■ NCR ■ OAT SYSTEMS ■ ONLINE SOFTWARE ■ PAXAR ■ SAMSYS ■ SIEMENS BUSINESS SERVICES ■ SONOPRESS ■ TEXAS INSTRUMENTS ■ TOMRA ■ TOSHIBA TEC ■ UPM RAFSEC ■ WANZL ■ WMS ■ X3D TECHNOLOGIES ■ ZEBRA

Future Store – Test platform for new technologies in retail



RFID and METRO Group

2003 – Exploring and testing

April:
RFID tests within the METRO Group Future Store Initiative in the Future Store in Rheinberg

2004 – Preparing and starting phase 1

January:
NRF in New York

May:
first METRO Group RFID Supplier Conference

July:
METRO Group RFID Innovation Center, Neuss

November: phase 1 of RFID roll-out

2005 – Starting phase 2 RFID roll-out

January:
100-day review of roll-out at NRF in New York

June:
second METRO Group RFID Supplier Conference, Cologne

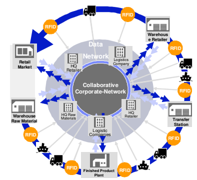
2006 – Our aim and vision

Action in 2006

- Gen 2 in Europe
- RFID on retail unit
- Back/front store

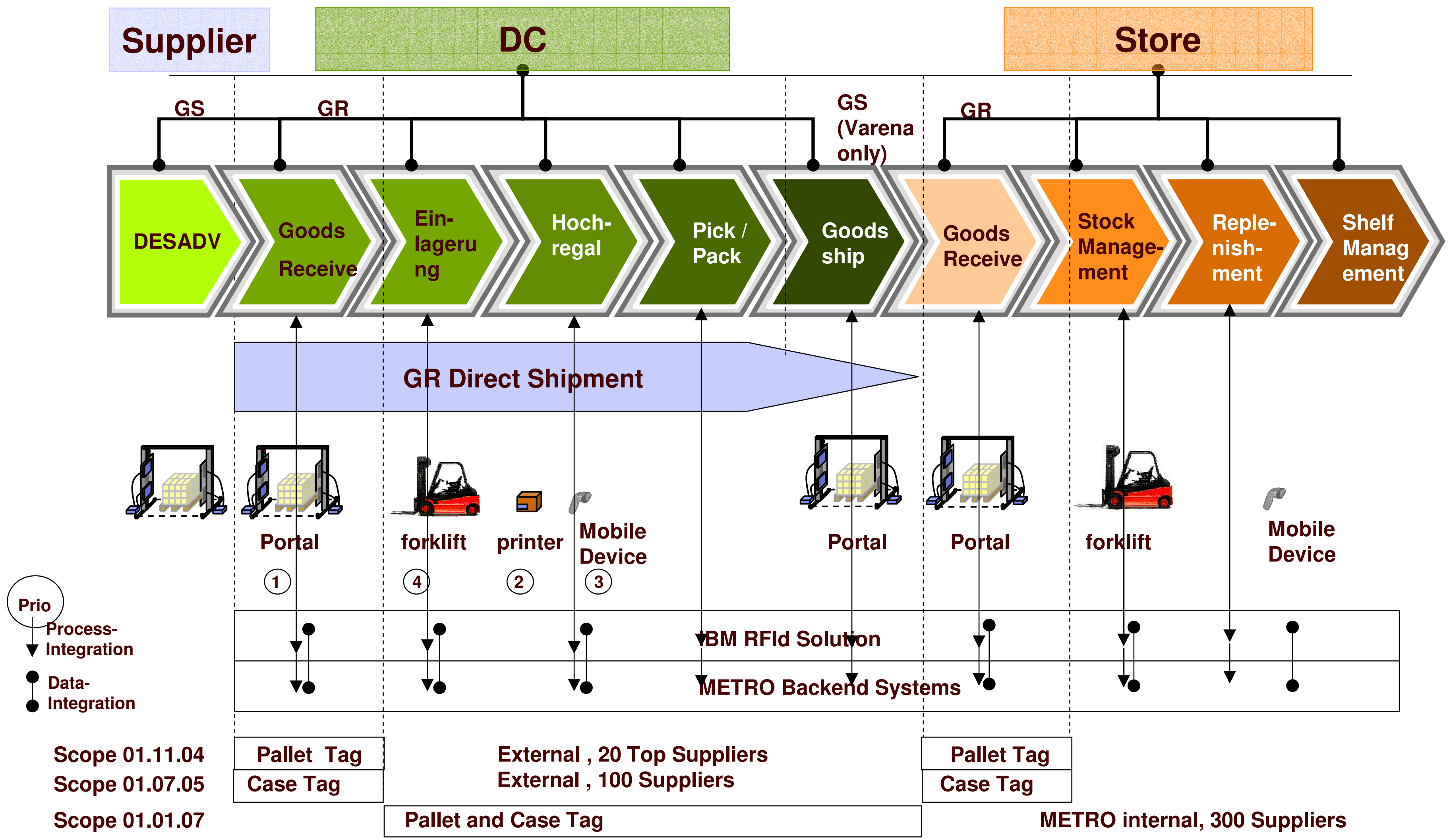
Vision

- The digital supply chain



Workshop on RFID,26th. of January 2006

METRO Group RFID Rollout
Overview on System / Process Integration



RFID on Trading-Unit Level in the Store

	Trading Unit
Process-Efficiency	**12 to 17%** (Goods receipt and shelf maintenance)
Theft/Loss	**11% to 18%** (depends on class of goods)
Goods-Availability	**9% to 14%** (Decreasing out of stock situations)

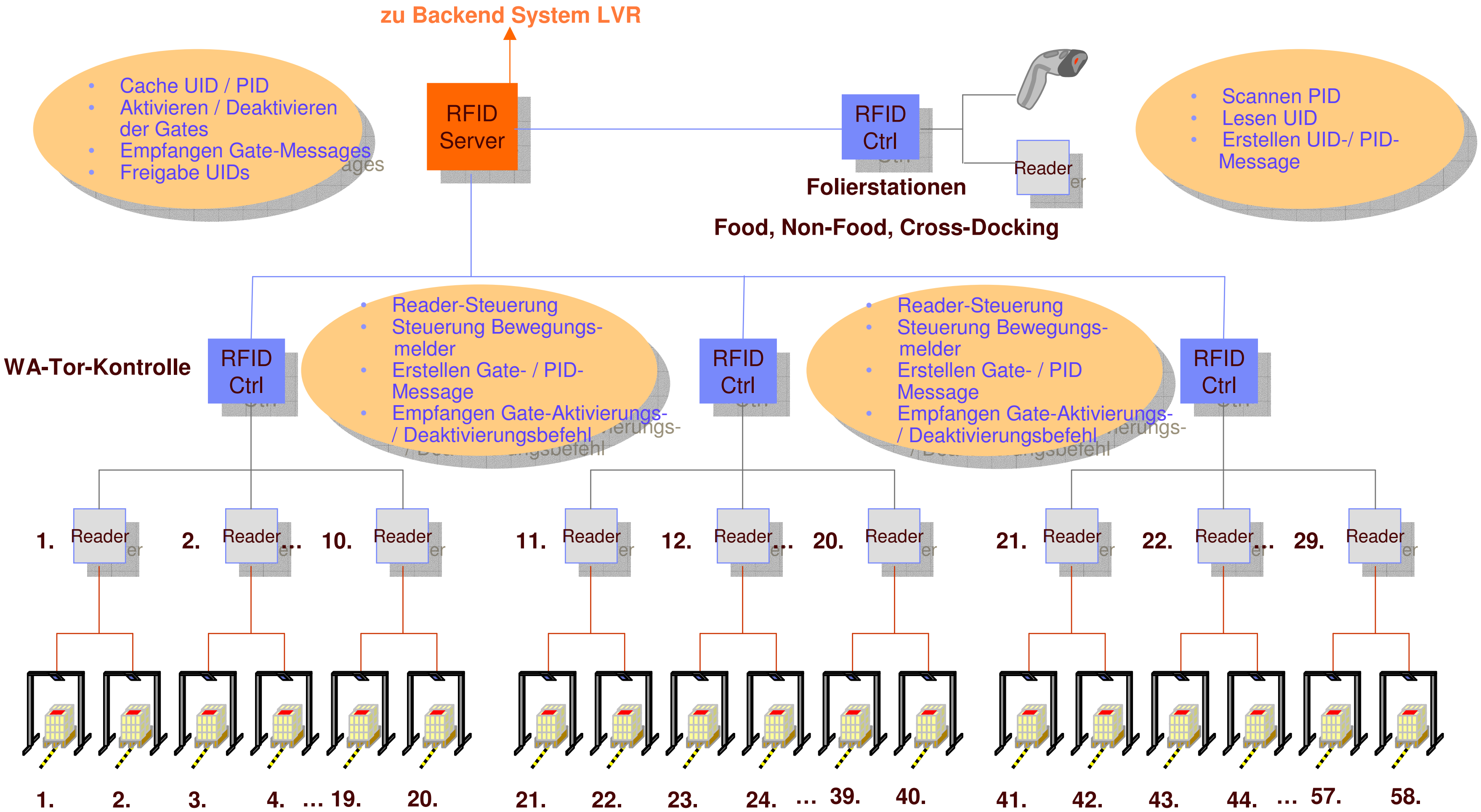
METRO Group RFID Innovation Center: one of the world's leading RFID test laboratories

- Opened July 2004
- Located in the Kaufhof warehouse in Neuss-Norf, Germany
- Total area: 1,900 m²
- Number of test systems: over 40
- EPCglobal accredited test center

RFID Inhouse Solution @ C&C DC VARENA

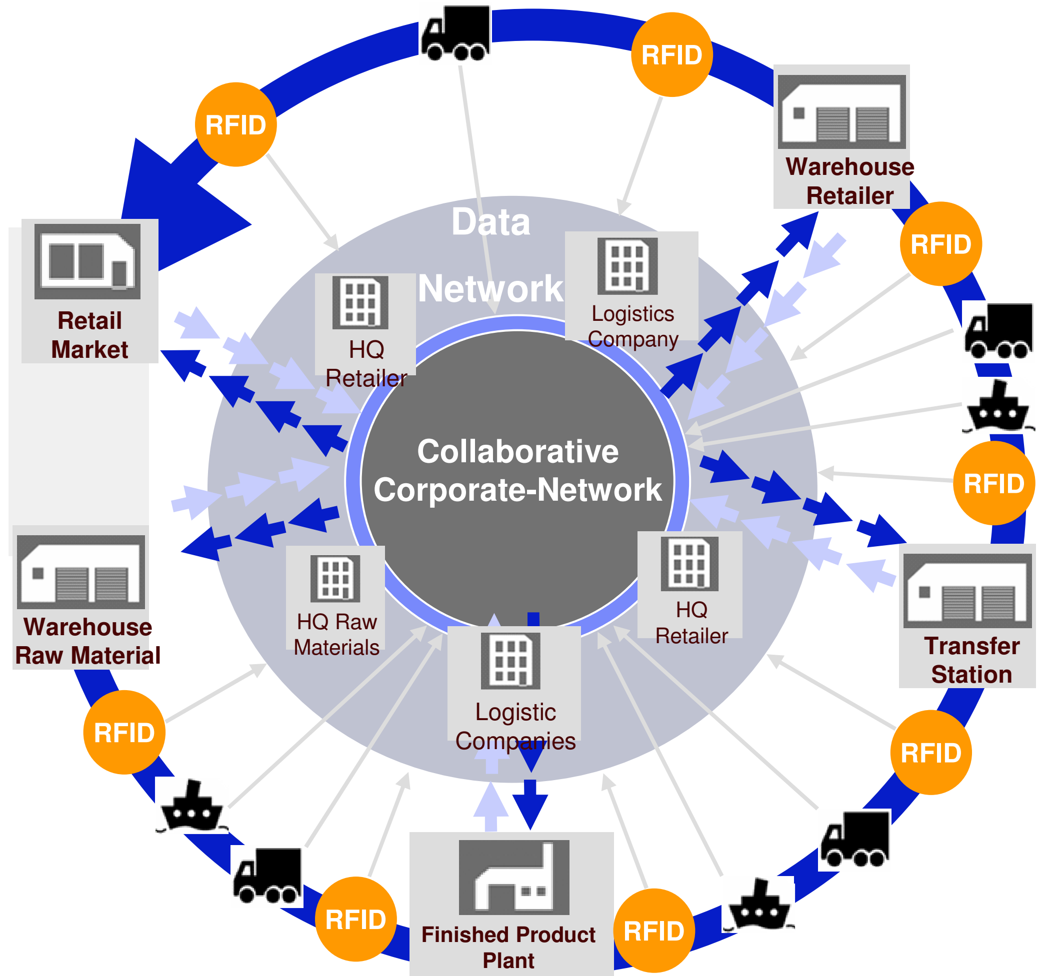
- RFID Solution to check pallet shipment at 60 Dock Doors
- >2000 pallets shipped per Tag, up to 600 000 pallets per year, live since July 2005
- RFID readrates: 99,4 %
- The largest produvtive RFID Installation within Europe / Worldwide
- Challenges:
  - Only prototypes aivalable -> Reader, Antennen, Tags
  - Commitet RFID Performance: >99%

RFID Warenausgangskontrolle @ C&C DC VARENA
Architecture



RFID Ctrl = im Text RFID Controller

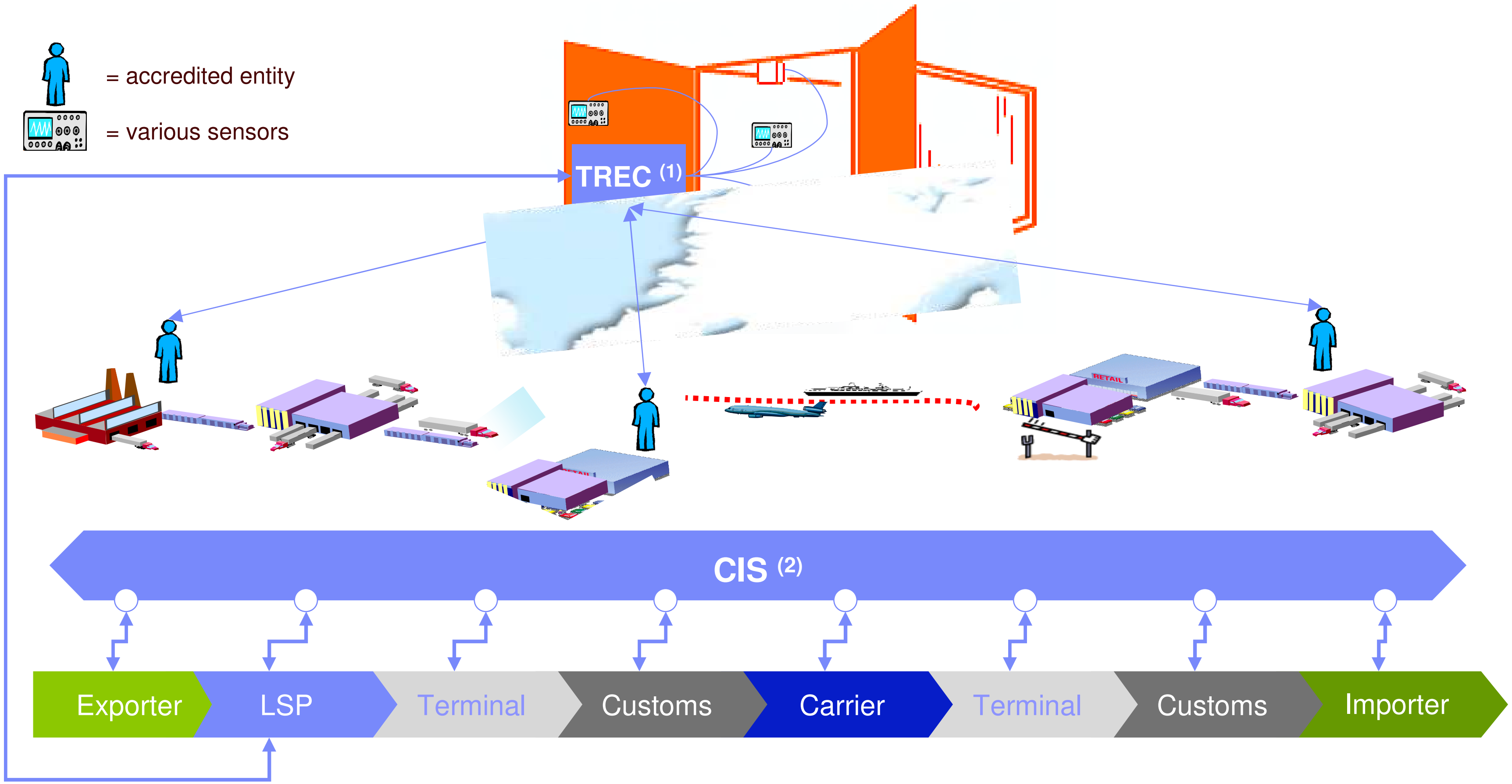
Vision: The Digital Supply Chain



Agenda

1	Introduction to Radio Frequency Identification
2	Standards - EPC
3	Regulations - ETSI
4	Case Studies 1. Metro, **2. Secure Trade Lane**
5	Summary

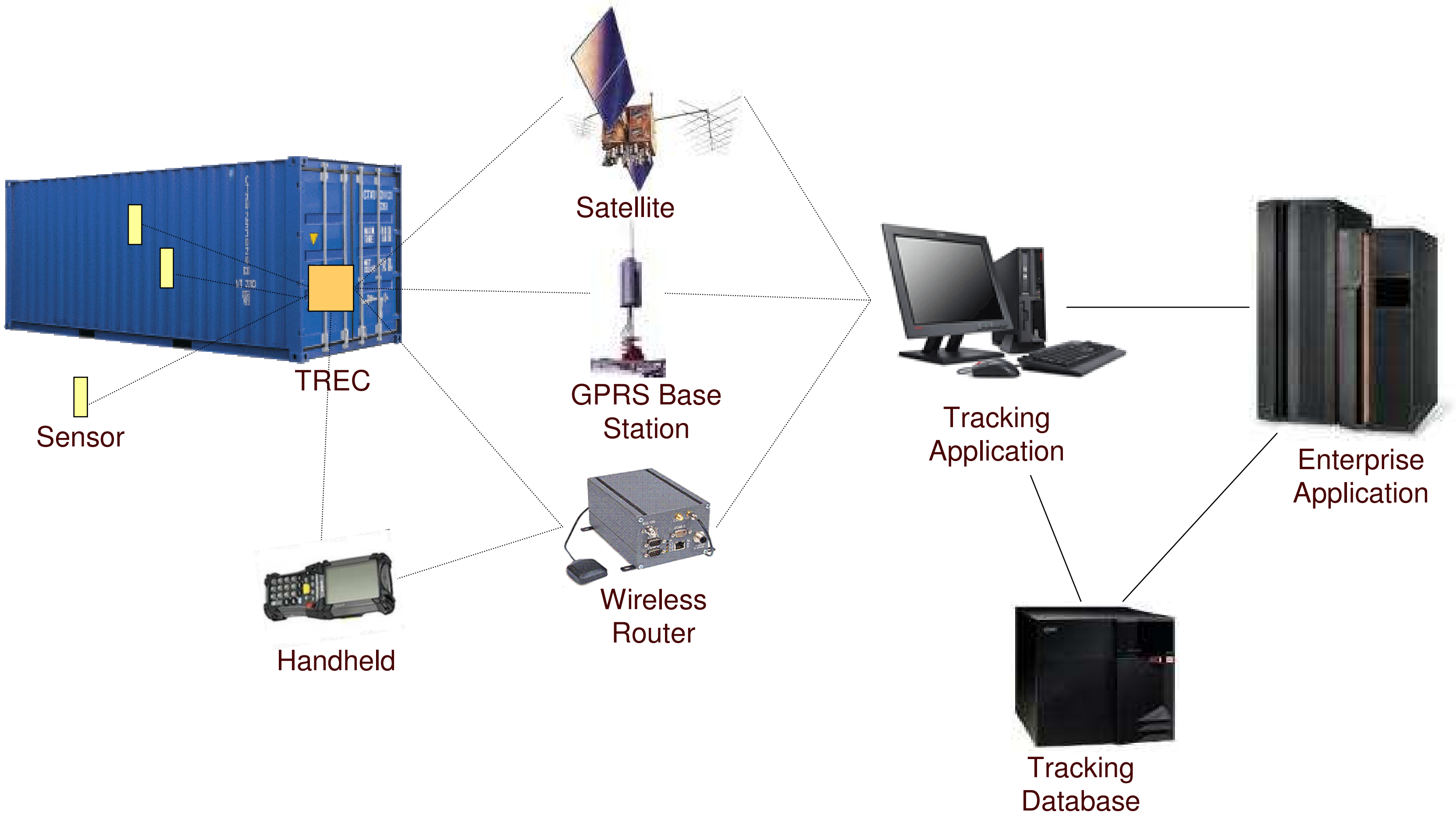
The unique IBM solution is based on the integration of different state of the art technologies into an end-to-end vision, implemented in a modular, non-proprietary and pragmatic way



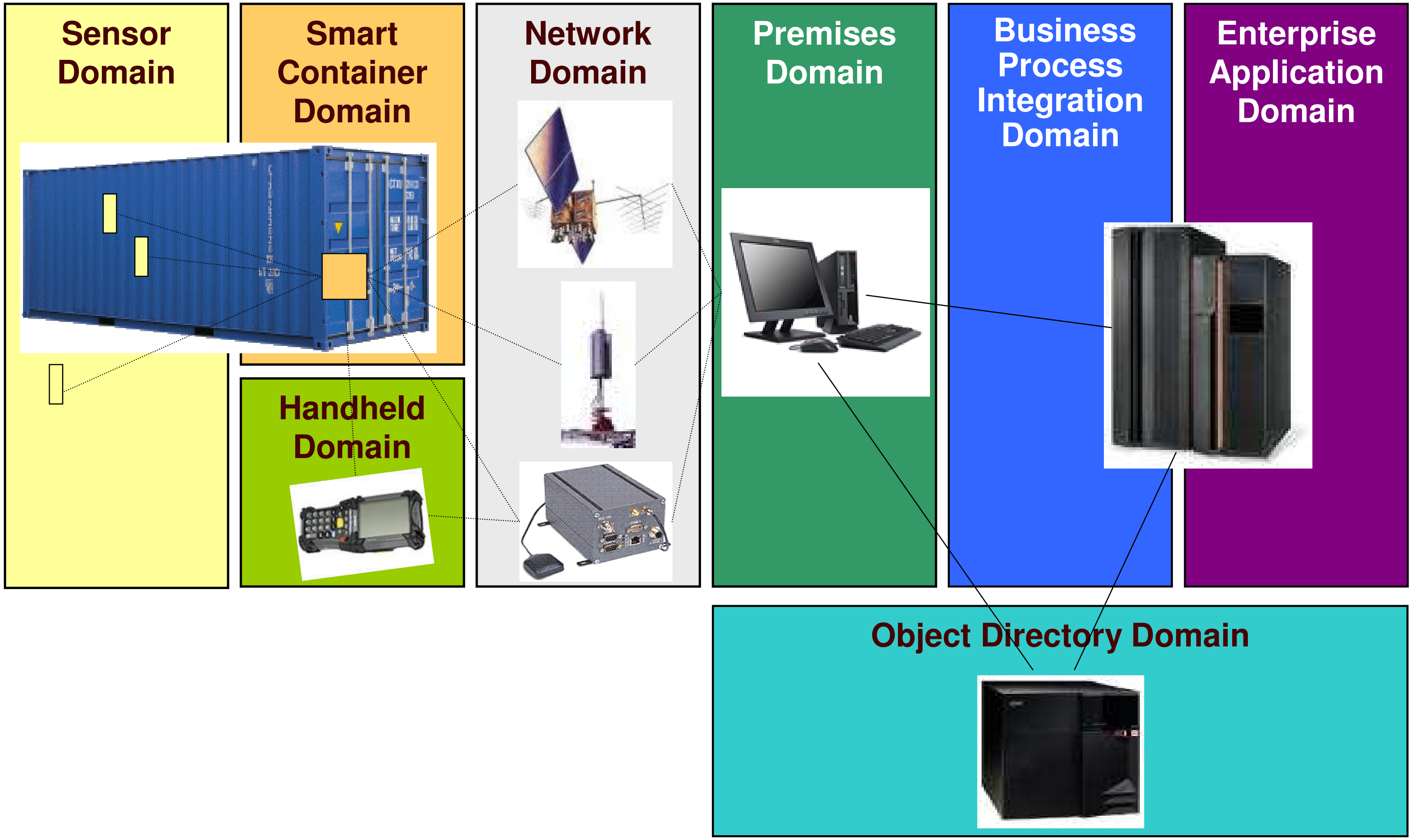
(1) TREC= Tamper-Resistant Embedded Controller
(2) CIS = Container Information System (Service oriented infrastructure)

Technology is the enabler for a Secure Trade Lane; the highest possible security and efficiency can only be given through an end-to-end approach

Secure Trade Lane comes as an end-to-end solution, together with corresponding pre-integrated hardware and software components forming an efficient backend

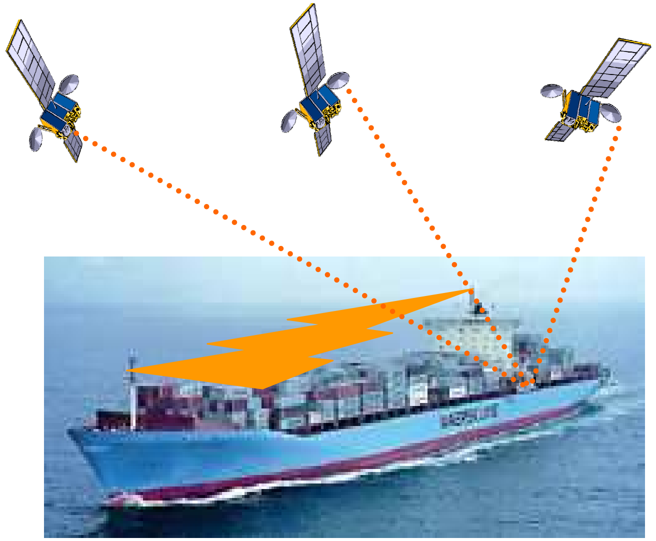


IBM has developed an Architecture Framework for Container Tracking and Secure Trade Lane, whereas this framework separates between various distinct domains

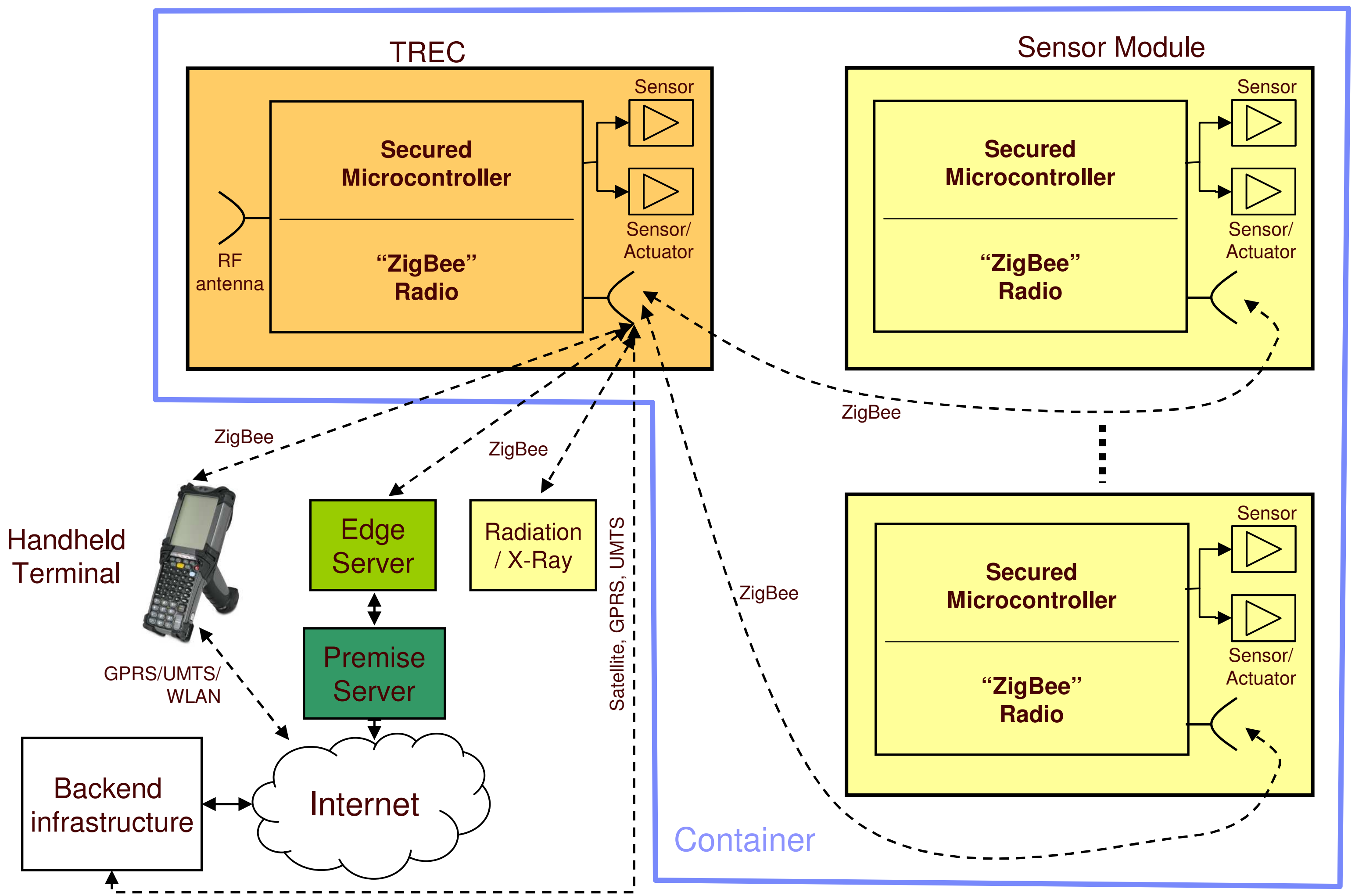


Geo-fencing is an additional positive aspect of intelligent data monitoring

- Nominal container itinerary
  - Computed from origin and destination
  - Location and time-window
  - Stored in TREC
- Reliable GPS-based container track
  - Tamper-proof GPS receiver on vessel receives GPS signals
  - Tamper-proof receiver transmits authenticated GPS position fixes to TRECs
- Real-time monitoring of container track vis-à-vis nominal itinerary
  - TREC continually compares track and itinerary
  - TREC records violations and/or sends out notifications



The TREC acts as a central point of control that can authenticate the source of evidence and implement access control to the evidence

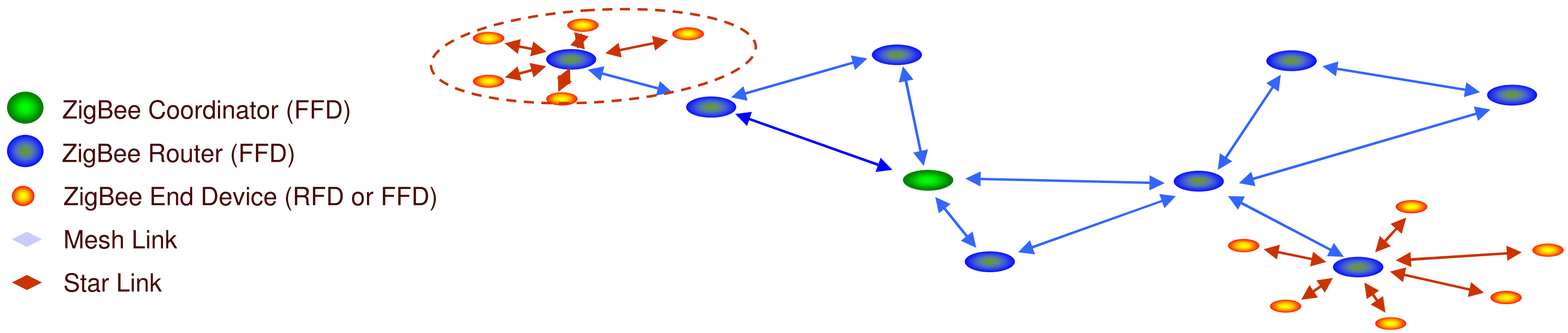


ZigBee is designed for low to very low duty cycles in static and dynamic environments with many active nodes

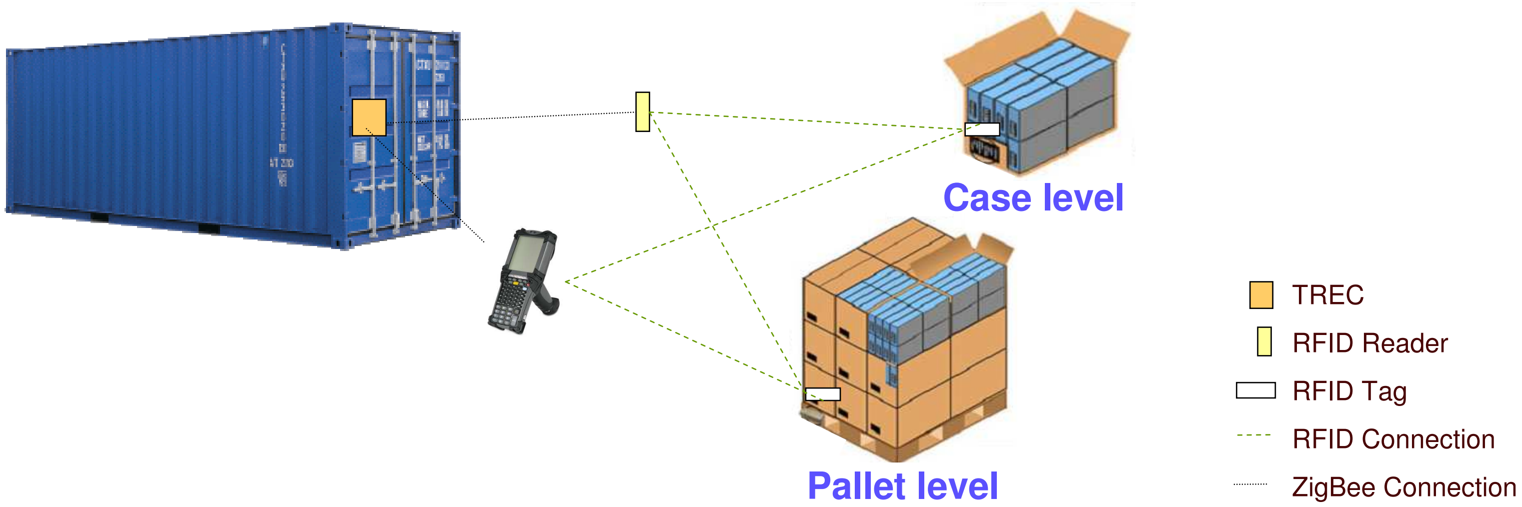
- Flexible link-in of nearly any amount of sensors

Feature(s)	IEEE 802.11b	Bluetooth	IEEE 802.15.4
Power Profile	Hours	1 Week	1Year+
BOM	$9	$6	$3
Complexity	Complex	Very Complex	Simple
Nodes/Master	32	7	64000
Latency	Enumeration upto 3 seconds	Enumeration upto 10 seconds	Enumeration 30ms
Range	100 m	10m	70m
Extendability	Roaming possible	No	YES
Data Rate	11Mbps	1Mbps	250Kbps
Security	Authentication Service Set ID (SSID)	64 bit, 128 bit	128 bit AES and Application Layer user defined

- Adhoc Mesh network at any place (e.g. port or vessel)



RFID and TREC can complement each other by connecting an RFID reader to the TREC as a sensor. As a result, the exact content of a container will be known

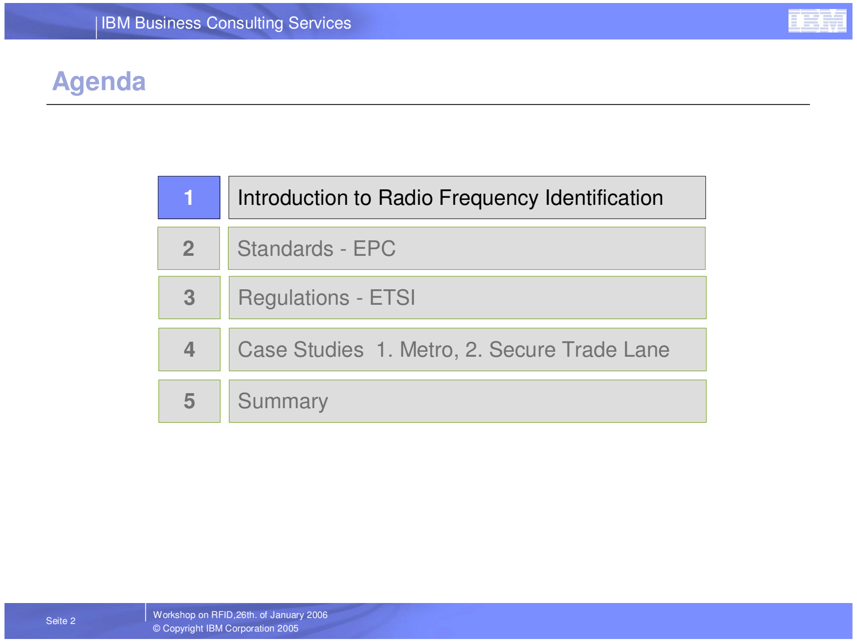


- Container level tracking can be expanded to pallet level, case level, and even item level tracking.
- RFID reader can either be attached to the container or mounted on a portal close to the container, to keep track what exactly is loaded in the container or taken out.
- For most reliable data, a handheld RFID reader is best to be used.
- TREC can store bill of lading for the container and replicate data with backend. Real-time requests initiated through handheld or PC from remote are possible to read TREC data

Agenda

Summary

- RFID is a technology with potential for change in business processes influencing
  - Cost structure
  - Security
  - Comfort
- In a few years, RFID will be as ubiquitous as barcode is today
- RFID requires you to follow a learning curve. Starting early gives you a massive advantages
- ROI is achievable today in many areas of your business



Is there any question, I can answer for you?

RFID Pilot METRO/P&G

Frank Schmid
Managing Consultant
Business Consulting Services
AI

IBM Deutschland GmbH
Hollerithstr. 1
D-81829 München

Mobile (+49) 160-580 1483
Frank.Schmid@de.ibm.com

Internet Information

http://www-306.ibm.com/software/de/websphere/rfid.html

http://www-5.ibm.com/e-business/de/insights/rfid.html?ca=ebod_de&me=w&met=txt&re=insight/de&tactic=305AX04W

ON DEMAND BUSINESS™