2008 RFID Technology Training

Intermec

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  - Vehicle & forklift solutions
  - RFID enabled printers
  - RFID Tags

An introduction to the world of RFID

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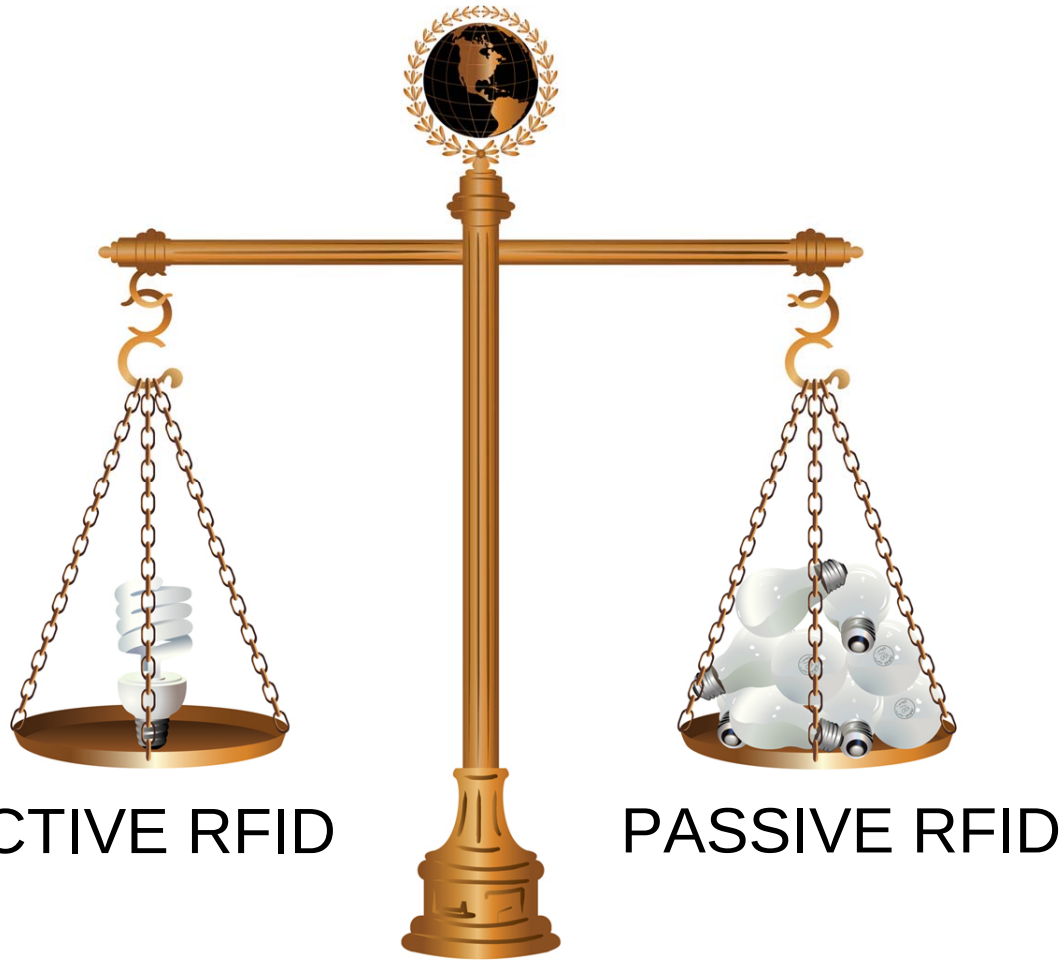
Basic types of RFID



ACTIVE RFID

PASSIVE RFID

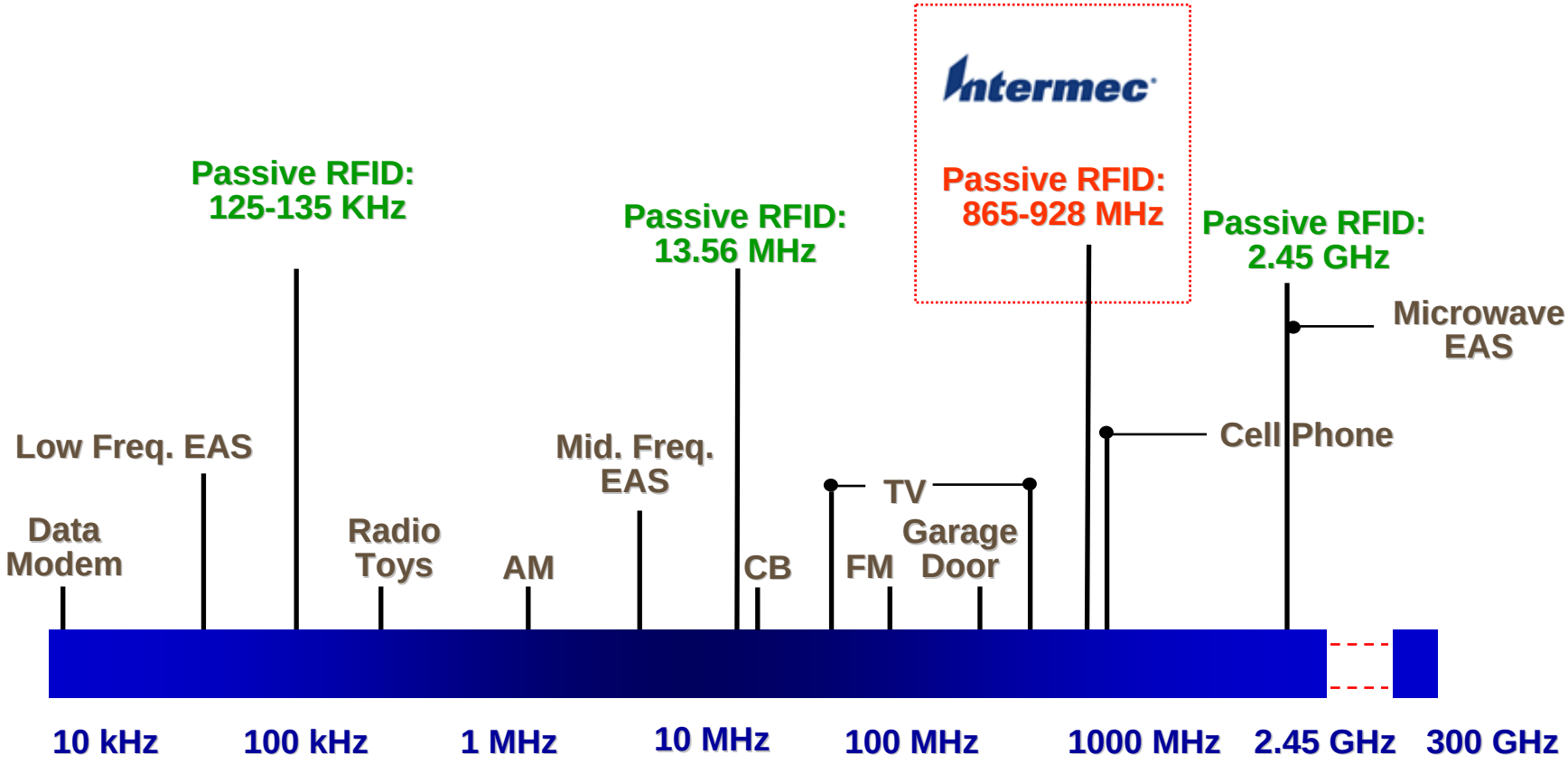
Basic types of RFID

1. Active RFID (Non-Intermec)
   - Battery powered memory, radio & circuitry
   - High Read Range (300 feet)
   - Optional advanced functionality – temperature, shock, and GPS sensing
   - No limit to data capacity!
   - Tag size and costs – most expensive RFID
   - $$$

2. Active Backscatter / Semi Active (Non-Intermec)
   - Reader activates tag, but battery powers memory and circuitry
   - Medium Read Range (10 - 50 feet)
   - Large data capacity - megabytes of data
   - Tag size and costs – still far more expensive than passive RFID
   - $$

3. Passive Backscatter (Intermec)
   - Reader powered
   - Shorter Read Range (4 inches - 18 feet)
   - Small memory capacity
   - Small tag size – cheaper tags
   - $

Passive RFID Frequency Spectrum



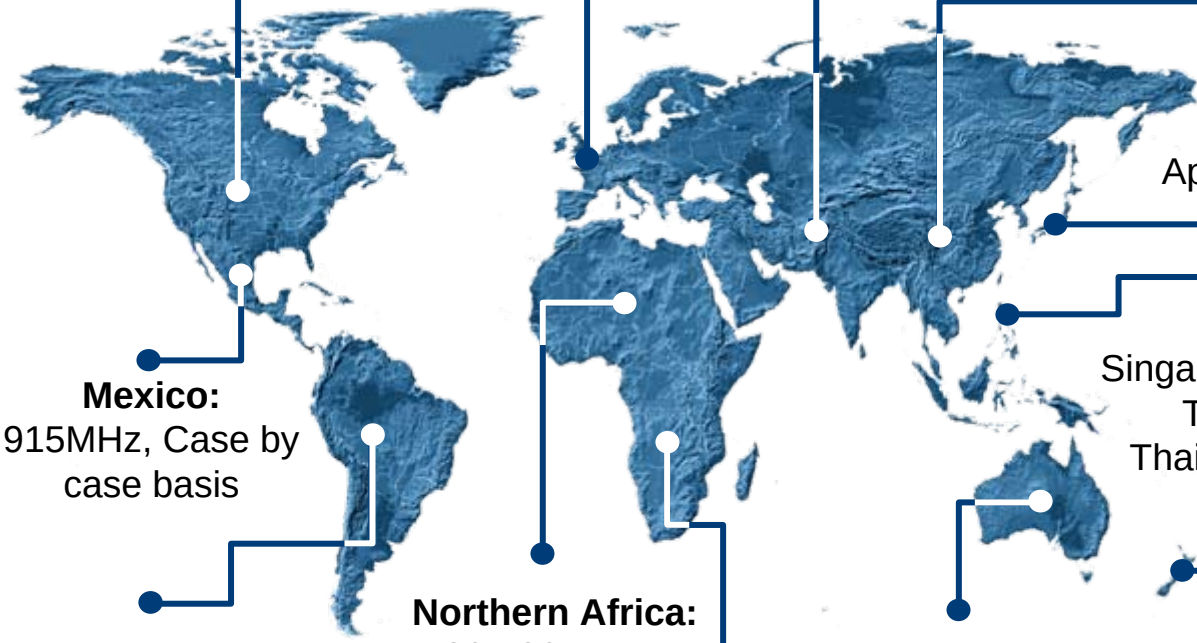
Intermec RFID

- Intermec's primary RFID focus is passive RFID, UHF, 865-928 MHz
- Summary of reasons for choosing this type of RFID:
  - Diverse range of uses
  - High data rates
  - Larger read ranges than any other passive RFID frequency
  - High level of global acceptance and standardisation
    - EPC Global
    - ISO
  - Small physical tag size – cheaper tags
  - Vast market enthusiasm for UHF 865-928 MHz RFID (Used by major retailers such as: Walmart, Metro, and Tesco)

Frequency and power

- Each Country has different regulatory bodies that govern what radio frequency and power can be used
- Although these governing bodies collaborate to allow for a common frequency range on which Passive UHF RFID can be used, they don't always enforce identical standards
  - This means that some countries support a smaller range of frequencies and less power, whilst other countries have agreed to a higher frequency range and more power.

Passive UHF frequencies of RFID by Country



US and Canada:
902 – 928 MHz

Europe:
865 – 867 MHz &
869 MHz

Middle East:
Potential for
865 – 867 MHz

China:
915 MHz single
frequency

Japan:
Application in Process

Pacific Rim:
Singapore 862 – 870 MHz,
Taiwan 915 MHz
Thailand924 – 926MHz

Mexico:
915MHz, Case by
case basis

South America:
915 MHz

Northern Africa:
865-867 MHz

Southern Africa:
915 - 919 MHz

Australia:
918 - 926 MHz

New Zealand:
869 and 865-867
MHz

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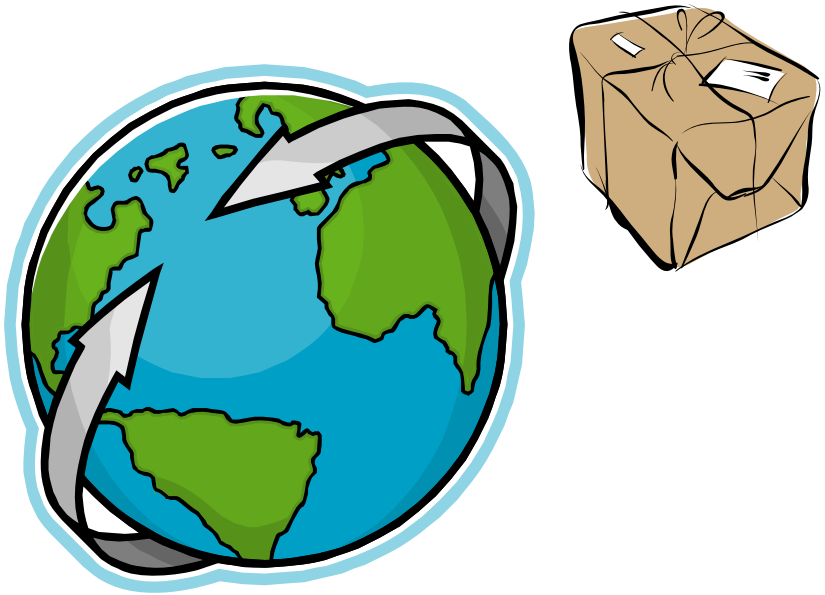
Frequency and power objectives

- The main objective is to be able to put an RFID tag on an asset in for example the USA, and be able to read that RFID tag in any other country that the asset may be shipped to.



Key regulatory / standards comparison

- US – 4 Watts (EIRP) between 915 MHz and 928 MHz (100 channels)
- Europe – 2.0 Watts (ERP) under ETSI EN 302-208, between 865 MHz and 867 MHz (10 channels)

What about protocol?

- Various over the air interface protocols exist. They describe:
  - How a tag should talk to an RFID reader (what language it should speak). When the tag should communicate, what information it should communicate and how it will communicate at a language level
  - How data should be stored on a tag, in what order, and in what area of memory.
  - Specifications for hardware and software that create uniformed procedures for performing RFID tasks
- Most popular over the air protocols for UHF RFID:
  - EPC C1G2
  - ISO 180006-C

Over the air protocols / standards

- EPC C1G2
  - From EPC Global – a non profit organisation. Specialists in the world of Electronic Product Codes
  - EPC C1G2 is the latest tag standard from EPC Global
  - EPC C1G2 offers incredibly fast tag performance, both reading and writing
  - Data stored on these tags is normally an Electronic Product Code – like a batch number
- ISO 180006C
  - From the International Organisation for Standardisation
  - Identical to EPC C1G2 in many ways. Often tags are actually physically the same as EPC C1G2!
  - Has a different tag ID system to EPC C1G2, which allows for unique tags
  - The unique ID stored on these tags is not the same as a batch number. It's like a unique serial number for the tag.

EPC C1G2 / ISO 180006C

- On all Intermec RFID tags supplied from Q1 2008 you can choose between two modes via a single bit switch:
  - EPC C1G2

  OR
  - ISO 180006C

  - Which mode to choose? Not a simple answer!
    - You might choose EPC C1G2 for **open loop** applications that need an identification number that is globally accessible. For example, a pallet of baked beans.
    - You could choose ISO 180006C for **closed loop** applications that require a unique identifier for every object, where data sharing with the world is not so important. For example, closed loop manufacturing processes.
    - By the end of the training course you should be able to work out the choices easily!

Putting it all together

- Business needs, application logic and process flow
  - This should indicate the type of hardware necessary – i.e. fixed mount RFID readers or mobile RFID readers
- Tag choice:
  - Air interface – ISO6C or EPC C1G2
  - Asset type – tags must be selected to work with the asset material
  - Physical type – size and shape
- Environment assessment
  - Choice of antennas
  - Portals, scan tunnels
- Software

Introducing the Intermec RFID product range

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The Intermec RFID product range - 2008

Feature Rich

Value

SmartSystems™

Fixed Readers	Vehicle Readers	Hand Held Readers	Printers	Tags / Media
 IF61	 IV7	 IP30	 PX6i	 IT60 Series
		 IP4	 PM4i	 IT30 Series
 IF30			 PF2i	 Smart Labels

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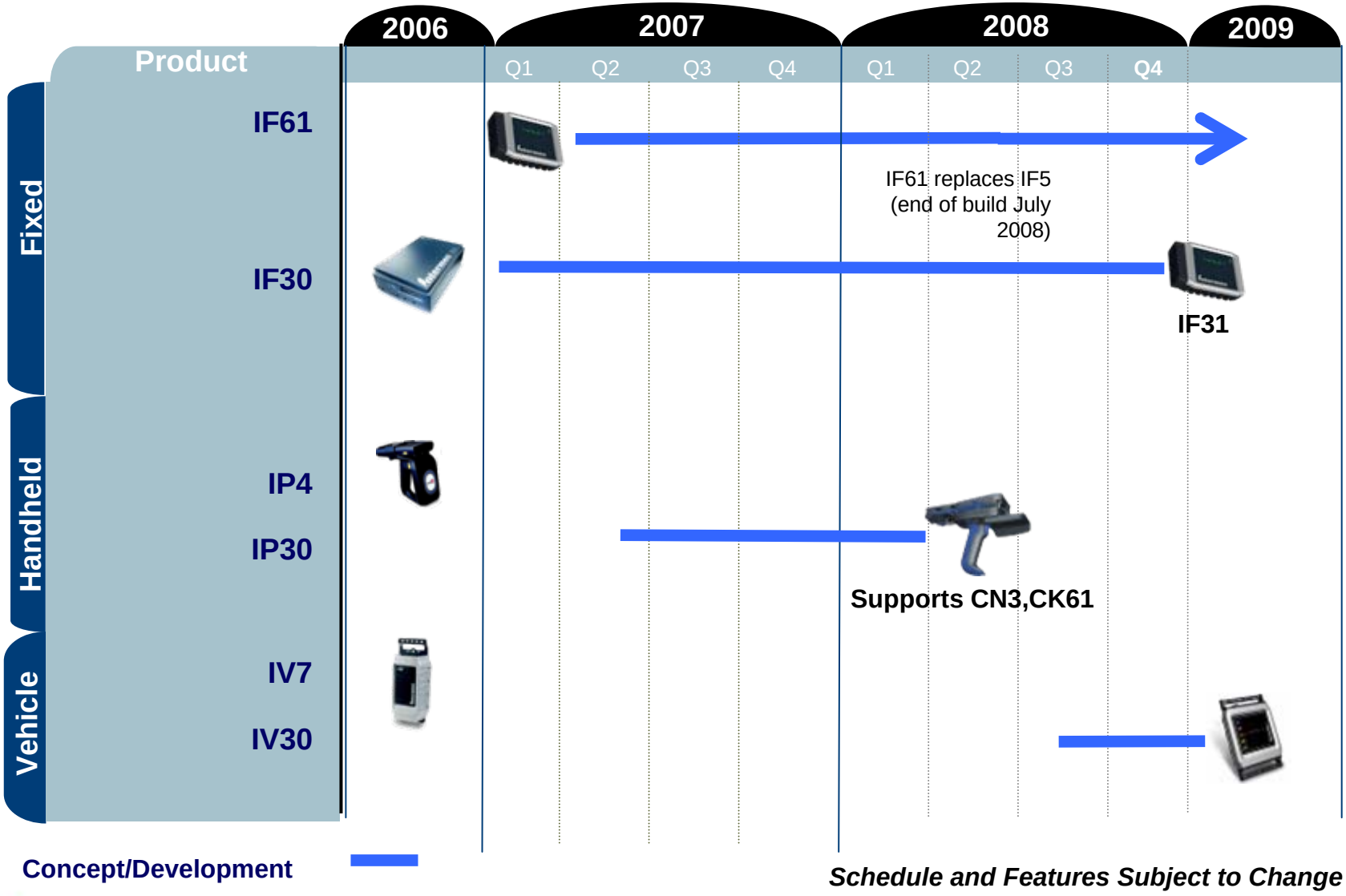
Intermec RFID hardware roadmap



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Intermec Advantage: Complete Global Systems

	Intermec	Motorola	Tyco	Alien	ThingMagic	LXE
Key Message	Global Mobile & Fixed Systems	EPC-only System	Reliance on OEM Readers	Tag Centric Business Model	OEM-centric Business Model	Handheld & Vehicle Only
Global Service & Support	+	+	+	–	–	~
EPC Tags	+	+	–	+	–	–
❯ RFID Printers	+	–	–	–	–	–
❯ Wideband EPC & ISO Tags	+	–	–	–	–	–
Fixed Reader	+	+	+	+	+	–
❯ Java & .Net Smart Reader	+	~	~	~	~	–
Hand Held Reader	+	+	–	–	–	+
❯ Forklift System	+	~	–	–	–	+
ETSI-based Reader Family	+	~	~	~	~	–
❯ EPC Interoperable	+	–	–	–	–	–

❯ Intermec advantage

\+ complete product line
~ incomplete product line
– no offering

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Fixed RFID Network Appliance Readers

Enterprise

ERP, WMS & business systems

ERP

WMS

Extends the reach of your enterprise software infrastructure to include RFID information.

Edge of network

Warehouse, distribution & manufacturing locations

Feature Rich localized intelligence

IF61

Critical RFID decision-making

- Data filtered and formatted at the edge
  - Minimizes IT impact
  - Minimizes system latency
  - Minimizes hardware complexity
- Multi tag reading/writing
- High tags/second performance
- Closed looped applications

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IF30 Network Reader

- Built in power supply & 4 mono-static antenna ports
- Best-in-class Dense Reader Mode (DRM)
- Self-powered sensor/control interfaces
- Secure ethernet interface
- Qualified reader/tag system performance
  - EPC Gen 2 certified
  - EPC Gen 2 interoperable
- IM5-2b radio module provides high performance multi-protocol capability
- Meets RFID global regulations
- EPC Global Gen 2 and ISO 18000-6b

Applications:

- Conveyors
- Portals or Dock Doors
- Shrink Wrap Stations
- Overhead Reading
- Access Control

Intermec

IF61 Enterprise Reader

Applications:

- Conveyors
- Portals or Dock Doors
- Shrink Wrap Stations
- Overhead Reading

Standard platform foundation
- Linux Operating System and IBM WRDI Platform

Eliminates the Industrial PC

Industry Standards
- IPv4, IPv6 & EPC: ALE, LLRP, RM, DCI
- Air Interface: ISO 18006 B&C, Gen2

Built-in extras: power supply, GPIO, 4 mono-static RF ports, 802.11 b/g WLAN (WiFi and CCX certified)

Application Development:
- On-board Workbench
- Java, JavaScript, VB.Net, C# .Net

Powerful Engine
- Intel Celeron 600 MHz Processor

128MB DDR/256MB Flash Memory
- Optional spinning drive (Up to 550GB)

Meets Intermec Rugged Standards
- IP54 Sealing

Fully supported by SmartSystem™ Foundation

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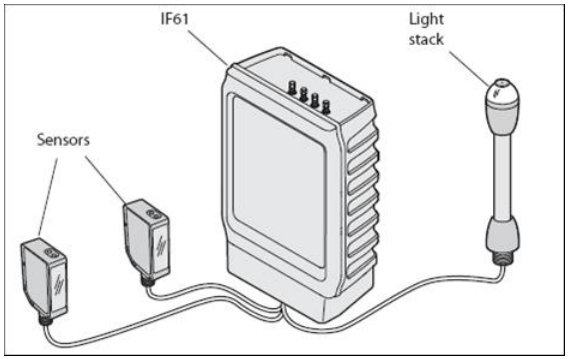
IF5, IF61, IF30 Proximity Sensor and Light Stack

PRODUCT	Q1	Q2	2008 Q3	Q4



The Intermec IF61 Smart Reader now has optional sensors and a light stack that plug directly into the GPIO interface of the Reader. No wiring or separate power is required as the sensor and light stack are powered by the IF61.

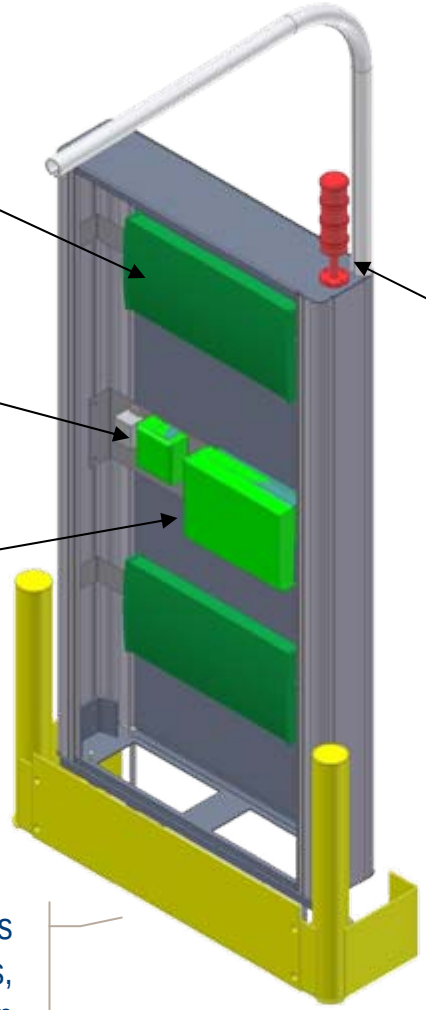
Also, the IF5 and IF30 fixed readers are compatible with these options

Intermec Portal System - ID60

Qualified Antennas

GPIO box

IF61 Smart Reader



Light stacks

Intelligent proximity sensor

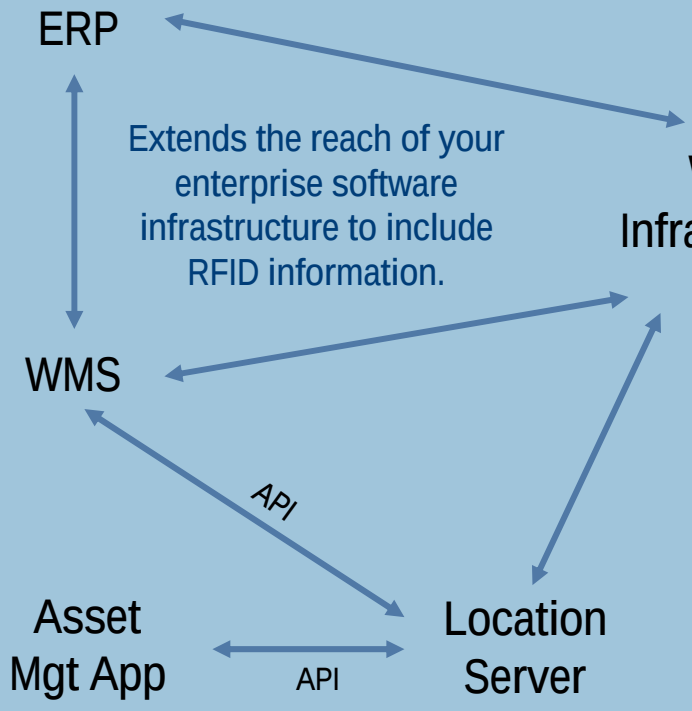
Feasibility, Process and Site Analysis, plus Installation

Intermec RFID Services Intermec

Mobile RFID Readers

Enterprise

ERP, WMS & business systems



WLAN Infrastructure

Edge of network

Warehouse, distribution & manufacturing locations

CV30 IV7

Feature Rich
High Intelligence

IP30 w/CN3
IP30 w/CK61

Wireless Mobile Intelligence

- More use, higher ROI
- More frequent visibility
- Mobile asset monitoring and management
- Reduced legacy and IT impact
- Critical RFID decision making
- ADC versatility and high performance
- Pallet, case, shelf, location tag reading

IP4 Hand Held Reader

Applications

- Item level tracking
- Asset tracking
- Picking
- Shipping & receiving
- Maintenance & field service
- “Exception” handling

Takes RFID to the point of work

Utilize existing applications, preserving your software investment

Provides RFID upgrade capability to Intermec 700 Series Mobile Computers

Reads and programs tags

Self contained RFID accessory that maintains all mobile computer functions

Easy omni-directional data collection

Software radio provides multi-protocol capability

EPC Global Gen 2 capable and download upgradeable to ISO 18000-6c

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IP30: Handheld Reader

- EPC Global Gen 2 and ISO 18000-6b
- Uses SR61 batteries and chargers
- Separate battery from terminal for full shift of use.
- Easy-to-use diagnostic LEDs
- Sleek, streamlined industrial design
- NI configurations available
- Communicates with terminal via Bluetooth or USB
- Compatible with CN3, CN3e, CK61, CK61ex

Primary Verticals:

- Industrial
- Transportation & Logistics
- Consumer Goods

Popular Handheld RFID Applications

Pallet Aggregation

Finding Orders

Retail Garments

RFID Compliance

File Tracking

Asset Tracking

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IV7 VMT Reader

Applications:

- Forklift
- Transport & Logistics vehicles
- Any industrial vehicle

4 mono-static antenna ports

Best-in-class Dense Reader Mode (DRM)

General Purpose Input Output (GPIO)

RS485 interface

Qualified reader/tag system performance
- EPC Gen 2 certified
- EPC Gen 2 interoperable

IM5-2b radio module provides high performance multi-protocol capability

Meets RFID global regulations

EPC Global Gen 2 and ISO 18000-6b

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Intermec Forklift System: Whole Product Solution

Vehicle Mount Computers CV30 and CV60

Hand Held Barcode Scanners SR60 and SR61

RFID Tags and Media

Intermec RFID Services

Feasibility, Process and Site Analysis, plus Installation

Adaptable Load Backrest and Antenna Cells

IV7 Vehicle Mount RFID Reader

RFID Printers and Fixed Readers

Remote device management

Intermec SmartSystems

Other accessories as needed per application
(sensors, cables, power supplies, installation kits)

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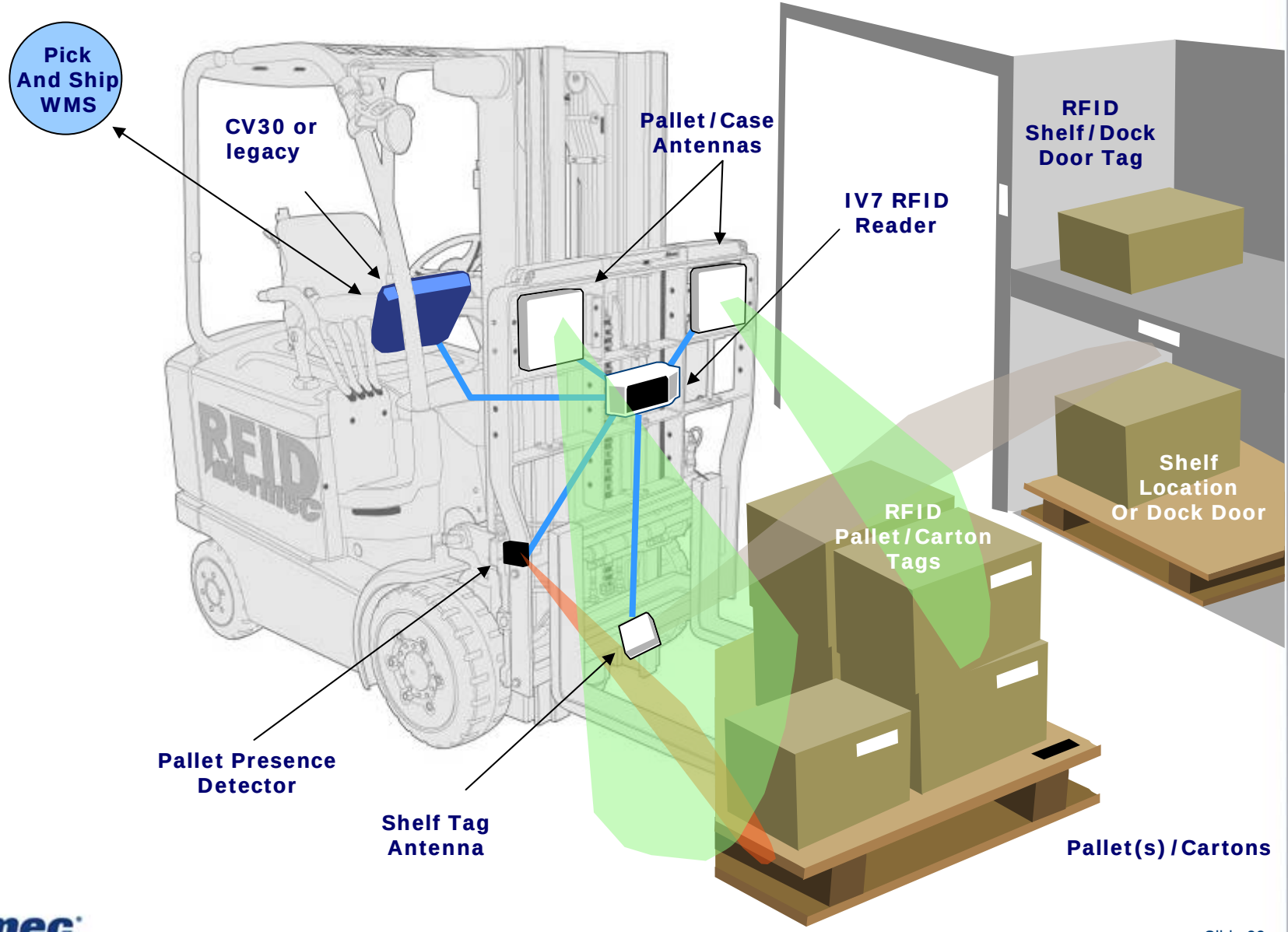
Pallet/Carton/Location Example Configuration



RFID on a forklift

Intermec Forklift System: Recent Installations

Crown
Wave

Hyster

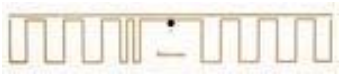
Yale

RFID Flexible Tag Platform

- Multiple silicon platforms
  - ISO 18000-6B
  - EPC Gen 2
- Region specific and wide band designs
- Media conversion
- Take from stock & custom labels

- Applications
  - Item level tracking
  - WMS
  - Shipping & receiving
  - DSD
  - Security

Take From Stock Products



Intermec HPBA
(ISO 6B - 915 & 869 MHz)

High Memory

TI Gen2
(Gen2 – wide band)

Performance

Avery AD222
(Gen2 – wide band)

Low Price

IT60 – Small & Large Rigid Tags

Applications:

- Work-in-Process
- Material Handling
- Logistics Tracking
- Asset Tracking

Consistent performance on varied materials
- Works on metal, wood, plastic & in free-space

Durable
- Suitable for harsh environments

Reusable
- Lower cost per use

Standards based
- Interoperable with competitive readers

Multiple form factors
- Application flexibility

Read distance
- Up to 30 feet

Global use:
- FCC and ETSI compatible in a single wide band design

Standards compliant:
- Gen 2/ISO18000-6C and ISO18000-6B versions available

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IT32A Gen 2 Identification Badge

Applications:

- Access Control
- Hanging Tag
- Nameplate
- Reusable container tag

Consistent performance on varied materials
- Works on plastic, cardboard, wood & in free-space

Durable
- PVC laminate

Reusable
- Lower cost per use

Standards based
- Interoperable with competitive readers

Application flexibility
- Optional magnetic stripe, can be punched

Read distance
- Up to 20 feet

Global use:
- FCC and ETSI versions available

Standards compliant
- Gen 2/ISO18000-6C

RFID Printers and Smart Media

PF2i Baggage Tag Printer

2” Desktop sized, high volume, minimal downtime

PM4i Printer

4” Smart printer intended for use in rugged environments

PX4i / PX6i Printers

Sturdy 4” and 6” label, ticket and tag printers

Smart Media

Smart labels and media for every application

EasyCoder® PF2i Printer with RFID

Applications:

- Bag Tags

Smart printer with stand-alone capabilities

Easy Host connectivity to ERP & WMS systems

Ideal for airline and transportation bag tags

Oracle WMS and SAP AII-ready

Qualified reader/tag system performance
- EPC Gen 2 certified
- EPC Gen 2 interoperable

IM5-2b radio module provides high performance multi-protocol capability

Ethernet, USB & Serial standard.
Optional 802.11 b/g, Dual serial, Parallel.

EPC Global Gen 2 and ISO 18000-6b

Intermec

EasyCoder® PM4i Printer with RFID

Applications:

- WIP Labels
- Pick/Pack/Ship Labels
- Cross-docking Labels

Smart printer with stand-alone capabilities

Easy Host connectivity to ERP & WMS systems

Heavy-duty metal construction for harsh, rugged environments

Oracle WMS and SAP AII-ready

Qualified reader/tag system performance

- EPC Gen 2 certified
- EPC Gen 2 interoperable

IM5-2b radio module provides high performance multi-protocol capability

Ethernet, USB & Serial standard
Optional 802.11 b/g, Dual serial, Parallel

EPC Global Gen 2 and ISO 18000-6b

Intermec

Available
Q4 - 2008

PX4i Printer with RFID

Sturdy 4” label, ticket and RFID tag printer

All metal construction for harsh environments

Modular design for integration into automated labelling applications

400dpi print resolution

Qualified RFID reader/tag system performance
- EPC Gen 2 certified
- EPC Gen 2 interoperable

IM5-2b radio module provides high performance multi-protocol capability

Ethernet, USB & Serial standard
Optional 802.11 b/g, Dual serial, Parallel

EPC Global Gen 2 and ISO 18000-6b

Applications:

- Compliance labelling
- Manufacturing operations
- Warehouse operations

Intermec

Available
Q4 - 2008

PX6i Printer with RFID

Sturdy 6” label, ticket and RFID tag printer

All metal construction for harsh environments

Modular design for integration into automated labelling applications

Upto 116 six inch labels per minute

Qualified RFID reader/tag system performance
- EPC Gen 2 certified
- EPC Gen 2 interoperable

IM5-2b radio module provides high performance multi-protocol capability

Ethernet, USB & Serial standard
Optional 802.11 b/g, Dual serial, Parallel

EPC Global Gen 2 and ISO 18000-6b

Applications:

- Compliance labelling
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- Warehouse operations

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