

An Introduction to RFID Technologies

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Who am I?

- PULSE Project Director, Savant
- System designer of PULSE
 - Core IT system of National Blood Service
 - Prospective End user of RFID
- Working with blood service since 1988
- Previous experience with military avionics

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RFID – An Overview

- How RFID / Near Field Communications works
- Tags, frequencies, standards
- Why Automatic Identification?
- Application areas and business benefits

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What is RFID?

- Radio-frequency identification (RFID)
 - an automatic identification method
 - relying on storing
 - and remotely retrieving data
 - using devices called RFID tags or transponders.
- RFID technology uses electromagnetic radio waves to interact and exchange data between a tag and a scanner

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How does it work?

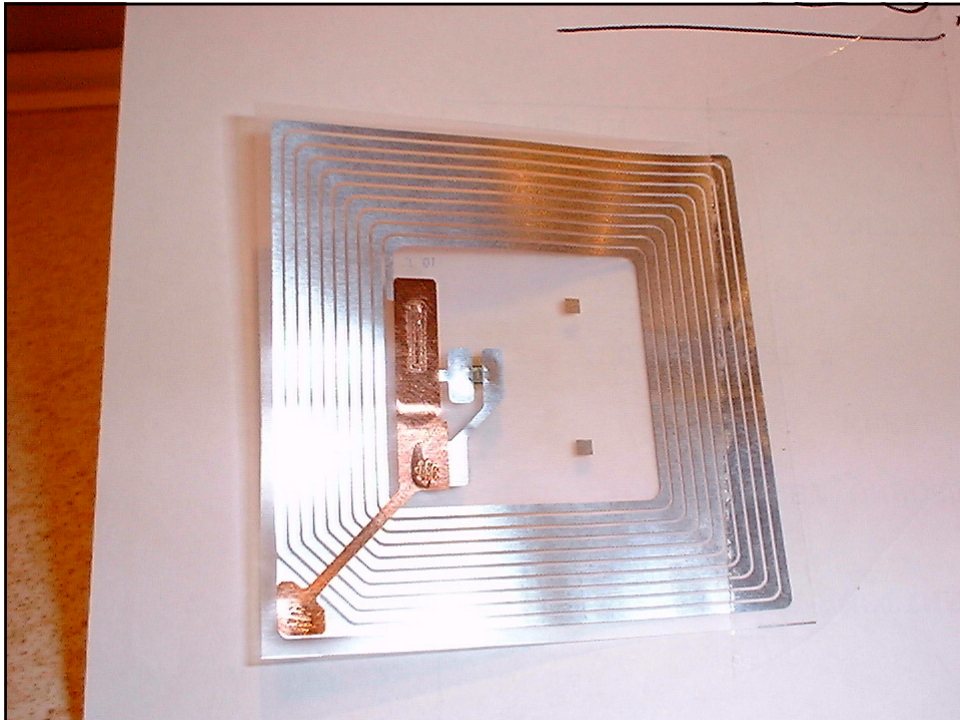


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RFID Types

- Passive
 - No internal power supply
 - Cheaper
 - Short range (10cm – metres)
 - Limited data capacity (2k bits)
- Scanner provides energy for chip to respond
- Disposable

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oyster™

usage subject to conditions - see over



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The image shows a hand holding a blue card with a white curved stripe. The word 'oyster' is printed in white on the blue background. Below the stripe, there is a small white logo. The card is set against a dark blue background with a green horizontal line and a blue ribbon-like graphic on the right side.

RFID Types

- Active
 - Internal battery
 - Longer range
 - Better in challenging environments
 - More expensive
- On tag power helps to boost signal
- Not disposable
- Can provide monitoring data (e.g. temperature)

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Examples of USe

- Supply-chain tracking and info system
 - Used in the real world!
- Ticketing Systems
- Payment Systems
- Access Control
- Passports
 - Malaysia – 1998
 - US and UK - 2006

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Low Frequency (LF)

- < 150 kHz
- Range = 0.1-0.3 m
- Magnetic field coupled; low interaction with water and cells
- Uses
 - Personnel access control
 - storage administration
 - animal identification

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High Frequency (HF)

- 6-28 MHz
- Range = 0.1–1.0 m
- Magnetic field coupled; weak interaction with water and cells
- Uses
 - 13.56 MHz “smart cards” for identification and financial transactions
 - transit passes
 - logistics and asset management
 - pharmaceutical items
 - anti-theft electronic article surveillance

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Ultra High Frequency (UHF)

- 0.3–3 GHz
- Range = 1-10 m
- Electromagnetic field coupled; range strongly affected by water and cells
- Uses
 - Case and pallet level supply chain logistics
 - auto and sea container tracking
 - automatic toll collection

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Data Storage

- Data read from and written to tag
- Tag has unique, locked identifier
- Once written, data can be
 - Locked
 - Overwritten, if not locked
 - Deleted, if not locked
- 256 characters is practical limit for passive tags
- ISBT128 provides the standard for storage

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Why would we use RFID?

- 1 trillion products use commercial barcodes
- 10% of these would benefit from RFID
- High value products
- Active encouragement from FDA
 - “critical to ensuring the long-term safety and integrity of the U.S. drug supply”.

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In the Blood Supply Chain

- We rely, absolutely, on accurate reading of identification data
- And of writing the data
 - Accurate application of labels
- Our primary information system is overloaded

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Automation – First Steps

Codabar
Barcode



ISBT128
Barcode



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Too much information?

Baxter
Baxter Healthcare Ltd,
Theford, Norfolk,
England
88-27-02-006

G052 500 600 001 U

RED CELLS (CPDA1)
STORE AT 4 C - 2 C

This component must not be used if there are visible signs of deterioration.
This component must be administered through a suitable transfusion set incorporating a 170um filter.
This component may transmit infection.

Volume 280 mL

This component was collected in CPDA1 anticoagulant, 100 millilitres of which comprise:

Anhydrous Glucose	161.0	
Sodium Citrate	80.4	
Sodium dihydrogen phosphate dihydrate	16.1	DO NOT
Citric Acid monohydrate	16.6	VENT
Adenine	2.0	

Lot: 0 1 9 7 0 4 1 0 1 9

Pack Type: Code R3371

Rh D POSITIVE

Expiry Date: 22 June 2000

Additional Information
D C c E e
+ - - - -

CMV Neg.
NEG : HT, K, Fy(a), M, N, S
NBS Bristol
Date Bled : 18 May 2000

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Current Technology Limitations

- Cannot prove data associations
- Minimum read is 2 barcodes
- Import read is 4 or 5 barcodes
- Limitations with automated systems
- Relies on optical alignment of scanner with barcode
- We've run out of space!

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RFID

- Space for more data
- Can be added, and locked, at different stages
- Improve applications
- Aids capture of audit information
- Streamlines reconciliation
- Automation of bulk handling
- Better stock handling

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