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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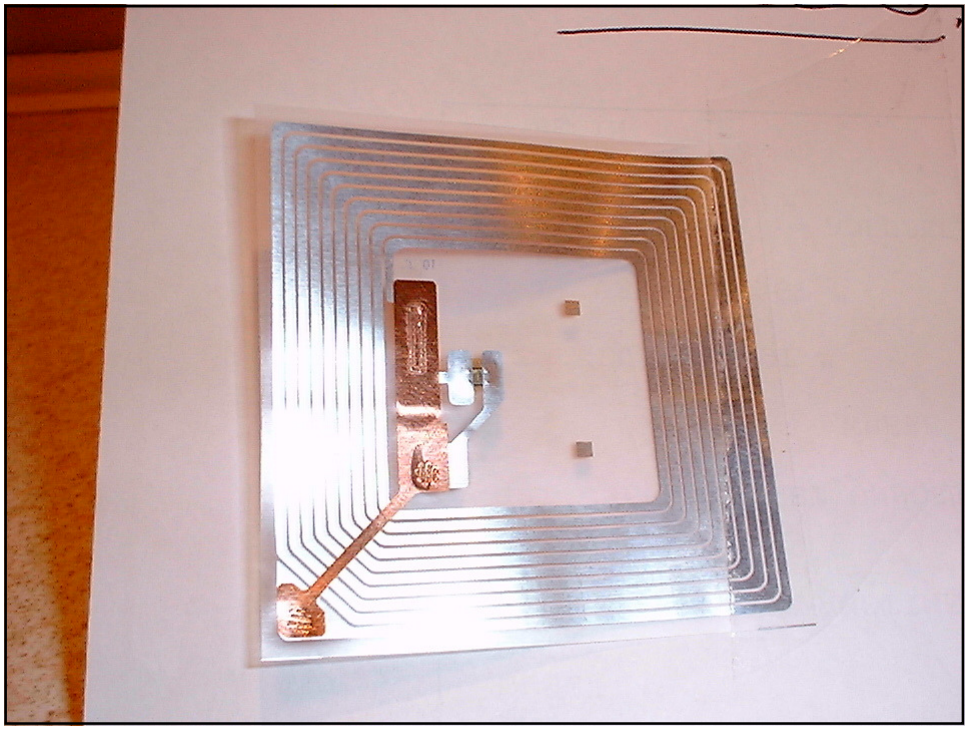

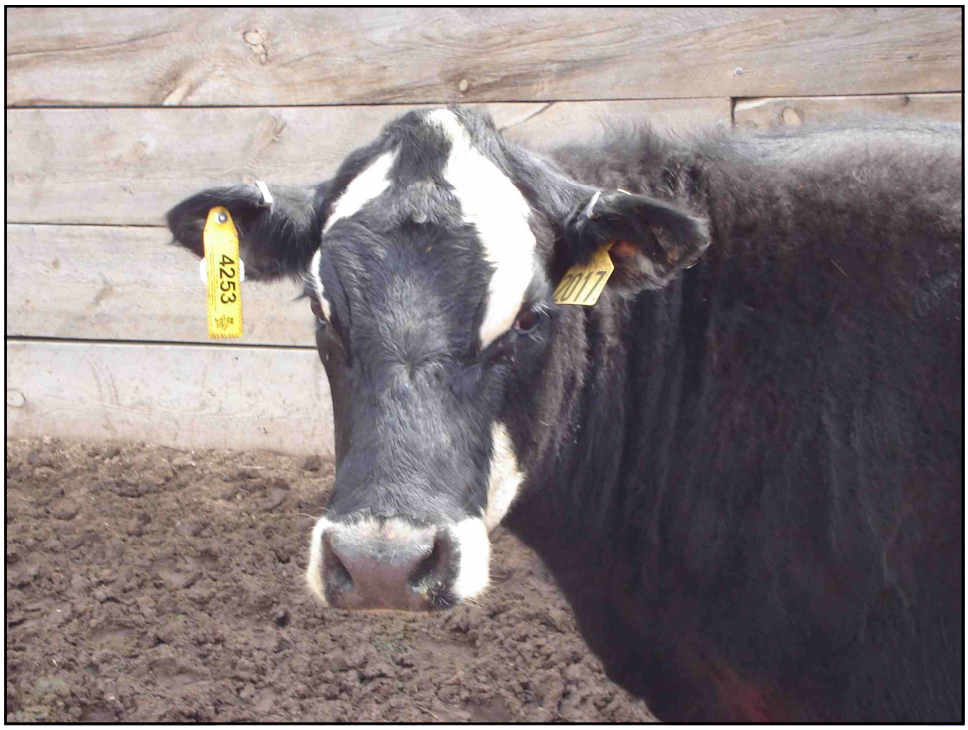
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RFID Types

- 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

900000K7 O+

ISBT128 Barcode

G092 502 123 456 K

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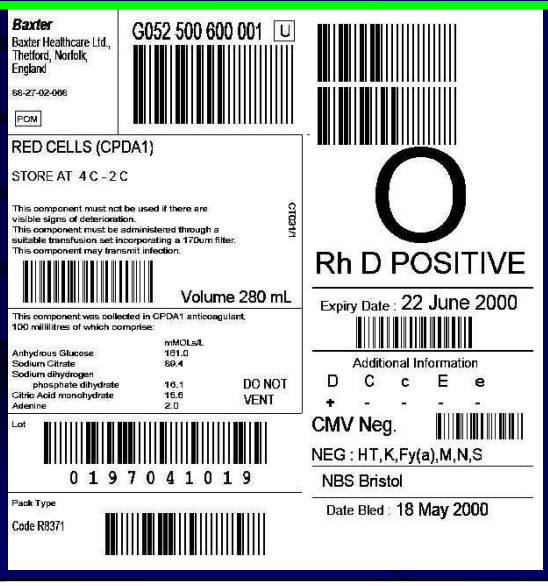
Too much information?



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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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