

RFID Technology

Overview

RFID – What is it?

- Radio Frequency Identification Device
- Holds a small amount of unique data – a serial number or other unique attribute of the item
- The data can be read from a distance – no contact or even line of sight necessary
- Enables individual items – down to the proverbial “can of beans” to be individually tracked from manufacture to consumption!

RFID Tag Attributes

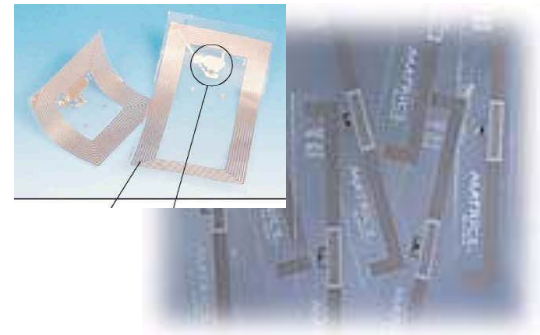
	Active RFID	Passive RFID
Tag Power Source	Internal to tag	Energy transferred using RF from reader
Tag Battery	Yes	No
Availability of power	Continuous	Only in field of reader
Required signal strength to Tag	Very Low	Very High
Range	Up to 100m	Up to 3-5m, usually less
Multi-tag reading	1000's of tags recognized – up to 100mph	Few hundred within 3m of reader
Data Storage	Up to 128Kb or read/write with sophisticated search and access	128 bytes of read/write

Passive RFID Tags

- “Traditional” tags used in retail security applications
 - Tag contains an antenna, and a small chip that stores a small amount of data
 - Tag can be programmed at manufacture or on installation
 - Tag is powered by the high power electromagnetic field generated by the antennas – usually in doorways
 - The field allows the chip/antenna to reflect back an extremely weak signal containing the data
 - Collision Detection – recognition of multiple tags in the read range – is employed to separately read the individual tags
- These passive tags form the basis of the Auto-ID designs, and, if manufactured in billions, will come down in price from \$0.80 to \$0.05 in the next 2 years.

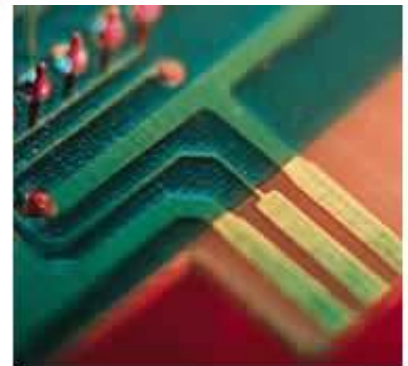


Performa Long Range Reader



Active Tags

- Battery Powered tags
 - Have much greater range – 100m
 - Hold much more information – Kbytes
 - Can integrate sensing technology
 - Temperature, GPS
 - Can signal at defined time
 - Multiple tags can be recorded at once
- Used for higher value items
 - Shipping containers
 - Babies
 - Electronic assets
- Cost between \$20 and \$40 per item
- Life between 2 – 4 years



Auto-ID Organization

- Non-profit organization supported by major software, consulting, tag and reader manufacturers and by MIT, Cambridge University and Adelaide University
- All research and solutions are public domain
- Developed vision of global approach to automatic ID of every product
- Developed standards for tags and readers
- Developed high level designs that will bring tag cost toward 5c and readers to \$100
- Developed – with SUN – Savant software to act as mediation between readers and a global network of “name servers” and databases – available as open source

EPC Network – Building Blocks

Tags	Data carrier – the ID number – Unique EPC Code – is programmed into the Tag
Tag Antenna	Connected to chip in Tag – could be wire or printed using conductive ink
Reader Antenna	Coil included in plastic or similar case – usually 12 – 18 inches square
Reader	Data capture device – interrogates the tag and retrieves the data from all tags in the receiving area. Can be fixed or portable
Savant	Servers/Software to support readers, extract unique information from the read data, and communicate with External databases
ONS	Object Name Service – similar to DNS in the Internet – knows the appropriate database holding full information about the product the tag is attached to

EPC Code

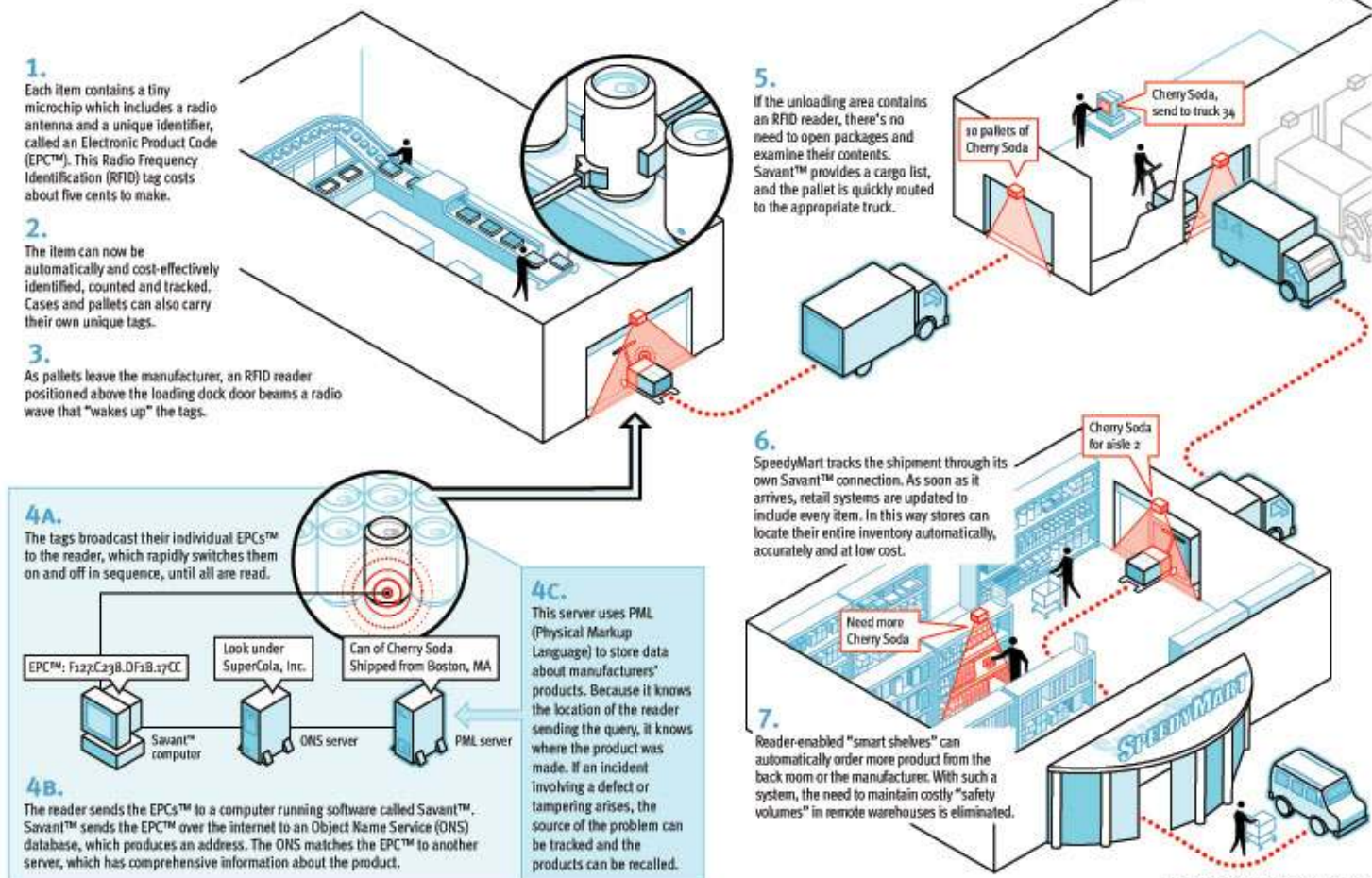
- eg 613.23000.123456.123456789 (96 bits)
- Header – defines data type (8 bits)
- EPC Manager – describes originator of EPC (Product manufacturer) (34 bits)
- Object Class - Could describe the product type (20 Bits)
- Serial Number – Unique ID for that product item (34 Bits)

Supply Chain – Global Vision

HOW THE EPC™ NETWORK WILL AUTOMATE THE SUPPLY CHAIN

XPLANATIONS™ by XPLANE®

With the new EPC™ Network, computers will be able to “see” physical objects, allowing manufacturers to track and trace items automatically throughout the supply chain. This technology will revolutionize the way we manufacture, sell and buy products. Here’s how it works:



Auto-ID Implications

- Harnessing research and major software/hardware companies to align with common standards and open source “middleware”
- End result:
 - Commonality of standards of tags and readers
 - Lowest potential cost for hardware components
 - Application software will become the “missing link” and differentiator