

# RFID Opportunities and challenges

The standard question

Tag prices

Will RFID replace bar code?

ROI from RFID

Conclusion

It does very much seem that the RFID is turning into a chicken egg story. The technology will not catch on before major issues such as standards, tag prices, ownership of intellectual property, ... etc are settled. But at the same time without wide scale use how will the process of settling the above issues be facilitated? Different companies and people have taken different paths towards solving the same problem and now that every one has their solution on hand, the final verdict has to come from the user.

## The standard question

The standard question basically deals with the following:

- Air interface protocol or how the reader interrogates the tag.
- What data should be represented on the tags and how should they be encoded.
- How to communicate a request for detailed information regarding a tag number to and from a local or a remote database

The two competing standards are ISO and EPC. ISO is being developed by International Standard Organization and is supported by many established RFID vendors particularly in Europe. ISO has been working on a set of standards governing the air interface protocol. The AutoID centre was established by MIT in 1999. This center set out to establish standards for an entire RFID solution. Table 1 below shows a brief comparison of the

application areas where each standard is concentrating on.

Standard	Air Interface	Data Encoding	Data Communication
ISO	✓		
EPC	✓	✓	✓

**Table 1:** Comparison between ISO and EPC standards

Just looking at the information presented in Table 1, one would think that a good and workable compromise is to convince EPC to adopt ISO standard for it's air interface protocol and ask ISO to adopt data encoding and data communication protocols being developed by EPC. This way every body walks away not having reinvented the wheel and the technology would benefit from the combined efforts of all parties involved quite efficiently.

This is an important area where major users can make a significant impact. If EPC and ISO standards do not merge or do not become interoperable, then users who operate their supply chain on a global scale can not benefit from implementation of the technology. They will have to ask their suppliers in different continents to maintain and implement multiple RFID protocols and obviously this is not workable.

**Without settling the standard issue, the larger multi-national users would hesitate to invest in the technology. But wait a minute, the standard issue was created because it was felt that with existing ISO standards 5 ¢ tag would not be possible. And now you would appreciate the resemblance of the situation to the chicken egg story.**

Making the two standards interoperable would mean that more work needs to go into design of readers and tags. More data has to be communicated during the read/write cycle and ultimately the performance can suffer and cost

of the design and production can rise. Furthermore one of the original reasons AutoID centre did not choose to adopt ISO standard was that the centre felt that it would reduce cost of the tag.

**In the short term and for the companies that are deploying RFID pilots in order to formulate long term strategies, the following factors are more important than the tag price:**

- **Transparency of the RFID hardware to the existing applications,**
- **Interoperability of RFID and barcode,**
- **RFID appliances that can offer functionality independent of the users ERP application.**

### Tag prices

In November 2001, Sanjay Sarma of the AutoID centre published a white paper titled "Towards the 5 ¢ tag" (1). In the conclusion of this paper it was mentioned that: "*The researchers of the Auto-ID Center believe that the goal of the 5¢ tag is difficult but achievable.*" In a subsequent paper published in February 2003, titled "Manufacturing Cost Simulations for Low Cost RFID systems" (2) Dr. Sarma along with Dr. Swamy conclude that: "*We speculate that it is indeed possible to achieve a 5¢/tag cost number at a sufficiently high volume of tags using even existing technology.*" Drs. Sarma and Swamy mention at the end of their conclusion that "*Volumes, roadmaps and, most importantly, orders will surely unleash a new cycle of much-needed innovation.*" Putting the two sentences at the beginning and the end of the conclusion section of their paper together and one would arrive at the chicken egg story that was referred to at the beginning of this paper. In other words without volume orders 5 ¢ tag will not become a reality. Now without settling the standard issue, the larger multi-national users (who incidentally can be the drivers for the very large orders) would hesitate to invest in the technology. But wait a minute, the standard

issue was created because it was felt that with existing ISO standards 5 ¢ tag would not be possible. And now you would appreciate the resemblance of the situation to the chicken egg story.

Contrary to the popular notion, we do not think that price of the tag is critical in the success of an RFID pilot implementation. In order to plan a pilot, companies need to consider many other costs as well. The costs of deployment such as purchasing and installing RFID readers, integration with back end systems and upgrading software applications. Therefore in the short term and for the companies who are deploying RFID pilots in order to formulate long term strategies, the following factors are more important:

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- Interoperability of RFID and barcode,
- RFID appliances that can offer functionality independent of the users ERP application.

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### Will RFID replace bar code?

RFID technology will not replace bar code for a long period of time.

- The first reason is the current efforts under way to create a new standard for Electronic Product Code that uniquely identifies every product down to the individual item level. Barcode standards are fairly well established and do not provide such detailed level of identification. The major strength of the new Electronic Product Code is that the new numbering scheme could provide visibility into the supply chain and that the availability of information about individual items will eventually enable us to

manage the supply chain in ways that might not be known today. Therefore users who are not in a position to benefit from such detail visibility into their supply chain might opt to implement some sort of a hybrid solution that relies on barcode along with RFID.

- The second reason is the tag price and other deployment costs such as purchasing and installing RFID readers, integration with back end system and upgrading software applications. Companies need to consider all of these issues when considering an RFID deployment. Therefore given the cost and the uncertainty, many of the decision makers will opt for tagging the more expensive “high end” items and use bar codes for tracking other less expensive items which would mean that within the same retail, manufacturing, warehousing or logistics environment these two technologies will have to co-exist for a while.
- An RFID reader does not cost a lot more than a bar code reader. Therefore having both an RFID reader and a bar code reader at the disposal of the user will not impose a huge cost.

**For item level tagging it is fair to assume that RFID tags will be applied in addition to the bar code for a considerable period of time.**

## **ROI from RFID**

### **Meeting supplier requirements**

Wal-Mart and Department of Defense have issued clear mandates for attaching RFID tags to cases and pallets of product by 2005. As an incentive to suppliers who attach RFID tags to their shipments, DOD is offering a fast-track billing process enabled by the quicker processing of deliveries.<sup>(3)</sup>

Health Care Distribution Management Association (a national trade association representing 89 distributors of pharmaceutical and healthcare products who constitute nearly

**RFID will become a cost of doing business with major customers very soon. Although some of these customers are offering some incentives for RFID compliance but none has offered to share the cost of the RFID implementation with the supplier and it has been left up to the suppliers themselves to find and realize the ROI in order to reduce the burden of the cost.**

100% of the pharmaceutical wholesale distribution market) has recommended that pharmaceutical manufacturers and wholesalers should utilize RFID at the case level with a goal for deployment of December 2005. <sup>(4)</sup>

Furthermore HDMA has recommended that pharmaceutical packagers and manufacturers should incorporate EPC tags at the selling unit level with a goal for deployment by 2007. In addition, it is recommended that healthcare distributors develop the appropriate infrastructure for tracking and tracing of products utilizing the EPC. Therefore RFID will become a cost of doing business with major customers very soon. Although some of these customers are offering some incentives for RFID compliance but none has offered to share the cost of the RFID implementation with the supplier and it has been left up to the suppliers themselves to find and realize the ROI in order to reduce the burden of the cost.

### **Regulatory compliance**

Threat of terrorism and spread of diseases such as mad cow through the food supply would facilitate the adoption of RFID technology in shipping containers and food packaging industries. Requirements of regulatory compliance are very labour intensive and RFID can reduce the amount of labour needed to comply with these requirements.

### **Recall Management**

Many manufacturing companies have stringent requirements in place in order to trace, identify and segregate lots of manufactured items that must not find their way into the market. Most these numbering schemes however do stop at

the package level. Although most of these systems are barcode driven, however the lot number does not find its way into the bar code label that is attached to the individual product item in many industries. Therefore managing a recall becomes quite labour intensive. It is obvious that companies can greatly benefit from RFID during recalls and really restrict the recall to exact products that need to be taken off the shelves and cut down the amount of labour that is needed to accomplish this task.

In addition to the above immediate incentives, the following areas are where implementation of RFID can realize many potential benefits.

### **Warehouse management**

- Stocking storage and movement of goods within the warehouse,
- Real time information regarding the location of each stock item,
- Decrease in errors allows suppliers to operate on thinner inventories and facilitate JIT inventory operations.

### **Picking and shipping**

- Reduce error in picking,
- Cut labour costs in verification of picked palette against the Order,
- Decreases the time required to prepare an advanced shipping notice,
- Invoice deductions and charge backs because the customers did not receive all the products that they asked for,
- Wrong products being shipped along with an order generally end up as waste,

### **Receiving**

- Does not need to use people to scan parts into inventory,
- Fewer mismatches between orders and deliveries to investigate,

### **Conclusion**

As you explore possible areas and benefits of application of RFID within your organization, look at the locations where barcodes are being used today. Could you increase efficiency in any of these scan points by eliminating the need to scan bar codes for at least some of the

more expensive high end products. Could you combine passive RFID tags in your distribution centres with existing barcode systems to realize efficiency gains?

You might be producing a range of items. Some of these items might not be RFID friendly because of the ingredients or the packaging. Or you might produce a range of low and high price items, you could start rollout of your RFID applications from your high priced items who are more RFID friendly where it is cost effective to attach a 25¢ tag. This would mean that for a good time period until tag prices drop and technology advances such that your RFID unfriendly items can also be used with the technology, barcode and RFID readers have to co-exist in your environment.

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Many projects fail because people tend to take the grand design approach. Given the nature of existing challenges in RFID field ( most of which are discussed in this white paper ) You will need a mechanism where you can phase in RFID incrementally. However the last thing you want to do is to not do anything until all the issues and challenges facing the industry are settled. You need to start experimenting with RFID today.

#### **Footnotes:**

- 1 – S. E. Sarma, "Towards the 5 ¢ tag", White paper of The AutoID center, <http://www.autoidlabs.org/>
- 2 – S. E. Sarma, G. Swamy "Manufacturing Cost Simulations for Low Cost RFID systems", White paper of The AutoID center, <http://www.autoidlabs.org/>
- 3 – Jonathan Collins, J, "DOD Provides Updates", April 1<sup>st</sup>, 2004 <http://www.rfidjournal.com/article/articleview/856/1/1/>
- 4 – HDMA Position Statement, Recommending use of RFID [http://www.healthcaredistribution.org/position\\_statements/electronic\\_product.asp](http://www.healthcaredistribution.org/position_statements/electronic_product.asp)