Why Has the Development in RFID Technology Made Asset Management More Urgent?

May, 2013

RFID has come into the mainstream

On December 12, 2012, the industrial giant Honeywell announced its acquisition of Intermec, a 46-year-old firm based in Everett, Washington, which manufactures RFID readers, printers, tags and labels, as well as bar-code scanners and mobile computers. To an average business minded reader, this may not be a big deal. But to RFID industry insiders, this was a significant moment. It was yet another signal that RFID technology has come into the mainstream.

In the past decade, RFID technology has evolved significantly, from a niche technology to a widely adopted asset tracking and identification solution replacing (or in some cases complementing) the traditional 1D or 2D barcodes. People have heard more about retailers, such as Walmart and JC Penney, using RFID tags to track the movement of merchandise on the floor and assist in supply chain management, but the application of RFID technology goes far beyond the retailing industry. The use of RFID tags in retail stores has no doubt contributed to the wide visibility and value of RFID technology. But less known is the fact that RFID technology has found many applications in a wide variety of industries. These applications have solved problems that previously had no solutions. As a result, the first adopters in these industries were able to strike a competitive edge, and the laggards were finding themselves playing the catch up game.

Some of the interesting and high value added applications of RFID technology include:

- Hospitals track surgical equipment, hazardous materials, and patients to improve operational efficiency and ensure compliance
- Oil and gas refineries track and monitor remote assets to reduce operational costs
- IT departments track all their laptops, desktops, printers, and servers to increase utilization and manage maintenance
- Food growers and distributors track their shipment to reduce spoilage and maintain traceability
- Pharmaceutical companies monitor for compliance, efficacy and authentication during shipments
- Manufacturing companies track parts in their assembly line to reduce errors

History of RFID (Radio Frequency Identification)

✓ First introduced in World War II to indentify friendly aircraft

✓ Really materialized in 1980s and began to reach the masses in 1990s

✓ In 1993, the E-ZPass highway toll system was launched

✓ In 1996, General Motors introduced OnStar, a satellite-based RFID tracking solution

✓ In 1997, Mobile introduced Speedpass, let people wave a key chain tag at gas stations to pay

✓ In the 21st century, RFID began to proliferate

Courtesy of PCMag.com

Innovations in RFID technology in the past few years

Like most new technologies, RFID technology has been improving steadily as a niche technology since its inception. However, during the past few years, the development and deployment of RFID technology has accelerated. The accumulated innovation has brought expanded selection of products and services, which in turn have been driving new applications and deepening the penetration of existing applications.

The expanded selection of products and services can be grouped into two categories:

- RFID tags. There are more variations in RFID tags, with different performance level, price level, fit for different types of environment
- RFID readers, data communication and analytics. RFID readers are increasingly sophisticated to read data and process data real time. The intelligence in RFID readers has reduced the costs on the integration of the information read from RFID tags with the enterprise back end data

Wider selection of RFID tags with different performances

Until recently, there were two types of RFID tags: Passive and Active. Passive RFID tags do not transmit but backscatter energy from an RFID reader. They are more affordable, but have limited performance and capabilities. They can only be read in short range (~10-30 feet), and typically won't function in RF-unfriendly environments, such as around liquids or metal surfaces. Active RFID tags, which are powered by batteries, beacon or transmit information to a reader. They have better range performance, but they can cost 10 times more than passive RFID tags. Moreover, active RFID tag systems are based on proprietary technologies and they often require custom integration.

In November of 2010, a new category of RFID technology was launched, with the approval of the ISO/IEC 18000-6:2010 Standard. This category of RFID technology is providing new levels of visibility, enabling new applications and opening new markets. This newly standardized category of RFID is also known as Battery Assisted Passive (BAP) RFID or sometimes "Class 3" RFID. In a nutshell, BAP RFID combines the best

What is RFID (Radio Frequency Identification)?

- ✓ A data collection technology that uses electronic tags to store data

- ✓ The tag is made up of an RFID chip attached to an antenna

- ✓ Tags maybe battery powered or derive power from a reader

How are RFID tags different from regular barcodes?

- ✓ RFID tags don't require line of sight in order to be read so the tags can be embedded in a package

- ✓ RFID tags are read faster

- ✓ RFID tags can be read at a wider range of distance

- ✓ RFID tags can store more information including location, history, waypoints and condition data

features of both passive and active RFID. Building on the successful EPC C1G2 passive RFID Standard's relatively simple, low power communications protocol, the new BAP Class 3 Standard enables capabilities previously only available with active RFID; long read ranges in excess of 100 meters, reliable performance in RF challenging environments and support for sensors - all at a compelling price point.

In addition to the Battery Assisted Passive RFID, another area of innovation is introducing RFID tags that can be read on metal surfaces. Traditionally, metallic material has been a challenge for RFID tags. Traditional RFID tags suffer significant performance degradation when near metal, such as detuning and reflecting of RFID signal, which can cause poor tag read range, phantom reads, or no read signal at all. The challenge of designing RFID tags to perform on a metallic surface has been largely solved. This has broadened the application of RFID in asset tracking and industrial applications, specifically asset tracking on servers and laptops in IT data centers, industrial manufacturing quality control and manufacturing, oil and gas pipeline maintenance, and gas cylinders. The technology is evolving to allow tags to be placed directly on metal. The capability allows manufacturers to track small metal items from cradle to grave. The main focus for RFID inside metal is tool tracking, weapon tracking, and medical device quality control.

Passive Tags	Class 3 Battery Assisted Passive Tags	Active Tags
PROS • Reader talks first communications • Low power passive backscatter • Low overhead, simple communications protocol • Low cost **CONS** • Shorter read range • Unreliable in RF challenging environments • Limited, if any, sensor capability	**Combine the best of Passive and Active Tags** • Long read/write range (>100m) • Reliable in RF challenging environments • Ability to add sensors and store data • Reader talks first communications • Low power passive backscatter • Low overhead, simple communications protocol • Significantly lower cost than active tags	**PROS** • Long read range (>100m) • Reliable in RF challenging environments • Ability to add sensors and store data **CONS** • Tag talks first (beacons) communications • Higher power requirements • More complex communications protocol • Relatively high cost • Proprietary technology

RFID readers, data communication and analytics

Intelligent RFID readers are built with more processing power, longer lasting batteries, and more connectivity options. Class 3 RFID readers are optimized to read Class 3 tags to achieve maximum performance and range. Also, they come with the option of communicating the data via Ethernet, WiFi or cellular protocols which makes instant data communication and sharing possible. Data from RFID tags can be captured and communicated instantaneously to the central or cloud-based database enabling businesses to analyze the data and make decisions quickly to improve asset performance and operational efficiency.

What does it mean for enterprise asset management?

With the development in RFID technologies, businesses and government agencies need to challenge their existing assumptions about the tools to track and manage assets. Specifically,

- *Assumption #1: we can't afford to use RFID technologies.*

The cost of RFID asset tracking technologies includes three components: tags, readers, and middleware. The fact is that all of them have come down significantly in cost.

- o Tags: Passive RFID tags today cost less than $0.50 per tag. With large quantities, you can buy RFID tags less than $0.30 per tag. Active RFID tags cost higher, but less than what they were selling for in three years ago. Battery Assisted Passive Tags (BAPs) cost higher than passive tags, but because they are reusable, the cost per use could be less than $1.
- o Readers: While RFID readers are still pretty expensive, ranging from the hundreds to the thousands dollars, depending on the functionalities. There are some new applications on smart phones that read RFID tags. So there are

Application of RFID technologies in Oil and Gas Refineries

Challenges:

- ✓ Tracking assets during transfer from land to rigs, and in the field
- ✓ Tracking the safety of personnel at mustering points
- ✓ Tracking the condition of installed assets to ensure proper maintenance

Solutions:

- ✓ Intrinsically safe RFID tags that stores parts and supplier information with the assets
- ✓ Battery Assisted Passive tags that deliver superior performance in RF-unfriendly environment at a distance of 100 meters or more
- ✓ Asset status can be read, written locally, and shared via The Cloud

For more details on this application, please visit http://www.intelleflex.com/downloads/solution-briefs/Oil-and-Gas.pdf

cheaper options available in deploying RFID readers.

- o Middleware: It used to cost at least $200k to connect the readers to a server, which is connected to the ERP system in the back end. Now, cloud-based middleware is available at a fraction of the cost.

- *Assumption #2: RFID technologies have too many limitations anyway*

RFID technologies have been associated with the perception of not working with metal surface, or limited reading range. The fact is that these are not true anymore.

- o Performance on metal surface: Today, reading of RFID tags on metal surface is very reliable. These tags have already been used in manufacturing settings, to track tools and machinery parts.
- o Limited reading range: Today, RFID tags can be read within 100 meter range reliably, without the need to install readers. This means that RFID tags should work for most warehouses, data centers, and outdoor staging areas.

What should you be looking for when you have decided to use RFID asset tracking technologies?

Running a great business is all about understanding the facts, challenging your existing assumptions based on these facts, and seeking cost effective solutions to address the problems. If you are willing to challenge some of the existing assumptions about RFID technologies, you will no doubt reach a conclusion that it's time to seek a solution to address the inefficiency in managing your assets:

- If you are in the health care industry, think about the costs you can save by increasing the utilization of your existing equipment, and the risks you can avoid by managing the maintenance condition of your equipment more tightly
- If you are in the oil and gas industry, think about the operational efficiency you gain by knowing exactly where your assets are at any time, and the risks you can avoid by safely tracking your personnel in the field
- If you are managing an IT department, think about the cost you can save by knowing how much equipment you have and where it is at all of the time, and the risks you can avoid by properly disposing the data in retired assets and recycling the electronics

When you decide to seek a solution to manage your asset, what are the critical factors you should consider in order for you to compare the available solutions and choose the most appropriate solution?

- Assess the operating environment your assets are located so you can determine what kinds of RFID tags are the most appropriate. There are many RFID tags and readers, with different performances and costs. It's important to do this homework.

- Be holistic when you think about managing assets. Your enterprise assets not only include those expensive equipment and tools deployed in the field, they also include your buildings, facilities, and office furniture. You want to manage them all together, so you can streamline the business processes.
- Think about "managing your assets", instead of "tracking the assets". If you have the mentality of "tracking the assets" you will end up with a less than optimal approach to managing your assets. You want to start with a strategy for improving the operational efficiency in managing your assets, and minimizing the risks associated with managing your assets, then you will put all the pieces in place in an optimal way.

Differences between "Tracking Assets" and "Managing Assets"

Tracking Assets:

- ✓ Address only a subset of enterprise assets
- ✓ Often an isolated business process
- ✓ Goals are limited in its scope and impact

Managing assets:

- ✓ Address the entire enterprise assets, physical and IT assets, fixed and consumables, facilities and equipment
- ✓ A key cross functional business process
- ✓ Goals directly impact the business's financial performance

About E-ISG Asset Intelligence (www.e-isg.com) – E-ISG Asset Intelligence provides software solutions "eQuip!" to manage enterprise assets, including on-premise software and SaaS applications. These solutions help customers to streamline their business processes and mange the assets throughout their lifecycle, including acquisition, assignment, maintenance, and disposal