RFID Technology

Trends and Applications

S. Swarn ◆ G.S. Rao

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PREFACE

RFID (Radio Frequency Identification) is an automatic identification and data capture (AIDC) technology, which records products, place, time, or transaction data without human intervention or error. The main component of the RFID is the RFID tag. These tags emit radio frequencies, which are detected by a sensor to give information about the product.

RFID, coupled with EPC is new technology that promises to revolutionise the capability to track goods or assets as they move through the supply chain. The RFID applications span almost every sphere of socio-economics life. The technology is widely used for tracking of animals, vehicles, goods, military equipment, automobile immobilisation, security, access control, library systems, retail, hospitals, healthcare, pharmaceutical and several other applications. These applications operate predominantly in the low frequency and / or 13.56 MHz bands and represent majority of current day revenues.

There are different estimates about the market potential of RFID applications by various market research organisations. All of these estimates, however, are upbeat about the booming RFID market potential.

According to ID TechEx, this year's global market for RFID including tags, systems and services is estimated at $1.94 billion but it will be driven by demand and new laws to $ 26.90 billion in 2015. ID TechEx indicates that 1.8 billion RFID tags have been sold in 2005. Key volume applications for RFID technology have been in markets such as access cards for the financial, security and safety markets, or for the automotive and passenger transport sector, with smaller markets in leisure, libraries, laundry and healthcare. The market for RFID interrogators will reach $1.14 billion in 2008 for EPC interrogators, and $0.75 billion in the same year for other interrogators, such as Near Field Communication interrogators.

Datamonitor (DTML) predicts that RFID technology including hardware, software and services across all verticals, will reach $ 6.1bn market by 2010. Another estimate by Venture Development Corporation says the global market for RFID systems reached $ 1.7 billion in 2004, in comparison to $ 1.4 billion of 2003, and grew at a compounded annual growth rate of 23.5%. The global market for RFID systems revenues is expected to grow at 36% annually through 2008 to reach a staggering $ 5.9 billion.

Market trends indicate that many applications are in early phases of adoption.

New application areas are evolving such as medical device tracking, real time location systems, asset tracking and sensing and monitoring. Niche markets that would evolve include: The tagging all patients, staff and assets in healthcare facilities worldwide for error prevention and other reasons; antiterrorism measures in global logistics; meat and livestock tagging in the face of new legislation against disease; and tagging of high value banknotes and drugs for anti-counterfeiting.

More rapid market expansion has been limited by the lack of harmonised global EPC/ISO standards for UHF RFID in the supply chain; slower growth expected within highly mature traditional RFID applications such as railway wagon tagging and toll collection; limited vendor experience and weak indirect channel support for supply chain management applications; poor UHF technology performance in supply chain environments especially harsh environmental conditions and low read accuracy rates; and the existence of a confusing value chain with vendors competing in a highly fragmented market.

Several technical challenges facing the industry include problems faced in the physics and science of tag placement; transponder read accuracies and patent infringements. Manufacturers and integrators need to work more together. Software challenges need to be addressed urgently especially relating to firmware, middleware, interfaces and protocols.

Another major area is the use of smart active label technologies in a number of industries, which target new and improved solutions targeted at the specific needs described by end users. Hailed as the next generation of RFID systems, Smart Active Label (SAL) systems include thin and flexible labels that contain an integrated circuit and a power source, enabling superior performance and enhanced functionality over existing passive labels and reduced costs over existing active tags. The first smart active label systems are already on the market. SAL systems provide a means of locating, tracking, and tracing assets or people across a number of industries. The number of emerging technologies includes RFID, sensors, displays, thin power sources, ICs, conductive inks, MEMS, and other printable microelectronic materials that are contributing to the development of smart active labels.

RFID market is in its last stages of testing. Retailers such as Wal-Mart, Tesco and Metro have announced RFID supply chain mandates. American Defence Department has launched RFID initiative. Pharmaceutical industry supply chains have been asked to adopt automatic identification processes.

Opening up of Radio Frequency in UHF 865-867 MHz band by a recent (March 2005) Notification by the Wireless Planning and Coordination Wing of the Ministry of Communication and Information Technology, Government of India, will surely facilitate speedy deployment of RFID across Industry sectors in India with major benefits to businesses, consumers and Government.

The Notification takes cognisance of International developments wherein radio frequency is being allocated within 860-960 MHz for operating mission critical Supply Chain applications across Industry segments covering Defence, Pharmaceuticals, Retail, Aerospace, FMCG, Automotive .... virtually everything.

The Indian Industry has evinced keen interest in adoption and deployment of RFID technology across Industry sectors from Retail, Defence, Pharmaceuticals, Automotive, Transport and Logistics to Industrial manufacturing, oil and gas etc.

Several leading Research Institutes in India have evinced keen interest in setting up Accredited Auto-ID labs in the country. Most IT majors in India have already positioned themselves to capitalise on emerging global opportunities and some of them have spread their wings overseas to take advantage of the burgeoning RFID market. In order for these to fructify in large volumes, it is felt that organisations such as EPC Global, Smart Active Label Consortium (SAL) and Association for Automatic Identification and Mobility (AIM) need to be more proactive in promoting RFID.

The Conference on "RFID Technology Trends and Applications" will focus on current trends in technology and the emerging global and Indian market trends in RFID, smart label technologies and products and applications in various sectors. There is a substantial emphasis on innovations in R&D, standards, regulations and security apart from a range of applications in a whole host of sectors such as Retail, Supply Chain, Logistics, Library Management and Pharmaceuticals.

This volume is a compendium of the papers presented in the Conference. We sincerely hope you will enjoy reviewing them.

Mumbai
September 10, 2005

S. Swarn
G.S. Rao

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Rajeev Shorey*

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Radio Frequency Identification Tags (RFID) Technology and Applications

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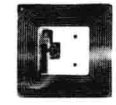
Agenda



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RFID News

- **Texas School District Tracks Kids with RFID**

  The Spring Independent School District in Spring, Texas, located just north of Houston, is using RFID badges to monitor the movements of 28,000 school children

  Good luck ditching class now !

  According to the New York Times

  > When the district unanimously approved the $180,000 system, neither teachers nor parents objected, said the president of the board. Rather, parents appear to be applauding. "I'm sure we're being overprotective, but you hear about all this violence," said Elisa Temple-Harvey, 34, the parent of a fourth grader

RFID News

- **Real-Time Locating System Keeps Kids Safe with RFID**

  RF Code and Texas Instruments have teamed to offer Wannado City, a role-playing theme park in Florida, a real-time human tracking system by employing RFID tags and readers

What is RFID ?

- An electronic tagging technology
- Allows an object, place, person to be automatically identified at a distance without a direct line-of-sight
- Uses an electromagnetic challenge/response exchange

Why is RFID making a splash now?

- **Technology is at least 40 years old !**
- Components **used to build tags and tag readers have become** more sophisticated
- Emerging standards

  EPCglobal
- Cost

  Benefits and cost savings brought about by the technology need to be greater than the deployment cost