

# RADIO FREQUENCY IDENTIFICATION AND INTEGRATION

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## Abstract

The society of today is on the border of a wide-ranged implementation of RFID technology in consumer products. Until today not many individuals are familiar with the new technology and the pro's and con's this will bring. The business market sees many opportunities with the new technology such as decreasing storage and handling costs and the possibility to monitor the shopping behavior of the customers. The question we asked was if the consumer identified the same opportunities that the business market did and if they thought this would compromise their personal integrity and privacy in any way. Thoughts about existing technology such as cellular phones and creditcards was positive and that this technology didn't affect their privacy in any greater extent.

**Keywords: Radio Frequency, RFID technology, Integration, credit cards**

## Introduction

The fact that today's society is heavily influenced by new technology probably has hardly avoided the reader. This means that technology is increasingly integrated into everyday life. There is hardly one man today who leaves home without his mobile phone. The many do not think about is that Their mobile phone can identify and position them regardless of where they are located Forsberg &Leuchovius, (2001). According to Allwood, (1998), it is possible to follow all purchases and transactions made with a credit card. At present, it does not seem like the individual is aware or at least not knowing this kind of tracking as a restriction in it personal integrity. According to Wallström, (2004), the so-called smart chip market is also called RFID technology is expected to get a big impact in the next few years. Radio frequency identification, RFID or Smart chip are the names used in most contexts. It is one Common name for technologies that use radio waves to identify individual objects. An RFID receiver can be as small as a risk tower which causes it can be used in applications such as clothes or household items for storing information. According to Christopher Boone, analyst at IDC (Information Development Center) which is an international analysis company, will be a breakthrough year for RFID in 2004 Worldwide. This is partly because American Walmart will implement one major investment in the area, which leads to several parties being affected, for example, by all suppliers in Walmarts supplier chain.

## Problem discussion

RFID is by no means a new technology but it is application in areas where individuals and consumers come in direct contact with it. It is this type of application that we will focus on and then relate the disadvantages that may arise, to the individual, to the personal integrity. Much of the literature we read on the topic deals with how the new RFID technology works all possibilities and benefits it brings (AimGlobal.org, 2004; Das, 2004;RFID journal.com, 2004).

The authors Jobs, (2001) and Rogers, (2003) deal in their literature, among other things, how capable of different individuals are to adopt new technologies and how they are handle this. According to Booth-Thomas, (2003), the use of smart chips in everyday life is more than just the introduction of a new technology. RFID opens up many new opportunities with both benefits and disadvantages. Companies signify with all the advantages that arise, for example, in logistics gains in the value chain, positioning of goods and more efficient management of sales on business.

In any case, these new opportunities also mean things that can be perceived as negative by consumers. Examples of these drawbacks we see are the amount of tailor made direct mail from other businesses equipped with RFID technology when the customer left the deal because the sender in the product may still be active as well as the storage of personal data as the new technology allows. According to Ström, (2003), the individual does not think about it Mainly on the disadvantages and limitations that new technologies make on the personal integrity. Power then makes the equation between integrity and oxygen, that is, oxygen is vital but we breathe it without thinking about its meaning, integrity is not either something you do not even notice until it's already violated and that's usually the case then to do something about it.

### **Positioning**

Positioning can be said to be a term with the meaning of geographically determining one device is located. In this section we will only assume positioning regarding mobile phones and credit cards as well as RFID transmitters and will therefore only focus on positioning within these contexts.

### **Positioning using mobile phone**

According to Forsberg et al., (2001) there are currently a number of positions for positioning through GSM (mobile telephony). Positioning can be performed on all mobile phones that use GSM network. GSM stands for Global System for Mobile Communications and is a circuit-switched wireless digital communications network. In 1991, GSM was introduced in Europe but passed quickly becoming a standard used throughout the world. GSM technology has traditionally been used for voice communication but can also be used with complementary modem technology for data transfer. GSM is made up of a number of base stations that are used to communicate digitally between mobile phones nearby. Each base station also has a certain coverage area called cell. The cell can vary in size form between different base stations.

### **Positioning with credit cards**

A typical credit card consists of a thin plastic card containing identification information such as an image, signature or personal code (pin code). This is stored either on the card or as information in the magnetic strip as the card has. The card allows the owner to trade with it and to read the information from a card in many cases, a special card reader is required. The advantage of credit cards is that the need to have Cash at hand decreases. One of the most used credit cards in Sweden is Visa card and it can be used to pay directly at the store and that the card holder can take out cash from an ATM. A Visa Card also works in many countries other than Sweden. In case of online payment with the card, the card is drawn by a card reader to register number. Then you enter your personal code and the money is deducted directly from the account. In many Stores are possible to withdraw cash in conjunction with a purchase and this is

done by raising buy the amount. When a transaction is completed, it stores information about which card which is used, which store is and how much the purchase price is. (howstuffworks.com, 2004, forenings sparbanken.se, 2004) Positioning by credit card becomes possible because it is recorded in which store you are trading a certain date and time. This leads to individuals can be linked to different locations.

According to Strom, (2003) there are four different kinds of integrity these are information integrity, integrity, communication integrity and territorial integrity. It is possible to connect Internet to the territorial integrity described by Strom, (2003). Territorial meaning that there is a variety of integrity within different reefs such as housing and work. According to Siepel, (1997) personal privacy is very difficult to define and this is based inter alia on integrity being a subjective opinion of a person what feels uncomfortable. However, in our interviews we have identified a pattern of what perceived as infringing on personal privacy. By this we mean that although each people's perception is different, there is nevertheless a common and similar theme for what it is Personal integrity means for an individual.

### **Integration and standardization**

RFID implementations require new standards to be agreed upon for identifying objects and linking them to other related information. The Auto-ID center, initially a project based at MIT, has proposed a universal standard for product "license plates" – the Electronic Product Code (EPC). Like a barcode, the EPC is divided into numbers that identify the manufacturer, product, version and serial number. Unlike the barcode, EPC uses an extra set of digits to identify unique items. The EPC is the only information stored on the RFID tag's microchip. This keeps the cost of the tag down and provides flexibility, since an infinite amount of dynamic data can be associated with the serial number in a database. To help computer systems find and understand information about a product, the Auto-ID Center has developed associated standards and technologies. The first key element is called the Object Name Service (ONS). ONS points a computer to an address on the Internet where information about a product is stored. The concept is based on the Domain Name Service, which points computers to the address of particular Web sites on the World Wide Web.

### **Data storage and management**

Use of RFID technology will require the high-speed handling of very large data streams from readers. The processing, storage and management of these streams and aggregated large data sets will pose a new challenge for hardware and software vendors. Much of the data stream will be repetitive information and can be ignored, but processing algorithms must still be developed to perform filtering operations, and these may be specific to applications or industries. Different industries may also have regulatory requirements that drive specific data processing and retention requirements that vary from other industries.

### **Think about Impact on Consumer Value**

RFID applications in many industries are being driven by consumer needs. In the automotive industry, where RFID applications are gaining traction, the deployment of RFID solutions promises clear new functional capabilities. Michelin is starting to use tags in its tires and there's great interest in next-generation consumer products, such as

passive keyless entry systems, theft-deterrent immobilizers, and parts-marking initiatives. As in the infancy of any technology cycle, it's difficult to ascertain whether car makers are over-specifying demand and technical product content prior to the need or development of the real customer demand.

### **Vertical Applications are the key but a current weakness**

An RFID solution consists of multiple components such as chips, tags, readers, antennas, software, and vertical market applications. Industry experts suggest that vertical market applications have been a weakness so far. Thus, greater effort needs to be expended in developing and deploying relevant business applications on top of the technology stack. One positive movement in this direction is the attention that has been given to the pharmaceutical industry's efforts with consumer packaged goods.

### **Galvanize industry collaboration**

The lack of industry standards can be a significant roadblock to the use of RFID technologies. Some industries have taken a collaborative approach to this issue. The major pharmaceutical players, such as the world's largest pharmaceutical manufacturers, wholesale distributors, and chain drugstores, are working together as a group to explore key uses for EPC applications. This pharmaceutical industry group has also created three working teams to build a whole-industry perspective on issues relating to counterfeiting, shrinkage, and theft. EPC Global and their associated working groups (hardware, software and industry verticals) are collaborating and working through real life scenarios on what is needed and laying the groundwork for realistic standards. An example of such collaboration is the working group tasked with hammering out the specifics needed for EPC Information Services (IS). VeriSign also offers a prototypical EPC IS to allow for R&D efforts and increasing familiarity with the EPC Network.

Each new compliance driver, such as Wal-Mart/DOD and/or FDA drug tracking pedigree needs, will both drive additional innovation and give practical industry insight that will be beneficial for all parties.

### **Summary**

Analysts and end users agree that the required functions, such as EPC commissioning and central data routing, reader management, data routing, high volume data management, advanced integration, and filtering, will get easier. Readers and related devices will get smarter, smaller, and more easily incorporate RFID or tag data into edge and enterprise systems (ERP, SCM and WMS.)

Enterprises will look for more flexible business processes and evolve beyond the initial static applications that allowed for RFID entry/integration/implementation. Natural evolutionary steps will be tools like trading partner management, process automation, and data management, which are critical components for developing and managing more dynamic composite business applications.

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