

Ethical Problems of Implementing widespread RFID devices in consumer products

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Summary

Since the introduction of the ubiquitous barcode in the 1980's many companies have enjoyed the increased efficiency which barcodes permit in quickly identifying and tracking many kinds of items. It is no surprise then that stores such as Wal-Mart are investing in an extension of this technology based on radio transmission which can be remotely read without requiring an optical line of sight. The advantages in stock keeping are clear since such technology could virtually eliminate theft, shrinkage and vastly increase the efficiency of recordkeeping and the customer checkout process. However there are ethical questions regarding the appropriate use of such devices in consumer goods. Principally, such devices, embedded in clothing for example, could be used post sale to track the activities of consumers during future trips to the store.

Introduction

Background

A Radio Frequency Identification (RFID) tag is built around a small microchip and an attached antenna. The purpose of the device is generally to serve as a way to identify an object to which the RFID tag is attached. The principle of operation is that the tag listens for an interrogation signal sent via radio waves from a remote scanner, and responds also by radio waves with the appropriate data contained in its memory. The genius of such a device is that it is normally powered entirely by energy from the signal broadcast by the scanner. Thus an RFID tag may operate reliably for a long time without the use of an internal battery.

Currently automated identification is achieved in most settings through the use of optical barcodes. The optical barcode has two significant limitations which the RFID tag addresses.

Firstly for an object to be read by a barcode scanner there must be an optical line of sight between the scanner and barcode. In practice this means either the object in question or the scanner must be positioned to allow this. The familiar sight of a sales clerk sliding purchases across a glass plate at a store is an example of this. The RFID tag overcomes this through the use of radio waves which can safely penetrate many objects. Thus an RFID scanner could read the contents of an entire shopping cart merely by passing it within range of the cart.

The second shortcoming of the barcode is a limitation on the amount of information which can be stored in any one barcode. Most barcodes are 10 – 15 digits long. In practice this means that the barcode is most often used to categorize objects rather than uniquely identify them. For example, in a clothing store every shirt of a certain design and size will have an identical barcode. RFID technology does not have this limitation. The limiting factor in the amount of information which an RFID tag can carry is a function of its size. An RFID tag the size of a grain of rice could carry at least 96 digits, enough that every shirt sold could have its own unique serial number. To put 96 digits in perspective, one might consider that merely 11 digits would be enough to give 100 billion people a unique number. 96 digits is enough space then to permit 1000 billion people to each purchase 1000 billion items, each item with a unique serial number.

Thus every single item from postage stamps to ball point pens to light bulbs could have its own unique number.

Objectives

The objective of this study was to consider the ethical implications for organizations which choose to use RFID tags to identify objects and persons and to arrive at recommendations for ensuring that RFID tags are used ethically.

Literature Review

Related Literature

1. Cavoukian, Ann Tag, You're It: Privacy Implications of Radio Frequency Identification (RFID) Technology. Toronto: Information and Privacy Commission Ontario, 2004.

This is a lengthy booklet designed to be guide to privacy and RFID. It is written by the privacy commission of Ontario, Canada. The main conclusion is that consumers should have absolute assurance that RFID devices are deactivated before they take possession of them.

2. Kelly, Eileen P. and G. Scott Erickson. "RFID tags: commercial applications v. privacy rights." Industrial Management & Data Systems 105.6 (2005): 703-713 ABI/INFORM Global. ProQuest. Pittsburg State University Libraries 22 June 2006.

This article focuses on the law and RFID privacy issues. The authors compare various laws and programs between the United States and Europe. The authors raise the question, is tracking someone by technology a form of stalking. This article is also concerned about criminal uses of RFID technology.

3. Garkinkle, Simson L., Ari Juels and Ravi Pappu. "RFID Privacy: An Overview of Problems and Proposed Solutions." IEEE Security and Privacy May 2005.

The authors from MIT overview shortcomings of RFID technology in a popular way as well as list several novel uses currently explored for RFID technology.

Major schools of thought

The majority of authors on the subject understand there to be an essential need to protect consumer privacy. Most expect this to be accomplished in one of two ways, voluntary pro-consumer behavior on the part of businesses or government regulation. Those in favor of government regulation expect that businesses will find the uses of RFID devices in items previously sold to consumers to be too much value to ignore. Others believe that government regulation will extinguish the RFID market before it becomes profitable for either retail business or RFID technology manufactures.

There also a significant number of private but vocal citizens who believe neither option will effectively mitigate the threat of lost privacy. The recommendation of this group is a ban of their use in consumer products.

Corporate uses of RFID technology in consumer products

The retail giant Walmart is requiring all of its suppliers to use RFID tags on shipment of goods no later than the end of 2006 (Kelly, 2005). The reason for this push is the advantages using RFID tags would provide. The current major limitation to extremely widespread use is the per-unit cost of the tags. Currently it doesn't make economic sense to put a 25 cent tag on a \$10 item.

Stock keeping controls

The advantages which an RFID system allows will cover nearly the entire production and marketing of a product. Most importantly these include increased efficiency Stock keeping and checkout procedures. A shopping cart of goods could instantly and accurately be totaled, virtually eliminating lines at checkouts. Inventory could be checked automatically by walking a scanner down the isles of a store. Using RFID tags a store could instantly know if unpaid merchandise is walking out the door. In strange twist on crime fighting, it is likely that stores will cooperate in developing a joint database of stolen goods. Should an expensive pair of shoes stolen from JC Penny's ever appear in a public mall, security may automatically be contacted.

To be effective as stock keeping controls RFID tags must at least meet two criteria: They must be ubiquitous and they must be hidden. In order to use RFID tags in the checkout procedure, every item in the store must be tagged, even the \$1 bottle of Coke. This is a departure from previous uses of security tags which were only affixed to high dollar items. Fortunately technology exists to include RFID tags in printed or adhesive labels. Secondly, the RFID tag must necessarily be hidden from the consumer. If the location of an RFID chip in an expensive jacket were publicly known a tech-savvy shoplifter could easily swap that RFID tag with one from a much cheaper article and take it out of the store. This need for secrecy or randomness in the location of tags in consumer articles directly conflicts with one possible solution to the privacy concern, that consumers be notified at the time of purchase of the existence and location of any RFID tags.

Garbage scanning

Bell South has applied for a patent concerning scanning household refuse for RFID tags (Bray, 2005). Advantages of scanning for objects which must not be disposed of in landfills – LCD screens and other toxic computer parts most re-chargeable batteries. Of course products illegally disposed of can be matched through a database to the original purchaser.

Tracking persons in public places

IBM has applied for a patent regarding the use of RFID tags included in consumer products to track the movements of a large number of people as they move though a

public place such as a mall or store or train station (Bray, 2005). This would allow for optimization of advertising designs and flow patterns. Consumers might receive text messages on their cell phones offering deals at store they happen to be in front of at that moment.

Tracking Objects for after sales services

Following the Firestone scandal involving the rollover of Ford SUV when defective tires blew out, the government mandated that every tire sold be traceable so that in the event of a recall affect tires could be easily identified. RFID is the natural solution to this tracking nightmare for the tire companies. Shortly every new tire sold will have an RFID tag embedded in for easy remote identification (Garfinkel, 2005). Any other product potentially the subject of a costly recall will likely be early candidates for extensive RFID tracking in order to minimize any future costs associated with a recall program. While this may be a boon to a consumer unknowingly driving on unsafe tires, there are several privacy concerns. Pneumatic or magnetic traffic counters could be replaced with RFID technology which would not only track the traffic density in a particular location, but which particular vehicles are passing a point on the road.

Government uses of RFID technology in consumer products

While the government of any country or state will ultimately only deploy a small fraction of the RFID devices to pass into consumer use, the methods and choices of governments will speak volumes concerning how these bodies intend to address the ethical issues involved.

Government Issued Identification, Passports

The US government has been reportedly working to develop standards for the use of RFID tags in passports (Zetter, 2005). An RFID tag in such a passport would include all printed information in a passport plus a photograph and biometric data such as a fingerprint. The intention is to bring the same kinds of efficiency to airport security as to the supermarket. The major problem is a question of whether the RFID tags will be encrypted or unencrypted. Encryption increases costs, reduces value to third parties such as airlines and will slow implementation. However there a significant privacy concern with unencrypted passports since in theory anyone inside a 30 foot range could read them. The currently proposed solution is to lock every RFID tag in a passport with a key which can only be read from a barcode printed inside the passport.

Currency.

Using RFID tags in currency may allow for rapid authentication and counting of currency as well as speed common cash handling techniques. The European bank is reportedly examining the possibility of using RFID tags in currency (Garfinkle, 2005). Hitachi leaked that it is under contract to European bank to provide RFID tags suitable for use in paper bills. This has caught the attention of conspiracy theorists as has no other issue in the debate over expansive use of RFID technology. The concerns over the use of RFID in currency typically include privacy concerns and the question of the value of a bill if its RFID chip is destroyed. Security minded persons are concerned about the

potential of a burglar to count the bills a potential victim is carrying before deciding to attempt a mugging.

Real Time tracking of government charges

In January 2005, InCom sponsored a pilot project in Sutter California where students were assigned RFID badges and expensive network of scanners recorded the location of students as they passed through doorways, interior and exterior or pass checkpoints in hallways (Lawrence, 2006). The program was cancelled due to parental complaints and pressure from the ACLU. California is moving to ban such uses of RFID technology. Tracking persons, such as minors, inmates, even the homeless is a common suggested non-commercial use of RFID tags.

Ethical problems

The major ethical concern for consumers and citizens is the right to privacy. US laws are fairly lax in regulating personal information collected by businesses. In contrast EU member countries are required to have legislation that regulates the collection of personal information such that data may only be collected if an individual has expressly opted in, the information is needful for executing a contract, or the information must be collected by law or for assisting law enforcement (Kelly, 2005).

The privacy concerns of US consumers fall into two distinct categories, information privacy and physical privacy. The concern of information privacy is the tracking the purchasing habits and other information regarding a particular consumer. This information may be used for targeted advertising or possibly used in evaluating a consumer for various programs such as credit worthiness. The use of a business to track the purchasing habits of a consumer is not entirely dependent upon RFID technology. This can essentially be done today through tracking credit card numbers used for purchases. The use of RFID tags active in consumer goods can however greatly enhance the abilities of business to collect this sort of information.

The presence of active RFID tags in consumer products after the sale created physical privacy concerns for consumers. Physical privacy concerns the personal security of a consumer as well as the ability to anonymously to move around public places. Potentially post sale RFID tags could be used to the movements of consumers wearing or carrying objects with RFID tags. Since RFID tags by nature are fairly open technology anyone with a scanner could perform such tracking. As mentioned before, burglars could potentially case mugging victims or even remotely search the houses of potential victims, looking for valuable items such as expensive electronics. Part of the danger of RFID tags in consumer goods is that consumers may be carrying these tracking devices without their knowledge and without the capability of deactivating or removing them.

Proposed Solutions to the Privacy Problem

Voluntary conduct on the part of businesses

The best way to ensure that the RFID technology does not interfere with the privacy concerns of consumers is for stores to automatically deactivate RFID tags at point of purchase. RFID tags can be killed in a number of ways; one of the more effective methods is use a dose of microwave energy. More suitable however are tags designed with a kill switch built in so that upon receiving an instruction they deactivate themselves permanently. Advocates of this approach believe that consumer choices will encourage stores to not engage in underhanded practices such as covertly tracking customers or using RFID technology as a basis for directing advertising.

Industry guidelines

The RFID industry has typically advocated self regulation for businesses using RFID tags. The common recommendation is that consumers at least be informed of the existence and location of RFID tag in any product sold. Optimally under these guidelines consumers would have the option of having the devices deactivated at the time of purchase. The online journal dedicated to RFID, rfidjournal.org lists the three main tenants of the Industry position on RFID and privacy. Firstly, RFID is essentially a neutral technology that is neither good nor bad but will have both kinds of uses. Secondly, RFID technology should be deployed with consumer privacy in mind and engineered in this light, not as an afterthought. Thirdly businesses must be candid with consumers about the how RFID technology is used in the products which consumers purchase. This would involve at least telling the consumer the location of any RFID tags in purchases.

Government Regulation

Consumer advocates prefer that the government regulate the use of RFID tags in consumer goods. Optimally a law would require that RFID tags be permanently disabled at the time of purchase. Not surprisingly the RFID industry vigorously opposes this. It is claimed that any kind of government regulation would effectively stunt the nascent industry. The public policy in most states today permits business to collect unlimited information on consumers (Kelly, 2005). With this in mind, and considering the interests the state would have in the usefulness of RFID tags in public activities such as law enforcement, it is unlikely that the government will be quick to set controls on how these devices are used.

Conclusion

RFID technology is still in an early stage of development. It is being widely used mainly in back office applications such as identifying pallets of goods shipped to a retail chain, or identifying high dollar items such as vehicles. The only factor limiting its use in cheaper goods is the current cost per tag. As costs go down, consumers may expect to see these tags appearing in the goods they purchase. Consumers should act now to demand that the rollout of RFID tags will be done a way that respects their rights to privacy.

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