RECENT ENHANCEMENTS IN RFID TECHNOLOGY FOR RETAIL INDUSTRY

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Abstract

RFID (Radio Frequency Identification Device) is a worldwide accepted and acknowledged technology for its various benefits and it has especially created a triumph in the retail industry enabling retailers to achieve targets with increased business performance with cost efficiencies in place. This paper aims to provide with RIFD overview and its global applications and benefits to its retailers and consumers as it is one of the swiftest and researched budding technologies with newest advancements.

Keywords: RFID, Retail, Consumers, Technology, Industry.

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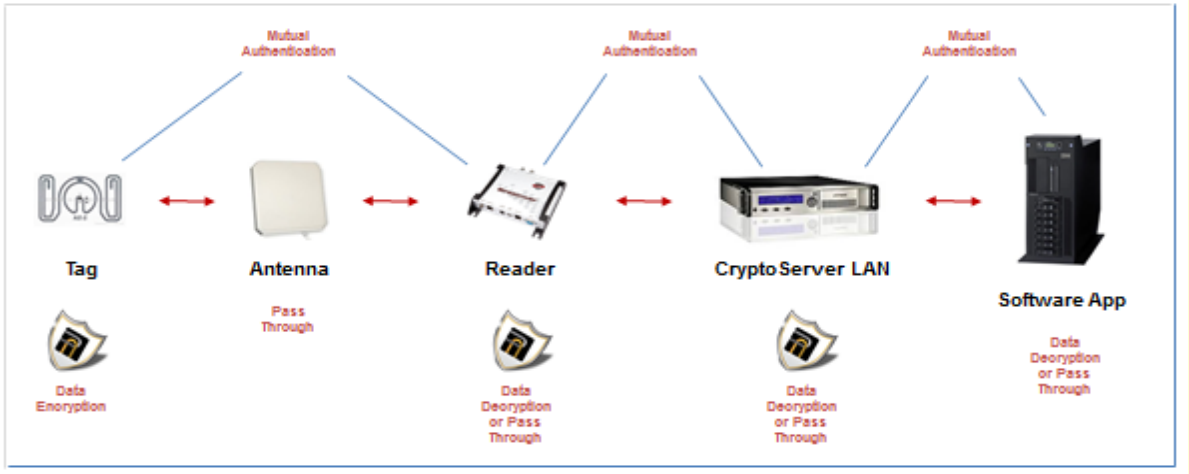
Introduction to RFID

RFID stands for Radio Frequency Identification and the system uses wireless radio communication technology to identify tagged objects or people via Radio frequency. Its three basic components are:

- **Tag:** Also called a transponder and composed of a semiconductor chip and an antenna.
- **Reader:** Known as an interrogator, and is composed of an antenna, RF electronic module, and a control electronic module.
- **Controller:** Also known as a host, which most often takes in form of a PC running database and control.

Figure 1: Depicts the Working of an RFID



Source: Communications between Reader and Tag (Source: Reverse Security, 2009)

RFID reader can identify a large number of objects around the same time whereas Barcodes can only be identified one by one. A bar code must be placed visible just in front of the reader to be read while an RFID Tagging or Tag can be read from long distances, with higher speed and precision (Banks, 2007).

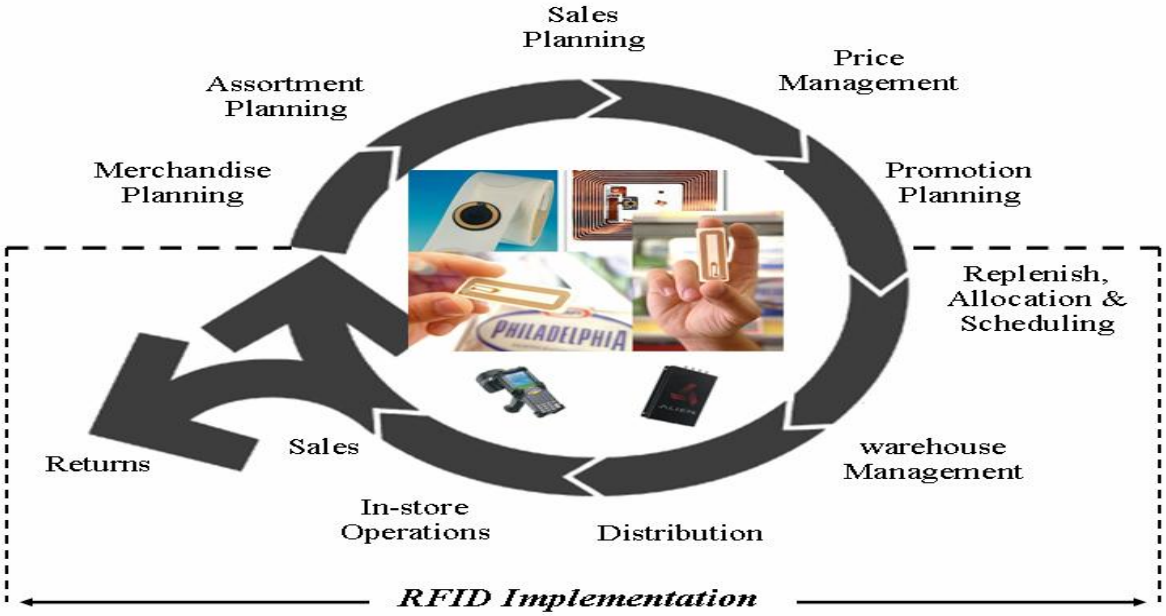
Figure 2: Depicts the different types of RFID Tags

Source: Nearfield, 2012

Retail Supply Chain

Retailers work as a link between the consumers and manufacturers of products and services through stores, internet, direct sales or advertisement sale. "Retailing is the set of business activities that adds value to the products and services sold to consumers for their personal or family use." (Levy, 2001). Due to rapid advancement in technology, business connectivity and global outsourcing had become mandatory for retailers to manage their supply chains to stay competitive.

Figure 3: Depicts the elements of Retail Supply chain



Source: Vargas, 2007

A typical integrated retail supply chain has the following elements as listed in the table below:

Merchandise Planning	It is an approach aimed at maximizing ROI through proper planning of sales and inventory. This approach is all about maintaining a balance between sales and inventory in order to increase profitability.
Assortment Planning	Retailer's planning for selection of merchandise (what and how much)
Sales Planning	Planning contain assessment of sales for a product in the market to reach the customers target.
Price Management	Process of improving, managing and improving processes of prices using forecast statistics and has direct impact on profits.
Promotion Planning	It is the process of managing promotions that drives demand and profit and depends on forecast data.
Replenish, allocation and scheduling	Process required to avoid Stock-outs of products and has potential to reduce inventory and influence improved customer services.
Warehouse management	It is the process used to improve products distribution across different facilities and has potential to reduce inventory.
Distribution	Process of distributing accurate products to the corresponding destinations.
In-store operation	It is the process of managing operations including goods receiving, shelf stocking, and order placement of products for replenishment.
Sales	It manages the sales process which is directly associated with the revenue generation.
Return	It is the return merchandise management.

Table 1: Elements of integrated retail supply chain (Source: Vargas, 2007)

RFID Retailer Benefits

1. **Real time Inventory Information**

Retailers can have real-time inventory information with RFID which can help prevent stock outs, locate stock within a store, avoid shrinkage of inventories, and enable retailer to use more yield effective pricing strategies.

2. **Decreased Labor Costs**

RFID technology aids in practical elimination of the need for human checking of stock. Labor reductions will be found in the following areas of retail operations like receiving, stocking, check out, cycle counting and physical counting.

3. **Prevention of Theft, Shrink and Inventory Write Offs**

In retail industry "Shrinkage" is a term used to describe inaccurate inventory counts as a result of customer theft, employee theft, inaccurate inventory counts due misplaces items, and stock reordered because items are on a display shelf in another area of the store. RFID technology has the potential to alert staff when items are being removed illegally, or when they have been misplaced within the store.

4. **Integrated Opportunities**

The RFID technologies will offer retailers new and unlimited marketing opportunities. The tracking of customers purchases before they leave the store offers retailers information that can immediately be used for the cross selling other related products. In-store suggestive selling allows retailers to communicate with shoppers while they are shopping in an effort to encourage them to buy an additional and complimentary item (USA Strategies, 2005).

RFID Consumer Benefits

1. **Consumer Savings**

Consumer savings will result due decreased costs in the supply chain as RFID will allow companies to better match up supply and demand. RFID will enable companies to more quickly identify goods that can need to be discarded or replenished. This in turn will give the customer access to a better and fresher product. In the long term, this will also lead to a decrease in pricing for the consumer.

2. **Authenticity and Improved security of prescription drugs**

RFID can also be used to distinguish genuine products from counterfeit products. It is a key consumer benefit given that counterfeits could potentially contain decreased dosages and elements as opposed to the genuine. Currently, consumers have no fool proof method of vetting their prescriptions which could lead to potential health issues associated with ingesting counterfeit drugs.

3. **Efficient Recalls will reduce Deaths and Injuries**

More reliable and faster product recalls along with proved food safety. RFID can be used to identify and recall outdated products, which will further enhance consumer safety (USA Strategies, 2005).

Recent Enhancements in RFID Technologies

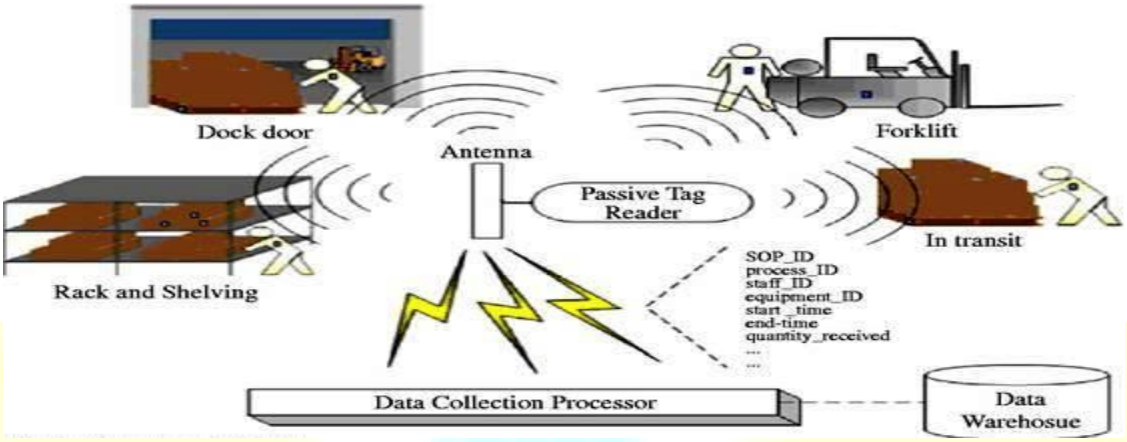
1. **Banking**

RFID has a large number of applications in banking. It can help in the management and enhancing the security of banking systems. Customers can be given RFID of their accounts along with a pin code with which they can perform transactions, similar to performing transactions from ATM. But these transactions can be made more interactive, sophisticated and these identities can be used at multiple places for more functionalities.

Source: Trackonu.com

2. **Inventory management in stores**

RFID can be used on goods for their identification. RFID can replace Barcodes and they may store additional information. With the help of RFID the goods can be monitored and security can be increased. RFID readers can be placed on the exits of stores so that all the goods or objects going out can be monitored.



Source: http://122.182.4.125/infiniumwebsite/Sol_RFID.aspx

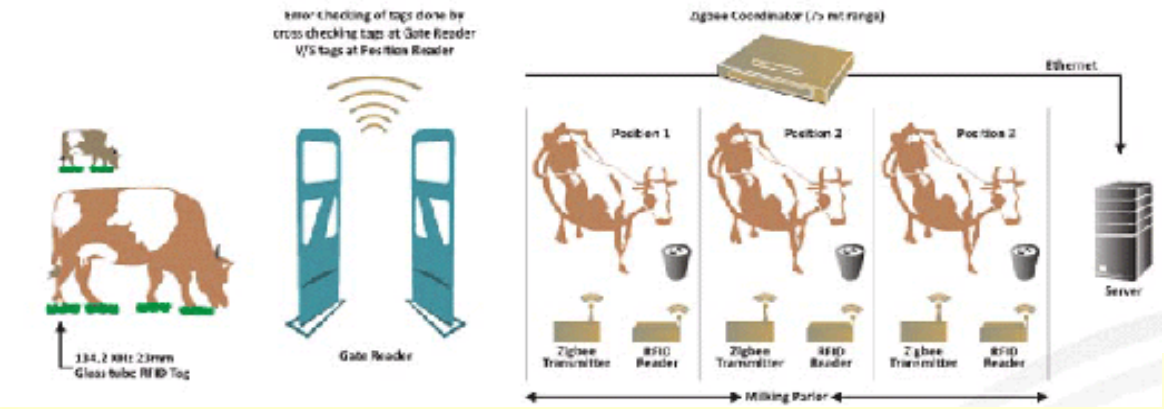
3. Asset tracking

With the help of smart RFID active tags we can track assets. Hybrid systems can be made in which RFID system is coupled with enterprise and wireless systems to monitor products, gather information and transfer data from mobile repositories inside and outside a particular zone in time intervals accurately.

Source: www.trackx.com

4. Animal tracking

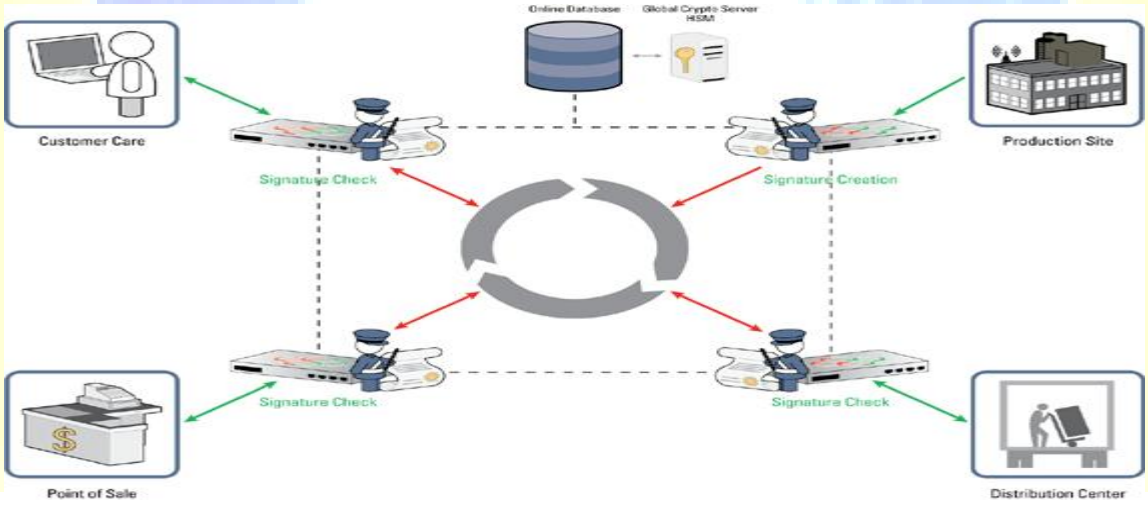
RFID tags can be used to track animal. Implantable RFID tags have been used for tracking livestock for many years.



Source: www.creasma.com

5. Security

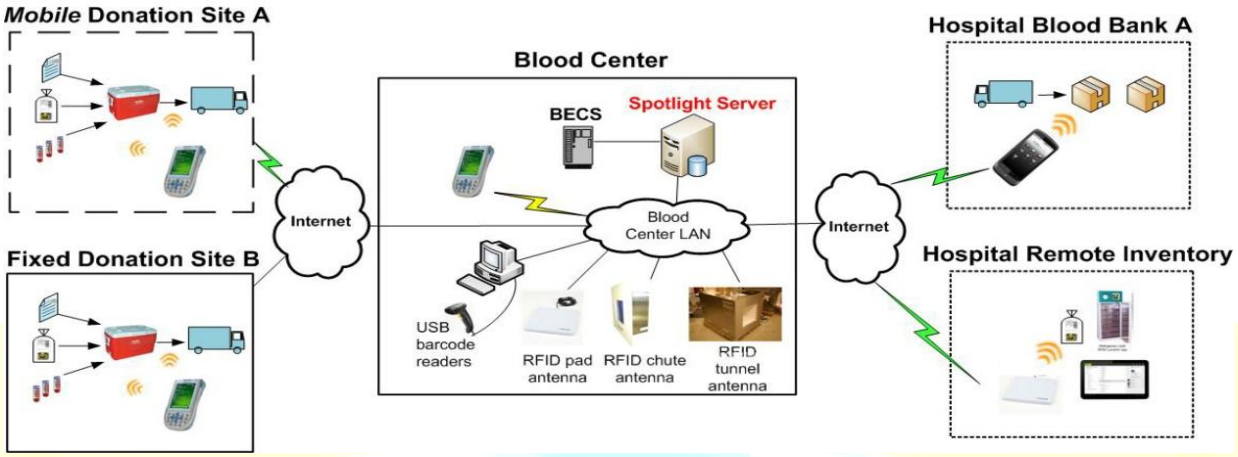
RFID can also be used for security purpose. The objects which are to be securely monitored are tagged and then reader monitors the tags continuously. In this way when the item is taken out of range then we can alarm the event.



Source: Online Crypto System

6. Hospitals

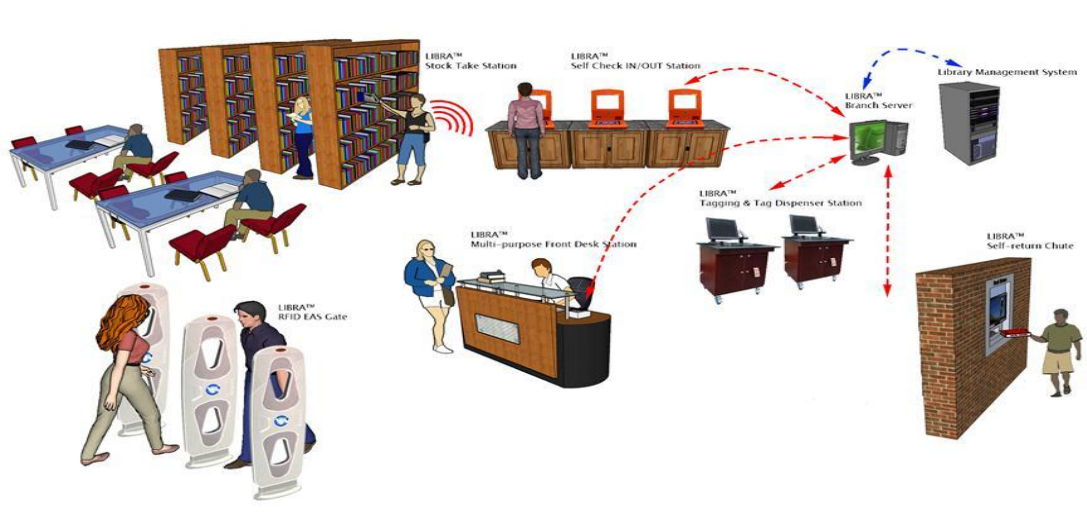
RFID can remarkably benefit hospitals. In hospitals RFID can be used to tag medicines, syrups and drugs which can prevent misshapen in hospitals.



Source: www.s3edge.com

7. Library

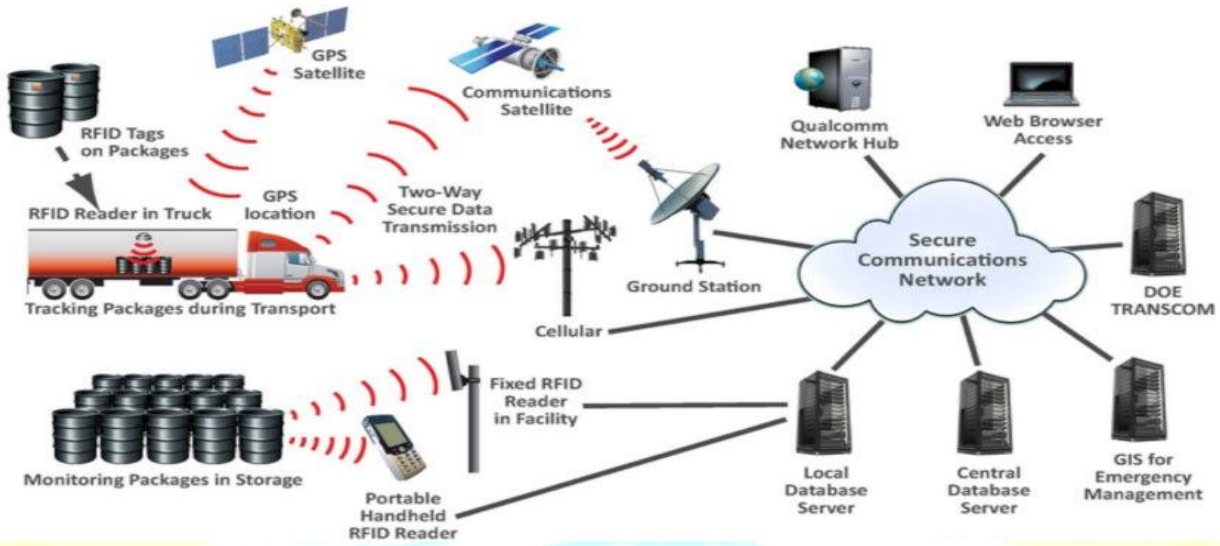
In large libraries books can be tagged for easy management. When issuing a book librarian can just use a reader and it can send an entry to the computer about the books ID.



Source: www.hkc.com.hk

8. Goods transport and checking

RFID may also be integrated with accelerometers so that we can detect jerks and drops. This can help in determining lack of care with fragile items, besides eliminating the need for barcode.



Source: www.lbagroup.com

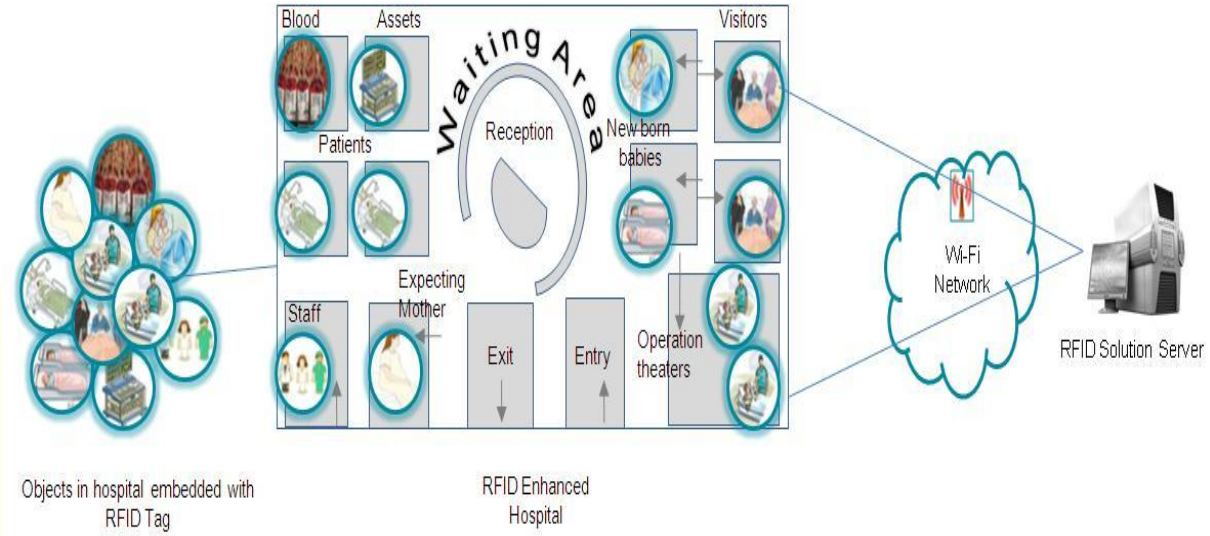
9. Military

RFID has been used in military operations from a long time. RFID were initially used for aircraft identification and can be used for other military purposes.

Source: Stevencrowley.com

10. HealthCare

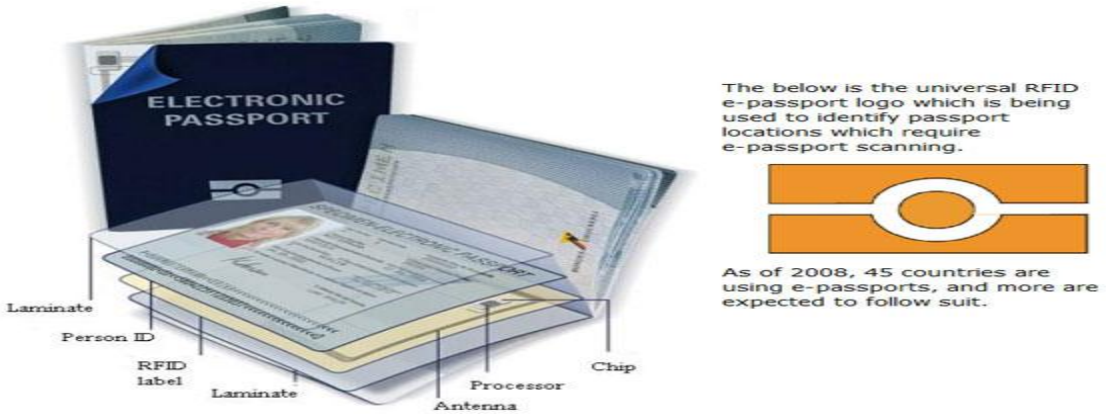
Some specially designed RFID can be even used to monitor heart beats of humans. This can help in alarming the person if his heart beat rate is not under normal functioning limits.



Source: Infinium Solutionz

11. Passports

Passports and other such documents can also be tagged with an RFID. International Civil Aviation Organization has released guide lines for RFID passport and other such documents that contain a tag which contains all the information of the person including his photo.



Source: Kevincoffey.com

12. Universal ID

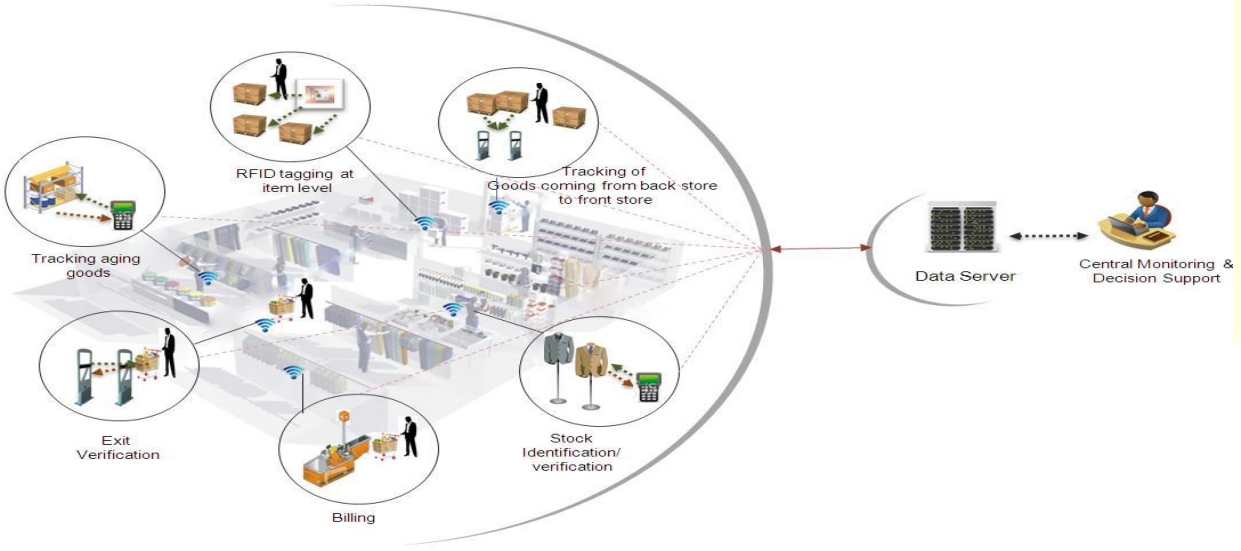
Every object can be given a identification code. Using the RFID reader integrated mobile phone one can read the RFID tag on an object and send this ID to the mobile phone

communication service provider. The provider can identify the object and can send a description of that object. This information can then be used for further transactions or processing.

Source: endtimestruth.com

13. RFID in Business

In business, reader reads the tag then sends the information, identification and location of the object to a computer. Now within this information further business processes are initiated.



Source: www.umsl.edu

Conclusions

The current research in RFID technology has already shown that it has a vast commercial scope. At present RFID is an emerging technology and its power have been realized but its capabilities are yet to be utilized completely. As this technology gets developed, its use will eventually increase many folds. RFID has a large business scope as it can bring about some great breakthroughs commercially. WAL-MART has been studying and researching the business applications of RFID and has become one of the biggest user in retail market. Many retail industries such as METRO AG, TESCO and 7-ELEVEN have started using RFID in their supply chain management. This not only helps them optimize their supply chain management but helps them to know exactly where their products are at any time and these products can be tracked down in the chain easily. India being the second largest growing economy, RFID technology is also getting rapidly adapted in Indian market. RFID is extensively used in APPAREL INDUSTRY in India. Many retail industries such as PANTALOON and MADURA GARMENTS have started using RFID to tag garments for SCM. In WIPRO'S Electronic City many stores such as ARVIND MILLS sells RFID tagged products. Mahindra and Mahindra is using RFID for integrated production management. JAYAKAR Library of Pune University and DHANVANTRI Library of Jammu University are using RFID for library management purposes. ASHOK LEYLAND is also preparing to deploy RFID in its assembling centers. In order to reduce retail shrinkage many large retail outlets in India such as BIG BAZZAR and PANTALOON are using RFID. Hence forth, the Commercial status of RFID is bound to increase in the near future.

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