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RADIO FREQUENCY IDENTIFICATION IN LOGISTICS

This article describes usage of radio frequency identification (RFID), technology which uses radio waves and which can be used to identify all kinds of objects in logistics. This identification method is coupled with automatic data capture and companies use it to get data into computer systems without intervention of employees. The aim of RFID technology is in increase efficiency, reduce data entry errors and in decrease count of necessary employees. RFID technology can also deliver benefits in different areas and not only in commerce, sale or logistics.

1. PRELIMINARY

Radio frequency identification is rapidly growing technology with a manifold of possible applications. As RFID solutions are getting cheaper, offer certain advantages especially in logistics. Automatic identification has become also very popular in many industry branches and is used to provide information about people, animals, goods and products.

2. GENERAL INFORMATION ABOUT RFID TECHNOLOGY

Radio frequency identification (RFID) is common name for technologies which use radio waves to automatic identification of objects. The most common form of self identification is saved product serial number, eventually additional information on chip. Chip and antenna are known under name "RFID tag". Through the antenna can chip transmit identification data to scanner (also known as "interrogator") which convert them to convenient form for further computer processing (Pužmanová, 2006, p. 20).

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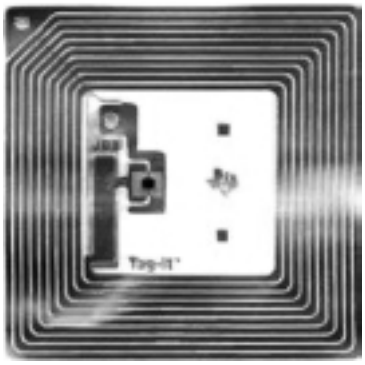
Fig. 1. RFID tag.



Source: IT NEWS, 2005.

RFID can be divided into two categories, which differ not only in power supply method, physical size or memory size, but also in frequencies, range and obviously price to:

- passive - with small memory size and power supply from scanner
- active - full-value, with chips, several interfaces a with battery for own power supply.

Passive RFID, which are used most often for basic tracking, have not internal power supply and count upon for energy from scanner. Their durability reaches many years and requires short distance from scanner (10 mm - 5 m). Passive RFID have limited memory size, but are small, proof and cheap.

Active RFID has internal power supply from battery and greater range than passive RFID (15 - 25 m), because they do not depend on power supply from scanner. They have bigger size and are not useful for all purposes.

RFID is not new generation of bar codes, how could somebody think. Thanks to its gist and memory possibilities offers this technology many more - not only identification, but also tracking movement and changing state of object. It is possible to save many more information, identify every tag absolutely individually, not only like member of class. It is also possible track state of objects and inform about it. It is not necessary direct seeability, proximity for scanning and it is also possible scanning more tag at the same time.

3. TECHNICAL PROPERTIES

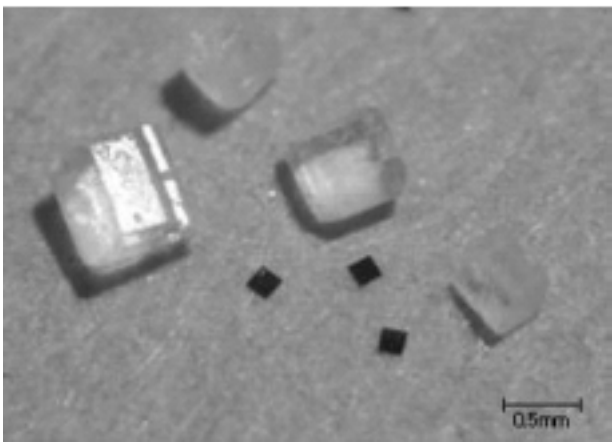
RFID uses different frequencies which depend on kind of tag. Passive RFID can use high or ultra high frequencies and microwaves can use only active RFID. With higher frequencies reaches tags higher transmition speeds, but it reduces possibility work through hard barrier (materials). Higher frequency signal has tendency to rebound back, whereas lower frequency signal is absorbed. The most popular is frequency 13.56 MHz and chips based on plastic electronic. Their great advantage is possibility be printed inside plastic substratum together with antenna.

One scanner can support up to 1500 tags per second if they transmit 256 bits of data. Environment, where is a lot of RFID tags, can be overloaded, but in spite of this fact can be at the same place also around million tags.

RFID antenna is produced from copper or aluminium wire, eventually from special conductive ink. Regarding that object can contain more RFID tags, but it is necessary to prevent signal interference. For this purpose is necessary to recognize tags density.

Nowadays exists the smallest RFID tags in size 0.15 × 0.15 mm and thickness 7.5 μm (Michalík, 2006). In this size is of course integrated chip and antenna. This chip is successor previous version, which has smaller size, its size was 0.4 × 0.4 mm.

Fig. 2. RFID tags and kitchen salt crystals.



Source: Živé, 2006.

4. APPLICATIONS

Application areas of RFID technology are wide. Huge interest has pharmaceutical industry, which prefers this technology as way of action against drugs fraud.

Among branches with the biggest opportunity for using RFID are commerce, aviation and defense. According to estimate Gartner company (IT NEWS, 2005), RFID technology will quick achieve in health service, logistics and pharmaceutical industry. Although logistics centers and forwarding houses develop special effort, most of RFID technologies are not still on appropriate level.

If will be interest in this technology go on, we can soon expect its wide utilization. RFID technology could be used in the first place in companies, where tracking process is not under control of business computer applications, therefore should be developed completely new business computer applications. Every branch will have own requirements, but individual branches could apply own individual requirements.

List of today's application of RFID technology is available on Wikipedia website, eventually on RFID Journal website.

5. SECURITY ASPECTS

Nowadays is the biggest problem security of information and communication technologies. It is exist great fear coupled with loss of privacy or personal data and their unauthorized usage. Fear from unauthorized data usage through RFID technology also explore European committee working party (Article 29 Working Party). Output of its work, WD 105, refer to basic principles of Data protection issue and assumes recommendation for producers of RFID tags, scanners and also for normalization organizations. New RFID tags already support partial or entire turn off function (Pužmanová, 2006, p. 22).

6. CONCLUSION

RFID technology is in the middle of the interest. It is expected that expenses on necessary hardware and software will be grow in years 2006 and 2007. Global expenses on RFID technology was $ 504 millions in year 2005 and in comparison with year 2004 it is 39% increase. In year 2006 is expected sale of new licenses in value $ 751 million. Till 2010 are expected expenses to RFID technology in value $ 3 billion USD.

Nowadays most of companies only explore real value of RFID technology there, where they do not use bar codes. This is also reason, why will be used. In years 2006 - 2007 is expected greater expansion in other branches, not only in commerce or sale. RFID is not substitute of bar codes, because both technologies will be exist together. Users can choose which of them will be used according to concrete requirements.

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