

Curtain Raiser on Gen-Next of RFID Technology

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ABSTRACT: *This paper gives a brief idea on Radio frequency identification (RFID) technology. RFID tags do not require any direct link for communication rather it uses various frequency ranges for tracking. Modulated signals are used for the purpose of tracking an object by communicating between reader and the transponder. RFID technology have been proved like a boon in various fields like health care, passport, toll system etc. As we are able to track an object, with the advent in the technology the transponder can also be tracked. RFID tags are of two types viz. Active and passive. Active tags have a source of supply whereas Passive tags don't. With the increase in omnipresence of RFID tags, threat is on the privacy. This paper brings to the notice the counter attacks on security and various measures to prevent it. Tracking objects in the indoor environment with active and passive RFID tracking solution has been implemented but this paper unfolds the next generation adventure in RFID technology.*

Keywords: *Identification Friend or Foe (IFF), Radio frequency identification (RFID), RFID tag, Reader, Real Time Location System (RTLS).*

I. INTRODUCTION

Radio frequency identification (RFID) is a pandemic technology in history. The British found the first application of RFID i.e. "Identification Friend or Foe" system (IFF) during the Second World War while the first commercial RFID application was the "Electronic Article Surveillance" (EAS) developed in 1970s as a theft prevention system. In 1980s there was hype in the field of RFID technology to use RFID for toll collection on roads. In 1999 the Auto-ID Center focused on item-level tagging. The probably first paper related to RFID technology was the landmark paper by Harry Stockman, "Communication by Means of Reflected Power" in October 1948. The first patent on RFID was issued in 1973 for a passive radio transponder with memory. An RFID system is composed of three main components: (i) tags, (ii) a reader and its antennas and (iii) a middleware application that is integrated into a host system.

II. RFID TAGS

The other name is transponder which contains a chip and an antenna. The RFID reader emits a signal which is then used by the chip. RFID tags can be attached to or embedded in an object which consists of various information regarding the details of the item. It also stores the information like the reading range, data storage capacity, memory type, size, operational life, and cost with respect to the tag. The tags could be (i) read only, write once/read many times or read/write capable, and (ii) active, passive or semi-active. Passive tags do not contain a power source, whereas active tags have a tiny battery from which they draw their power, and therefore its data storage capacity and communication range is more [3].

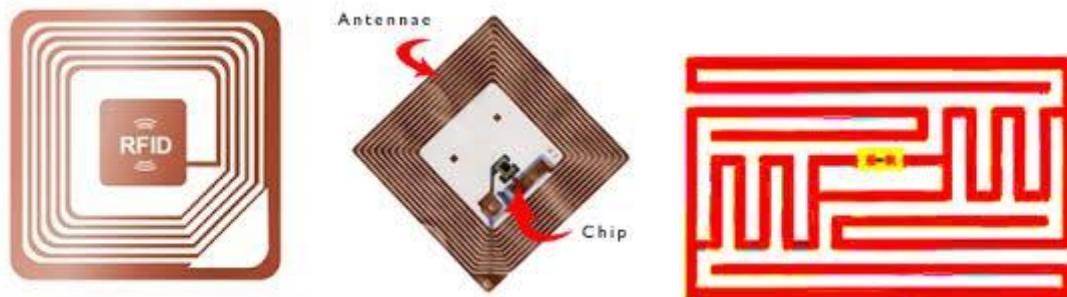


Fig.1 examples of RFID tags [4][5][6]

III. RFID READER AND THE ANTENNA

RFID reader and antennas RFID readers, also known as interrogators, are electronic devices that emit and receive radio signals through the antennas coupled to them. RFID readers are responsible for the data flow between the tag and host through the middleware which is acting like a buffer. RFID readers are of different type's viz.fixed reader; hand-held reader; and mobile reader. Fixed readers are usually mounted on walls; hand-held reader is embedded with the person whereas the mobile reader is used to cover larger area.

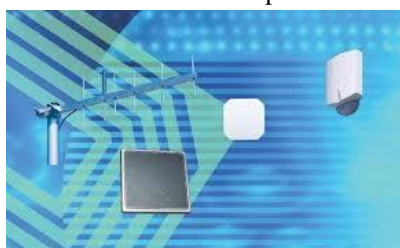


Fig.2 RFID reader and antenna [7]

IV. Working

The RFID reader generates an electromagnetic field around it due to which an e.m.f. is induced and thus current starts flowing. The current thus generated is used as a source of supply for the chip. In passive tags this current is also used for charging a condenser so as to give a constant supply to the chip. In active tags the condenser is replaced by a battery. As soon as the chip is activated the signal is sent by the antenna to the tag asking for the details, now the tag will decode the signal and will send the desired information. Practically, the reader doesn't have its own electromagnetic field but rather it uses the field experienced by the tag. In general many metals reflect electromagnetic field so it becomes difficult for the reader to read making the solution so much complicated. Another scenario is that the tag requires continuous power for reading. The relationship between the power and the distance between the tag and the chip is directly proportional to each other. As the distance is increased the amount of power required is also increased.

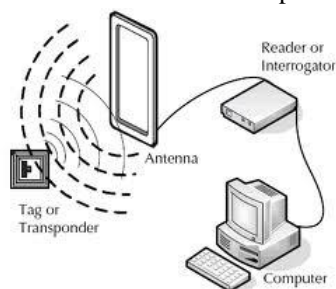


Fig.3 RFID system [8]

V. Past-time

RFID can be seen as an emerging technology for automatic tracking systems. Till date, RFID is rapidly replacing manual labels, trading stamps, barcodes etc. Until now, RFID applications are mostly concerned with indoor environment, tracking and tracing objects. The use of passive RFID technology is increasing mostly due to reduced cost and better performance. Due to this the passive RFID tags which are used for mounting on metals is also popular. On the other hand the use of active RFID is in RTLS (Real Time Location Systems), due to improved standardisation and the possibility for integration with existing IEEE 802.11.

VI. PRESENT UPDATE

Previously, the RFID tags were used only for getting the information about the object but the present scenario is that the reader is used to get the information of the complete system. Suppose in an IT environment previously if the tag was put on the computer so the reader will give the details of the particular computer but today due to the advancement in the technology that particular tag will give the information about the entire computer associated with it in the LAN connection. As we know that animal tagging is very much popular so as to keep track of them at large farms but nowadays person tagging is also done so as to keep track of the person specially VIPs.

VII. CURTAIN RAISER

Recent development in the field of IC technology has created a fire among the RFID technologists to enhance the technology and overcome the limitations. As we know that passive tags operate by generating energy from the field without any battery, but have short reading range. On the other hand active tags have larger reading range but shorter life due to large demand for power. So, a new technology based on VLSI integrated circuit and computer technology known as "ActiveWave low power active tags", having a long read range feature of active combined with the long life and reliability of passive tags are used [9]. The core of the system is built around the RFID tags, RFID readers, host computer, and Windows based software. These tags have the following features like hands free operation, Multi-Tag functionality, Wireless connection between the RFID reader and host computer, User-friendly Windows based host software, Very low power highly reliable active tag technology and Compact-size tag for wrist bands. Take an example of RFID technology during Haj Pilgrimage. In spite of all the arrangements that are done, following are some of the common difficulties faced by the pilgrims and the authorities alike: Identification of pilgrims, Medical Emergencies etc. The idea of using passive RFID have already been proposed and experimented on 1000 pilgrims who have given the conclusion that this technology will be used by the Haj Ministry in near future. Moreover, the active RFID have also been experimented, but the limitation with this is that they are using hand-held reader which cannot respond to multiple tags at the same time. RFID offers an effective solution to the Haj problems described above. A wristband Active wave RFID tag that can be worn by each pilgrim at all times. This tag can be read using the PC-card reader which when connected to the computer displays the information of the tag. If multiple tags are active than cyclic redundancy check codes are used by the host to display the information of the tags. These tags can be energized by placing the Smart field generator at regular distance from the reader and the tag. The following are some of the information that can be stored in a tag: Personal details - like name, address, blood type, nationality, contact information of the pilgrim etc. Two types of RFID wristbands are available one which has to be cut when removed and another which can be re-programmed and reused. So in this way the Haj pilgrims can be tracked by the officials by just monitoring on the computer and can be provided help if any problem arises.

7.1. Wristband Tag

The tag can be configured to automatically wake up at pre- defined intervals, transmit its information to the system, then go back to sleep to conserve battery life. Unique anti-collision algorithms are used to ensure that all tag data is received, even when multiple tags are transmitting at the same time. To guarantee that all data remains accurate, all tag packets use reliable cyclic redundancy checks.

7.2. PC-card Reader

The PC-Card Reader connects directly to a Host computer's PCMCIA port to monitor and control the RF side of the system. The Host can be a PDA, laptop, or even Tablet PC. The PC-Card Reader receives all RFID data transmitted by a tag. It deciphers this data and sends the information in real-time to the Host. When searching

for specific items, the PC-Card Reader can turn on optional tag LEDs and buzzers to make finding items much easier. Two RF frequencies are used by the Reader to communicate to the system. The Reader transmits data using one frequency and receives data using a different frequency. This dual-frequency method allows for fast and reliable full-duplex communications.

7.3. Smart Field Generator

The Smart Field Generator is a small, efficient tag wake up device that communicates directly with the Reader. It transmits wake up commands to tags at 433 MHz. For broadcast commands, any tag within range of the Smart Field Generator will respond by transmitting its ID along with other information. The Smart Field Generator has three modes of operation. The Field Generator periodically turns on and calls tags for a specified time, then turns off for a specified time; the Field Generator is turned on by a motion sensor as soon as movement is detected. This last feature is very powerful because it allows the system to search for specific tags at any location at any time.



Fig.4 Wristband tag, PC-Card Reader and the Smart Field Generator [10][11][12]

VIII. Future Scenarios

Though advancement has been done in the technology and will continue so but threat is sometimes on the security of the people. Suppose your passport consists of all the information in the form of RFID pattern, so if any terrorist is passing by, than he can easily identify the person by just activating the reader. Thus, security of the people is on threat as it is very much easy for anybody to find a single person from the crowd of thousands. As the miracles continue so the day is not far away when the carpet which is tagged will tell the vacuum cleaner that dust is present and cleaning has to be done. Moreover as nowadays every woman is working outside so it becomes difficult for them to keep the record of the daily need items. So if every item will be RFID tagged then by sitting at the office the women can come to know which item is missing by just activating the chip on the laptop and getting the complete picture of the items inside the refrigerator. Since the foot falls at the malls are increasing very rapidly and the people throng there for pleasure but hurdle lies at the time of payment when there are long queues, so RFID technology can be used to solve this problem. A special gate is designed in which a reader is present so when a trolley passes carrying the items having RFID tag the reader will track the items and thus counting and billing is done. The amount is displayed on the gate and you only have to use the debit card which will also consist the RFID pattern and thus the reader will make the transaction from the linked account. So in this way RFID can be used for saving time, improving luxury and comfort.

IX. Conclusion

The RFID is becoming pervasive in the field of consumer products, military, security etc. The main advantage of RFID is to track the object with the help of mobile or immobile reader. While this is still the major advantage of RFID over barcodes, RFID has its own limitations in the form of RF interference [13]. In most of the issue the tag is used to track and trace the object [14]. With the help of the tag we only come to know whether the object is present or not but the actual position is determined by the locale of the system. Moreover, RFID systems are mainly used in Real-Time Location Systems (RTLS) or tracking systems [15] [16] [17]. As the RFID future scenarios have been discussed above the drawback lies on the fact that there is threat on

security and getting so much ease and luxury will empty the pockets too but still life moves on making technology better from good towards best.

X. ACKNOWLEDGEMENT

The authors would express their gratitude and thanks towards the below mentioned references for enlightening their path on RFID technology.

REFERENCES

- [1] Wikipedia-RFID
- [2] US. Patent 3,713,148
- [3] (<http://www.jotmi.org>)
- [4] www.consafelogistics.se
- [5] www.preemptivemedia.net
- [6] www.chemsultants.com
- [7] www.directindustry.com
- [8] www.epc-rfid.info
- [9] ActiveWave Incorporation, (2009), <http://www.activewaveinc.com>
- [10] www.tootoo.com
- [11] www.globalspec.com
- [12] www.existco.com.au
- [13] P. V. Nikitin and K. V. S. Rao, "Performance limitations of passive UHF RFID systems," in *Antennas and Propagation Society International Symposium 2006, IEEE, Albuquerque, NM, 9-14 July 2006*, pp.1011-1014.70
- [14] D. J. Park, Y. B. Choi, and K. C. Nam, "RFID-based RTLS for improvement of operation system in container terminals," in *APCC '06. Asia-Pacific Conference on Communications, 2006., Busan, Korea, Aug. 31 2006-Sept. 1 2006*, pp. 1-5.
- [15] B. Ding, L. Chen, D. Chen, and H. Yuan, "Application of RTLS in warehouse management based on RFID and Wi-Fi," in *Wireless Communications, Networking and Mobile Computing, 2008., 2008*, pp. 1-5.
- [16] J. Song, C. T. Haas, and C. H. Caldas, "A proximity-based method for locating RFID tagged objects," *Advanced Engineering Informatics*, vol. 21, no. 4, p. 367– 376, Oct. 2007.
- [17] S. Zhou, W. Ling, and Z. Peng, "An RFID-based remote monitoring system for enterprise internal production management," *International Journal of Advanced Manufacturing Technology*, vol. 33, no. 7-8, pp. 837-844, Jul. 2007.