

Review

Deployment of RFID (Radio Frequency Identification) at Indian academic libraries: Issues and best practice

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Library is a growing organism, pertaining to 5th law, nowadays library is getting into a new technology such as RFID, 3M, etc. This paper discovers deployment of RFID technology and its issues and best practice at libraries. RFID technology is applied to various activities in libraries like automated check in /check out (without the intervention of the library staff), theft detection, stock verification etc. and comprises many components including RFID tags/labels, Library Staff Station, security gate, self service units, shelf management etc. and it can be extended to many more areas in future.

Key words: RFID in library management, RFID issues, RFID privacy and policy, RFID in Indian libraries, best practice in RFID, deployment of RFID in library, guidelines for implementing RFID.

INTRODUCTION

As its name implies, the term RFID is generally used to describe any technology that uses radio signals to identify specific objects. Typically, an RFID system consists of an RF device that communicates with a tag, which is embedded with a single-chip processor and an antenna. The RFID reader can be fixed or portable, much like the good - old barcode scanners. RFID tags are capable of storing and transmitting information. They vary in design and capability, depending on the manufacturer and their intended use. The first distinction between tags is whether they are passive or active (Simson and Beth, 2006).

Passive tags have no power source of their own, and only become activated and able to transmit data when they are energized by the electromagnetic field of the reader. They typically have 64 bits to 1 kB of non-volatile memory (EEPROM). These tags are simpler to manufacture and are less expensive, passive tags are well suited to many supply-chain applications for product or asset identification. Passive tags, high frequency (approximately 13 MHz) and low frequency (around 125 kHz) systems typically have a read range of less than a meter. With HF and LF tag systems, the size of a tag has a significant impact on the read range. Some applications limit the read range to 15.2 to 20.3 cm. Some newer technologies (UHF systems) do have longer ranges of 6 to 8 m. These systems are intended for transport pallets and shipping crates. The read range depends on many factors, mainly the size of the tag and the readers'

antennae and their output power.

Active tags, on the other hand, have a tiny battery for their power source, which results in an improved range of 30 m and better data handling. The reliability approaches 100%. The battery boost also allows for large memories (battery-backed SRAM as high as 128 KB), or additional sensory and data logging capabilities, such as temperature monitoring. This makes them suitable for longer-range applications such as asset locating. The battery and added circuitry make them more expensive than passive tags. Active tags have a larger footprint and a shorter operating life than passive tags

History of RFID

The British pioneered RFID during World War II to identify their own aircraft returning from sorties over occupied Europe. Early radar systems could spot an incoming aircraft but not determine its type. But with the transponder in RAF planes, RFID could differentiate Allied from enemy aircraft. In fact, this is essentially the same kind of friend –or– foe system still used today.

In the late 1960's the U.S Government began using RFID to tag and monitor nuclear and other hazardous materials. In 1972, the same year as the first deployment of UPC, schlage Electronics (now Westinghouse) developed an RFID card for access control. In 1972, Los Alamos Scientific Laboratories transferred its technology

to the public sector, which encouraged a number of companies to explore new uses of RFID. Today, it is used for automatic toll collections, access control, and security, tracking objects and humans in shops, library, hospitals etc.

RFID Technology in library

Radio Frequency Identification (RFID) Technology has changed the concept of security all over the world by giving smart cards for an individual's identification. The use of RFID has now been extended to libraries, so as to keep them efficient and competitive in an ever-changing environment. The technology is applied to a variety of activities in libraries nowadays like totally automated check in /check out (without the intervention of the library staff), theft detection, stock verification etc. and comprises many components including RFID tags/labels, library staff station, security gate, self service units, shelf management etc. and it can be extended to many more areas in future. Being a new technology its potential is to be elaborated a little.

RFID tags are flexible and paper-thin with an electronic chip. When placed into books of other media, these tags/labels can be read and written to using radio frequency, that operate without contact and line of sight. It has in-built EAS function, to detect thefts and is designed to last for the lifetime of the item they identify. The library staff station facilitates handling of materials having RFID tags. Through a modern graphical user interface, many functions can be run on this station. Once the label is placed in the document, its identification such as accession number/shelf location is registered in the chip of the label. This information is either to be taken from the library database or it is directly taken from the book by scanning the barcode on the book. Thus, these ID tags are used for check in/check out purposes.

After establishing the validity of the member through the smart card, the documents to be checked out are placed on the deck of the station. Library database is updated automatically by putting the book in the borrower's account and theft detection system of the label is deactivated. When the document is to be returned, the borrower has to place it on the deck and it gets checked in and the theft detection mechanism is activated. Fine, if any would be calculated and a slip may be printed at this time. If the document is to be renewed, it is to be placed on the deck and can be renewed after checking the validity of renewal and a new due date is to be confirmed.

Deploying RFID in libraries

The process for deployment can be divided into many phases taking into consideration budget provision, the

types of document holdings, number of volumes, types of items meant for circulation, and the number and types of members the institution has. Care should be taken to integrate the library automation package while detailed tender specification is drawn. Since the technology is new to Indian library environment, proper demonstration of the system can be arranged and should visit the library where the system is successfully running. (Privacy and security in library RFID Issues, Practices, and Architectures Article available at <http://www.cs.berkeley.edu/~dmolnar/library.pdf>).

While evaluating the tender, the past experience of the firm supplying the equipment, tags, reader and software should be thoroughly investigated. The fixing of tags to documents can be initially outsourced, then in house arrangement can be done after proper training. The reader should be able to read the other manufacturers RFID tags. The provision for reading the existing barcode in the document can be made and the required data can be downloaded by interacting with the present database and can be written to the tag. The tags can be over layered with the self adhesive sticker containing the logo of the library or the institution for longer life. Until sufficient confidence is gained with the system, the old system in practice can be continued.

Checklist for deploying RFID

1. Budget (check the budget allotted for library)
2. Collection and usage of materials
3. Orientation to the user
4. Training to the librarians
5. Privacy policy, standards of RFID tags
6. Frequency and life of the tags
7. Time bound to implement the new technology
8. Measure the benefits of new technology
9. Maintenance and service from the vendor for the RFID components
10. Best practice sharing about the RFID from various users

Recently, many Indian institutions and corporate library have started deploying RFID in their libraries. These are few libraries implemented RFID in India are

1. IIT Chennai, VTLS LMS
2. IIM Shillong, VTLS
3. Pandit Deendayal Petroleum University, Ahmedabad, Alice Software
4. IIM Indore, VTLS
5. Chandragupt Institute of management Patna, VTLS
6. Sandip Institute of Technology and Research, Nashik, KOHA
7. Marwadi Education Foundation Group of institutions, Rajkot, KOHA
8. IIM, Lucknow, Libsys
9. IGCAR, Chennai, Libsys

10. Parliament Library, Delhi
11. Nirma University, Softlink Asia (Alice Software)
12. Anna University, Chennai
13. BCL, Delhi, Libsys
14. Kerala State Library
15. NIT, Surat
16. Jaykar Library, Pune
17. IISC, Bangalore, Libsys
18. PRL, Ahmedabad
19. Babaria Institute, Vadodara, Gujarat
20. IIT Kharagpur,
21. Punjab University, Chandigarh
22. Bank of Baroda, Mumbai
23. IMSC, Chennai
24. IIM, Kozhikode
25. Great lakes Institute of Management, Chennai

Issues in deploying the RFID

Though it is implemented in some of the Indian institutions, it still has a number of important implementation issues that need to be addressed before deploying the new technology (Daniel et al., 2007):

1. Resolving consumer privacy issues
2. Overcoming the costs of developing and deploying the RFID technology at library
3. A lack of standards and regulations in India
4. Lack of robustness (scalability, accuracy etc)
5. Lack of training and experience, end –user confusion
6. Resolving ethical concerns
7. Data management and technology immaturity

Problem with RFID

The major problems with RFID can be divided into the following three categories:

Technology related issues

- a. Problems with RFID Standards
- b. RFID Systems can be Easily Disrupted
- c. RFID reader and tag collision / Interference

Privacy and ethics related issues

- a. Tags can be read at greater distance with a high gain antenna
- b. Contents of an RFID tags can be read after the item leaves the library
- c. RFID tags are difficult to remove

Security related issues

- a. Data ownership and data-mining techniques

- b. Data theft
- c. Data corruption

Best practices

(Privacy and security in library RFID Issues, Practices, and Architectures Article available at <http://www.cs.berkeley.edu/~dmolnar/library.pdf>):

1. Privacy policy: If the library has not adopted a privacy policy, it should develop one that encompasses its implementation of RFID.
2. Purpose specification: Library users must be given notice of the purposes for which tags and readers are used.
3. Collection limitation: The collection of information should be limited to that which is necessary for the stated purpose. There should be no personal data encoded in RFID tags.
4. Technology neutrality: RFID technology in and of itself does not impose threats to privacy. Rather privacy breaches occur when RFID, like any technology, is deployed in a way that is not consistent with responsible information management practices that foster sound privacy protection.
5. Privacy and security as primary design requirements: Users of RFID technology should address the privacy and security issues as part of its initial design.
6. Consumer transparency: There should be no secret RFID tags or readers. Use of RFID technology should be as transparent as possible, and consumers should know about the implementation and use of any RFID technology.
7. Security safeguards: There must be auditable security and integrity in transmission, databases, and system access, including the use of encryption.
8. Accountability: The library must inform its users who they can contact for questions and complaints.

RFID Shielding: Protection

Shielding is another protection mechanism. A number of products are available in the market in the US that will allow a customer to RFID-Enabled cards or passports to shield their data. Aluminum foil to wrap the RFID ID cards to protect against reading (RFID shielding, Aluminum Foil Does Not Stop RFID, on <http://www.omniscienceisbliss.org/rfid.html>) and thick metal foil will prevent most reads. UHF tags can be successfully shielded from most reads by placing them within an antistatic plastic tag.

Conclusion

Despite any security concern, it does not appear that

RFID will be running out of steam in the future. In fact, it is just the opposite and its popularity is increasing, ABI Research (ABI Research on RFID usages: WWW.abiresearch.com) recently reported that, the global market for the RFID readers and reader modules grew to >35,500 unit shipments in 2005. However, RFID technology is changing the world and it is making the lives comfortable and convenient. However, every new technology comes at a cost, RFID too. To remediate that cost factor, we should make more efforts to guide its implementation and put pressure on government to develop standards, public policy and best practice guidelines for their use. Lastly, you cannot ignore the security risks of RFID tags and their impact on the security and privacy of an individual.

If you are interested in deployment of the RFID in library, before implementation check the privacy policy to protect the patrons and standards. As RFID has its own issues and benefits, most of the Indian institutions have started implementing RFID for tracking the library materials, it is very useful for detecting theft and auto check in / out etc. New technology always has their own issues and benefits, so RFID also has their own issues and benefits. So that libraries should work to ensure that, RFID products are manufactured and used according to well established privacy principles before procuring for implementation.

Finally, libraries and librarians must be outspoken in their public education efforts related to RFID not only because they can benefit from the safe implementation of RFID systems but also because RFID represents that start of a slippery slope to ever greater loss of control over our personal information.

REFERENCES

- ABI Research on RFID usages: WWW.abiresearch.com.
 Daniel HV, Albert P, Mike P (2007). RFID: A Guide to Radio Frequency Identification. Wiley, ISBN: 978-0-470-10764-5. pp. 97-110.
 Few libraries implemented RFID is available on <http://ncsi.iisc.ernet.in/pipermail/lis-forum/2010-April/010543.html>
 Privacy and security in library RFID Issues, Practices, and Architectures Article available at <http://www.cs.berkeley.edu/~dmolnar/library.pdf>
 RFID shielding, Aluminum Foil Does Not Stop RFID, on <http://www.omniscienceisbliss.org/rfid.html>.
 Simson G, Beth R (2006). RFID Applications, security and privacy. Pearson Education, ISBN: 81-317-0166-2, pp. 230-242.