

RFID Technology and Applications with Special Reference to Indian Libraries

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ABSTRACT

RFID has provided better opportunities, better access, storage of mass data and reprogramming than the Barcode technology. The libraries are growing day by day and it is necessary for large libraries to implement such facilities which save their time and are also user friendly. RFID is one of them. RFID promotes operational efficiency of the libraries. In this paper the components and features of a RFID library are describe to provide guidance for the evaluation of different system. It also briefs about advantages and disadvantages of RFID System in Library.

KEYWORD :- Radio frequency identification (RFID), RFID Tags, RFID reader, RFID server .

1. INTRODUCTION:-

RFID is the latest technology to be used in library for book identification, for self checkout, for sorting, conveying of library books and also for theft detection. The aim of using RFID technology is to increase the efficiency, reduce data entry errors, and spare staff to perform more value-added functions. RFID is a combination of radio-frequency based technology and microchip technology. The information contained on microchips in the tags affixed to library materials is to read RFID technology regardless of item orientation or alignment, i.e., the technology does not require line of sight or a fixed plane to read tags as traditional theft detection systems do. Distance from the item is not a critical factor except in the case of extra-wide exit gates. The corridors at the building exit(s) and can be as wide as four feet because the tags can be read at a distance of up to two feet by each of two parallel exit sensors. The devices

used for circulation and inventorying are usually called “readers” while the ones used at building exits are usually called “sensors”.

Definition:-

According to the Harrod’s Librarians glossary and reference book “*RFID an alternative to the barcode that uses tiny microchips in tags to hold and transmit detailed data about the item tagged*”.

Dictionary of library & information science defines RFID as “*The use of microchips and library card, enabling patrons to check out items by walking through a self-service station equipped with an antenna that emits low frequency radio waves.*”

2 RFID Standards used in Indian Libraries

2.1 ISO 180003- Mode 1 is a ISO standard for parameters for air interface communications at 13.56 MHz (High Frequency), based on which RFID hardware is being developed for sage in Library. The standard defines communication parameters on which the tag and reader communicates with each other.

2.2 ISO 28560-1/2/3 is a set of Information and documentation — Data model for use of radio frequency identifier (RFID) in libraries. The standard is under development stage at ISO and is planned to release in 2010. The standard is based on NISO committee’s recommendation document “RFID in US Libraries”. It will be defining various aspects of usage of RFID in libraries right from RFID hardware selection to placement of RFID tags and information to be written inside the tag.

2.3 SIP2 Protocol is a communication protocol that provides a standard interface beaten a library’s integrated library system (ILS) and library automation devices (e.g., check-out devices, check in devices, etc.). The protocol can be used by any application that has a need to retrieve information from an ILS or process circulation transactions via the ILS. There are two versions of SIP, version 1.0 and 2.0. SIP2 is based on a proprietary protocol, but has been opened for use by all parties providing systems for library circulation.[3]

3. RFID System Components

A comprehensive RFID system has three components:

- (1) RFID tags.
- (2) Readers.
- (3) Server.

3.1 Tags

Each paper-thin tag contains an etched antenna and a microchip with a capacity of at least 64 bits. There are three types: “read only”, “WORM,” and “read/write.” Tags are “read only” if the identification is encoded at the time of manufacture and not rewritable. This type of tag contains nothing more than item identification. It can be used for items acquired after the initial implementation of RFID and by libraries that

have collections without barcodes. Such tags need not contain any more than 96 bits.

Passive Radio Frequency Identification (RFID) Tag has no power source and no on-tag transmitter built onto it, which gives a passive tag a range of less than 10-metres and makes it sensitive to regulatory and environmental constraints. Passive tags are generally the lowest in cost making them suitable for use in large inventories of books and other library media.

Active Radio Frequency Identification (RFID) Tag has both an on-tag power source and an active transmitter. Active tags are connected to their own battery. They can be read at much higher ranges, up to several kilometres away. However, they are larger and more expensive than passive tags. Active RFID tags are not suitable for libraries (as will be discussed later on). They are usually used for manufacturing, such as tracking components on an assembly line, or for logistics where the tag may be reused.

Categories of tags :

- Low Frequency(LW)
- High Frequency(HW)
- Very High frequency(VHW)
- Ultra High Frequency (UHW)

3.2 Reader or coupler: RFID reader consists of a transmitter, receiver, antenna and a decoder. They communicate with RFID tags, identify them and receive data stored on the tag.

3.3 Server. The link between Reader and library automation system. In other words, it is the communication gateway among the various component(boss). It receives the information from one or more of the readers and exchange information with the circulation database

3.4 Antenna. The antenna produces radio signals to activate the tag and read and write data to it. Antennas are the channels between the tag and the reader, which controls the system's data acquisitions and communication. The electromagnetic field produced by an antenna can be constantly present when multiple tags are expected continually. Antennas can be build into a doorframe to receive tag data from person's things passing through door.

4. BENEFITS OF RFID FOR INDIAN LIBRARIES:-

- Fastest, easiest, most efficient way to track, locate & manage library materials.
- Efficient Book circulation management.
- 24X7 services for return of books.
- Automatic Check-in and Check-out.
- Library inventory tracking in minutes instead of hours.
- Multiple books can be read simultaneously.
- Unique ID of the RFID tag prevents counterfeiting.
- Automated material handling using conveyor & sorting systems.
- Stock management

- Operations such as managing material on the shelves, identifying missing items and taking stocks regularly will be feasible.
- Spending minimal time on circulation operations allows library staff to assist patrons
- Routine patron services are not disturbed even when libraries are facing staff shortages & budget cuts
- Security.
- Library item identification & security is combined into a single tag, thereby eliminating the need to attach an additional security strip

4.1 Practical issues faced during implementation of RFID Technology in libraries

- Hardware & Software should meet global recommended standards for use of RFID in Libraries
- RFID hardware products for library should be compatible with global protocols such as SIP2, NCIP, ISO 18000-3, ISO 15693, ISO 14443A & ISO 28560
- Supplied equipment should allow forward compatibility with anticipated new standards
- Vendors should make hardware & software upgrades in future to conform to standards
- Special emphasis on Staff training & Local Support Vendor Selection
- In Libraries, 13.56MHz High Frequency tags should be used RFID tags for library use should be passive
- The typical read range of tags for library applications should not be increased substantially beyond the present range of 8-20 inches for smaller tags in future
- Only tags including standardized EAS & AFI feature should be used in libraries
- The system will cause no interference with other applications
- The system will utilize ISO/IEC 18000-3 Mode 1 tags programmed so that they should work for identification of items in other libraries
- Security implementations for RFID in libraries should not lock a compliant system into any one security possibility (EAS, AFI, Virtual deactivation), but rather leave security as a place for differentiation between vendors
- RFID tags should be reprogrammable for migration purposes

Pros and Cons OF RFID

Pros:-

- Speedy and Easy User self-charging/discharging
- Reliability
- High-speed inventorying
- Automated materials handling
- Tag life
- Self-service/Self-issue/Self-return

- Stock management
- Staff savings
- Reducing Repetitive Stress Injuries (RSI)
- Less time needed for circulation operations

CONS :-

- High cost
- Accessibility to compromise
- Removal of exposed tags
- Exit gate sensor (Reader) problems
- Invasion of User Privacy
- Reader Collision
- Tag Collision
- Lack of Standard

3.1 RFID in Indian Libraries

Jayakar Library, University of Pune is the first library in the country to implement RFID technology with the initiative of Prof. A S Kolaskar, the Vice Chancellor and Dr. S K Patil, University Librarian and his team executing this technology.[4]

The consideration of implementing RFID technology is across all major libraries in India, The following visionaries institute and university have already taken the early lead in implementing of RFID in their libraries.

Some of the Libraries using RFID technology in India are:-

- Jayakar Library, University of Pune, Maharashtra.
- Dhanvantri Library, Jammu University, J&K.
- Indian Institute of Technology, Chennai.
- Indian Institute of Science, Bangalore, Karnataka.
- Bank of Baroda, Mumbai.
- IIM Indore, Maharashtra.
- Indian Institute of Technology, Kharagpur.
- IIM Kozhikode, Kerala.
- Indira Gandhi Centre For Atomic Research (IGCAR, Kalpakkam)
- Panjab University, Chandigarh.
- Lovely Professional University, Phagwara, Kapurthala, Punjab.
- Punjab Engineering College, Deemed University, Chandigarh.
- Dr. Tulsidas Library, Post Graduate Institution of Medical Research, Chandigarh.

Some Important Vendors of RFID in India are as follows:-

1. 3M Library Systems Division, C-40, Okhla
Industrial Area, Phase-2, New Delhi -110020
http://solutions.3mindia.co.in/wps/portal/3M/en_IN/World/Wide/?WT.mc_id=ggp_redirect_en_IN

2. Daphne Systems Private Ltd., 2nd Floor, 459-Functional Industrial Estate (FIE), Patparganj, Delhi -110092
www.daphnesystems.com/
3. Gemini TRAZE RFID Pvt. Ltd. , 1, Dr. Ranga Road, Alwarpet, Chennai - 600 018
<http://www.traze.in/contactus.asp>
4. GreenFuturz Software Solutions, Zams Palm Avenue, #22 6F, 6th Street, Alagiri Nagar, Vadapalani, Chennai - 600 026.
<http://greenfuturz.com/products.html>
5. LibSys Corporation, 633-A, Phase-V, Udyog Vihar, Gurgaon-120016
<http://www.libsys.co.in/home.html>
6. Modular Technologies India Private Limited, City Tower, 117, Sir Thiagaraya Road, 5th Floor, T.Nagar, Chennai - 600 017
<http://www.modulartech.in/product.html>
7. Netlink information systems limited, 571, Phase 5, Udyog Vihar, Haryana 122015.
<http://netlinkis.com/Services.asp>
8. RapidRadio Solutions Pvt. Ltd., B-404, Satyamev I, Opp. Gujarat High Court, Sarkhej Gandhinagar Highway, Ahmedabad - 380 060
<http://www.rapidradio.co.in/products.html>
9. RFID Infotek, 102 Corporate Avenue, Sonawala Lane, Near to Udyog Bhuvan, Goregaon (East), Mumbai 400 063
www.cvlindia.com/inquiry_kyc01.asp
10. VTLS Software Pvt. Ltd., B-219, Sector 26, Noida- 201301
<http://www.vtls.com>

Conclusion

RFID is the latest fast growing technology to be used in library for minimizing the theft of documents and as an access control systems. RFID-based systems move

beyond security to become tracking systems that combine security with more efficient tracking of materials throughout the library, including easier and faster charge and discharge, inventorying, and materials handling. Since RFID technology for the libraries in India is new and the future of Indian libraries depends on this technology, there is an urgent need to develop Indian libraries with RFID enabled technologies, to face global competition.

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