# APPLICATION OF RFID TECHNOLOGY IN LIBRARIES

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## ABSTRACT

*Radio frequency identification technology is a latest technology today most of the libraries adopting to radio frequency identification technology for their services like Stock management, check in check out ,theft controlling. Radio frequency identification technology playing vital role in academic environment, the rapid advances in information processing, storage and communication technologies have revolutionized the role of libraries in disseminating information services to their users. This paper discovers the basic technology, its need in the library system and its components. Its also merits and demerits of radio frequency identification technology in libraries.*

***Keywords:*** *RFID, Barcode , Security system, Tags, Antenna ,Theft detection.*

## Introduction

RFID stand for radio frequency identification .These trends have created a radio frequency identification technology in libraries. Increase in the value of collection and in traffic, combined with flat or very modest additions to staffing, have led to increase in theft. RFID is a combination of radio-frequency based technology and microchip technology. The information contained on microchip in the tag affixed to library materials is using radio-frequency technology regardless of item orientation or alignment .The RFID is a wireless communication technology, which automatically identifies the target without physical contact. Libraries are considered as a pinnacle of higher learning mainly because this is the central area of dissemination of knowledge in the farm of books, journals ,audio and video tapes, CD-ROMs etc .to one and all. The basic aim of any library is to provide maximum opportunities to its users for optimum utilization of available resources. Libraries have been seeking technological aids to improve their user services and internal management of various services offered. Barcode technology is one such tool, which is being used in improving the efficiency of libraries all over the world.

## Historical background of radio frequency identification technology

Radio frequency identification technology was developed in 1948,but its implementations started in 1970s.The first U.S. patent for an active radio frequency identification tag with rewriteable memory was obtained by Mario E. Cardullo on January 23,1973.In 1973 Charles Walton, a Californian industrialist, received a patent for a passive transponder that was used to unlock a door without a key. Then Walton licensed the technology to a lock making company called Schlage and radio frequency identification technology is another form of automated identification system, which is similar to barcodes. Radio frequency identification in India was developed in the 1940s for defense applications. 1st time it was used for commercial purpose in 1980 for cattle tracking applications Recent interest is in making radio frequency identification technology more ubiquitous in the global value chain. The first library suppliers started to market their systems in the mid 1990s. During the1990s the proliferation of competing systems and radio frequencies

created the need for standards and interoperability. Libraries need the higher frequency waves to allow for smaller, less powerful and portable readers. As complexities and uses increased, standards were developed to allow systems to work together. Development of standards is still going on with the latest standard being release late in 2004.

## Need of radio frequency identification technology in libraries

The need of radio frequency identification technology in libraries are as follows**:**

- Libraries implement radio frequency identification to improve user services
- To increase collection accuracy with accurate re-shelving of materials
- To increase circulation staff productivity
- To reduce tosses of library material like books, journals, magazines, CDs, DVDs
- To provide more value added future service with same number of library staff.

## Components of radio frequency identification technology system

The components required for the proposed radio frequency identification technology system are mentioned below:

- Radio frequency identification tags that are electronically programmed with unique information
- Readers or Sensors to query the tags
- Antenna
- Server to load the software that interfaces with the integrated library software
- Radio frequency identification label printer
- Handheld reader
- Self check unit
- External book return
- Staff and conversion station

## Radio frequency identification technology system in libraries

Readers in libraries radio frequency identification technology system are used in the following eight ways:

1. Conversion station-Where library data is written to the tags
2. Staff workstation at circulation-Used to check-in and check-out materials
3. Patron self check-out station- Used to check-out books without staff assistance
4. Exit sensors-Verify that all books leaving the library have been checked out
5. Patron self check-in station- Used to check-out books without staff assistance
6. Book drop reader-Checks in books when patrons drop them in the book drop
7. Sorter-Automated system for returning books to proper area of library
8. Porter reader-Handheld reader for inventorying and verifying that items are shelved correctly

**Basic technology comparison of Radio frequency identification and Barcode**

| Radio frequency identification | Barcode |
|---|---|
| 1. Can be read and write | 1. Read only |
| 2. Multiple items can be read at a time | 2. Only one item read at a time |
| 3. There is no need of taking books out from shelf | 3. Each book has to taken out from their places |
| 4. No line of sight required | 4. Needs direct visible contact to reader |
| 5. Long life span | 5. Limited life span due to printing |
| 6. Search misplaced books | 6. Misplaced books have to search manually |
| 7. Self check in/out | 7. Self check in/out counter cannot work |
| 8. Theft prevent in the library | 8. Theft prevent in the library is not possible |
| 9. Tracking is possible | 9. Tracking is not possible |
| 10. It is easily possible | 10. Automated sorting of library material is not |
| 11. It is time saver in stock verification | 11. It is time consuming in stock verification |

## Merits of radio frequency identification technology system in libraries

The major merits of radio frequency identification technology system in libraries are as follows:

- Rapid charging /discharging
- High reliability
- Long tag life
- Faster circulation
- High speed inventorying
- Automated material handling
- Easy stock verification
- Automated issue/return
- Theft reduction
- Automated sorting of books on return
- High level of security
- External book return
- Reduce shrinkage errors
- Easy book identification for shelving process
- Technology standards to drive down cost
- Reduce materials cost and handling
- Improve customer service
- Inventory visibility accuracy and efficiency

## Demerits of radio frequency identification technology system in libraries

The main demerits of radio frequency identification technology system in libraries are mentioned below:

- High cost
- Radio frequency identification tag visible
- Vulnerability to compromise
- Chances of exposed tags
- Exit gate sensor problems
- Lack of standard and protocols
- Reader collision
- Tag collision

### Role of librarian in radio frequency identification technology system

Radio frequency identification technology introduces an ethical dilemma for librarian. The technology allows for greatly improved services for patrons especially in the area of self-checkout, it allows for more efficient use of professional staff, and may reduce repetitive stress injuries for library staff. And yet, the technology introduces the threat of hot listing and tracking library patrons. Librarian have taken extra steps to ensure that laws such as the USA PATRIOT act cannot be used by government entities to invade the privacy of their patrons and yet many of those same libraries are placing traceable chips on their patron's books. Libraries have traditionally acted to protect and defend the privacy of their patrons and yet some are implementing a technology before proper safeguards have been developed. Library use of radio frequency identification technology serves to legitimize the technology in the eyes of the community. Therefore, it is incumbent on the library community to ensure that the technology is developed in concert with established privacy principles and that any library use of radio frequency identification follows best practices guidelines consistent with library values.

## Best practices of radio frequency identification technology system for libraries

The following the best practices guideline for library radio frequency identification technology system use:

01. The library should be open about its use of radio frequency identification technology including providing publicity available documents stating the rational for using radio frequency identification, objectives of its use and any associated policies and procedures and who to contact with questions.

02. Only authorized personnel should have access to the radio frequency identification technology system

03. Signs should be pasted at all facilities using the radio frequency identification technology. The signs should inform the public that radio frequency identification technology is in use, the types of usage and a statement of protection of privacy and how this technology differs from other information collection methods.

04. No personal information should be stored on the radio frequency identification tag. Information describing the tagged item should be encrypted on the tag even if the data is limited to a serial number

05. No static information should be contained on the tag (barcode, Manufacturer number) that can be read by unauthorized readers.

06. Information describing that tagged item should be encrypted on the tag even if the data is limited to a serial number.

07. All radio frequency identification readers in the library should be clearly marked.

08. All communication between tag and reader should be encrypted via a unique encryption key.

09. ISO 18000 mode-2 tags should be used rather than ISO 15693 standards.

## Conclusion

Radio frequency identification technology system have been in use in middle or larger size libraries for books identification, for self checkout, for anti – theft control ,inventory control and for the sorting and conveying of library books ,journals, CDs, DVDs and other electronic reading materials. These applications can lead to significant saving in labor costs, enhance customer service lower book theft and prove a constant record update of media collections.

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