RFID TECHNOLOGY IN LIBRARY AND INFORMATION CENTERS : RELEVANCE AND PROSPECTS

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Abstract

RFID is a combination of radio -frequency-based technology and microchip technology and the information contained on microchips in the tags affixed to library materials is read using radio frequency technology. This technology is slowly merging the Library automation activities and services as an urge on the part of Library managers to improve the effectiveness of the library keeping in mind of the user's consciousness towards information access and use. As this technology is new to the field of librarianship, author attempts to provide conceptual framework of relevance of RFID technology and its functioning, also it highlights the prospects of this technology.

Keywords : RFID Technology

1. Introduction

The impact of information technology on libraries has been profound. It is, after all, technology for processing and transmitting information, so libraries could hardly stand aside from it. Many have become enthusiastic and expert proponents for the value of Information and Communication Technology based services (Gorman, 2002). Among the various technologies, the RFID (Radio Frequency IDentification) seems to be dominating in the information industry as a means to improve efficiency in library activities and services. In fact, this is one of the significant technologies of the new millennium that had invaded the libraries. 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, inventory and materials handling.

Although the technology is still considered young and emerging especially in Indian context and it is based on electronics, and therefore, major breakthroughs are not only natural, but are expected. During the last several years the jargon "smart labels" are the buzz words often heard as a supplement to RFID technology. Although this technology has been adopted by the software industries in India to some extent, but the libraries are in the primitive stage and this concept of RFID applications in libraries is only heard in workshops/ conferences and its reality has to be realized in Libraries in the years to come. An attempt has been made in this paper to provide crystal overview of RFID technology as a means to strengthen the automation activities of libraries with a view to improve the efficiency of information services to the user community in the light of the fourth law – "Save the time of users" of library science.

2. Concept of RFID

The concept of RFID systems originated in the 1940s as a means of distinguishing friendly aircraft from enemy aircraft in WWII. Large powered RFID tags, or transponders, were placed on friendly aircraft in order to be correctly identified by radar signals. This IFF (Identify: Friend or Foe) system was the first use of RFID and its concepts continue to be used in present day aviation traffic control. The invention of the microchip and subsequent technological advances led to the design and use of passive RFID tags. This was primarily used to track objects in industrial environments where barcodes were unable to sustain

the harsh surroundings. Today the RFID technology has become integral part of many business industries, software companies and information industries in the world.

Although the technology is still considered young and emerging, it is based on electronics, and therefore, major breakthroughs are not only natural, but are expected. During the last several years, “smart labels” are the “buzz” in RFID (Garfinkel and Rosenberg, 2005).

According to Chachra (2003) Radio Frequency Identification (RFID) is the technology that is slated to replace barcodes in library applications. It is a form of identification that is contact-less and does not require line of sight. The technology, though new to libraries has been in use in other sectors for more than 20 years. The RFID tags are placed in books and generally covered with a property sticker. Antennas of different sizes, based on application, are used to read the tags and manage the various library functions.

3. Components of RFID System

A comprehensive RFID system has three components :

3.1 RFID Tags

The tags are electronically programmed with unique information. The tag is paper thin, flexible and approximately 2"x 2" in size which allows it to be placed inconspicuously on the inside cover of each book in a library’s collection. It consists of an etched antenna and a tiny chip which stores vital bibliographic data including a unique ID number to identify each item. This contrasts with a barcode label, which does not store any information, but merely points to a database.

3.2 Readers or Sensors

These components are available in various shapes and sizes to suit respective applications within the library, and are often integrated into one enclosure for that specific purpose i.e. patron self check-out machines and inventory readers. The reader powers the antenna to generate an RF field. When a tag passes through this RF field, the information stored on the chip is decoded by the reader, and sent to the computer system or Central Server which in turn, communicates to the Library Information System. The architecture of RFID functioning can be understood from the following Figure 1.

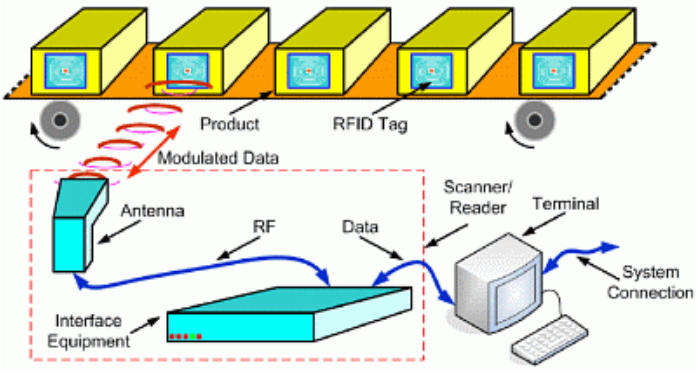

Figure 1: Functioning of RFID System

3.3 Server/Docking Station

The server is the heart of some comprehensive RFID systems. It is the communications gateway among the various components. It receives the information from one or more of the readers and exchanges information with the circulation database. Its software includes the APIs - Applications Programming Interface, necessary to interface it with the automated library system.

4. Benefits of RFID Systems

- The use of RFID in Charging/discharging reduces the amount of time required to perform circulation operations and significant time savings are attributable to the facts that information can be read from RFID tags much faster than from barcodes and that several items in a stack can be read at the same time. . The time savings are less for charging than for discharging because the time required for charging usually is extended by social interaction with patrons. For patrons using self-charging, there is a marked improvement because they do not have to carefully place materials within a designated template and they can charge several items at the same time. Patron self-discharging shifts that work from staff to patrons. Staff is relieved further when readers are installed in bookdrops.
- RFID security and the tracking of materials throughout the library that overcomes the problem of theft in the library. It is a hybrid system that uses for security and RFID for tracking, but handles both simultaneously with a single piece of equipment.
- The readers of the RFID system are highly reliable, which that almost 100 percent detection rate is possible using RFID tags.
- RFID systems encode the circulation status on the RFID tag. This is done by designating a bit as the “theft” bit and turning it off at time of charge and on at time of discharge. If the material that has not been properly charged is taken past the exit sensors, an immediate alarm is triggered. Another option is to use both the “theft” bit and the online interface to an automated library system, the first to signal an immediate alarm and the second to identify what has been taken.
- A unique advantage of RFID systems is their ability to scan books on the shelves without tipping them out or removing them. A hand-held inventory reader can be moved rapidly across a shelf of books to read all of the unique identification information. Using wireless technology, it is possible not only to update the inventory, but also to identify items which are out of proper order.
- RFID tags last longer than barcodes because nothing comes into contact with them. Most RFID vendors claim a minimum of 100,000 transactions before a tag may need to be replaced.

However, the RFID Systems are prone to criticisms for the following reasons. They are

- The major disadvantage of RFID technology is its cost which may cost $2,500 to $3,500 or more each; a server costing as much as $15,000 may be required and the tags cost $.60 to $.85 each. While the cost of tags comes down to $.50 or less.
- There is a chance to defeat the RFID system by wrapping the protected material in two to three layers of ordinary household foil to block the radio signal.
- It is also possible to compromise an RFID system by placing two items against one another so that one tag overlays another. That may cancel out the signals. This requires knowledge of the technology and careful alignment.
- If the tags are exposed to the users, then there is possibility of removal of exposed tags and however this problem can be overcome, by inserting the RFID tags in the spines of all except thin books. It can also imprint the RFID tags with its logo and make them appear to be bookplates.

5. Conclusion

RFID (Radio Frequency IDentification) is the latest technology to be used in library theft detection systems. Unlike EM (Electro-Mechanical) and RF (Radio Frequency) systems, which have been used in libraries for decades, 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, inventory and handling of materials. It is up-to the library professionals to understand its significance and thereby make sincere efforts to adopt the RFID technology to build the image of libraries in rendering effective technology-mediated services to the users.

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