APPLICATION OF RFID IN LIBRARIES FOR PHYSICAL INFORMATION SECURITY - A VIEW

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Abstract

New technologies have always been of interest for libraries, both for the potential of increasing the quality of service and for improving efficiency of operations. In the era of globalisation and liberalisation and with the advent of hi-technologies, the whale world has been condensed in a very small frame. With enormous knowledge explosion, the need to quench the thirst of information cannot be over emphasized. Barcode made inventory tracking easier, but they have their disadvantages. For starts each barcode has to be read in individually by the reader. If an entire well stocked information Centre needed to be checked in to a computer, it could mean several hours of work. Furthermore, the basic barcode is just a tag with data printed on it, and this data can't be updated. Except, of course by sticking another barcode over it. Where Radio Frequency Identification (RFID) tags come in takes asset tracking to the next level, with smart intelligent tags embedded in the package, the information on the tag can be scanned and updated automatically by readers. RFID married with today's enterprise resource planning solutions, may soon be the next big thing in information management. The technology provides an automated method to collect product or transaction information. The RFID system works using "smart" tags, with inbuilt silicon chips that store data, a reader that scans information from the tags, and the infrastructure to store and analyse the data. This present paper will give you an understanding of how technology can impact on our libraries.

1.   Introduction

Strategic We just can't beat a great idea. The basic barcode, or the universal packaging code (UPC), first introduced in early 1970s, is one such. UPS bar coding was the first standardized product identification system. It's simple and easy to implement with no effort, you can barcode every thing from groceries to books and cloths. The white and black bars require just a quick scan to update the status on the inventory tracking system. The idea is to allow manufacturers; wholesalers and retailers track products and shipments. Whether it's a super market checkpoint line or your local British Council Library, barcodes have found use in all kinds of places.

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 reader's far optimum utilization of available resources. So libraries have been seeking technological aids to improve their customer 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. Further libraries began using RFID systems to replace their electro-magnetic and bar code systems in the late 1990s.

2.   RFID is future of Barcoding (NANO Barcodes)

Nano bar coding is a new way to encode information on the sub micron scale. DNA and antibodies in blood can be bar-coded. Micro-scopic gold and silver stripped rods can be attached to biologi-cal molecules. When viewed under blue light the gold and silver stripes create barcode like and dark patterns since silver is more reflective than gold. RFID radio waves are used to automatical-ly identify people and objects. It consists of a microchip and an antenna. Both chip and antenna together form the RFID tag RFID has advantages over barcodes such as the ability to hold more data, the ability to change the stored data as processing occurs and is very -effective in harsh environment where barcode labels won't work. Some of the applications of RFID include animal identification, security access, anti theft systems, air car tracking and railway car tracking.

An increasing number of companies in a variety of markets worldwide are embracing RFID technology to increase quality and quantity of data collection in an expeditious manner, a feat not always possible with bar-coding systems. The technology's enhanced accuracy and security makes it an ideal data collection platform for a variety of markets and applications, including healthcare, pharmaceutical, manufacturing, warehousing, logistics, transportation and Information Management System.

3.   Components of RFID System

An RFID system comprises three components; a tag, a reader and an antenna.

a.   RFID Tag

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.

b.   RFID Reader & Antenna

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, 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 PC or central server, which in turn, communicates to the Library Information System.

RFID systems tags are designed to operate at a number of designated frequencies, depending on the application requirements and local radio-frequency regulations:

- Low Frequency (125kHz);
- High Frequency (13.56MHz);
- Ultra High Frequency (860-960MHz);
- Microwave (2.45GHz)

4.   Usage of RFID in Libraries

- For inter library loan safeguarding an RFID tag from one library shall be   readable and usable in other libraries
- An RFID application shall have a standardized interface to any library system

- To ensure independence of suppliers RFID tags shall be available from several sources

- To ensure backwards compatibility RFID tags shall use the same identification numbers as used on present barcode systems

- The library RFID applications shall comply with existing international standards.

RFID tag that would actually work during inter-library loan they're thinking ahead over there. So, the working group decided to develop a data model for each tag that would work for all library purposes. They came up with a model that includes space on the tag for the following mandatory pieces of information. RFID improves library workflow, staff productivity and customer service with these attributes. However, the ability to conduct inventory counts without removing a single book from the shelf is what really separates RFID from preceding technologies such as barcodes.

Type of usage :

- In acquisition: Item has not been entered into the library inventory yet. It cannot be circulated.

- Item for circulation

- Item not for circulation

- Discarded item. Item is discarded and permanently removed from circulation.

Well, as we move forward with RFID tags in our books, our shelves are becoming digitally aware of what is on them…and where. When our stacks become networked, that network is accessible. When a patron needs to know where a book is located the librarian can pull up a "map" of the stacks and print out directions to the exact location of the book - even if it is out of place! Need more help? What about embedding Label of Encoding Data (LEDs) into the shelves of the stacks. LEDs that are network controlled. LEDs that can be selectively set to blinking in a certain color or pattern as the patron approaches with his or her RFID-enabled library smart card.

5.   Effective Solutions

RFID is claimed to provide cost-effective solutions to many of the key issues facing most libraries:

- Annual stock taking

- Rapid checking that books are shelved in the correct area

- Searching for specific items using a scanner

- Self check-out of items

- Self-return of items

- Security

- Library membership cards

The concept of RFID can be simplified to that of an electronic barcode. First emerging in the 1980s, RFID was primarily used to track objects in industrial environments where barcodes were unable to sustain the harsh surroundings. Today in 2005, RFID is being used to authenticate official memorabilia, track proprietary assets, automate access control and, since the late 1990s, manage inventory and theft in libraries. Technological applications and privacy implications of RFID Tags in libraries. RFID readers

would replace the bar code laser scanners now in use. New security gates would alert staff when someone attempted to remove an item from the buildings without first checking it out and would identify the item being removed. Under this system, patrons would be able to check out their own library materials instead of waiting in a check-out line. That would free up library staff for other duties.

i.   Popularity of RFID:

The popularity of RFID will come not only from a technology 'pull up' from the top but also a 'push up' from the bottom - from bar coding itself. Bar coding is a line-of -sight (LOS) technology that is self-limiting as compared to RFID that is NLOS. Bar coding is far more human resources intensive than RFID. RFID tags can be used for status control as well as for security check. One person, on an average, can equip 10,000 items with RFID tags within a month. RFID affords self-checkout and automatic book return. The released human resource can be deployed in more gainful and creative work like retrospective conversion speeding up library automation, keyword preparation, statistical research on borrowing patterns to guide purchase policies among others. With some libraries in Indian like IISc's JRD Tata Memorial Library, ISRO and NAL in Bangalore launching pioneering experimental RFID systems, the country is in a good position to launch projects like the one proposed below.

By now it is clear that RFID middleware working on the edge of the network is at the center of the RFID evolution. Basic RFID middleware moves data to the point. of transaction and has the core function of data and device monitoring and management. It extracts data from the RFID reader, filters it, aggregates the information and routes the data to data warehouse management system or service execution system (SES). There are equivalent formulations in terms of the requirement, operation, and management of a library.

Such a middleware will have to address at least the following in the library context: concurrent control over multiple users, directory services, initiation of processes on different computers, data and device monitoring, remote data access session management, termination of local and remote processes, security and integrity, buffering I/O activity, event data management, event recognition, support read/write devices, create detailed audit trails and task management. Any company or organization in India that develops such a middleware before mid 2006 will have good chance of commercial success with library RFID.

ii.   Advantages of RFID:

Libraries are suffering from budget shortfalls as never before. With cuts to state and local governments, it is difficult for libraries to keep the library staffed and open. RFID is seen as a way to address the staff shortages (Flagg, 2003). Self-check systems have become very popular with both patrons and staff. RFID self-check systems allow patrons to check-in or check-out several, rather than just one, books at a time. Self-check systems reduce the number of staff needed at the circulation desk. The San Francisco Public, Berkeley Public, and Santa Clara City Libraries all report that reduction of RSI injuries is one of the reasons they have implemented, or are considering implementing, RFID systems (Molnar, 2004; Santa Clara City Library, 2004, Flagg, 2003).

With RFID-enabled tools, inventory-related tasks can be done in a fraction of the time as with bar code readers. A whole shelf of books can be read by the reader with one sweep of the portable reader which then reports which books are missing or misshelved. For archives handling sensitive materials, the ability to inventory items without handling them is an additional benefit. Sorting can be accomplished automatically with RFID. As books are dropped into the book drop, the reader reads the tag and uses the automatic sorting system to return the book back to the shelves, the stacks or the hold area.

Security is another aspect of library operations that may be greatly improved with RFID-based security systems. Rather than purchasing additional tags for security, a single tag can be used for identifying items and securing them. As patrons leave the library, the tags are read to ensure that the item has been checked out. Librarians also report that lost or hidden items are more easily retrieved using the portable readers. At the session, "Tiny Tracker: The Use of RFID Technology by Libraries and Booksellers" (ALA Annual Conference, 2004, Orlando), Karen Saunders of Santa Clara City Library

iii.   Disadvantage of RFID:

The main disadvantage now is the cost of tags: silicon chips with an etched circuit and main antenna that transmit data to a reader. To reduce tag costs (as well as size), R&D is concentrating on alternatives to silicon chips like the use of inherently conductive polymers (ICPs) to print circuits and antennas (or even fabricate chips and print circuitry) on flexible substrates like polyethylene terephthalate, polyethylene naphthalate. (PEN), polyimide and even paper. The polymers are usually polythiophene and pentacene, aromatics with a double-conjugate structure. Such organic tags many eventually cost a cent a piece or less. There are also a few other feasible competing projects, the commercial success of anyone of which may bring about tagging individual items like books on a large scale.

iv.   RFID Security systems for libraries:

Bar codes cannot be the signal feed for anti-theft systems so the usual combination is to have a combination of bar codes for identification, and some electromagnetic (EM) based anti-theft system. In self service stations the identification system must interact with the anti-theft system so that items have the correct EM state after the circulation transactions, i.e. checked out item must be deactivated, and returned items activated. In my experience these interactions are still unreliable and lacking in functionality.

As for the signal source for the anti-theft system, i.e. the magnetic stripe, label, or rod, there is a danger of a technology (or system) trap: once the magnetic device is attached to the library item it should, ideally, not be possible to take it away. This, however, makes it difficult to switch to another EM security system, if the signal source cannot be used in the alternative solution. I my experience such interoperability is rare. It is also possible that the option of "ignoring" old magnetic devices (and just add new ones) is not realizable since remaining old devices can interfere with the new ones. In practice it is impossible to remove or exchange, for example, magnetic rods glued into the spine of a book, so the system choice seems to be irreversible.

v.   Role of Librarians :

RFID technology introduces an ethical dilemma for librarians. 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 workers. And yet, the technology introduces the threat of hot listing and tracking library patrons. Librarians 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 track able 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 RFID 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 RFID follows best practices guidelines consistent with library values.

vi.   Some Guidelines for Library Use of RFID

Because libraries are implementing RFID systems, it is important to develop best practices guidelines. Given the immature state of RFID implementations in libraries, best practices guidelines are very much in flux because libraries are just now beginning to understand the implementation issues, shortfalls with the technology and the greater privacy concerns. For the library considering RFID, Molnar (2004) suggests that libraries ask potential vendors whether they plan to develop a system that allows for rewriting tags on every checkout and then restoring the ID at check-in. This process eliminates the problems associated with storing static data on the tags and eliminates the problems of tracking and hot listing. The ability to write new data to the tags during circulation requires the library to use read/write tags capable of supporting all the check-ins and check-outs the item will require over the lifetime of the item. The library will need to determine how many writes will be required and then identify a vendor who will support such a protocol.

When preparing an RFP for RFID technology, Cavoukian recommends including:

- The institution's obligations with respect to the notice, access, use, disclosure, retention, security and disposal of records;

- A requirement that the institution maintain control of, and responsibility for, the RFID system at all times;

- The designation of a senior staff member to be responsible for the institution's privacy obligation and its policy.

Incorporating and expanding upon thee efforts of Berkeley Public Library, San Francisco Public Library, Cavoukian, (June 2004) and the work of the Privacy Rights Clearinghouse (Givens, 2004), the author proposes the following best practices guidelines for library RFID use:

- The Library should be open about its use of RFID technology including providing publicly available documents stating the rationale for using RFID, objective of its use and any associated policies and procedures and who to contact with questions

- Signs should be posted at all facilities using RFID. The signs should inform the public that RFID 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.

- Only authorized personnel should have access to the RFID system

- No personal information should be stored on the RFID tag

- Information describing the tagged item should be encrypted on the tag even if the data is limited to a bar code number

- No static information should be contained on the tag (bar code, manufacturer number) that can be read by unauthorized readers

- All communications between tag and reader should be encrypted via a unique encryption key

- All RFID readers in the library should be clearly marked

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

6. Conclusion

RFID technology promises to change our world. It has the capability of making our personal lives and our work lives in the library more convenient. However, every new technology comes at a cost. In order to remediate those costs, efforts must be undertaken to guide its development and implementation. Most of the libraries are not yet implemented RFID systems. RFID would replace the barcode laser scanners now in use. New security gates would alert staff when someone attempted to remove an item from the buildings without first checking it out and would identify the item being removed. Under this system, patrons would be able to check out their own library materials instead of waiting in a check-out line. That would free up library staff for other duties. Libraries should work to ensure that RFID products are manufactured and used according to well-established privacy principles. Not only are libraries one of many industries who can benefit from the safe implementation of RFID systems, but also because RFID represents the start of a slippery slope to ever greater loss of control over our personal information.

7. Referance

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