

Use of RFID technology in Libraries: A perspective from the Catholic University of Eastern Africa (CUEA), Nairobi



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Objectives of the paper

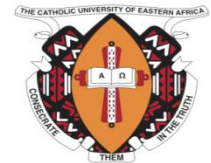


The paper explores:

1. Potential of RFID technology in facilitating cost-effective and efficient library operations: Experiences gained at the CUEA.
2. Key challenges experienced in the in the use of RFID in libraries
3. Exposes some issues that must be put into consideration in successful adoption RFID technologies in libraries

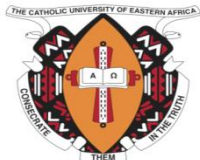
Outline of the paper

1. Introduction
2. Principles of operation of RFID technology
3. The benefits of implementation
4. Challenges in the use of RFID
5. Key Issues towards success
6. Conclusion and recommendations



Introduction

- ❑ RFID Technology is the latest technology to be used in libraries to ensure security and facilitate innovative services.
- ❑ It is recognized as an ideal technology for managing ICT-driven academic library of the 21st century

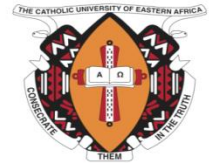


Introduction

□ Definition

❖ (RFID) technology is a wireless technology that uses radio-waves to:

1. Automatically detect,
2. Track,
3. Identify, and therefore
4. Manage various objects and people that e.g. library books and merchandise (Ayre,2010; Juels, 2005).



❖ It works by transmitting data stored in a portable device called a **RFID tag**, to **an RFID reader** and onwards to an **application system** to execute a particular **function**

Introduction

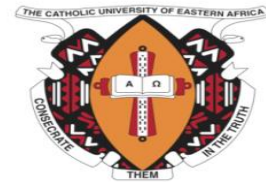
- Two years ago the Catholic University of Eastern Africa (CUEA) identified and made a decision to

implement RFID technology in order to improve efficiency and cost-effectiveness in library services



RFID technology: Principles of operation library setting

- RFID technology consists of the following:
 - ❖ RFID tags (tags / Security Tags)
 - ❖ RFID Readers
 - ❖ RFID Tagging machine
 - ❖ RFID Software
 - ❖ RFID-based components e.g.
 - ❑ *Inventory scanner*
 - ❑ *Access control gates (& exit RFID Security Gates)*
 - ❑ *RFID Smart cards*
 - ❑ *RFID self check stations, & staff work-stations, etc*



RFID TAGS (TRANSPONDER)

- ❑ In a RFID enabled library RFID tag replaces the barcode with a micro-chip
- ❑ Has an internal memory which can be encoded with an identifier of a library material (e.g. barcode)
- ❑ Attached to an object (e.g. book) & used to identify the object when the object when it is brought close to a RFID reader for processing purposes



RFID TAGGING SYSTEM/STATION

This is used to print on the RFID tag information about the library material (identifier e.g. barcode)



RFID READER /INTERROGATOR

- Consists of a transmitter, receiver, antenna and a decoder
- It communicate with RFID tags, identify them and read (receive) data stored in the tags
- Therefore it provides a contact data link stored which means transactions can be performed on object e.g. issuing a book without opening it.
- Line of sight is not necessary for reading tags



RFID READER /INTERROGATOR

- Readers in library systems are used to application systems with RFID- equipment e.g.
 - ❖ Tagging/conversion station
 - ❖ Staff work stations & patron self-check stations
 - ❖ Access control & Exit gates
 - ❖ Inventory scanners
 - ❖ Multifunctional printers, etc.



RFID SOFTWARE

- Server-Based RFID Software

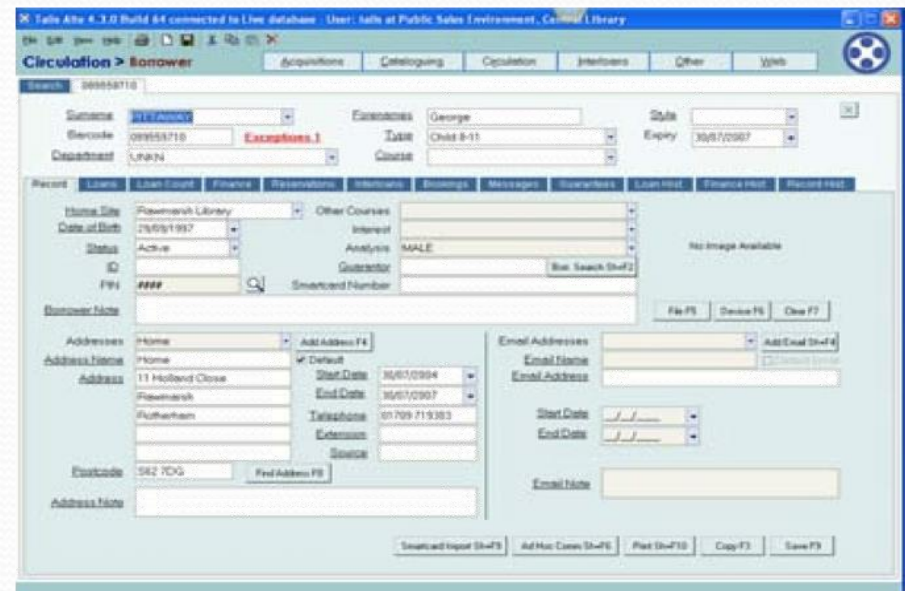
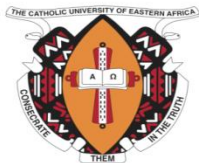


Image courtesy of Talis

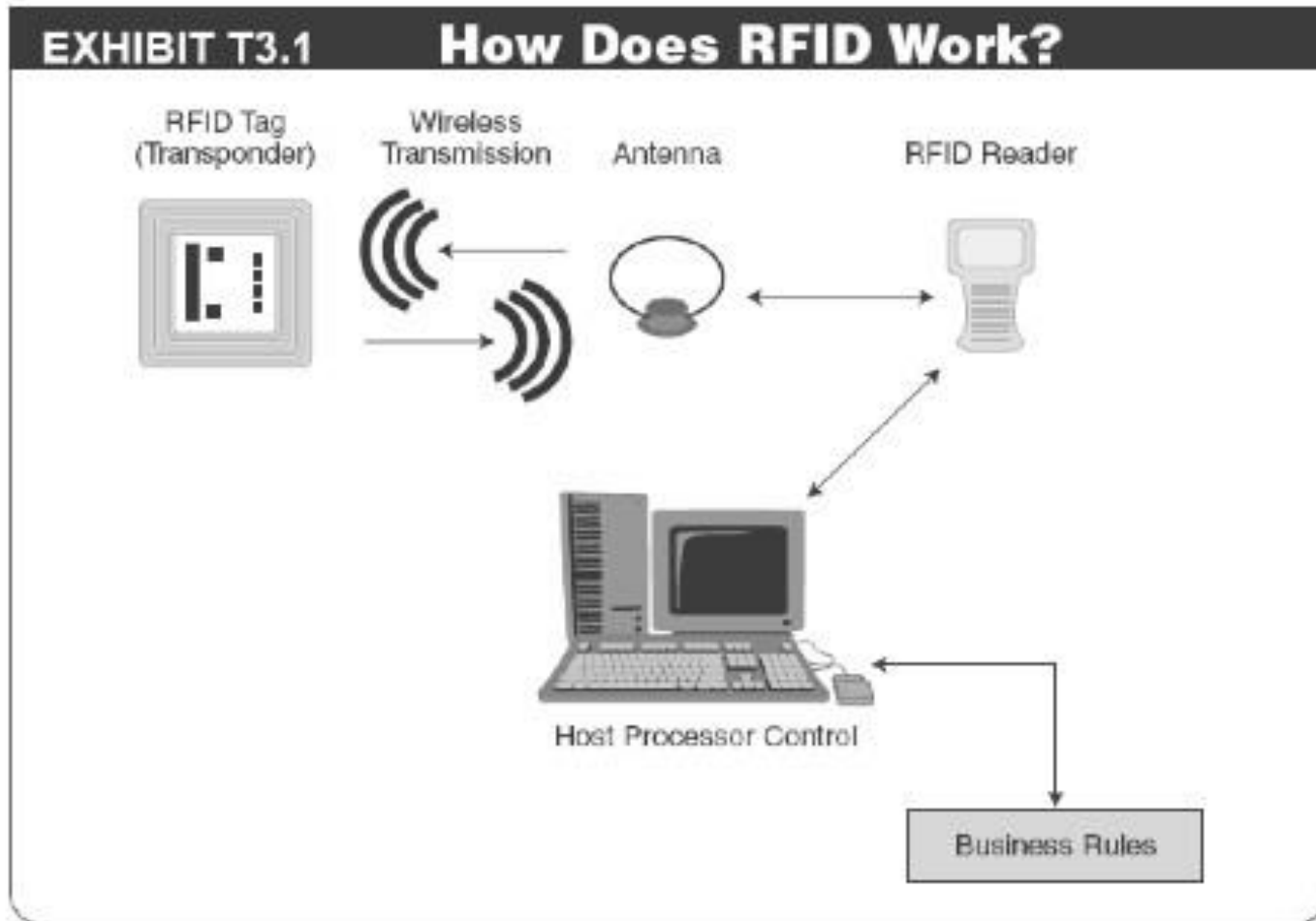
RFID TECHNOLOGY: PRINCIPLES OF OPERATION

RFID Software

- Most critical component of RFID system
- Works using the data of patrons and reading materials which is stored in the Library Management System (LMS) database, etc.
- Functions
 1. Provides an interaction between the data stored in the LMS, and specific RFID-based components each
 2. Instructs the RFID components to perform tasks as required by LMS user.
 3. Components perform the specific transactions using the data and register the changes or results in the database



RFID SOFTWARE (HOW IT WORKS)



Source: Drawn by E. Turban.

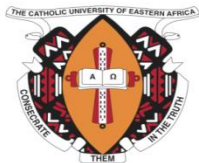
RFID STAFF WORK STATIONS

- In *staff mode of operation*, they are used to *issue, return & renew borrowed library* items.
- The reader is used to scan information from the RFID tag and send to the LMS for processing
- RFID Antenna transmits power and data from and to the RFID tag.
- The antenna connects to a reader that communicates with the self check software to read and write information from to the RFID tag



SELF CHECK IN/OUT STATION

- Used by patrons to issue library materials to themselves as well as return .
- Using these stations patrons can also check their library accounts for borrowing trends as well connect to the E-payment system to clear their overdue fines



RFID-BASED PATRON CARDS

- Each has a unique RFID number tagged with personal details in the patron database . They also combine a mag-strip & a barcode for multiple use such as banking



INVENTORY SCANNER

Used of shelves to capture inventory of materials without touching them this is transmitted to server using wireless technology to identify missing/mis-shelved books



RFID ACCESS CONTROL GATES

Provides access to library by library patrons



RFID EXIT GATES

Used to detect materials that have not been pro
issued



PAYMENT SYSTEM CASH TOP-UP STATION

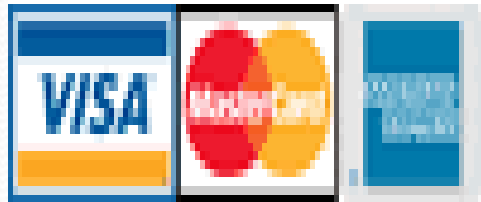
Key features and benefits

- Accepts Money in varies denominations
- Notes -Ksh.100,200,500 and 1000
- Swipe card system
- Adds value to your student account instantly.
- Multi Use: pay fines /photocopying/ printing/catering/infirmary charges etc.



WEB-BASED PAYMENT SYSTEM

Linked to Banking systems



Library
E-payment
Centre

RFID-BASED MULTIFUNCTIONAL PRINTERS

Seamless academic support services: photocopying, printing & scanning of docs



CATERING AND INFIRMARY TILLS: Applications beyond the library

EMOS TILL v1.0.9 [1234] - Main Menu

Fish Course	Meat Course	Vegetarian Main	Steak	Half Chicken	Lamb
Chips	Roast Potatoes	Mashed Potato	Boiled Potato	Rice	Potato Wedges
Peas	Broccoli	Carrots	Cabbage	Beans	Sweet Corn
Apple Pie	Black Forest Gateau	Death by Chocolate	Tiramisu	Cheese Cake	Ice Cream
Apple	Banana	Orange	Pear	Grapefruit	Grapes
HB Pencil Single	HB Pencil Box 10	Southern Comfort	Brandy	Red Wine Glass	White Wine Glass
A4 Pad	A3 Pad	Scotch	Beer Half	Tea	Coke
Hole Punch	Ruler	Bloody Mary	Beer	Misc Sale	Drinks Menu
£10 Phone Card	£20 Phone Card	£5.00 Account Credit	£10.00 Account Credit	Stationery Menu	Main Menu

Log Off

X Reading

Receipt is ON

No Sale

Clear Last

Clear All

Card

Cash

Item	Price £
Chips	£1.25
Steak	£1.30
Peas	£0.50
Broccoli	£0.50
Apple Pie	£1.00
Beer	£3.40

6 **£7.95**

£10.00

1	2	3	£5.00
4	5	6	£10.00
7	8	9	£20.00
Clear	0	00	X

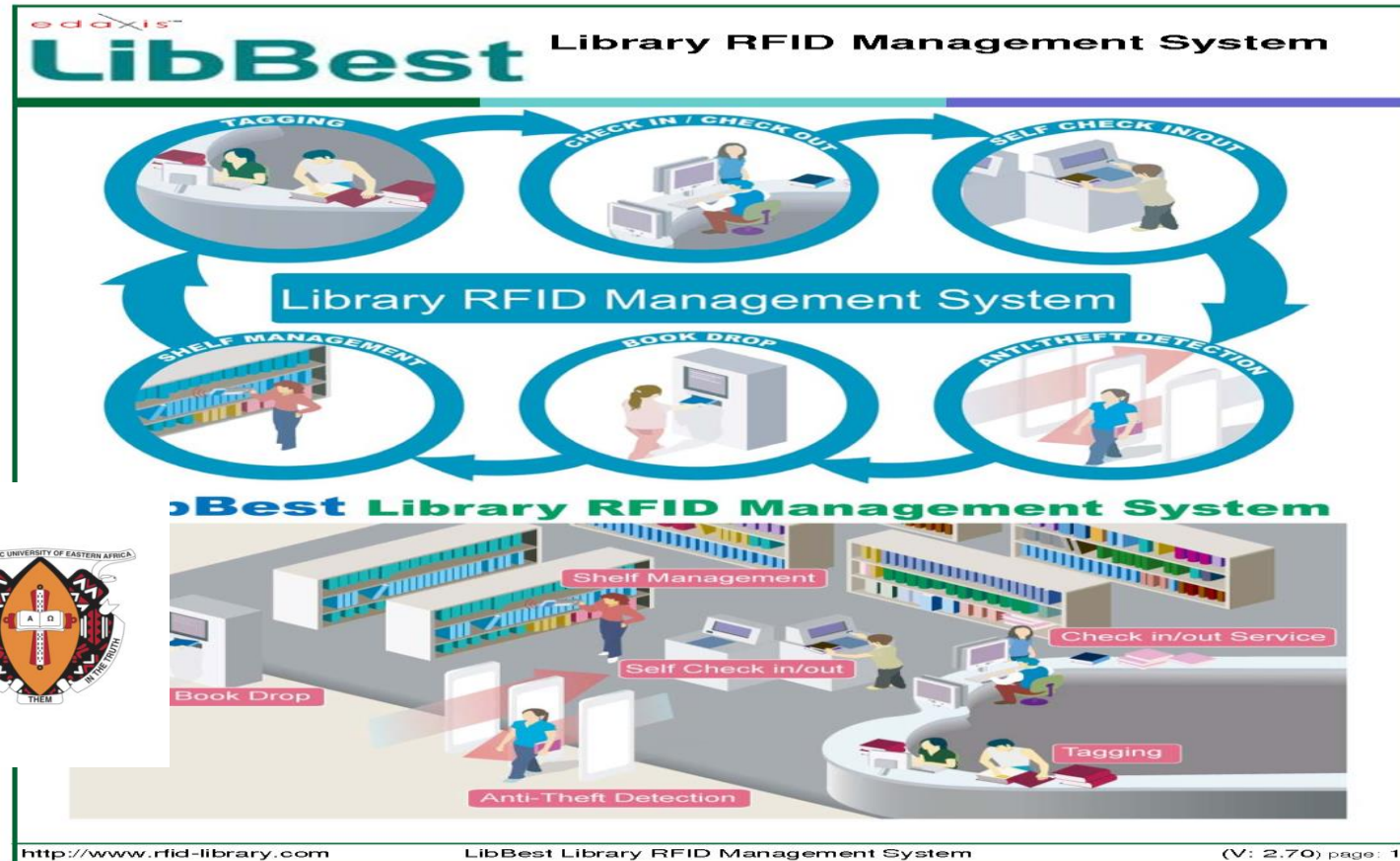


Automated Locker Rooms

- Automated Locker Rooms



The infrastructural set up for RFID-based library system



http://www.edaxis.in, Contact: +91-9312533852, +91-9711433853, Fax: +91-11-66173698, E-Mail: info@edaxis.in

RFID Set up at CUEA

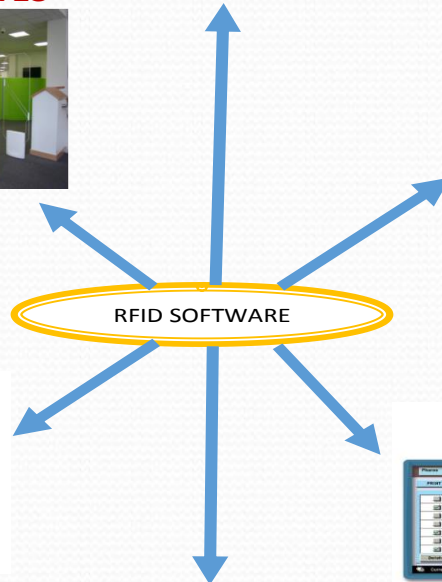
INVENTORY SCANNER



RFID LOCKERS



RFID ACCESS /EXIT GATES



E-PAYMENT SYSTEM



RFID MULTIFUNCTIONAL PRINTERS



SELF-CHECK STATIONS

Benefits in using RFID technology

1. Efficient inventory (asset) management of library collection (books, journals, and multimedia items): Accurate stocktaking, valuation of the collection
2. Improved security for in the library through facilitating the use of:
 - Library access control RFID enabled patron cards & gates
 - RFID exit gates which are linked to the circulation services and detect materials that have not been properly borrowed
 - Centralized monitoring base for all transactions e.g. books leaving the library



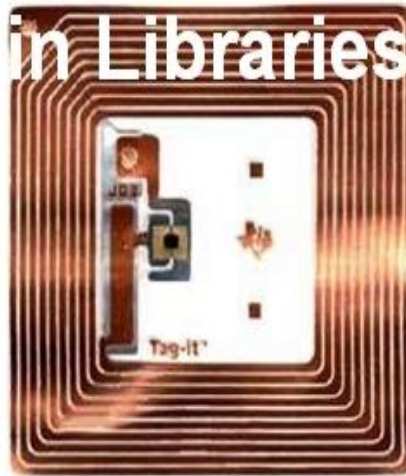
Benefits in using RFID technology

3. Efficient library circulation services (borrowing and returning of library resources) to library patron:
 - Reduced queues at the front desk as patrons issue themselves with books at the self-check stations
 - Efficient patron access of library materials through efficient shelving and re-shelving of books and journals
 - Accurate records of borrowing, retrieval of sources location missing/mis-shelved materials, journals and books.



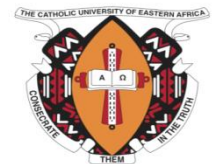
BENEFITS IN USING RFID TECHNOLOGY

RFID (Radio Frequency Identification) technology in Libraries



Benefits in using RFID technology

4. Facilitate innovative use of ILS to provide efficient library services e.g.
 - ❖ Payment of library dues (e.g. overdue fines) done through RFID-enabled payment system connected to banking systems & mobile money services for top up
 - ❖ RFID Self-check-out system assist patrons to issue themselves with library materials
 - ❖ Cashless academic support services (e.g. printing and photocopying, bookshop, infirmary, cafeteria)



Benefits in using RFID technology

5. Improved operational efficiency/Strategic management through use of appropriate statistical reports
 - ❖ Easy to collect library usage utilization statistics for the books/journals and user categories, most used resources
 - ❖ Easy to acquire information about the patron and provide personalized service: facilitate management of data about individual patron data and their use of the collection,
 - ❖ Has reduced the demand for manpower by making the library more reliant on technology rather than on manpower e.g *Automated baggage lockers*
 - ❖ Staff have being released to perform more intellectually involving and critical functions e.g. Information li raining & Research consultation



Challenges / Negative experiences

1. Maintenance costs for RFID technology much higher than barcodes and electro-magnetic strips
2. Tags can be removed by vandalism since they easier to find than electro-magnetic strips
3. Removal of exposed RFID tags from books (vandalism) may be attempted to theft of books from the library
4. Tag detection rate is not 100%
5. Concerns over invasion of personal privacy.
6. Requirement for well trained ICT personnel to maintain RFID technology



Considerations for successful implementation of RFID technology

1. There is need for a stable, integrated library system (ILS) which supports all the functionalities of RFID
2. Need for RFID-based operational components such as multifunctional printers to use RFID innovatively
3. Address privacy concerns of patrons
4. Need for adequate process planning
5. Training of staff and patrons
6. Adherence to standards and carefully right software and hardware with good specs



Conclusion and Recommendations

- ❑ RFID is fastest and most beneficial technologies being adopted by business today
- In libraries it can improve operational and strategic management efficiency
- In the long-run lead to better return on investment (ROI)
- These benefits result in higher customer satisfaction
- For best results key issues such as technology, staff and patron, power supply and privacy concerns need to be addressed



Comments!

Questions!