

Dipl.-Bibl. (FH) Stefan Niesner

RFID in Libraries

Presentation at the ISNM International School of New Media

14/07/2004

Overview

- 1. RFID and How It Works
- 2. Attributes
- 3. Components
- 4. Applications for Libraries
- 5. Benefits
- 6. Vendors
- 7. Libraries Using RFID
- 8. Current Problems
 - Costs
 - Standardization
 - Data Protection / Privacy Rights

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Overview

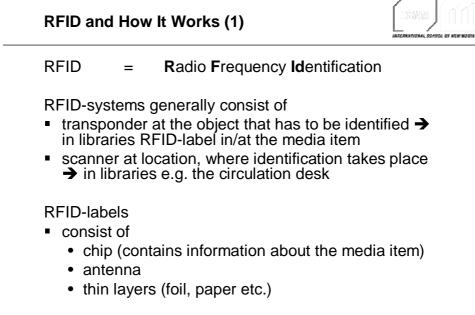


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RFID-labels

- are passive, i.e.
 - they don't have their own battery
 - energy and data transmission is only possible within a scanning field (electro-magnetic waves)
- transmit their data to a scanner on a frequency of 13,56 MHz and simultaneously get energy by inductive coupling

Valid standards for transmission of data

- ISO 15693
- ISO 18000-3 (currently in final draft stage)

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RFID and How It Works (3)



- exact identification of every physical unit as media item
- identification by an unique number (item number)
- item number is machine readable on a data carrier that is affixed to the media item → nowadays a label is used
- machine readable data carriers: OCR-character, barcode (both used since approx. 1968) or RFIDlabel (used since 1998)

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Anti Collision Function

scanner is able to read simultaneously more than one transponder

Changeability of Data

- data can be changed
- regulation by a vendor-dependent data format

Data Transmission from Distance

- no direct line-of-sight needed
- transmission through non-metallic material is possible

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Components (1)
Scanners can be subdivided according to the range of their scanning fields into
scanners with large range (approx. 45 cm)
two or more parallel lined up antennas
application: entrance/exit gate for theft detection
scanners with medium range (approx. 30 cm)

- flat antenna of laptop-size
- application: staff and self service stations, returning machines, sorting machines, book processing station
- scanners with short range (approx. 10 cm)
 - mobile scanner, often plugged to a PDA
 - application: inventory

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RFID-labels

- can be affixed to nearly all types of library material
- special labels for CDs and DVDs
- are the most expensive component of a RFID-system (in comparison to barcodes)
- have chips with actually 7.000 bit capacity

Application Server and Library Software

- Data interchange with TCP/IP-based protocol (SIP2, SLNP, NCIP)
 - directly → library software
 - indirectly → application server

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Circulation

- core application, especially self service stations
- several items can be processed simultaneously (stack processing)
- no positioning or opening necessary (multimediapackages)
- Iending of the item is written to the user account and the securing bit on the chip is deactivated
- self processing of nearly all types of media for patrons
- additional check-in possibilities (24-hour-check-in stations, often with sorting machines)

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Applications for Libraries (2)

Theft Detection

- normally separated elements for media identification and theft protection integrated in just one label
- securing bit on the chip can be de-/activated
- entrance/exit gate works like a normal, well-known EM exit gate
- RFID-system can register which items have been stolen
- But: "there never has been and never will be an impregnable or unbeatable security tag - the beast does not exist" [Source: Smith (1999), p. 48]





Inventory

- items can remain in the bookshelf during inventory
- mobile scanner registers every media item
- comparison in-time or afterwards with library database gives information about
 - missing,
 - wrong placed or
 - · incorrectly checked-in media items.
- impossible repair control of media items

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Applications for Libraries (4)

Intelligent Shelf / Smart Shelf

- Nedap Intelligent Book Shelf
 - "allow[s] you to monitor articles taken out of, or placed back on the shelf on a (central) monitor the minute they are taken or returned!" [Source: Nedap (2004)]
 - "you are able to see what articles are often lent out, and what articles are not" [Source: see above]
- Vatican Library
 - "the shelf has its own RFID-transponder that contains a list of all books that should be placed on one board" [translated from Heise-Newsticker (2004)]





Applications for Libraries (5)

Contact-less Chip Card as Library Card

 University of Göttingen (Germany): from the winter semester 2004/05 as student identity and library card

Book Transportation System

- transponders affixed to transport bins
- new building of the main library of the Technische Universität Berlin (Technical University)
 - June 2004: technical acceptance
 - October 2004: test operation, full operation planned from beginning of the winter semester

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Benefits



- faster circulation processes
- nearly no queues at the circulation desk
- additional check-in possibilities by check-in stations and sorting machines
- less routine work for the staff
- possibility for a periodical and easy practicable inventory

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Vendors

Theft detection with on/off-mode

- Bibliotheca RFID Library Systems (Switzerland) and ekz.bibliotheksservice (Germany)
- TAGSYS (France) and VTLS (USA)
- ST LogiTrack (Singapore)

Theft detection without on/off-mode

- 3M (USA)
 - theft detection by Tattle Tape (name of the magnetic stripe)
 - February 2004: the "One-Tag RFID System" without Tattle Tape is introduced
- Checkpoint Systems (USA)
 - chip isn't re-writeable, i.e. without securing bit, securing by passing-by method

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Libraries Using RFID (1)



Examination of

- Stadtbibliothek Siegburg GmbH (Germany)
- Public Libraries in Singapore
- University of Las Vegas Library (USA)
- Stadtbibliothek Winterthur (Switzerland)
- Städtische Büchereien Vienna (Austria)
- Stadtbücherei Stuttgart (Germany)

(Stadtbibliothek, Städtische Büchereien, Stadtbücherei = Public Library)

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Libraries Using RFID (2)

Reasons for Buying a RFID-system

- the introduction of a media securing system was originally planned
- to manage a frequent use by patrons
- possibility for introduction of self service stations
- reduction of labor intensive work for the staff
- getting the circulation process faster
- new building with larger floor space in comparison to old building but not more staff than before
- planning of a new building with a high grade of automation

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Libraries Using RFID (3)



Libraries in this European cities are using RFID (altogether 57)

Austria: Vienna Belgium: Gent, Leuven Denmark: Aarhus, Silkeborg France: Lyon Germany: Bad Homburg, Bergheim, Berlin, Bonn, Chemnitz, Dresden, Frankfurt/Main, Hilden, Krefeld, Kronberg, Mittweida, Plauen, Rostock, Siegburg, St. Augustin, Stuttgart Italy: Cologno, Cosenza, Cremona, Florence, Gorizia, Milan, Modena, Padua, Pavia, Rome, Sassari The Netherlands: Doetinchem, Eindhoven, Heiloo, Hoogezand, Utrecht Spain: Cadiz Sweden: Stockholm Switzerland: Baar, Frauenfeld, Rotkreuz, Winterhur, Zurich UK: Cambridge, Colchester, Glasgow, Lancashire, Leeds, Nottingham, Oxford Vatican

Other Countries (selection)

USA, Singapore Australia, India, Israel, Japan, Macau, New Zealand

[Source for Europe: Kandel (2004)]

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Current Problems (1)

Costs

- the costs for scanners and their operation are comparable to the costs of the barcode
- new costs for mobile scanners
- RFID-labels are expensive (prices are from 2001)
 - RFID-label: ~ US-\$0.60 US-\$0.90
 - barcode: ~ US-\$0.01 US-\$0.025
 - magnetic strip: ~ US-\$0,10 US-\$0,22
- in spite of an expected price reduction, a RFID-label won't reach the price level of a barcode label

Costs should always be seen in relation to benefits that are only made possible by new technology.

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Current Problems (2)



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Standardization

- ISO 15693 = independence on chip vendors
- library is dependent on the vendor of its RFID-system because of the data format
- different data formats
 - only item number and securing bit
 - additional data like e.g. signature or location
 - risk of storing unnecessary data like e.g. personal data of patrons
- possible solution
 - standardized data format
 - software that understands all used data formats

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Current Problems (3)

Data protection / Privacy rights

Critics say: "insecure RFID tags will permit inventorying of people's possessions and tracking of people via their possessions. These risks are especially great where books [...] are concerned, because both privacy and freedom of expression are at stake." [Source: Electronic Frontier Foundation (2003)]

Possible solutions for libraries

- to store a minimum of data on the chip
- no personal data of patrons on the chip
- data encoding: the chip should only be readable with the scanner in the library, where the item originally belongs to

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Thanks for listening!!!

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Sources (1)

All links were last visited on 11/07/2004.

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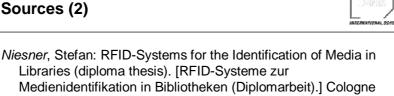
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