

GLOSSARY: RFID and Library related – terminology

AFI

Application Family Indicator: a memory block in the upper part of the memory of a chip, meant to determine and discriminate several application areas. For example; patrons with books should not cause an alarm in the supermarkets security system because the system should discriminate that the detected labels are for another application. Libraries may not have an application code in your country yet.

Some RFID-manufacturers (f.i. Dialoc ID, 3M & Bibliotheca) use the AFI code for security purposes. They have defined two AFI-values to indicate the status 'checked in' and 'checked out'. To the present there are no international agreements (or ISO standards) about AFI-coding.

Anti-Collision

Is a method to enable the detection of multiple labels simultaneously when in the detection area of a RFID reader. The anti-collision protocol also enables stackreading.

AVM

Audio Visual Materials. In broader sense often used for several digital media, including cd's, dvd's etc. For the 'tagging' of the AV materials there are different sorts of labels available; for cd's and dvd's the bulls eye label or the booster label for extended range, for audio cassettes a special format bulls eye label, and for video cassettes a special long format video label.

Backward compatible

Compatible with former generation systems.

Range

The detection area of a reader/writer tag where tags/labels are detected.

Bin

Collection container, stacking compartment, optionally on wheels.

Book-Drop

Check-in unit: book shute with incorporated scanner.

Booster

Amplifier. The read range of a label can be extended with the use of capacitors.

Check In

Check-in process

Check Out

Check-out process

Chip-Card

A card with a chip, containing at least an identification number, and mostly has extra memory to store fixed or variable data. The Dutch "Nationale Bibliotheek Pas" uses the so-called Mifare protocol.

CRC

Cyclic Redundancy Check: a powerful check of the validity of the data in a chip, by use of a checksum. The CRC can be 8 or 16bits (1 or 2 byte). During the reading of a data frame, the reader can calculate if the value of the CRC, as stored in the last byte(s) of the frame, is similar to the value of the read data blocks minus the CRC.

Data-Model

In some countries libraries have agreed with their umbrella organization to all use the same chip, which data should be stored in a chip and in what format. The agreed data model should be described in a Generic Set of Requirements RFID. The model always should carry fixed, obligatory data. Optional data may be stored in a free part of the memory but should always be stored in the same place and format.

The obligatory part should always carry:

Data Explanation

Data Model Identifier:	An ID for the version of the data model, as used in the chip.
Type Identifier:	Indicates if the chip is a patron identifier or an object identifier.
Object Identifier:	Unique number for an object in libraries. The release of new numbers should be coordinated by the umbrella organization.
Item Identifier:	Identification of the part of an object in a library.
Barcode:	The memory area where the barcode of a library can be programmed (used for the conversion of possessed assets)
Library Identifier:	Identification of the object owner (also see ISIL-codes).
Logistic Party:	Identification of the supplier of the object.
Logistic Number	The ordering number of the object (can be ISDN number)

Digital Library Assistant ®

Digital Library Assistant, in basic a handheld pc with reader/antenna, a mobile solution for search & inventory actions.

Downlink

Data transmission of the reader to the tag/label.

EAS

Electronic Article Surveillance: securing articles with the use of tags/labels, that cause an alarm when activated in security gates at the exit or entry of a building. The tags/labels can either be removed or deactivated by staff or automatically after valid registration in self service units.

EM strip

Electromagnetic security strip.

EPC

Electronic Product Code, an unique number for all items in the world. A combination of RFID and web server functionality that is monitored and managed by the international Auto-ID Center, launched by the famous Massachusetts Institute of Technology (MIT).

Frequency

RFID-systems use a part of the radio communication spectrum, officially assigned by each country.

Although it may vary in several regions in the world, a global classification can be made which frequency bands may be used:

- LF (low) (125 - 134 KHz)
- HF (high) (8 - 13.56 MHz)
- UHF (ultra high, 300 MHz - 1.2 GHz)
- Microwave (2.45 - 5.8 GHz)

The choice of frequency is depending on the application and the functional demands, as every frequency has its pros and cons and restrictions. Reading distance, anti-collision, environment (metal & moist) are to be considered. Library applications work typically with HF systems(13.56 MHz frequency, worldwide accepted). This frequency makes reading range up to ca. 1 meter possible, without having much detuning of moist. (so that labels cannot be shielded with a hand), also having excellent anti-collision available for multiple object reading.

Integrated EAS Security Function

RFID-labels with a specific developed security EAS bit, which can be switched on and –off via software.

Generic Set of Requirements

Document describing the data model for RFID in Public Libraries.

Hybride Circulation System

Mixed form of barcode, RFID and EM techniques which are used all together or in separated departments within one organization.

Interface

Connection between systems.

Also: Userlevel, f.i. the screens for users to operate software.

ISIL (ISO 15511:2003)

International Standard Identifier for Libraries and Related Organizations. Mostly umbrella organizations in countries are responsible for the management and issuing of ISIL codes.

ISO

International Standards Organization. The RFID-applications relevant in libraries are based on a frequency of 13.56 Mhz:

ISO 14443 (proximity cards) Standard, defining the communication for cards used for access and patron cards.

ISO 14443 is divided in 4 parts, all defining different aspects:

- ISO/IEC 14443-1:2000 Part 1: Physical characteristics
- ISO/IEC 14443-2:2001 Part 2: Radio frequency power and signal interface
- ISO/IEC 14443-3:2001 Part 3: Initialization and anti-collision
- ISO/IEC 14443-4:2001 Part 4: Transmission protocol

ISO 15693

RFID for item management. Defines the communication for applications with short or medium range (0,10-1mtr) and how to read/write in chips. Anti-collision is part of the protocol. Also defines the unique identification of RFID-tags.

ISO 15961/2

The standards 15961 and 15962 define protocols for both the application interface and the rules for encoding tags and labels.

ISO 18000-3

For item management the ISO 18000 family is the only important standard for the future.

- ISO/IEC 18000-1 Part 1: Generic Parameters for the Air Interface for Globally Accepted Frequencies
- ISO/IEC 18000-3 Part 3: Parameters for Air Interface Communications at 13.56 MHz.

The 18000-3 standard is backward compatible with ISO 15693, still the reference norm in libraries today.

Item Identifier

Library objects that contain more parts then one, should preferably tag all parts with a RFID label.

All tags of a media-object get the same object identifier, but are added with a 'item identifier' per part (also see: Data model). The structure is as follows:

Item Identifier Meaning

0100 One of unspecified number of parts

0101 Number one of object containing one item.

0103 Item number one of three parts in total.

Safer

Cd or dvd locking frame.

MIFARE®

Platform for smartcards developed by Philips that uses the ISO14443 proximity protocol. The Mifare platform is a worldwide used platform in more than 80% of all contactless smart cards.

National Library Card

Smartcard for public libraries.

Near Field Communication

Short range communication between reader and tags, mostly a strong requirement in the application.

Object Identifier

Unique number for a library object. The issuing of numbers mostly is coordinated and managed by the umbrella organization in countries.

Paystation ®

Payment terminal for all cash handling in libraries.

Paystations use SIP2 protocols for communication with the Library Management System (LMS)

Gates

Security antennas that activate alarms when active RFID-labels or EM strips pass through the antennas.

Privacy-aspects RFID

Lots of goods are tagged (even pets and humans) of which a gigantic stream of data (so called big data) can be collected to monitor our movements and whereabouts. Unauthorized persons with a reader next to a library exit could read the book identifiers of books you just borrowed. They could misuse data to steal your identity (' phishing').

In America more than in Europe, people worry about the future whereby the government, but also unauthorized people can collect data about individuals, the goods they buy, where they went, what they borrowed, etc..

To be prepared for social discontent the ALA (American Library Association) adopted an act, wherein privacy issues are respected, with regards to the use of RFID in and by libraries. It is an extension on the earlier Book Industry Study Group (BISG) resolution.

Proximity

Short Range: Near Field Communication. Tags or smartcards can only be read and programmed on short range, up to 10cm.

Reader

A transmitter/receiver, transmitting radio waves via an antenna and capable to receive and collect the data that a chip sends back, further to a computer application.

Retro fitting tags

Re-tag the total collection in a library with new RFID-labels. Mostly and simultaneously the old barcodes are converted into the RFID labels, and/or the database wherein the barcodes are attached to the titles,

Added with object identifiers in the chip (for instance to use pre-programmed labels).

RF Security

Article Surveillance System (EAS) that uses radio waves. In retail and in some libraries the most common frequency in use is 8,2 - 10.50 Mhz. Typical tag formats are the self-adhesive aluminum or copper foil antennas without chip with paper top. Libraries that use these kind of systems are having "bypass" processes where the books are routed outside the security gates. The labels cannot be switched on or off.

RFID

Radio Frequency Identification, the identifying of objects with the help of radio wave technology. A RFID-system consists minimal of one RFID reader, one antenna and transponders (tags). Every tag can be uniquely identified because of their unique number in the chip.

Bullseye Label

Round label with a hole in the middle, to be used for cd's and dvd's.

SIP

Standard Interchange Protocol: describes the interface protocol for data traffic to create a standard between a library management system and the peripheral equipment like self-service terminals, pay stations, readers, gates, etc. Libraries have the advantage that equipment becomes more or less plug and play and that in case of a change in library management system the peripheral equipment can migrate to the new system. The protocol was originally developed by 3M. Although in 1998 version 2.00 was launched to at least offer a minimal interface for self-service check-out terminals, lots of handling at the staff and service desks were not defined in the SIP protocol.

The American Standard Association NISO has adopted the initiative of 3M and came with the extended concept of a far more detailed concept of the NCIP of Z39.83 protocol.

Smart-Card

A card with a chip, containing at least an unique identification number, and mostly extra memory to store fixed or variable data. Library cards most often use the Mifare protocol.

Sorting Machine

Device where books are transported via a conveyer belt or slide construction to be put in the right selected sorting bin.

Sorting Robot

Device where books are picked up from a bookdrop and put in the right bin.

Stack Reading

Reading a stack of objects in one move.

Radiation

The electromagnetic radiation of EAS and RFID-systems is in general very low and harmless to people, provided that the systems meet the international legislation. The European directives on this subject are:

- EN 50357 Evaluation of human exposure to electromagnetic fields from devices operating in the frequency range 0 Hz to 10 GHz, used in electronic article surveillance (EAS), radio frequency identification (RFID) and similar applications.
- EN 50364 Limitation of human exposure to electromagnetic fields from devices operating in the frequency range 0 to 10 GHz, used in electronic article surveillance (EAS), radio frequency identification (RFID) and similar applications.

System Memory

The memory of a Philips Sli-(x) chip is organized in two parts: a system and a user part. The first four (of in total 32) blocks of each 4bytes form the system part. In de Sli-(x) chip there are $4 \times 4 = 16$ bytes pre-programmed by the chip manufacturer, among that an unique identifier (UID) of the chip and it contains the functions for: AFI, EAS, and write access.

Tag

A tag, label or transponder is part of a RFID-system, that will be attached to objects to identify them. It consists of a chip and an attached inductive antenna, and a building form like a label or a ring. Active tags have their own energy source like batteries, are always "on" and can transmit data over large distance. Because of their battery, active tags are always relatively large, expensive and have a limited lifetime.

Passive tags do not have their own energy source. Radio waves with limited power are transmitted by a RFID-reader, introduce power via the antenna of the tag, which feeds the chip to read or write the data to and from.

Tag-it ®

Trade name for tags of Texas Instruments. The Tag-it tags can be used in libraries (they are compliant to the ISO 15693 standard), but do not have the EAS-function, hence can security only be done with AFI.

By using Tag-it, libraries choose for supplier dependent solutions and exclude future use of RFID-systems on EAS basis.

Tattletape ®

Trade name for electromagnetic security strips of 3M.

Transponder

Other word for tag or label. The word *transponder* relates to transmit and respond.

UID

Unique IDentifier, an unique, pre-programmed, un-erasable number for every chip.

Unloaded Frequency

Real tag frequency in free air. Attached in a book the frequency will drop with hundreds of KiloHerz. The optimal response frequency of book labels to a 13.56 MHz system must have an unloaded resonance frequency of approx.. 14.00 MHz.

Uplink

Data transmission from transponder to reader.

User Memory

The user part of the chip memory. In the Philips Sli-(x) chip are 28 blocks of four bytes each, eq.112 bytes = 896 bits free programmable memory space. The system memory is pre-programmed

Vicinity

Vicinity cards operate contactless on a max. distance of approx. 1 meter.

Video Label

A long format self-adhesive RFID-label, sticked to the small side of a videocassette.

Write-Access

Writing rights in a tag. The memory of the Philips Sli-(x) chip has 4 blocks of 4 byte. The first 4 blocks are the system part of the memory. One of the system part functions contain the writing rights of the user part of the memory.

X-Range label

Extended range: a label with a amplifying read range b.u.o. a booster.

Self Service in Public Libraries

All processes relating to the check-out, check-in, reservations, extension, payments in libraries by the patrons themselves. Also reservations or processes via the internet can be called self service.

Z 39.xx

Serial protocols for functions within library systems and 'information retrieval'.

Z 39.83:2002

Circulation Interchange (ANSI/NISO, also known as NCIP)

- Part 1: Protocol
- Part 2: Protocol Implementation