



CONTACTLESS User Information Guide

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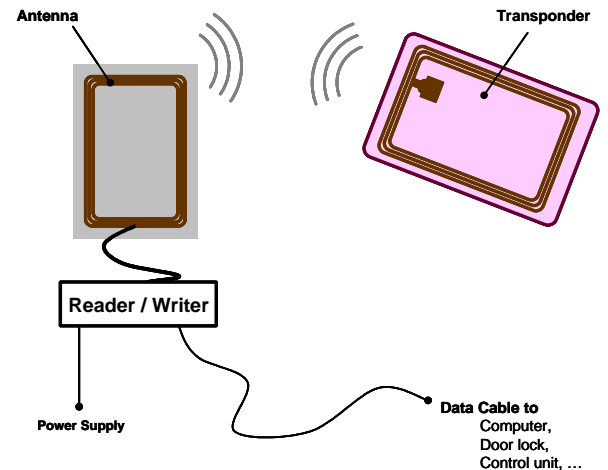
Contactless technology

Basic Contactless system components consist on:

- An antenna or coil
- A transceiver (Reader/Writer) linked to a Control Unit, a Computer, ...
- A transponder (Contactless Card or RF Tag) with user data

The reader sends out electromagnetic waves that form a magnetic field when they "couple" with the antenna on the Contactless Card.

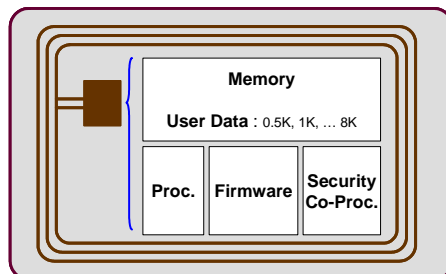
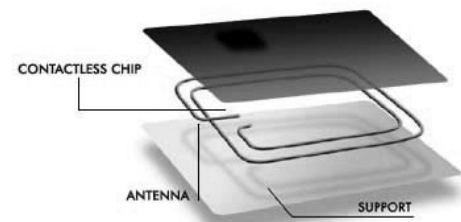
A passive Card draws power from this magnetic field and uses it to power the microchip's circuits. The chip then modulates the waves that the tag sends back to the reader and the reader converts the new waves into digital data.



Contactless Card

Contactless cards enclose several components :

- **Chip**
- **Antenna**
- **Paper or Plastic laminated support**



Depending on applications, there are basic to sophisticated cards available in the market. The Chip itself is the core module of such a card.

It does manage the communication with the reader, data retrieve and storage into the card as well as secured access and data encryption.

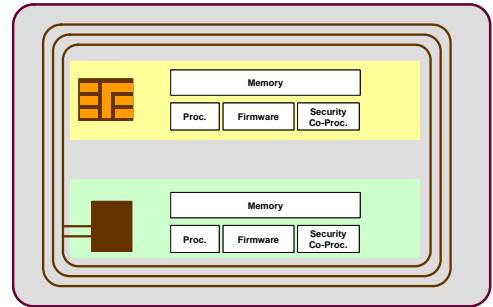
Other types of contactless cards

■ Hybrid card

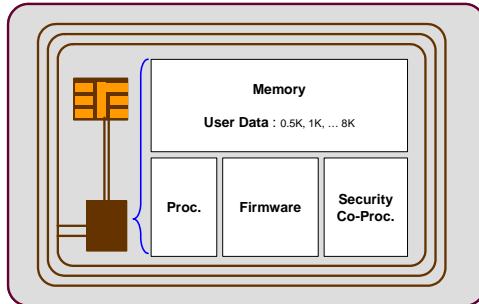
On a hybrid card, multiple independent technologies share the common plastic card body but do not communicate or interact with each other.

For example, one card could carry a magnetic stripe, bar code, 125 kHz technology, picture ID, contact smart card module and either ISO/IEC 14443 or ISO/IEC 15693 contactless smart card technology.

The advantage of a hybrid card is that existing installed systems can be supported, while new features and functionality can also be offered through smart card technologies.



■ Dual card



A dual-interface card includes a single chip with both contact and contactless capabilities.

Contact and contactless technologies can therefore be implemented on one card, each addressing the application requirements most suited to its capabilities and sharing the same data.

Hybrid and dual-interface technologies are complementary and, with thoughtful implementation, transparent to the end-user.

Market Standards

There are three primary contactless technologies considered for physical access control applications:

- 125 kHz,
- ISO/IEC 14443,
- ISO/IEC 15693

■ **125 Khz proprietary solutions**

125 kHz read-only technology has been used for RFID access control systems and is based on de facto industry standards rather than international standards. There is a huge installed base in America, but this de-facto standard is currently replaced by ISO standards.

125 kHz technology allows for a secure, uniquely coded number to be transmitted and processed by a back-end system. The back-end system then determines the rights and privileges associated with that card.

Manufacturers offer now migration paths to ISO standards for 125KHz systems, through multi-standard equipments able to operate both 125Kz and 13,56 MHz cards in parallel.

■ **ISO Standards**

Contactless Card Standards cover a variety of types as embodied in ISO/IEC 10536 (Close-coupled cards), ISO/IEC 14443 (Proximity cards), ISO/IEC 15963 (Vicinity cards). These are intended for operation when very near, nearby and at a longer distance from associated coupling devices respectively.

Data is read and written through RF transmission at the standard allocated frequency of 13.56 MHz using power also generated for the chip by magnetic induction from the external interface device, similar in function to a transformer.

■ **ISO-14443 – Proximity cards (up to 10 cm / 4 inches)**

ISO/IEC 14443 is one of a series of International Standards describing the parameters for identification cards as defined in ISO 7810 and the use of such cards for international interchange.

ISO/IEC 14443, or “proximity” systems, has been designed to operate at close range (0-10cm or about 0-4”) between the chip medium and the interface device

Type A & B define two different protocols and signal modulation. This doesn't affect the end-user application except for the card type which should comply with A or B mode.

Based on ISO/IEC 14443, Philips Mifare architecture is the market leader in contactless applications.

- **ISO-15963 – Vicinity cards (up to 1m)**

ISO/IEC 15963 is intended to allow operation of Vicinity cards in the presence of other contactless cards conforming to ISO/IEC 10536 and ISO/IEC 14443 standards.

ISO/IEC 15693, or “vicinity” systems, operating at up to 1m (about 3.3 ft.) between the chip medium and the interface device

Vicinity systems have been traditionally used in tollbooth, subway pass, and similar applications, but typically have slower data transmission speeds and smaller chip memory storage than the proximity systems

Proximity systems have long been used in door pass or privilege applications, such as at airports for employee access to restricted areas.

- **Philips MIFARE based on ISO/IEC 14443**

The MIFARE contactless smart card and MIFARE card reader/writer were developed to handle payment transactions for public transportation systems. Although contact smart cards could also do the job, contactless readers are faster and easier to use, and there is virtually no maintenance on the readers, or wear and tear on the cards.

MIFARE technology is owned by Philips Electronics.

A MIFARE reader chip is not required to read the card's fixed random ID number (Factory Serial Number). However, it is required to access any data stored on the card. Philips has also licensed manufacture of the card chip technology to Infineon.

Some of MIFARE characteristics:

- Passive cards (no battery)
- ISO-14443 compliant
- Consists of a chip and a coil antenna
- Are available in ISO card packages, fobs, discs
- Use RF energy to power the chip and send and receive data
- 1 -10 cm (1-4 inch) read range
- Uses a frequency of 13.56 MHz
- 1000 bytes of data storage
- Holds 16 separate applications
- Open standard

- **Market applications**

As from now, there is a growing demand for Contactless cards in markets where Magnetic cards used to provide security features.

Security, Banking, Telecom, as well as Id, Loyalty and Leisure sectors are now moving to contactless technology. The main benefits for contactless applications vs legacy technologies are:

- High speed of access and high throughput
- Useable in harsh or dirty environments
- More durable and reliable cards
- Reduced maintenance costs for card readers
- User friendly
 - Less intrusive
 - No physical insertion of the card into reader
 - Card orientation doesn't impact the application
 - Handsfree use
- Security level similar to Smart Contact cards
- Mixed operation of several technologies
 - Contactless only card
 - Dual interface contact/contactless card
 - Hybrid card

	Proximity	Proximity	Vicinity
Distance	up to 1m	up to 15 cm	up to 1m
Standard	De Facto	ISO 14443	ISO 15693
Freq.	125 Khz	13,56 Mhz	13,56 Mhz
Transmission Speed	4 Kbits / sec (around 500 characters / sec)	ISO: 106 Kbits / sec (around 13,000 char/sec) 848 Kbits / sec available (around 100,000 char/sec)	26,6 Kbits / sec (around 3,300 char/sec)
Typical Memory Size	up to 256 Bytes (256 char)	up to 64 Kbytes (65,536 char)	128 to 2KBytes (128 to 2048 char)
Read / Write	Read only	R/W	R/W
Security	Manufacturer's specific	MIFARE, DES, 3DES, RSA, ECC, AES	DES, 3DES, Manufacturer's specific
Typical Application	Access Control, Id	Id, Access Control, Biometric, Secured data, Passport, ID Card, Bank, Telecom	Id, Access Control, Toll, Car Park, Luggage

Evolis contactless offer

Evolis decided to integrate several 3rd party products in its portfolio.

This will help Evolis direct and indirect sales force to propose a large and unique range of personalization solutions, including printing and encoding devices, based on an established catalogue.

Those 'Turn Key' configurations developed by Evolis, a manufacturer of High Valued products, aim helping both VAR's, System Integrators and End-Users to select the best product for their own application, at very attractive conditions.

Those solutions comply with ISO/IEC 14443 A + B, ISO/IEC 15693, Mifare A and some other market standards.

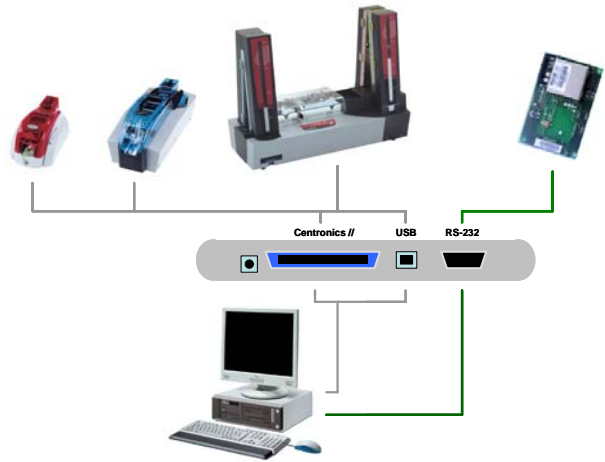
In case of a project requiring a customized solution, Evolis also defined a 'Contactless Integration Process' that allows System Integrators and VAR's to benefit from Evolis R&D and Manufacturing support .

For more details about the Evolis standard offer and the Evolis Contactless Integration Process, please contact your Evolis Sales Representative or send a mail to info@evolis.com.

Hardware connection

The computer will control both printer and encoding unit from a single application. So there will be two links :

- Parallel or USB to the printer
- Serial (COM) to the encoding unit



Software programming

Application software for contactless encoding is usually a dedicated one, designed to suit the customer needs: Data Model, Data Access and Security. It can be programmed in different languages such as C, C++, Visual Basic.

▪ SDK for customized software

Each 3rd party supplier makes programming toolkits available, for various platforms and programming languages.

Pay attention to the fact that those SDK (Software Development Kit) have to be ordered directly to the Contactless Encoding Unit supplier.

Some basic SDK are available over Internet, free of charge.

▪ Encoding features with Card Designer software

Mediasoft, owner of the eMedia Card Designer, developed a 'MIFARE wizard' aiming to add Contactless features to eMedia. This assistant allows Developers and System Integrators to simply design the card 'mapping' as well as security rules for Mifare cards.

Thanks to this brand new application, it is very easy to link card fields to databases without any program to be developed.

Immediate benefit is the cost reduction of such a solution, allowing the end user to buy a 'turn key' solution including both hardware and software required for card personalization.

Using Evolis card printers equipped with the MIFARE ACG compatible encoding unit, combined with eMedia Pro software version 6 and its MIFARE wizard, will help to democratise and implement contactless solutions. Such a job will be 'as easy as' a MAGnetic encoding operation.

A similar solution is available with CardFive (NFive sw editor). Please contact directly NFive for more details.

End User Key Benefits

in using Evolis Printers and Contactless solutions

Standard portfolio based on market standards, covering a wide range of contactless applications:

- ISO 14443 A & B
- ISO 15693
- MIFARE
- Felica

Mixed operation with other encoding technologies so the printer provides the end-user with an 'All-in-One' printing and encoding solution

- MAG
- Smart
- Contactless
- MAG + Smart + Contactless combined together

Manufacturer process to customize integration, to better suit the end-user needs when a standard offer cannot be used

- Study and integration done by Evolis R&D, according to printers capability
- Integration performed in the Evolis factory to guarantee superior quality for the final product
- Direct contact between module designer and printer manufacturer to benefit from the latest updates

Evolis 'stamp' on the global solution

- Manufacturer's commitment on time-to-market solution
- Overall superior quality
- Innovative solutions through easy-to-operate products, focussing end-user satisfaction

Evolis and Mediasoft propose a 'Turn-Key' solution package

- MIFARE wizard will help eMedia end-users to easily define the card data model
- Mediasoft eMedia will comply with MIFARE + ACG 6152H solution
- Cost reduction and implementation on the card personalization side. System integration on reader side has to be developed as of today.

Quality at a very competitive price

- Evolis strategy is to democratize the Desktop Plastic Card Printers use
- Evolis designed a low-end contactless offer at a very attractive price
- Mediasoft will provide the end-user with an affordable solution for card personalization
- From ISO/IEC 14443, each configuration is positioned at a lower price than main competition

Useful Links

Suppliers

ACG	www.acg.de
ASK	www.ask.fr
HID	www.hidcorp.com
IER	www.ier.fr/htmleng/acceng/accueileng.html
INSIDE	www.insidecontactless.com
LASERCARD	www.lasercard.com
PRO-ACTIVE	www.pro-active.fr
PHILIPS	www.semiconductors.philips.com
SONY	www.sony.net/Products/felica/index.html
TEXAS INST.	www.ti.com/rfid

Consortiums

CALYPSO	www.calypsonet-asso.org
ISO	www.iso.org
EUROSMART	www.eurosmart.com
SMART CARD ALL	www.smartcardalliance.org
VISA	www.visa.ca/en

Others

MIFARE	www.mifare.net
RFID	www.rfida.com/rfidtech.htm

Bibliography

Web sites

Most of the information of this document are extracts from both Manufacturers and Consortiums web site

You will find those useful links in the 'Useful Links' chapter of this document

Documents

Contactless Technology for Secure Physical Access:
Technology and Standards Choices
A Smart Card Alliance White Paper
October 2002

Contactless Chips and Border Operations
A Realistic Assessment
Prepared by LaserCard Systems Corporation
August 2003



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