Chapter 1.9
Contactless Payment with RFID and NFC

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INTRODUCTION

The radio frequency identification (RFID) reading technology enables the transfer, by radio, of information from electronic circuit to a reader, opened up some interesting possibilities in the area of e-payment (Domdouzis, Kumar, & Anumba, 2007). Today, the near field communication technology (NFC) opens up even more horizons, because it can be used to set up communications between different electronic devices (Eckert, 2005).

Contactless cards, telephones with NFC capacities, RFID tag have been developed in industry and the services (Bendavid, Fosso Wamba, & Lefebvre, 2006). They are similar, but, some major differences explain the specificity of these three applications and the corresponding markets. The label, or marker, is a small size electronic element that transmits, on request, its numerical identification to a reader.

The RFID identification makes it possible to store and recover data at short distance by using

these miniature markers or labels (see Figure 1) associated to the articles to identify. The cost of the label is only few centimes. An RFID system is made of labels, readers connected to a fixed network, adapted software (collection of information, integration, confidentiality...), adapted services, and management tools that allow the identification of the products through packing.

Contactless smartcards (see Figure 2) contain a microprocessor that can communicate under a short distance with a reader similar to those of RFID technology (Khu-smith & Mitchell, 2002).

The originality of NFC is the fact that they were conceived for the protected bilateral transmission with other systems. NFC respects the standard[a] ISO-14443 (Bashan, 2003) and thus, can be used as a contactless card. It can be used as a contactless terminal communicating with a contactless card or another NFC phone (ISO-18092). Services available through NFC are very limited today, but many experiments are in progress and electronic ticketing experiences (subways and bus) started in Japan[b].

There are two types of NFC phones:

- The mono chip composed of only one chip for GSM services (called the SIM) and NFC services. In that case, an NFC service is dependent of the phone operator.
- The dual chip shows a clear separation of the two functions within two different chips. That completely isolates the operator and allows independent NFC services…

We define the technology standards, the main platforms and actors in the background section. The main trust develops some contactless payment applications, and analyses the benefits and constraints of the different solutions. The future trends section concerns the research and technology evolution in contactless payment applications.

Figure 1. Some examples of RFI label

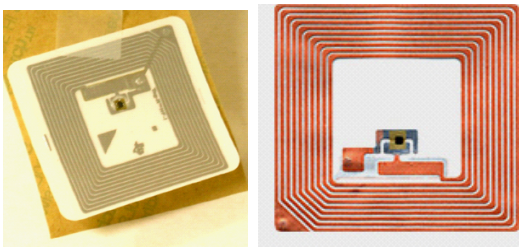

Figure 2. Example of a contactless bank card

BACKGROUND

The major interest of contactless cards is to facilitate access control, micropayment… Another interest refers to the usury of card; it is insensible to contact oxidation. We detail briefly the international standards that are involved in RFID and NFC.

Standards

ISO-14443

This standard is the international one for contactless smartcards operating at 13.56 MHz in close proximity of a reader antenna. This ISO norm sets communication standards and transmission protocols between a card and a reader to create interoperability for contactless smartcard products. Two main communication protocols are supported under the ISO-14443 standard: Type