Chapter 45
RFID and NFC in the Future of Mobile Computing

Diogo Simões
Movensis, Portugal

Vitor Rodrigues
Movensis, Portugal

Luis Veiga
INESC ID / Technical University of Lisbon, Portugal

Paulo Ferreira
INESC ID / Technical University of Lisbon, Portugal

ABSTRACT

RFID (Radio Frequency Identification) technology consists of a tag that can be used to identify an animal, a person or a product, and a device responsible for transmitting, receiving and decoding the radio waves. RFID tags work in two different modes: they wake up when they receive a radio wave signal and reflect it (Passive Mode) or they emit their own signal (Active Mode). The tags store information which allows univocally identifying something or someone. That information is stored in an IC (Integrated Circuit) which is connected to an antenna, responsible for transmitting the information.

An evolution of this technology is the Near Field Communication (NFC). It consists of a contactless Smart Card technology, based in short-range RFID. Currently, there are mobile phones with NFC embedded in such a way that they work both as a tag and as a NFC reader. These technologies will be widely available both in mobile phones and other devices (e.g. personal digital assistants, etc.) in the near future allowing us to get closer to a ubiquitous and pervasive world.

This chapter describes the most important aspects of RFID and NFC technology, illustrating their applicative potential, and provides a vision of the future in which the virtual and real worlds merge together as if an osmosis took place.

DOI: 10.4018/978-1-60960-042-6.ch045

INTRODUCTION

Technology is a term with origins in the Greek *technología* (*τεχνολογία*) — *téchnē* (*τέχνη*), 'craft' and *-logía* (*-λογία*), the study of something, or the branch of knowledge of a discipline (Encyclopedia Britannica, 2009). Applied to the human species, this concept deals on how we use knowledge of tools and crafts in order to control and adapt to our environment. Historically speaking, the technology has been present since the beginning of mankind, being fire or the wheel some of the most revolutionary technological discoveries ever.

Technology also refers to the collection of techniques, as the knowledge of how to combine resources to produce desired products, to solve problems, fulfill needs or satisfy wants. Throughout mankind's evolution, the term technology has been applied in various different ways, resulting in the creation of different technological areas, such as the industrial technology, the military technology, the medical technology and many others. All of the different technological areas have the same common purpose of improving processes or creating new products in order to enhance a specific area. Typically, these technological areas are the result of a specific need in a specific area.

One of the most recent technological areas is the communications technology, which came as a result of the necessity for mankind to being able to communicate securely, faster and globally. The telephone and then the Internet were important technological advances when speaking of communication, allowing people to communicate seamlessly and globally, using different means (voice, text, data, and multimedia content).

For Human kind, there are two main aspects that have proven to be determinant throughout times, which are ambition and realization. Every time a technological barrier is broken, we realize that something that was not possible before is now real and we realize that we still have not reached the limit in that technological area. When we realize that, our ambition motivates us to overcome the next technological barrier. This is how information and communication technology has been evolving so rapidly during the last few decades.

Some years ago, we became able to communicate from one side of the world to another and this achievement created another need: being able to communicate in the same seamless and global way at the same time we could be mobile. This was how a new technological area was created, the Mobile Technology. The necessity of being able to communicate anywhere, anytime and at any speed has turned out into a major revolution in our everyday lives, and we are now able to use most of the communication technologies even while we are moving, by using the mobile phones which integrate those technologies.

This chapter presents how the Mobile Technology changed people's everyday lives and how it is on the verge of doing it again. In addition, we provide a practical scenario (based on a prototypical example called OSMOSIS) that illustrates the range of possibilities that are made possible by RFID/NFC technology.

Mobile Technology: Past Generations and Evolution

Nowadays, we are living in a new era, where everything and everyone is connected, at all times, anywhere. It is possible to be connected anywhere only due to the major technological evolution we have seen in the mobility and ubiquity areas. For the end users, the mobile technology became real with the appearance of the first mobile phones, just a few decades ago. At first, these devices only allowed people to communicate with each other by voice and the network had gaps in its coverage. This soon changed and the development of the mobile technologies went through three different generations of evolution in only a few years.

Mobile devices capabilities went from analog, circuit switched voice-only traffic to a whole set of advanced services and large bandwidth data transfer, seamlessly integrating multimedia services

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