Chapter 14
Copyright Protection in the Distribution of Multimedia Digital Objects in Internet

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ABSTRACT
This chapter shows the most significant approaches developed so far for the distribution of digital contents with copyright protection, highlighting their most interesting features. These proposals may be classified into two categories: on the one hand systems that try to prevent unauthorized uses of the contents, and on the other hand systems whose purpose is to detect unauthorized uses of the contents and to identify involved offenders. This chapter is focused on the systems that fit in the second of these strategies, most of which are based on the use of watermarking techniques. However, watermarks cannot provide a suitable answer to this issue by themselves, but they must be framed into more complex systems, involving the participation of different entities and the use of well defined protocols which establish the exchange of data and contents among these entities. It is important to point out that cryptography is also a key element in all of these systems and protocols.

INTRODUCTION
The protection of the copyright in the marketing and distribution of digital materials is a challenge faced by different participants in the sector during the last years (Digital Rights Management, n.d; Ianella, 2001). The copyright management in traditional activities, in general, has taken advantage of the physical nature of products to prevent unauthorized uses of them. It was almost always more interesting for users to buy a new object than to make copies of it, due to several reasons: making copies may involve...
considerable time, sometimes a copy can be not much cheaper than a new object, and the quality of the copies may not be attractive. This situation changed significantly when digital technologies and materials were introduced into markets. Digital contents can be easily copied and transmitted through communication networks, and the quality of the materials remains identical regardless of the number of copies made.

The increasing number of technical tools available to users for the processing of digital materials at affordable prices in last years, along with the ease of publication and transmission of digital information through Internet, has resulted in a market where piracy has become a common practice. This situation has revealed the need to protect intellectual property rights of authors of digital contents, as they are easily vulnerable without the use of specific protection measures.

The development of protection measures in the distribution of products in such environments was tackled when the level of piracy began to increase significantly. These activities especially reached significant levels in the 70s; software was the affected product. Later, in the 90s, the deployment of Internet led to the spread of piracy to other types of contents, especially music and video, although any copyrighted digital object may be affected, such as books, databases, confidential business information, etc.

The various efforts made to prevent these attacks to copyright have not been successful so far, mainly due to the lack of robust solutions for most of the situations, and because the different approaches have not been widely accepted by the different parties involved. The fact that Internet has traditionally been considered by most users as a scenario where information can be freely distributed, adds a greater difficulty to the acceptance and implementation of solutions.

The use of watermarking techniques for copyright protection in distribution of digital contents has driven a significant amount of efforts. In most of the proposals the application of these techniques has been bound to the identification of offenders, although some schemes for protection against copying have also incorporated these technologies.

It is interesting to highlight that watermarks by themselves cannot provide a suitable answer to the above-mentioned issue (Mintzer et al., 1997; Craver et al., 1998), but they must be framed in more complex systems based, in general, on the use of TTP (Trusted Third Parties) (Qiao et al., 1998) or register entities (Petitcolas et al., 1998), and using well defined protocols.

It is also important to highlight the need for standardization (Craver et al., 1998), and legal support of technical solutions for the practical viability of such systems.

This chapter presents the main approaches suggested so far for protecting the copyright of digital contents when they are distributed in Internet; systems based on watermarking will be fitted in them. The chapter includes an analysis of the most important requirements to be taken into account by these systems, and a description of the most relevant approaches developed so far, including an assessment of their main advantages and shortcomings.

**STRATEGIES FOR COPYRIGHT PROTECTION**

Most systems developed so far for copyright protection of digital contents can be classified into two broad categories corresponding to two different strategies: systems that try to avoid unauthorized uses of contents, and those that try to detect unauthorized uses.

The approaches in line with the first strategy usually involve the use of devices or mechanisms for protection against copying, in order to limit the access to protected materials, or simply to prevent the making of copies. Examples of such systems include systems for ciphered television broadcasting, or devices to avoid making copies in DVD players and recorders.
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