Chapter 6
Digital Rights Management in Peer to Peer Cultural Networks

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ABSTRACT

As a general and effective protection measure for copyright violations which occur with the use of digital technologies including peer to peer (P2P) networks, copyright owners from the cultural sector often use Digital Rights Management systems and digital watermarking techniques to encrypt copyright information with the cultural content. In other cases copyright owners restrict or even block access to the digital cultural content through the Internet and the P2P infrastructure. This chapter claims that DRM and P2P can be quite complementary. Specifically, pa P2P infrastructure is presented which allows broad digital cultural content exchange while at the same time supporting copyright protection and management through watermarking technologies for digital images.

INTRODUCTION

Peer to Peer networking is supported by suitable software which enables a computer to locate a content file (text, image, video, sound, software etc.) on another networked device and copy the encoded data to its own hard drive. P2P technology often is used to reproduce and distribute copyrighted content without authorization of the rights owners. Except for digital music and video the P2P infrastructure is also used to make and

distribute illegal copies of digital cultural content which lies under the protection of the Intellectual Property Rights (IPR) legislation. For this reason the short history of P2P technology and software has been one of constant controversy by many in the content industry. In the Cultural Heritage area the content owners are feeling even more threatened by the broad and unregulated exchange of digital content in P2P environments (CSTB, 1999) and cultural networks.

For this reason security must be applied to Cultural Heritage networks according to the following basic guidelines. Information integrity is

very important especially in networks where data accuracy is decisive. Confidentiality is the aspect of security that ensures the privacy of information. Copyright management and protection of the creator's intellectual property rights is a necessary but difficult task especially when it comes to digital content exchange. Copy control and owner identification are the most popular countermeasures against copyright violations. Provision made for supporting digital rights management in the structure of a cultural network can be a powerful instrument in the procedure of checking the validity of information source. Complementary, fingerprinting and watermarking digital content before its distribution among trustworthy users protects the content from its unauthorized disposal since the trace of a copy will reveal the source of the leak in a cultural network.

As a general protection measure for copyright violations through digital technologies including P2P, copyright owners often uses digital watermarking techniques to encrypt and watermark content or otherwise Digital Rights Management technologies to restrict access, totally blocking digital content to be accessed through the Internet and the P2P software infrastructure.

This chapter claims that watermarking, Digital Rights Management (DRM) and P2P can be quite complementary. Specifically, a P2P network infrastructure is presented which allows broad digital content exchange while on the same time supports copyright protection and management through watermarking technologies. In brief, the platform is functioning mainly for digital images of cultural heritage and is tracking all the watermarked image files which are distributed and copied through the P2P network. The challenge is the algorithmic complexity of detecting multiple watermarking keys in the P2P network effectively and quickly, especially when thousands of image files are concerned. This is managed by an optimization detection algorithm which allows effective watermarking key detection in optimal P2P hops.

THEORETICAL BACKGROUND

The proposed system is setting a new basis for the close cooperation of the two different scientific areas of DRM and P2P aiming at exploiting the distributed computing nature of P2P networks for efficient digital rights protection and management. As a background knowledge the basics of the two different technologies are being presented.

Digital Rights Management and Protection: Watermarking

Unfortunately, there is not a commonly agreed definition for DRM. The term, according to the World Wide Web Consortium (DRM, 2008), covers the description, recognition, protection, control, commerce, monitoring and tracking of all the possible usage types concerning digital content - including the relationship management between the digital object's owners.

According to Katzenbeisser (2002), DRM is a term that is used to describe a range of techniques which collect information for rights and right holders, so as to manage copyrighted material; and the conditions under which these materials will be distributed to the users.

DRM refers to the protection of the intellectual properties of digital content by controlling or detecting the actions of the authorized end user to the digital content. It gives the digital object's owner the ability to securely distribute valuable content such as books, photos, videos, magazines; at the same time helps the owner manage the content, avoiding unauthorized usage or copying. The copyright protection is mainly achieved extensive use of digital watermarking.

Digital watermarking is based mainly on the use of detectable and readable watermarks. In this section the most important advantages and disadvantages of each case are being presented.

The watermarking algorithms are applying watermarks (invisible information in bitstreams) to digital images (Wayner, 2002). The process of

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