ABSTRACT

This chapter discusses technologies and standards related to digital rights management (DRM). Firstly, it presents DRM systems that are multimedia information management systems that take into account digital rights and protection. These systems enable the controlled distribution and use of multimedia content through the digital value chain. Then, this chapter presents current initiatives, standard and proprietary, that specify a DRM system. It focuses in the MPEG-21 standard initiative, mainly in the parts of this standard that normatively specify the different pieces and formats needed by a complete DRM system. Finally, this chapter presents one of the key components of DRM systems, rights expression languages (RELs) that have been defined to express content usage rules.

INTRODUCTION

Distribution and use of digital content is continuously growing. In the context of this Digital Revolution, it is important to prevent unauthorised distribution and use of copyrighted content.

Digital rights management (DRM) systems provide a means for content creators and distributors to address the unauthorised copying issue. These systems enable the creation, distribution, and consumption of digital content according to the permissions and constraints stated by the content creator. A DRM system provides intellectual property protection by encrypting, or protecting in other ways, the digital content, so that it can only be accessed and used by authorized
users according to the digital rights governing this content. The different elements that form a DRM system are the digital objects declaration languages, rights expression languages, intellectual property management and protection, rights enforcement, adaptation, distribution and consumption of content, and notification of events within these systems.

Digital rights management and content protection are necessary in different business models that include the management and distribution of digital content as music, movies, or e-books. DRM is also useful for managing the user privileges and content access, for example, in a virtual collaboration environment. It is also useful in B2B environments, when adapting or aggregating digital content, for example, in the edition process of an encyclopaedia. Moreover, it could be necessary in financial services or in health care, for example, to manage the access to patient medical records.

In order to illustrate how a DRM system works, a simple music distribution scenario is presented. A music producer has produced a new album and granted, to a distributor, permission to distribute this album. Then, the distributor makes available the music album, which has been protected and packaged in a digital object, publishing it in the distributor’s Web site. When a user downloads the digital object with the protected album, he cannot render it until he obtains the appropriate license containing the usage rules and the key for unprotecting the content. The license also has been protected and bounded to the user devices.

Nowadays, different companies have developed their proprietary systems for distributing digital content in a controlled way. For instance, Apple, Microsoft, and Sony have their own proprietary systems. Then, the major problem for DRM systems is the lack of interoperability among them. This is a big problem for consumers because if they have purchased content protected by a concrete DRM system, they only can reproduce this content in players that support this concrete DRM. In order to provide interoperability among existing DRM systems, there are different initiatives, such as Coral Consortium (http://www.coral-interop.org/) or DReaM (Fernando, 2005), working on interoperability issues.

**DRM SYSTEMS**

Conventionally, digital assets were managed by digital management systems that do not control the distribution or consumption of these assets according to the terms imposed by their creators. Occasionally, metadata related to the use of the digital content was generated, associated to the asset, and stored for later search and retrieval.

Nowadays, digital objects are managed in a controlled way by digital rights management (DRM) systems. These systems enable the creation, distribution, and consumption of multimedia content according to the permissions and constraints stated by content creators and rights issuers. DRM permits the governance of multimedia content throughout the complete digital value chain. For example, when a distributor buys content, he agrees to certain permissions and constraints, as to distribute freely a low-quality version of a track, and to distribute the complete music album to the members of a music club with a special fee.

There are different initiatives, standard and proprietary, that specify a DRM system or the elements that form it. These initiatives consider different concepts as those detailed next.

**Creation of Digital Objects**

The creation of digital objects process involves combining the protected digital assets with associated metadata to create digital objects that include the usage rules, information regarding the protection tools, and other data as the creator of the asset.
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