DIGITAL MUSIC ELECTRONIC COMMERCE
Addressing the super distribution model

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Abstract: Music is from far one of the most important types of media that is being exchanged in today's open networks. Users, pushed by a growing number of factors are exchanging more and more music files using popular P2P sharing technologies, such as Kazaa, e-Mule or Gnutella. If from one side this fact is important and positive, from the other side it is driving to a growth in the number of piracy situations, related to the violation of the authors copyright. Super distribution is from far the most popular electronic business model on the Internet and the World Wide Web. This is especially true when digital formatted content, such as music, videos or even books are considered. What are the main reasons for these facts? - Because it works. This paper proposes an approach to address such IPR issues trough the usage of an open DRM architecture.

1 SUPER-DISTRIBUTION

The tremendous potential of "super-distribution" on the Internet has been demonstrated by the peer-to-peer file sharing systems, such as Napster and Gnutella. To date, this technique has mainly been limited to illegal distribution of copyrighted material by communities of Internet users, although it is now also being used legitimately by media companies for advertising and to promote products/services.
Whilst super-distribution has shown its tremendous potential, this e-commerce model has yet to achieve commercially sustainable revenues, mainly due to the lack of any mechanisms for content protection and payment for licensed material. Super-distribution and peer-to-peer technologies have therefore initially been used mainly for the illegal distribution and copying of copyrighted material. However, once a licensing scheme has been adopted and interoperability issues have been addressed, super-distribution is likely to be one of the key techniques used to promote and sell digital media (Bill, 2003).

2 OPENSDRM DESCRIPTION

OpenSDRM deploys a traditional DRM solution for content rights protection (Siegert, Serrão, 2003) that can be applied for publishing and trading of digital multimedia content. Additionally, the security architecture proposed started from the OPIMA international specifications (IEC/ITA, 2000), MPEG-4 IPMP Extensions (King, Kudumakis, 2001) (Lacy, Rump, Kudumakis, 1998) and the emerging MPEG-21 IPMP architecture (Bormans, Hill, 2002) as well as with some of the proposals for JPEG2000 standard Part 8 – JPSEC – JPEG2000 security (Kudumakis, 2003). This DRM solution is composed of several optional elements covering the content distribution value chain, from content production to content usage. It covers several major aspects of the content distribution and trading: content production, preparation and registration, content, interactive content distribution, content negotiation and acquisition, strong actors and user's authentication and conditional visualization/playback (EC, 2002).
OpenSDRM is composed by a set of external and internal components which interact with each other. The components and actors that interact externally with the OpenSDRM architecture (Serrão, Neves, Barker, Balestri, Kudumakis, 2003) are: User, IPMP Tools Provider, Content Provider, Payment Infrastructure and Certification Authority.

The internal components of the OpenSDRM platform and the corresponding interfaces are: Media Application, Media Delivery Server,

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Commerce Server, Authentication Server, License Server, IPMP Tools Server, Registration Server, Content Preparation Server and the Payment Gateway.

3 SUPER-DISTRIBUTION IN OPENSDRM

In this section a description on how OpenSDRM handles the super-distribution model is provided. Basically, the super-distribution scenario is very simple: a user obtains content and gives it away to his friends, that after may give the same content to its own friends and so on. However, for this section we consider the following two scenarios:

1 The User buys content and gives to a Friend: this scenario demonstrates the case in which the User obtains a content file (music) and then shares it with a friend;

2 The User buys content and gives to a Friend together with its own access rights (license): this second scenario, only makes sense in the sense that the DRM is protecting the content. It covers the hypothesis in which a User acquires the content and afterwards gives it to a friend and at the same time gives him also part of its own acquired rights.

The following sections will provide more detail about these scenarios, and explain how the OpenSDRM platform can handle them while, at the same time protects IPR. Another important and relevant aspect relates to the fact that the content and the licenses are protected (Serrão, Neves, Trezentos, 2003) (Serrão, Neves, Kudumakis, Barker, Balestri, 2003).

3.1 Normal content acquisition

Acquiring content secure by the OpenSDRM is a straightforward process already explained in other publications (Serrão, Neves, Trezentos, 2003) (Siegert, Serrão, 2003), however the process can be described in the steps presented bellow:

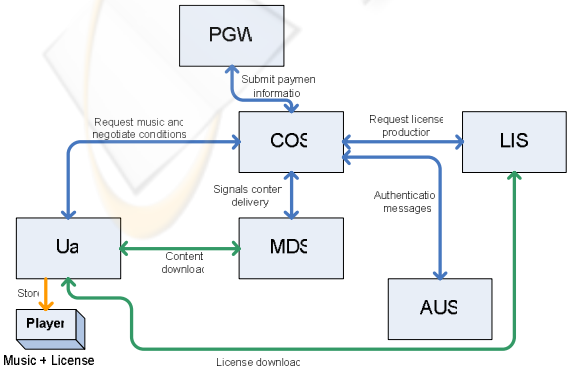

Figure 1: Normal Scenario

The user (Ua) selects music to download on the COS; COS validates Ua on the AUS; Ua negotiates with the COS the appropriate content license conditions for the music; COS requests to the LIS to produce a license with the appropriate conditions negotiated for the content and for the Ua; COS signals the MDS to prepare the content to be sent to the Ua; COS processes with the PGW the payment for the Ua; Ua downloads the content; When Ua tries to play the music, the player verifies that the music is protected and contacts the LIS to download the license for it; Ua downloads the license; The player renders the music according to the license; The license is stored securely on the player.

The user (Ua) is then able to listen to the music according to the conditions established on the license it has acquired on the COS. Currently the license supports two types of expiration: play count and time limit.

3.2 Passing content to a friend

Whenever the content is on the Ua side, it is protected through strong encryption. Therefore, even if the user gives the music to other users, they won't be able to listen to it. OpenSDRM focus is not on the prevention of file sharing, but rather in preventing that this share is completely uncontrolled.

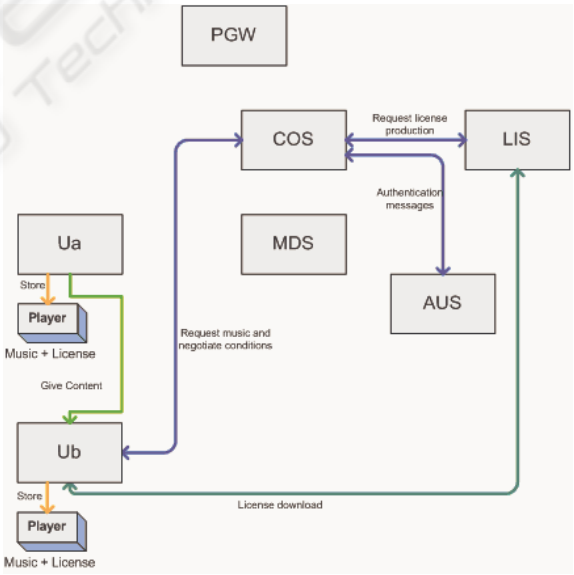

Figure 2: Give content scenario

OpenSDRM supports the possibility that a user can give content to its friends to normal means – therefore enabling the super distribution model. The files can even be shared through popular P2P systems. The bottom question in this case is the fact that the receiving user (Ub) cannot access to the

music without the appropriate license. Therefore, Ub needs to obtain a license from LIS in order to listen to the content. The process can be depicted in the following: Ua gives music to Ub; Ub gets the content and tries to open it using the player; The player detects that the Ub doesn't have the appropriate license to listen to the content; The user (Ub) contacts the COS and searches for the specific music track; COS validates Ub on the AUS; Ub negotiates with the COS the appropriate content license conditions for the music; COS requests to the LIS to produce a license with the appropriate conditions negotiated for the content and for the Ub; Ub downloads the license; The player renders the music according to the license; The license is stored securely on the player.

This is a typical case of super distribution, controlled by DRM. However, in some situations, it is not very practical. If we consider that Ub, would just like to listen to the music one or two times immediately, he would first have to acquire a specific license for that purpose, which may take some more time, and money. A variance from the solution presented in this section is presented next. This is the case in which Ua transfers not only content but also some of its own rights to Ub.

3.3 Passing content and rights to a friend

In fact, a more attractive scenario involves not only the transfer of content, but also the transfer of usage rights. This is the case, for instance, in which a User wants to give its content to a friend and at the same time, pass its own rights (or part of them) as well.

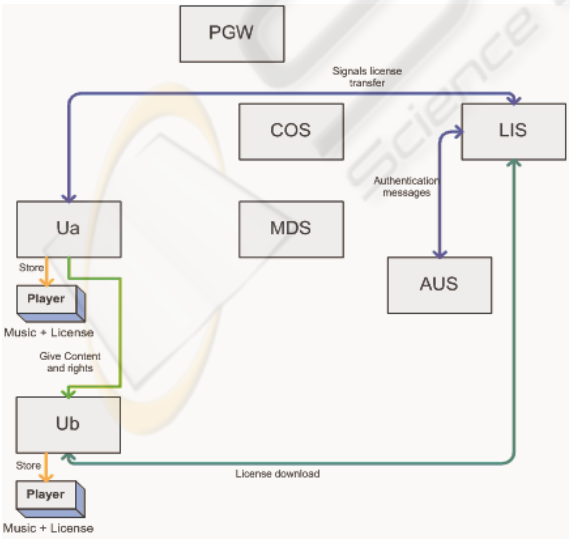

Figure 3: Give content and rights scenario

The user usage rights are expressed in ODRL format, using some relevant fields, such as 'keyvalue', 'uid', 'count' and 'individual'. These fields are use in the license to personalize it to a specific content and user. Considering this license, the owner might be willing to give part of its rights (the ability to listen to the music ten times) to a friend.

This procedure can be described in the following steps: Ua gives content to Ub; Ua also wishes to transfer some of its own rights to Ub; Ua signals LIS that he is going to transfer rights to Ub; LIS asks to Ua what rights does he wish to transfer; LIS updates Ua license; LIS produces Ub license; Ub plays the content in the player; Ub downloads license from LIS; Player renders content.

4 CONCLUSIONS

One of the business models that have been under consideration for many years (super distribution) involves the insertion of DRM functionalities into the P2P mechanisms, enabling consumers to continue to share freely content files through file sharing networks but only in a way that ensures that the usage occurs on terms established by the rights owner. However, due to the lack of the protection functionality required to support such models don't have much success. The majority of DRM systems can be distinguished by two essential features: (a) the ability to deliver content usage rules independently of the content; (b) the persistency on content protection when acquired by a user granting the access and use according to the permissions granted to that user. In this way, content downloaded for use on a particular device cannot be transferred to a second device unless the permission obtained by the user for that content expressly permits such a transfer.

OpenSDRM is according to these, implementing a set of security functionalities that enables a P2P network to support the most three common content distribution business models: a) Subscription model and Pay-per-view; b) Aggregator model and c) the Reseller model.

Although content has its own security when transferred from device terminals OpenSDRM implements also a licence management process, centralized on clearinghouses that enables and ensures compatibility when a user need more rights than the ones transferred. This service would provide publishers with information about player devices and also support to alternative business models such as pay-per-view or subscription based pricing models based on secure licenses issued. Players with Internet connectivity could also support

online security verification and downloadable security updates.

In conclusion, some of the OpenSDRM functionalities that contribute to the success of super distribution can be resumed in the following:

• It is easy to use and convenient in the sense consumers can share (redistribute) his content;

• Provides enough value to convince a significant number of users to choose it over free exchanges because a network of clearinghouses providing higher quality content and more efficient distribution can negotiates personalized licenses;

• Can give to the user a new consumer experience contributing in this way to the enhancement of its acceptance by encouraging users to exchange content;

• Can contribute to the acceptance of a new standard;

• It is secure and flexible enough for both traders and consumers;

• Enables portability and offline distribution.

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