

ZapThink Briefing Note

CONTENTGUARD: XRML *PROTECTING DIGITAL RESOURCES WITH XRML*

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Abstract

A digital work is a discrete piece of content or resource such as an electronic document, audio file, video clip, component of application functionality, or other feed of information. As the notion of the digital work has evolved, so has the need to protect that work from improper usage, distribution, or disassembly. ContentGuard's belief is that DRM will evolve so that best of breed components will be developed by different parties in order to drive interoperability. This model breaks the current closed-loop mindset of DRM providers. In order for this approach to work, a single rights management language is needed, rather than a monolithic trust model. The goal of XrML is to expand the usefulness of digital content, resources, and services to rights holders and users by providing a flexible, extensible, and interoperable industry standard language that is platform, media, and format independent.

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The Protection of Digital Works

Nowadays, almost everything of value is information – or more specifically, a digital work of one sort or another. What is a digital work? A digital work is a discrete piece of content or resource such as an electronic document, audio file, video clip, component of application functionality, or other feed of information. As the notion of the digital work has evolved, so has the need to protect that work from improper usage, distribution, or disassembly. Providers of information have long struggled with the methods to protect these resources and these needs have not yet been fully met. In the context of XML, an increasing amount of valuable information will be exchanged in a free-flowing context without any mechanism to assure their proprietary nature. In this new world, what is needed is to marry up existing notions of conditional access control (access to a particular resource) with persistent protection. In other words, provide a long-lasting form of digital rights protection and management. This can extend to the world of Web Services where this persistent form of protection can provide conditions for how Web Services can be used and distributed.

The traditional approach of providing restricted access to resources has been to provide access control through a remote gatekeeper on a server that provides password and authentication control. This system then examines a resource repository and grants access according to negotiated terms. However, once the content is downloaded, there is nothing on the client side to prevent the person from performing inappropriate or unauthorized activities. Historically, attempts to solve this problem have taken the form of Digital Rights Management (DRM) technologies and products. DRM provides protection that travels with that resource and provides a virtual "license" that covers that work. This license is bound to device or object.

However, a primary issue to be resolved in a DRM implementation is whether to place the rights information along with the metadata about the content itself or whether to separate this vital information from the metadata. In the first case, the rights information itself becomes a piece of metadata tied specifically to the content itself. Implementing it in this manner causes a "right" to always be the same and does not allow contextualization. For example, an owner of a resource may want to charge different amounts of monetary consideration, or allow additional rights, if a user belongs to a certain group or presents certain authenticated credentials – such as a subscriber to a service, a student at a university, a member of a fan club, or an employee of a particular company. Keeping the rights separate from the metadata about the content allows the same content to be distributed in unique ways with many additional business models which are viable today.

Up until now, DRM implementations have been monolithic, end-to-end systems. This single trusted source would control all the important steps in the DRM process. In essence, it would be an end-to-end, closed-loop system as exists in a number of major DRM providers such as InterTrust and SealedMedia. In this DRM environment the system has to package rights, encrypt the content, put it in a central repository, provide means for activation on the receiving end, issue licenses, and provide a way to inform the rendering application (Adobe, RealPlayer, etc.) about the terms of the license such as number of times to view, rights to print, and expiration. This monolithic model for DRM, while secure and doable, presents a number of hurdles to the adoption of this important piece of functionality that can enable trustworthy computing going forward.

ContentGuard's belief is that DRM will evolve so that best of breed components will be developed by different parties in order to drive interoperability. This model breaks the current closed-loop mindset of DRM providers. In order for this approach to work, a single rights management language is needed, rather than a monolithic trust model. Interoperability of business models as well as between platforms and formats is needed so that DRM as a technology can get the traction it deserves in the marketplace. In essence, this is an evolution

of DRM rather than a replacement. The end result will be a greater adoption of DRM technology used in a wider realm, such as in protecting and metering Web Services resources.

The Extensible Rights Management Language (XrML)

First conceived of in the early to mid 1990's at XEROX Parc, a generalized rights management language that is now known as the Extensible Rights Markup Language (XrML) was originally created as the Digital Property Rights Language (DPRL). In the course of developing the grammar and the language, Xerox filed for and subsequently obtained the patent rights for the use of any rights grammar or language. The division within Xerox, which was commercializing these technologies, was then spun-off in April of 2000, with a minority investment by Microsoft, as ContentGuard, Inc. The patents to these technologies were assigned over to the new company and Microsoft subsequently obtained the licensing rights for this technology in the use of its products.

The goal of XrML is to expand the usefulness of digital content, resources, and services to rights holders. It accomplishes this by providing a flexible, extensible, and interoperable industry standard language that is platform, media, and format independent. XrML, now at version 2.0, is an XML-formatted specification that contains four major constructs: the notion of the use of a "resource", for which "rights" are granted, provided certain "conditions" are met, by the "principal" to whom the grants are made. These constructs make up the concept of a grant, and a combination of grants can be put into a license, which is just a signed grouping of grants. XrML is designed to be used in either single tier or multi-tier channels of distribution with the downstream rights and conditions assigned at any level. In addition, the trust environment can also be specified in the language in order to maintain the integrity of the rights and conditions.

XrML 2.0 is extensible and fully compliant with XML namespaces using XML schema technology. XrML 2.0 extensions can be designed for specific industries or with the inclusion of other elements, such as resource-level metadata standards like ONIX and RDF.

Written using XML Schema, the system can even assign rights to individual Web Services and other such resources. This has some profound implications. Usually, if you have 10,000 media items, you have to assign 10,000 rights. However, with a resource-based framework, a user can ascribe rights to a Web Service, which can control everything it produces with just a single right. Other implications of being able to DRM control Web Services is the concept of an organization granting specific rights to a requesting service, for the use of a particular Web Service for a given period of time after which rights are revoked.

So, the issue for digital rights users is in defining the granularity of a digital work. Is it an entire web page or a single element on the page? Does each digital work (pictures, text, multimedia, etc.) require separate rights? With this framework, users can define the granularity with the ability to have services perform "batch" operations on those resources.

XrML 2.0 was announced in November 2001 and subsequently submitted for consideration to MPEG-21 for consideration as the basis for the MPEG Rights Expression Language in response to their Call for Proposals for a Rights Data Dictionary and Rights Expression Language. While XrML 2.0 has been selected by MPEG as the starting point and the base architecture of the MPEG Rights Expression Language, ContentGuard will submit XrML to any other standards body which has identified the need for a Rights Language. Indeed, ContentGuard is already working with other bodies such as Open e-Book Foundation (OeBF), and the TV Anytime Forum in response to their Calls for Requirements for a rights language. In addition, ContentGuard has publicly committed to "handing-off" the specification to a governing body or global standards organization that can manage the development and governance of XrML in an open and public manner, going forward. ContentGuard's vision is a single, open specification rights language whose extensibility allows it to meet the current and

future needs of DRM adopters and implementers, independent of the platform, media type, format, business model, or industry segment.

The only challenge to open, widespread use of XrML is ContentGuard's patents on the technology described by the specification. ContentGuard has a portfolio of patented technologies in the area of digital rights management. Claims in these patents cover the distribution and use of digital works as well as the use of a rights grammar or language in a system. The patents do not specifically mention either DPRL or XrML. However, they do cover the description, interpretation and enforcement of rights in a grammar-based environment. While the company is promoting XrML as a standard, they don't want to apologize for filing their patents. There is currently no fee to obtain the XrML specification and schema. However, commercialization of product that uses XrML in a context covered by the ContentGuard patents may require a licensing fee that ContentGuard has committed will conform to a "reasonable and non-discriminatory" (RAND) policy in conformance with ISO regulations.

ContentGuard and the XrML SDK

The company's main focus is not on developing standalone DRM products, but on driving the standard for interoperability in DRM for digital content and Web Services. The company is no longer focused on the overall DRM industry, but on XrML, period. Their main business is in selling tools and providing reasonable and non-discriminatory licenses to technology vendors. Users that want to commercialize the use of XrML, have to obtain a license from ContentGuard. They also have royalty-free license agreements for people who are just tagging resources.

XrML is currently governed by ContentGuard, Inc. The company is committed to helping the DRM industry adopt XrML as an industry standard to empower the creation of a consistent, standardized foundation for access and usage rights information. In addition, the company has provided the XrML 2.0 SDK that allows developers to quickly and easily build XrML-based applications for commercial use in various hardware and software products. This tool will lower the cost of deployment and facilitate a higher degree of compliance with the standard. The XrML 2.0 SDK is available for download at www.contentguard.com.

The Market

The DRM industry as a whole has not taken off as quickly as people anticipated for three main reasons: the lack of standards (due in major part to the monolithic, closed nature of existing DRM products), the lack of commercial tools, and the lack of established business models. While many have been opposed to DRM due to its seemingly heavy-handed approach to copyright users, ContentGuard contends that standards such as XrML and DRM in general can actually be enablers of free-use and valid use of documents without having copyright holders be held captive by piracy. The company and supporters of DRM need to convince the market that DRM is a necessary condition to work within confines of legal and acceptable usage and socially acceptable conditions.

Some of the vendors using XrML include Microsoft, Zinio Systems and OverDrive. These companies are a group of early adopters who are using XrML in their own systems or services. In particular, Microsoft has been using XrML since its inception, due in part to its minority interest in ContentGuard. Microsoft is using the technology in its Digital Asset Server (DAS) products.

Challenges

The primary challenge for XrML is the continued growth of the DRM market, for which interoperability is a prerequisite. As a result, adoption of XrML is dependent on the continued growth and health of DRM and ContentGuard's ability to promote the format. Simultaneous to

this challenge is the need to have content tagged in XrML format as well. In essence, there is a supply and demand side problem to adoption of XrML. There need to be resources with rights ascribed using XrML and have technology vendors build their technology applications using XrML.

Key Conclusions & Recommendations

- XrML is increasingly becoming an influential and necessary specification for implementation of DRM technologies and strategies. Companies looking to implement digital rights management should investigate XrML for adoption.
- XrML faces challenges in adoption from standards groups, tools vendors, and content owners. As the organization succeeds in promoting its specification, these issues should subside.
- Hopefully, any issues surrounding its patent and ownership of the underlying concepts won't impede the progress and acceptance of XrML as a standard for digital rights management.

Profile: ContentGuard	(December 2001)
Date Founded: April 2000	
Funding: Privately-held.	
The company is owned by Xerox Corporation (NYSE:XRX), with Microsoft Corporation holding a minority position.	
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Related Research

- XML in the Content Lifecycle Technologies and Trends Report
- Intertrust Briefing Note (ZTBN-0265)

About ZapThink, LLC

Founded in October 2000, ZapThink is an analyst firm focused on the eXtensible Markup Language (XML) and XML Standards, and its adoption by businesses, scientific and academic institutions, and governments. ZapThink provides leading analytical, reporting, and consulting services that help provide complete understanding about a particular technology space by helping clients achieve a complete view of a technology in context with its surroundings.

ZapThink produces and sells XML-focused research and analysis reports including the Pros and Cons of XML, Web Services Technologies and Trends, the ZapThink XML Standards Report, as well as a number of other technology and industry-specific reports. Founded in 2000, ZapThink, LLC is headquartered in Waltham, Massachusetts. Its customers include Global 1000 firms as well as many emerging businesses. For more information, visit www.zapthink.com

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