BERLECON WHITEPAPER

DRM, DRM PATENTS AND MOBILE DRM

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SUMMARY

Digital Rights Management (DRM) is in a process of change. Early definitions and DRM systems emphasized the rather defensive protection of digital content. In comparison, current visions regard DRM more as an enabler for new business models made possible by persistent management of digital objects throughout their life cycle.

Realizing this vision, however, requires that digital assets can be managed across different channels and devices. The field of mobile content illustrates this need. Early content like logos and ringtones was mobile-only. DRM for this content is mobile-specific copy protection, e.g. by blocking forwarding to other phones. With rich media content like music files, the demands on DRM systems rise. For example, consumers are used to listening to their music on different devices, mobile and stationary ones. Supporting this behavior in DRM requires multi-device and multi-channel capabilities, and ultimately interoperability amongst DRM systems.

Newer DRM concepts enable the creation of such DRM systems. Implementing them, however, requires that value chain participants correctly understand the meaning and importance of intellectual property rights like patents in this area. DRM systems can become quite complex, and many companies believe they have patents covering certain elements of them. Such an understanding is necessary not only for those enterprises creating new DRM solutions, but also for those offering DRM-based services. Depending on the specific circumstances, a license might be required from patent holders.

Currently, the landscape of intellectual property rights is confusing, especially for those value chain participants that are not used to handling patents. This might change in the future if the current activities of the MPEG Licensing Administrator succeed. MPEG LA will offer a license to a pool of essential patents covering DRM systems. Such licenses are already well-established for other consumer electronics technologies.

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This whitepaper, which is sponsored research, discusses the role of patents and other intellectual property rights for DRM components in the light of changing demands on DRM systems. It shows how the different forms of IPR relate to each other and how one can license them. A special focus is the mobile environment, which is in the process of becoming an early adopter of more sophisticated DRM solutions. The whitepaper concludes with implications for participants in the mobile value chain.

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Analysis

1 The Basics of Digital Rights Management

While digital rights management (DRM) is an intensively discussed topic, its purpose and meaning are not always clear. The overlapping economic, technological, legal and societal aspects make DRM a rather complicated matter. In addition, the definition of DRM has evolved over time.

1.1 Content Protection – The Current State of DRM

The concept of digital rights management began to gain its current significance during the 1990s. With the emergence of the Internet combined with low barriers for duplicating digital goods, content owners, technology providers and policy makers saw a need for new solutions to define and to enforce usage rights for digital content: digital rights management solutions.

Early focus: content protection

Therefore, the early definition of DRM focused on the *persistent protection of digital content against unauthorized access* as well as on the *effective enforcement of assigned usage rights*. According to this definition, the purpose of DRM solutions is to ensure that only those devices or users with appropriate rights gain access to protected content. Persistency requires that this protection stays intact, even if the content is forwarded or copied. Persistent protection can be achieved by encrypting the asset itself, so that only a person or device with the correct key gains well-defined access to the asset – password-protected PDF files are a simple example. In many discussions, as well as in reference works, this definition of DRM as a protection device is still the most widely used one.[1]

Proprietary DRM systems hard to sell

Based on the outcome of many technology research projects, start-ups like Electronic Publishing Resources (EPR, it later became InterTrust) as well as established companies (e.g. IBM with its solution infoMarket) started selling DRM systems. However, it quickly turned out that selling DRM is not easy.[2] To make a proprietary DRM system work, different parties (content

[1] See, e.g., the entries in the online reference works Webopedia, Wikipedia, or Whatis.com.
[2] For a short overview of this period see Bill Rosenblatt, Bill Trippe, Stephen Mooney (2001): Digital Rights Management, Wiley.

owners, distributors, end users, etc.) must use the same technology. This is difficult to achieve with many players, as they all must be convinced of the same solution. Therefore, after a while many companies withdrew from this market or concentrated on smaller niches. Nevertheless, these activities have determined the current state of DRM implementation, which is generally considered unsatisfactory:

Current state of DRM considered unsatisfactory

- Most early implemented DRM systems are *mostly defensive copy protection systems*, not full-fledged DRM systems enabling new business models.
- The current *fragmented DRM landscape* consists of *proprietary island solutions* that are not interoperable.
- As a result, the *public perception* of DRM is more that of *digital restrictions management*, not that of DRM as an enabler of new business models, products and services.

1.2 Standardized Management of Rights – The Goal

The visionary goal of DRM differs in two aspects from the current situation: DRM will be an enabler technology for new business models and services, not merely a means for copy protection. At the same time, different DRM solutions will be interoperable across different devices, channels, and content types.

Management of Rights for New Business Models

DRM systems must be able to model complex relationships

Relationships between content owners and users are often complex. For example, they may involve more than two parties, e.g. a content seller, a company as buyer of rights, and finally its employees as users. Or they may involve purchases across an extended supply chain that includes distributors, resellers, etc. Also usage rights for content are often non-trivial, in the offline as well as in the online world. There is more than simple "content consumption"; e.g. printing, copying, forwarding, burning to CD, etc. DRM systems should be able to model and manage all these usage forms. This is also shown in newer definitions for DRM:

Newer DRM definitions emphasize management

- "Digital Rights Management is the persistent management of a digital object under a set of terms and conditions throughout its life cycle" (ContentGuard)
- "Digital Rights Management covers the description, identification, trading, protection, monitoring and tracking of all forms of rights usages over both tangible and intangible assets including management of rights holders' relationships." (Roberto Ianella, IPR Systems)[3]

Higher demands on DRM systems

While these definitions differ in scope,[4] they both address the need to *manage* digital rights. And both imply that DRM systems have to go beyond simple one-to-one relationships. This in turn demands more capabilities from DRM solutions than simple copy protection or access control. They have to enable the definition and enforcement of complex business rights; they have to enable tracking the usage of rights; and they have to enable the trading of rights within multi-tier value chains.

DRM as foundation for digital ecosystem of rights, their holders and users

DRM as understood by the broad definition is thus more than a purely defensive protection of digital content. Rather, it is the foundation for creating a digital ecosystem of rights, rights holders and rights users identical

[3] Renato Ianella (2001): Digital Rights Management (DRM) Architectures, in: D-Lib Magazine, Vol. 7, No. 6., [www.dlib.org/dlib/june01/iannella/06iannella.html].

[4] According to Ianella's definition the management of rights for physical objects is also included. Therefore he prefers the term "digital management of rights" over "digital rights management".

to the one that exists in the offline world – or even richer. This ecosystem can be used to replicate elements of offline business models or even to create new ones in the digital world.[5]

Interoperable DRM Systems for more Consumer Satisfaction

Current DRM systems restrict mobility of digital assets

Current DRM systems often impose stronger restrictions on using digital content than necessary from a business point of view. For example, it is not business logic, which dictates that a song downloaded to a mobile phone cannot be played on other devices. Rather, the mobility of digital assets is often restricted because usage terms and conditions cannot be transferred between devices and because copy protection might get lost when transferring the assets between devices.

Interoperable DRM solutions alleviate such problems and thereby increase consumer satisfaction. But interoperability has even more advantages:

Several advantages of interoperability

- It facilitates the delivery of digital assets in complex supply chains involving many different parties. It enables a persistent and consistent management of rights even in multi-tier supply chains.
- It decreases barriers for the creation of a single European or even worldwide market for digital assets.
- By standardizing, it decreases the cost of setting up and running DRM systems and their complexity, making DRM cheaper and more reliable.
- It makes digital assets more valuable, as they can be used in more situations. Resulting demand increases can benefit producers with higher profits and consumers with lower costs.
- It enables new business models. If more types of usage behavior and user peculiarities are covered by DRM, business can create special offers taking into account individual tastes.

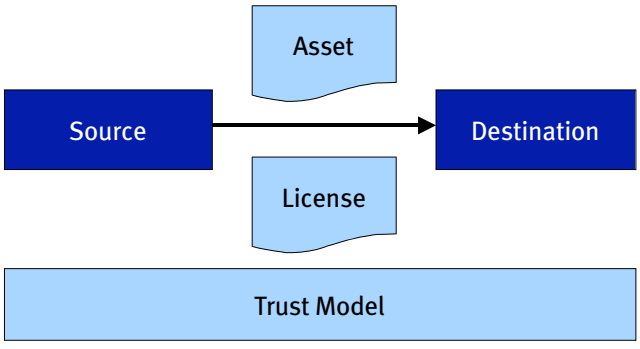
Standardization as prerequisite of interoperability

Creating such an ideal landscape of interoperable DRM systems requires a certain degree of standardization, so that DRM solutions from different vendors can communicate with each other and digital assets can be used in different environments (see section 2).

1.3 Main Components of DRM

Many different ways exist to describe the different components of DRM. Figure 1 shows a rather simple DRM model.

Fig. 1: DRM model



Source: ContentGuard

Five major elements of DRM systems

In this model any DRM system consists of five major elements: source, destination, digital asset, license as well as a supporting trust model.[6]

[5] For an overview see INDICARE (2004): Digital Rights Management and Consumer Acceptability – State of the Art Report, [www.indicare.org].

[6] Most DRM models are less abstract than figure 1 and more detailed. The closer the different models are to actual implementation, the more they differ in the num-

- A *source* provides data and a *destination* uses the data. Both, source and destination can be a person as well as some computer system. The data can be a digital asset or a license:
- A *digital asset* can be, e.g., a music file, an e-book or a piece of software.
- A *license* defines what the destination can do to the digital object under what conditions.
- The communication is supported by a *trust model* spanning the different devices and other components involved. Its realization ensures that all parties and components can be trusted: the source is authorized to issue the license, the license itself has not been tampered with and the destination (device) will comply with the license terms. Encryption, authorization and other security technologies are the means to realize this trust model.

For example, the source can be the backend system of a mobile phone operator. It sends an encrypted music file (the digital asset) as well as a digitally signed license that allows unlimited playing of the song to a specific mobile handset (the destination).

Other DRM models with more or different components

Some DRM models include more or other components than figure 1. One additional component contains the whole e-commerce aspects of buying digital assets, e.g. ordering and paying. Payment is often a precondition for being able to use an asset. Another difference between models can be related to the trust model. While depicted as a fairly independent and basic component in figure 1, others have integrated trust aspects like authorization incorporated more tightly in their DRM architectures.[7]

Elements of a license

The license itself may contain the following elements:

- A *right* that specifies what can be done with the digital asset, e.g. play, print, issue sub-licenses, copy, etc.
- This right may be subject to certain *conditions*. For example, a condition may specify that the right to "play" can only be exercised if it has not been exercised more than 4 times before.
- Identification of a *principal* or a *party* to whom a right is granted.
- Identification of a *resource* or *asset* for which a right is granted.

DRM technology is agnostic to rights and relationships expressed

DRM technology is agnostic to the rights and relationships expressed and enforced. Complete control by content owners, generous fair-use-like rules, or even copyleft – all these ideas can be represented at least to some extent using DRM technology.

Even "Fair Use" may be modeled to some extent

The capabilities of DRM technologies to represent fair-use-like rules depend very much on the specific national legislation – "fair use" in the US is a different and to some extent broader concept than "fair dealing" in the UK or the "Privatkopie" in Germany. While DRM probably cannot be reconciled with the vague concept of fair use in its entirety, parts of it can also be modeled in DRM systems. However, this requires an exact specification, e.g. of the exact number of copies allowed. Not everyone regards this as desirable, which is one reason some fair use advocates oppose DRM. A more important reason, however, is probably the fear that content owners will not even grant such minimum fair-use-related rights – despite their technical feasibility.

ber of components, their purposes and the information flows between components. For an overview see Susanne Guth (2003): A Sample DRM System, in: Eberhard Becker, Willms Buhse, Dirk Günnewig, Niels Rump (Eds.): Digital Rights Management – Technological, Economic, Legal and Political Aspects, Springer 150-161.

[7] See also Guth (2003).

2 The Role of Standards for DRM

Standards may improve usability and decrease costs

Standards accepted by many are a prerequisite for a landscape of interoperable DRM systems. Standardization allows different technical components to work with each other. The music file that can be played on different devices is the obvious outcome. But there is also a second, not so visible effect: Standardization of technical components reduces the total cost for devices that include these components. Interoperability directly affects the end user experience of DRM systems, while reduced component costs impact industry acceptance of DRM.

Standards: Rights Expression Languages and More

Rights Expression Languages are major component of modern DRM

DRM systems consist of many different components that benefit from standardization. One important component, especially for complex DRM systems, is rights expression languages (RELs). Rights in a license have to be expressed in a machine-readable form, so that DRM software can read and act upon them. This is the role of RELs that define in a consistent way how rights can be expressed. Most rights expression languages are based on XML, two major ones exist today:

MPEG-21 REL

- *MPEG-21 REL* (also called MPEG-21/5) is part of the ISO MPEG-21 multimedia framework, which "aims to enable the transparent and augmented use of multimedia resources across a wide range of networks and devices."[8] The starting point for MPEG REL was XrML, a rights expression language proposed by ContentGuard to MPEG-21. In spring 2004, the standardization body ISO formally approved MPEG REL as a standard.

ODRL

- *ODRL*, the "Open Digital Rights Language", was originally developed by Renato Ianella at the company IPR Systems in Australia. It is now maintained by the ODRL initiative. This small industry initiative is "an international effort aimed at developing and promoting an open standard for the Digital Rights Management expression language."[9] A subset of ODRL is being used in OMA DRM (see section 4.2).

Other RELs

Several other rights expression languages do exist, often with specific and limited capabilities. Examples are CreativeCommons (CC), an expression language for rights to open access web resources, which is purely informational and currently not machine-enforceable, or METSRights (METSR), which focuses on library-specific issues.[10] But MPEG-21/5 and ODRL can probably be considered the most universal and ambitious RELs.

Further standardized DRM components

However, RELs are not the only standardized components of DRM. To ensure interoperability and a seamless usability, further components have to be standardized – some also outside DRM itself. While a standardized REL allows a content distributor to have a consistent expression of business models across formats, media types and platforms, a seamless exchange of DRM-protected content across devices requires more, e.g. also a standardized trust model governing these devices. Within MPEG-21, e.g., two more parts deal directly with DRM. The goal of the – still unfinished – component IPMP (intellectual property management and protection) is to define a standardized way to protect digital assets as part of the trust model underlying DRM systems. The already accepted component RDD (rights data dictionary) defines a consistent vocabulary to describe users' rights.

[8] MPEG-21 Overview v.5, [www.chiariglione.org/mpeg/standards/mpeg-21/mpeg-21.htm].
[9] www.odrl.net
[10] Karen Coyle (2004): Rights Expression Languages – A Report for the Library of Congress.

What is an Open Standard?

Different aspects defining openness of standards

Many vendors and standards organizations call their standards "open", as this term has a positive meaning. However, there exists confusion about the exact definition of openness, as different aspects can be taken into account:

- *Access to specification*: Is the standard specification available to everybody (maybe for a fee)? Or is it owned by a single company or a small group and only made available to selected partners?
- *Standardisation process*: Is the standardization process characterized by some degree of openness and democracy? Or are there barriers to participation, e.g. high membership fees for the respective organizations or restricted membership possibilities?
- *Cost of use*: Is there a significant cost for accessing the specification and/or for implementing it? Are there patents related to the standard that have to be licensed for a fee?

Different definitions of openness

Depending on individual beliefs and interests, different definitions for open standards can be derived. Standardization bodies, e.g., tend to focus on the first two points and consider a standard as being open if the specification is available to everyone and the process is open and follows well-defined transparent rules. Typically, they regard the cost of use as an issue unrelated to openness. This is different in stronger definitions, which are more frequently used in the open source community, e.g. in a definition by Bruce Perens, who also coined the term "open source software". According to his definition, open standards must, among other things, be free to read *and* free to implement. This requires that patents embedded in standards must be licensed royalty free, with non-discriminatory terms.[11]

Free availability of specification need does not mean free implementation

Perens' requirement points to an issue which is also important for the field of DRM; the fact that a standard specification is freely available does not necessarily imply that an implementation of this standard is also royalty free. This is due to the fact that copyright (governing the *standard specification*) and patents (governing the *implementation*) are independent of each other and may overlap (see section 3).

Box 1: ODRL and XrML: One open, the other not?

During the last years it was often claimed that ODRL is an open standard, because the ODRL initiative advocates open standards and because it is made available royalty free. At the same time, ContentGuard's XrML (which by now is a legacy specification) was often called proprietary. ContentGuard, who controlled XrML, clearly stated that using XrML in a context covered by its patents portfolio requires a license that might involve the payment of royalties.

However, this distinction is not in line with Bruce Perens' definition of open standards. ContentGuard believes that its portfolio of patents is not restricted to XrML but covers *any* rights expression language. If this is the case, then also ODRL cannot be an open standard, because this definition requires implementation of a standard to be free, too. Thus, according to this strict definition neither ODRL nor XrML are open standards.

Applying, however, a weaker definition of openness, such as the governance of the standard by a standardization organization, both specifications may be called open. As MPEG has chosen XrML as starting point for its rights expression language MPEG REL and as XrML is not developed further, the current versions of both languages are maintained at standardization organizations.

[11] Bruce Perence: Open Standards – Principles and Practice, [www.perens.com/OpenStandards/].

While proprietary de-facto standards are developed and controlled by single companies, most standards are developed within organizations. While these have some common characteristics, opinions differ on which organization's standards have higher value.

Different types of organizations conduct standardization

- *Official standardization bodies* like ISO, CEN or others, are national or international organizations, which are often government-sanctioned. Their standards derive some weight from this. They are particularly important in most industries involving physical products – from traditional industries to telecommunication equipment and digital consumer products.
- Non-profit *industry consortia* like W3C, IETF or OASIS, play an important role in the development of software- and Internet-related standards. While their standards do not have the same official blessings as those from official standardization bodies, their work is widely accepted in the Internet and software industry. Just like the official bodies, these organizations typically have formalized and transparent processes.
- *Industry initiatives* are smaller and more informal bodies often focused on advancing a single standard specification. They typically have a lower degree of transparency. But they are often the starting point for a standard that is later handed over to bigger standardization bodies.

Market determines whether a specification becomes a real standard

While MPEG REL is developed in ISO, an official standardization body, ODRL is maintained by the ODRL initiative, a smaller industry initiative. What these organizations develop, however, is only the standard specification. Whether this specification becomes indeed a standard, i.e. achieves some degree of dominance, will be decided by the market.

3 Intellectual Property Rights on DRM Components

To create any DRM system, standard or proprietary specifications about how the system works have to be implemented in software or hardware. This leads to a variety of issues, which stem from the fact that DRM systems are not only a means to protect and manage intellectual property, but also contain intellectual property themselves. These issues should be taken into account early.

3.1 Basic IPR Concepts and Issues

Legal framework supports innovation and growth

Innovations drive economic growth. Many innovations are created in private enterprises, driven by the goal to achieve some competitive advantage by out-innovating competitors. To keep others from imitating too quickly and thus to ensure a return on investment that justifies developing the innovation, enterprises aim to protect the intellectual property associated with innovations as much as possible. Society supports this protection with a legal framework to keep this driving force behind economic growth working. Three major means of protection are available to innovators:

Means of protection: Trade secret,...

- *Trade secret* is the simplest form of protection. By not disclosing how things work, imitation is made difficult and expensive. Trade secret forms the basis for proprietary software and communication standards. Compiling the software makes it hard to understand how it works and thus hard to imitate. And hiding how software components communicate makes it difficult to engineer replacements for one component.

...copyright, and ...

- *Copyright* is a legal protection of *explicit expressions* like music, movies, books, photos, drawings, and also software. They all are automatically protected by copyright in most countries once they have been created. Copyright protects only specific works (and derivative works), not ideas. For example, it protects a specific computer program but not the way a programmer has tackled a problem. The copyright owner can set terms and conditions for using the protected work.

...patents

- *Patents* are a stronger form of protection of intellectual property. Often most industrially applicable products, as well as methods, systems and processes in relation to a specific use, are patentable. The exact border between patentable and non-patentable inventions, however, depends on national legislation and is often difficult to delineate. But the general idea is that patents can be used to protect how a problem is solved and not only a specific expression.

Publication of patents to foster innovation

IPR protection is only one facet of patents. The other is that patents must be published and have to describe specifically what the patent covers. In addition the patented innovation must be new. The idea behind these rules is to keep innovation going, while the patent lasts. Competitors of the inventor can look at the patent, learn from it and invent new technology based on the understanding obtained.

When patent claims exist, licensing, circumvention or challenging patents possible

If this new technology overlaps with the claims made in the patent in some way, then the innovator has to find an agreement with the patent holder, which typically means taking some sort of license. But an innovator can also attempt to circumvent the claims made in the patent to avoid such an agreement. Obviously, the question of whether some technology infringes patent claims is often difficult to decide and frequently ends up in court. Finally, an innovator can also try to challenge a patent, e.g. because he or she believes that the patented innovation was already known before the patent was granted.

Trade secret, copyright and patents are independent of each other

The different forms of IPR protection – trade secret, copyright, patents – are independent of each other. It may even be the case that copyright and patents on some innovation are held by different entities. If, e.g., a programmer codes a device driver, he or she holds the copyright on this piece of software. This does not ensure, however, that an implementation is not infringing somebody else's patents, e.g. on how a piece of software may interact with the device. The same applies to a standard specification; developing and making available for free a specification on how two widgets can communicate with each other does not exclude the possibility that implementing this specification infringes patents – either patents owned by somebody involved in developing the specification or patents owned by somebody else.

Box 2: Software patents: An issue of dispute

While the existence of patent protection as such is generally accepted by most, patents on software and on software-enabled business processes are currently a hot issue. Such patents have increasingly been granted in the US. In Europe, the situation is unclear. While the European Patent Convention excludes business methods as such, in practice a patent may be granted if a technical effect is involved. However, differing legislation across European countries and inconsistent application of rules make the outcome of a patent application difficult to predict.

Opponents of software patents argue that many granted patents are trivial (e.g. the patent on Amazon's one-click system), that patent descriptions are too vague for deciding clearly whether a patent applies, and that patents threaten especially small companies since patent research is difficult and expensive.

No matter how the current debate and legislative initiatives turns out, the patents that have been granted so far will have to be taken into account.

3.2 Patent Licensing

Bilateral licenses and cross-licensing agreements

The obvious way to license patents from their owners is to enter into bilateral licensing agreements with them. While the typical situation is to license the specific IP needed for one's products for a fee, there is an important exception: cross-licensing agreements. In such an agreement two enterprises agree to grant each other rights to a pool of their patents. This is often an

agreement without the actual payment of royalties, so no direct income is derived from these patents. However, cross-licensing enables both parties to create and market new products without having to worry about potentially infringing the other party's patents. This is sometimes criticized as a "tax on being small", since small companies themselves typically do not have enough patents to enter into cross-licensing agreements and avoid the payment of royalties.

License Portfolios

Patent portfolios less cumbersome than bilateral licensing

As bilateral licensing can become quite cumbersome, especially in an industry where products include many different components covered by patents, another form of licensing has been developed: a joint license to patents from a number of different companies that cover essential technologies, which are granted through a licensing administrator (a.k.a. a "patent pool").

Examples: Thomson, MPEG LA, Via

In the field of music, e.g., the French company Thomson administers a pool for major MP3-related patents that belong to several different organizations, among them also German Fraunhofer institute. More important is MPEG LA, the MPEG Licensing Administrator. This company, which is independent of the standardization body for MPEG, ISO, already covers a variety of technology platforms. These include, e.g., several MPEG standards as well as DVB-T, the standard for terrestrial digital video broadcasting. Also the Via Licensing Corporation, an independent subsidiary of Dolby Laboratories, licenses patents related to some MPEG standards and to Digital Radio Mondiale. These organizations pool as many essential patents for a technology as possible. While they cannot guarantee that they license all patents related to a technology – especially since participation by patent owners is voluntary – they offer licenses for a portfolio of patents considered to be essential for implementing a certain technology or standard.

One-stop shop beneficial for both parties

Both parties benefit from these one-stop shops for IPR. For users of IP, licensing is much simpler than bilateral negotiations with each rights owner. Also the organizations typically put some effort into identifying essential patents. This decreases uncertainty, even if not all of them can be licensed via the administration. For IPR owners, they provide a source of revenue without the need to negotiate individual licensing deals. In addition, the benefits for IPR users make it more likely that the technology will gain strong acceptance quickly, which in turn raises the revenues from patents.

Box 3: DRM-related activities of MPEG LA

In the field of DRM, MPEG LA has a good chance of becoming the most important one-stop shop. In October 2003, MPEG LA started a process to create a patent portfolio license related to DRM. For this purpose, the institution has created a DRM reference model that describes elements of DRM systems in use. This model is used as a basis for evaluating and determining patents that are essential for DRM. MPEG LA has issued several calls for patents during 2004, the last ones for patents covering OMA 1.0 and OMA 2.0 (see section 4.3). After an evaluation of submitted patents, MPEG LA announced in January 2005 its first single license for a portfolio of patents. These are essential patents for implementing OMA DRM 1.0. Additional joint licenses covering other DRM specifications are planned.

While MPEG LA carries in part the same name as the MPEG-21 standard, the two efforts are independent of each other. According to MPEG LA, its DRM activities represent "an independent effort with no need for formal standard setting whose sole use will be to form a joint patent license for the convenience of the marketplace."[12]

[12] [www.mpegla.com/pid/drm/].

Some companies may still want to license patents bilaterally, e.g., because only some of the pooled patents are relevant to their products, because the royalties may be lower or because they can otherwise achieve better or more customized terms. In addition, companies will have to enter into bilateral agreements with those IPR owners that are not part of the portfolio group but nevertheless own relevant patents.

Portfolios not always the best solution

3.3 Patents and Standardization Bodies

Patent issues are also important for standardization bodies.[13] On the one hand, patents raise a couple of challenges for these organizations. On the other hand, these bodies have an important role to play in clarifying which patents might cover the implementation of certain technology.

Patent issues important for standardization bodies

One challenging issue is the incentive for so-called submarine patents, where industry members of the body help to drive industry standards but hide the fact that they have patents on these standards. Once a standard is established and widely used, they disclose their patents and try to start charging for their use. To avoid this, standardization bodies typically require participants to disclose their relevant patents at one stage in the process in so-called IP declarations.

Patent disclosing required to avoid submarine patents

Another issue for organizations is to balance legitimate IPR exploitation interests of members with attaching as few IPR strings as possible to a standard. If a standard is made available for free and without the need to engage in costly and complex licensing agreements, this will most likely increase its rate of adoption. On the other hand, if members have invested in R&D, they typically want to see some return.

Balance between exploitation interests and acceptance of standards

To clarify such situations, standardization bodies typically have IPR policies that have to be accepted by members.[14] One policy, followed for example by W3C, is that members have to license patents royalty free. Other institutions like OASIS or ISO only require licensing on reasonable and non-discriminatory terms (RAND).

IPR policies to clarify situation

In addition, these bodies play an important role by structuring the IPR landscape. IPR policies and IP declarations force those companies that participate in the standardization process to be more open. So it quickly becomes clear which IPR exists in the field covered and who owns it. Thus, the business risks connected with implementing the standard are reduced, as the implementers can base their decisions on better information. In addition, the standards often form the nucleus for activities of licensing administrators like MPEG LA.

Bodies structure IPR landscape

4 DRM in the Mobile Environment

4.1 Driving Forces for DRM in the Mobile Value Chain

Visions were bold when licenses for the third generation mobile communication standard UMTS were auctioned or awarded to mobile operators in Europe around the year 2000. Mobile operators especially were keen for UMTS to start. After all, offering value-added services in addition to voice services and plain access to data networks promises an increased average revenue per user (ARPU), a major performance indicator for operators. Value-added services also offer a possibility for differentiation by compiling

Promise of higher ARPU drives mobile content business

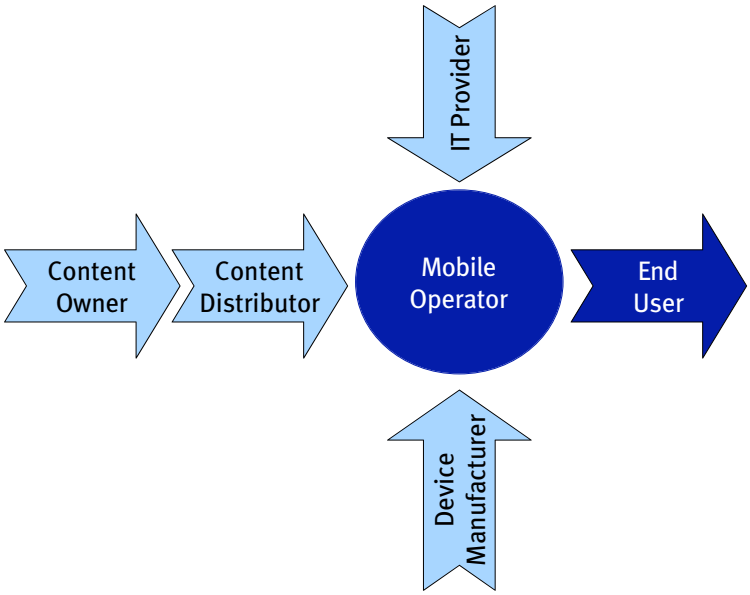
[13] See also Bruce Perens: The Problem of Software Patents in Standards, [www.perens.com/Articles/PatentFarming.html].
[14] For an overview see Priscilla Caplan (2003): Patents and Open Standards, [www.niso.org/press/whitepapers/Patents_Caplan.pdf].

unique sets of products and services for each target group. This in turn promises stronger client-relationships and better margins.

Offering rich media content not trivial

Making available rich media content like music or video to consumers was and still is one of the most highly discussed opportunities for operators. However, this is not trivial. It requires significant investments as well as the co-operation of many players along the value chain (see figure 2).

Fig. 2: The mobile content value chain



The value chain: content owners and distributors, ...

When it comes to mobile content business, *content owners* are the parties that must be convinced that the chosen DRM solutions are indeed sufficient. *Content distributors* often provide services for content owners, e.g. by converting the content into the formats required for mobile distribution across different networks and devices or by creating necessary metadata for catalogues and DRM systems. Therefore they are relevant DRM users.

... device manufacturers and IT providers, as well as ...

Two parties in this value chain provide the DRM infrastructure. *Device manufacturers* design and manufacture the mobile handsets. As DRM functionality is often integrated in the devices, these companies determine to a large extent the capabilities of DRM systems. *IT providers* are hardware, software and service companies that provide content distributors and mobile operators with the necessary infrastructure solutions, including DRM systems and components.

...mobile operators and end users

Finally, the *mobile operators* typically coordinate these activities and bundle content, devices and infrastructure to products and services they sell to *end users*.

Mobile operators as driving force have to strike delicate balance

Mobile operators are a major driving force behind the introduction of DRM. But at the same time they have to strike a delicate balance. On the one hand, content owners and distributors will not provide content without sufficient protection, therefore operators can only enable this marketplace by introducing DRM solutions. However, at the same time they must not alienate users with DRM systems that are too strict or not user-friendly. Otherwise they risk the mobile content business having very limited customers like early digital music distribution initiatives did.

Lightweight content business so far with low demand on DRM

Operators have started their content business selling light media content like logos, pictures, ringtones, etc. For this content, the demands on DRM systems are relatively easy to meet. First of all, this content is created specifically for mobile devices. This enables mobile operators to use mobile-only DRM systems, as portability of digital assets across devices is not needed. A forward-lock, which prevents buyers of content forwarding it to other

phones, might be sufficient. In addition, most of the content is of low value, so even imperfect protection is often good enough.

Mobile music changes situation

This situation is currently changing with increasing interest in mobile music. Driven by their need for higher ARPU and motivated by the success of ringtones as well as mobile MP3 players like the iPod, most mobile operators are currently introducing possibilities to download and listen to full music tracks. Other types of rich media such as video clips are also in the first stage of mass market testing.

Rich media demands DRM systems with multi-device and multi-channel capability

Rich media demands better DRM systems that allow a management of rights across different value chain participants and devices. It is widely assumed that users want the same rights and usage possibilities for identical content, no matter through which channel and for which device they bought the rights originally. This is not limited to the mobile sphere, but also includes the fixed sphere. A music file, for example, may be listened to on a mobile handset, an MP3 player, a home stereo, a car radio and many other devices. DRM systems supporting this consumer behavior must have multi-device and multi-channel capability.

4.2 Current State of Mobile DRM

Mobile DRM currently in transition phase

Currently, mobile DRM is in a crucial transition phase. Existing standards-based DRM systems are mostly restricted to the mobile environment and light media content, while standardization for multi-channel, multi-device DRM systems suitable for rich media is still ongoing. Therefore many mobile operators currently employ a mix of standard-based DRM systems for light media content and proprietary systems for rich media content.

OMA DRM

OMA: driving standards and interoperability

DRM in the mobile environment is identified with the work of OMA, the Open Mobile Alliance.[15] This alliance of about 400 companies is the major organization driving standards and interoperability in the mobile environment. While it addresses the entire mobile value chain including content providers, its members are mainly IT companies, device manufacturers and mobile operators.

OMA DRM 1.0 und 2.0

OMA has provided the framework for drafting the OMA DRM standard, which was specified as version 1.0 in November 2002 and in an extended 2.0 version in July 2004. OMA DRM uses ODRL as the rights expression language. While the first release of OMA DRM consists of some important DRM building blocks, only the second release enables secure distribution, authentication of devices, revocation of licenses and other aspects of a full-fledged DRM system suited to rich media distribution.

The first version defines only three modes: forward-lock, the combined delivery of digital asset and rights (lightweight DRM) as well as a separate delivery of assets and rights, which enables new business models like superdistribution. Roughly 200 handsets have already implemented OMA DRM 1.0, at least partially. In comparison, OMA DRM 2.0 is still at the stage of a candidate enabler, which means that it can now be tested for interoperability. Mobile devices are not yet available.

First companies advertising OMA 2.0 support

Nevertheless, the first companies are already advertising OMA DRM 2.0 support in their solutions. One example is German CoreMedia, which has recently announced that it will provide its DRM system to Vodafone for the

[15] www.openmobilealliance.org

3G Vodafone life! portal. Other examples are Norwegian Beep Science or US-based NDS and Discretix. Dutch DMDSecure has announced its support for the next version of its software.

Advantage of OMA: broad support

The main advantage of OMA DRM is its broad support from mobile operators, device manufacturers and IT suppliers, which makes it possible to achieve interoperability between different operators and handsets. However, full multi-channel and multi-device DRM requires more, most of all an extensive infrastructure to realize a trust model.

Trust model with help of CMLA envisaged

To build such a trust model, Intel, mmO2, Nokia, Matsushita, RealNetworks, Samsung and Warner Bros. Studios have set up CMLA, the Content Management License Administrator. The CMLA aims to ensure interoperability between devices, confidence in the DRM implementations in CMLA-certified devices, as well as an infrastructure for key and certificate generation and distribution and other elements. Whether and how fast the CMLA will achieve these goals is still an open issue, however.

Other DRM Systems

So far few rich media services based on OMA

Operators have already started offering rich media mobile music. Few, e.g. Sony Network Services' StreamMan, are OMA DRM-based. Some operators, e.g. Vodafone, follow a dual strategy by using a proprietary service for current offers and an OMA-based solution for upcoming services.

Various proprietary alternatives

Several companies offer proprietary DRM systems for mobile music. Swiss SDC, for example, has developed a Java-based system, which does not require special DRM implementations on the mobile handset and offers some degree of multi-device support. SDC's solution is already being used by mobile operators like O2, Vodafone, and Cegetel as well as by the mobile music service provider Musiwave that serves further operators. Chaoticom from the US offers another proprietary system, which is currently used by Orange, Telenor and others. Last but not least, Microsoft and its DRM system are also players in this market. T-Mobile sells a special smartphone, the T-Mobile SDA music, which is equipped with the operating system Windows Mobile.

iTunes on Motorola phones not yet available, but intensively discussed

Another, not yet available, solution has gained a lot of attention recently: the iTunes client for Motorola mobile handsets. The cooperation was announced in July 2004, shipping of the first handsets is planned during 2005. It will not be possible to buy music through this software with the first version – music files will have to be transferred from a PC or Mac. However, its advantage is the already existing iTunes music store infrastructure including Apple's proprietary Fairplay DRM system and distribution contracts with many content owners.

While from a technical and timing point of view iTunes on Motorola handsets might seem inferior to OMA DRM 2.0 and also as coming too late, it will most likely be easy to use and working. As shown in another area of mobile communication – the successful BlackBerry mobile e-mail solution – proprietary easy-to-use solutions can win market share from standards-based solutions.

OMA DRM not the only possible future

The other DRM systems illustrate that complete standardization on OMA DRM is not the only possible future for mobile DRM. Proprietary solutions like those of Apple, Microsoft, SDC and others can play a role, especially if preferred by content owners. In addition there may well be competition for OMA DRM from MPEG-21, as MPEG standards traditionally have a strong presence in consumer electronics.

4.3 Mobile DRM and Patents

Patents also relevant for mobile DRM

As in other application areas for DRM, patents are also an issue for mobile DRM. However, as yet the patent situation for mobile DRM is much less transparent than that for more established standards like MP3 or MPEG-4, where most essential patents are known and can be licensed via patent license administrations (see section 3.2).

Various companies with patent claims

A number of companies claim to have IPR related to DRM, mobile DRM, or content protection in the mobile environment. Such claims are not restricted to the US or US-based companies, some also cover Europe. OMA alone lists several member companies that have made DRM-related IP declarations.[16] Among these are Nokia, Philips, RSA Security, and SDC. In addition, the patents of major DRM IPR companies like ContentGuard and InterTrust, which are not members of OMA, will have to be taken into account. And finally, there remains uncertainty, whether the list of declared IP is really complete. Industry heavyweights like Microsoft and Sony Ericsson – also members of OMA – may also have DRM-related patents.[17]

Complex IPR issues with complex technology

The more complex an implemented DRM system is, the more complex the IPR issues become, simply because more potential patents have to be taken into account. While mobile device and consumer electronics manufacturers have some experience in dealing with a large number of patents, software companies are less used to this.

Efforts of MPEG LA promise to facilitate licensing

The efforts of MPEG LA promise to facilitate licensing if the organization succeeds. In January 2005 MPEG LA could announce its first success: a tentative portfolio license agreement covering essential patents related to OMA DRM 1.0. The holders of these essential patents are ContentGuard, InterTrust, Matsushita, Philips and Sony. The proposed licensing agreement will involve royalties of 1 US$ per device (payable by the party that offers the device to an end user) and 1% of any transaction in which an end user pays for delivery of a digital asset employing OMA 1.0 (payable by the service provider). MPEG LA plans for an actual license agreement to be issued by March 2005.

In the future an extension of the portfolio license is possible. Taking into account industry requirements, MPEG LA has published a DRM reference model in 2004 that covers also OMA DRM 2.0. Based on this model, there is a pending call for essential patents covering OMA DRM 2.0.

5 ContentGuard

ContentGuard, sponsor of this whitepaper, is an important player in the DRM sphere due to its DRM-related patent portfolio. As intellectual property issues will most likely play a significant role in the future development of DRM solutions, it is useful to look at ContentGuard in more depth.

Development of the Company

Xerox PARC spin-off

ContentGuard was founded as an independent company in April 2000 as a spin-off of Xerox Corp. Xerox held a majority ownership and Microsoft took a patent license and made a minority ownership investment. ContentGuard's aim was to exploit more than a decade of patented research on DRM at Xerox Palo Alto Research Center (PARC), where researchers like Mark Stefik and others laid many foundations for modern DRM systems.

[16] [www.openmobilealliance.org/about_OMA/OMA_IPR_Declarations.html]
[17] According to esp@cenet, the patent database of the European Patent Office, [ep.espacenet.com].

ContentGuard started as a software company selling its own DRM solutions based on its intellectual property and providing content distribution services based upon these solutions. Today, however, ContentGuard's main business is the licensing of IP and the development and promotion of DRM standards. The company also develops software tools for these standards.

Current focus: licensing of its intellectual property and promoting DRM standards

In April 2004, Xerox sold most of its ownership position to Time Warner and Microsoft. In November 2004 the French consumer electronics company Thomson announced plans to join as another investor with a 33% stake in ContentGuard, At the time of writing, these ownership changes were being reviewed by the European Commission's Competition Directorate. However, all three companies have said that they intend to continue ContentGuard's work to promote interoperable standards for digital media and promote the development of the digital distribution through licensing essential IPR.

Currently restructuring of ownership

Assets and Strategy

ContentGuard today focuses on monetizing its intellectual property by licensing its patents. While this strategy might not make ContentGuard friends everywhere, it is rather open and straightforward. Unlike technology suppliers, IP pure plays like ContentGuard or InterTrust have an incentive to license their intellectual property broadly to maximize license revenue. Key in such a strategy is developing a market that uses the technology to which the IP applies as well as setting reasonable license fees.

IP pure plays have incentive to license broadly

In ContentGuard's case this means advancing the DRM market by developing DRM standards and promoting interoperable DRM systems. The company has been rather active during recent years in promoting a common way to express rights that is independent of platform, media type, format or vendor. It has contributed its rights expression language XrML to a number of standards bodies in the hope that this would lay the foundation for business model interoperability.

ContentGuard active in advancing interoperable DRM systems

In early 2004, ISO MPEG 21 formally approved MPEG REL, which is based upon XrML as an international standard. The future development of this rights expression language will now be determined by the standards body. ContentGuard has not made any enhancements to XrML since November 2001 when version 2.0 was submitted to MPEG, and maintains it as a legacy specification. Other standards bodies are adopting or considering using MPEG REL (with profiles and/or extensions) as their REL standard (e.g, Open eBook Forum, education and distance learning efforts in IEEE and MPEG, Web Services Security in OASIS, TVAnytime Forum).

Patent Licensing

During these efforts, ContentGuard has repeatedly pointed out that it believes it has fundamental patents that apply to systems for distributing and managing digital works. While some claims apply to technology using a grammar to define rights, the company believes they are not restricted to XrML.

ContentGuard believes it has fundamental patents

Therefore ContentGuard licenses its patents anywhere they apply, regardless of standards, or which standards are being used. Licenses are royalty free for development purposes. They are also royalty free if an application, e.g. a content authoring tool, only assigns usage rights to digital works. Any deployment beyond assigning rights involves the payment of licensing fees. The terms and conditions depend on the specific license agreement, which takes into account the business model of the license-taker. They also depend on the licensing channel:

ContentGuard licenses patents regardless of standard used

Different ways of licensing

- Companies can take bilateral licenses, as Sony, Microsoft, Time Warner, Thomson and others already have.
- ContentGuard has committed to several standard bodies (for example MPEG-21) a licensing of its patents on reasonable and non-discriminatory (RAND) terms for use in applications and systems that comply with the approved standard specifications.
- ContentGuard is engaged with MPEG LA in its process to form a DRM patent pool. In this process MPEG LA has found ContentGuard patents to be essential for implementing OMA DRM 1.0. Once the MPEG LA portfolio license is available, these essential patents can also be licensed via MPEG LA.

ISO MPEG REL proposed to any organization needing an REL

ContentGuard proposes ISO MPEG REL to any organization needing a rights expression language. It also proposed MPEG REL to the predecessor organization to OMA (WAP Forum), which, however, decided to use ODRL. Nevertheless, ContentGuard believes that its patents also apply to OMA DRM and has also communicated this to OMA, even though ContentGuard is not a member of OMA. OMA has not listed this declaration among the IP declarations received from its membership.

6 Implications

Patents are currently reality, also for the software industry

While there is currently considerable discussion in Europe as well as the US about the potentially detrimental effects of patents on the software industry, such patents are currently a reality, whether one likes them or not. Even if the legal situation changes in the future in Europe or the US, this will not be of much help to companies that want to develop the market for DRM-solutions and DRM-protected content now. Therefore every participant in the value chain that uses DRM needs to consider the patents that may apply and take their existence into account in their business cases.

Patents on DRM technology have to be taken into account just like other patents

These companies have to take into account patents on DRM technology just like any other patent, which either means licensing, circumventing the patent claims, or challenging the patents. Of all players in the value chain, mobile device manufacturers and manufacturers of consumer products have an advantage. As (hardware) patents are well established in their industries, they are used to dealing with patents. For software companies this will be more of a challenge, especially for smaller companies without the necessary resources and experience.

Also mobile and portal operators should clarify whether they need a license

Mobile operators and portal operators tend to be only users of technology, which means that normally they do not come into contact with patents very often. However, part of their activities might be covered by patents and require a license. This is not limited to mobile DRM but also includes activities like MP3 streaming. Therefore these companies also have to clarify whether some of their activities require a license and if they are covered by their technology (software or hardware) supplier.

All players must understand role of patents in their industry

All players have to make sure they understand the role of patents in this industry. For individual companies this requires a better understanding of different IPR forms, IPR issues and the possibilities of handling them. For industry associations and standardization organizations there is a role to be played in better educating market participants about essential patents and patent holders in their industry or related to the standards they develop.

Patent portfolio licensing can decrease costs and uncertainty

Compared to individual patent research and bilateral licensing, patent portfolio licensing can decrease costs and uncertainty. In several other technology fields (e.g. CDs, wireless communications, digital music encoding) patent pools are already a well-established tool to strike a balance between the compensation of IP holders and keeping the barriers for technology and service providers low for using this IP. DRM may very well fol-

low these examples. Licensing administrators like MPEG LA can play an important role here and should therefore be supported. Licensing through these organizations should be taken into consideration.

Benefits and potential of DRM technology are clear to market participants. But to create a solid DRM-based business model, companies deploying or using DRM need to understand the IPR issues of DRM technology and need to take into account the cost of using necessary IP for state-of-the-art technology.

Methodology

This whitepaper is based on extensive desk research as well as on presentations by and conversations with companies in the DRM and mobile environment. It was written in November-December 2004.

Disclaimer

The content of this whitepaper was compiled with the greatest possible care. However, we cannot take any responsibility for its correctness or completeness. Estimations and assessments reflect our current state of knowledge in December 2004 and may change at any time. This applies especially, but not only, to statements about future developments.

Names and terms used in this whitepaper may be trademarks.

Abbreviations

ARPU	Average Revenue Per User
CEN	European Committee for Standardization
CMLA	Content Management License Administrator
DRM	Digital Rights Management
IETF	The Internet Engineering Task Force
IP(R)	Intellectual Property (Rights)
ISO	International Organization for Standardization
MPEG	Moving Picture Expert Group
MPEG LA	MPEG Licensing Administrator
MP3	MPEG Audio Layer 3
ODRL	Open Digital Rights Language
PDF	Portable Document Format
OASIS	Organization for the Advancement of Structured Information Standards
REL	Rights Expression Language
UMTS	Universal Mobile Telecommunication Services
XrML	eXtensible rights Markup Language
W3C	World Wide Web Consortium