The Role of Digital Rights Management as a Solution for Market Uncertainties for Mobile Music

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Introduction

In this article Mobile Music is defined as commercially available digital music that is distributed over mobile networks. Music has become the ideal case study for the Internet with its unique availability in digital form on billions of CDs. Online distribution became an underground phenomenon from the inception of content downloads over the Internet (Pettauer 2000). Preconditions for Mobile Music are increasingly positive, as all participants in the mobile value chain seem to have interests in successful business models based on digital rights management (DRM).

How Mobile Music can drive successful end consumer business models:

- Consumers are accustomed to Mobile Music (using walkman/portable CD/MP3 players). Additionally, listening is a key functionality of phones.
- Music consumers and wireless pioneers are congruent (under 25 years).
- Little input functionality for linear content is required (play, pause, fast-forward, etc.).
- Formats and rendering devices are already available.
- Content preparation efforts are limited to the extent that audio content is digitally available as compared to books and graphics, and therefore little conversion is required for music or audio books.

Though much literature can be found prognosticating a significant change in the competitive environment of the music industry, little research exists on the combination of revenue models and property rights in the field of Mobile Music (Zerdick et al. 1999, p. 53). The starting point for this analysis is the assumption that the basic principle of the electronic market as an efficient allocation mechanism works. However, uncertainties on both the supply and demand sides of the electronic market lead to insufficiencies. Two significant consequences regarding the business models resulting from the virtualisation of music include: revenues are likely to be affected by the different cost structures associated with Mobile Music, and Mobile Music market business models are likely to be impacted by copyright protection issues similar to those which exist for the Internet. Therefore the following research questions are being examined:

- What possible business models are available to entrepreneurs to overcome both supply side and demand side market uncertainties in order to expand Mobile Music market distribution?
- Which of the identified business models offer the greatest likelihood of long term Mobile Music market viability?

In order to attempt to answer the research questions posed, the second section of the paper provides a definition of digital rights management, discusses

Abstract

This paper examines and categorises potential business model scenarios for music based on wireless technologies, henceforth referred to as Mobile Music. The virtualisation of Mobile Music leads to market uncertainties where offering parties on the supply side may not be able to sufficiently privatise it. On the demand side, due to changing cost structures for digital goods, consumers may not be willing to pay directly for such goods. As a result, revenues have to be collected indirectly by public or private entities. Business models for Mobile Music can therefore be categorised into four scenarios. In the first scenario, a model is proposed where Mobile Music is used to promote the traditional offline business. The second scenario proposes a model where consumers are willing to pay for additional services to access Mobile Music. The third scenario significantly differs from the above mentioned two, as music providers are expected to be able to protect their content by using digital rights management technology for subscription systems. In the final scenario, peer-to-peer technologies are used to show how Superdistribution allows consumers to share and recommend copy-protected songs. The paper concludes with an analysis about the potential players in Mobile Music.

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next four years market research firm IDC predicts that this market will grow to approximately $3.57 billion in revenue, with an annual growth rate (CAGR) of over 100 percent across a variety of vertical and horizontal markets. There is an important distinction to be made between DRM technologies and DRM distribution platforms for mobile content:

- **DRM Technology** deals mainly with the encryption of digital content, usually specialized for specific environments like the PC platform or specific content types. In the mobile environment, Microsoft, SDC or LOCKstream are examples of DRM technologies.

- **A DRM Distribution Platform** is designed to manage the overall process related to the distribution of both the digital content and the associated rights, and therefore might include one or various DRM technologies. OverDrive or Bertelsmann’s Digital World Services are providers of such a platform.

With growing bandwidth and increasing handset capabilities, rich content becomes accessible from mobile end devices just like on today’s Internet via the PC. In contrast to the Internet, especially for mobile content, all parties involved have a major interest in a flourishing mobile content business.

Involved in the value chain of mobile content are mobile content owners, aggregators, carriers, handset manufacturers and consumers with shared interests in successful mobile content.

### Content owners

Re-purposing existing content for the new mobile sales channel can be a very profitable business due to little upfront investments required for content creation. Just as on the Internet, competing with piracy and illegal copies turned out to be a major challenge for those involved in the digital content business. Mobile content owners can only earn back their investments in mobile content if their copyrights and content are protected. Content owners are unlikely to allow premium content to be distributed without effective DRM, especially in Europe and in the U.S.

### Aggregators

Aggregators draw traffic with attractive content and their own brand value. Aggregators may take any form in the wireless world: carriers, portals, device portals and Internet-based portals (e.g., Yahoo!). Revenues are generated mostly from commerce transactions and advertising. Aggregators face the same challenge as content owners: to control the distribution of mobile content without the risk of overwhelming piracy.

### Carriers

Carriers (and mobile network operators) want to capitalize on their heavy investments by using their networks for services beyond providing bandwidth for voice. The re-use of billing capabilities and bandwidth for mobile content is expected to drive profitability in the future. By providing unique, differentiated content, carriers can increase average revenue per user and significantly lower their churn rate.

Carriers understand that a mobile DRM implementation requires intense integration work and thus is a strategic decision. Therefore, the choice for a specific DRM platform can have far-reaching consequences for future content business models. Even though the first implementation might be needed for music only, carriers have to be ready to support multiple content formats and therefore should be prepared for supporting multiple DRM technologies.

### Handset manufacturers

In a market close to global maturation, handsets can be differentiated by providing more functionality which the
consumer would be willing to pay for (instead of the provider subsidizing it). At the same time, handset manufacturers, just as carriers, have to increase their brand loyalty by providing attractive services and applications to consumers. In order to compete with rising “no-name” manufacturers, established brands have started to provide content through their clubs and portals.

Consumers

The consumption of mobile content has always been an attractive proposition to consumers and is deeply interwoven with today’s media consumption behaviour (books, newspapers, walkman are just a few examples). Increasingly, consumers are demanding content be transferable across multiple devices.

Demand-side: cost structure and revenue models

Information goods, like Mobile Music, are characterized as having high fixed costs or first-copy costs but very low incremental costs (Skiera 1999, p. 97). In the case of the music industry, producing the master-copy is very expensive while production of additional copies can be accomplished at very low marginal costs (Kelly 1998, p. 54). A study conducted in England, Germany, Italy and France by Doglio & Richeri (1996) found that in the music industry the first-copy cost amounts to an average of 21.1 percent and manufacturing costs amount to 8.5 percent. The highest per-unit cost is attributable to marketing and sales with 49.9 percent, and the remaining 20.5 percent is allocated to label costs and margin. Additional cost elements beyond manufacturing costs include: retail obsolesce, returns, physical distribution and transport. Costs for technology, bandwidth and customer service, etc. also have to be factored in.

The benefits of digital distribution of Mobile Music do not significantly change the per-unit cost at current volumes. It does however offer the possibility to distribute in much larger quantities than in the physical world.

Additionally, a number of different revenue models for Mobile Music are possible:

- **Airtime sharing** refers to the participation of content suppliers in connection revenues (per time unit or per data packet). To a great extent, the size of the connection revenues generated with attractive mobile content will determine the near-future success of mobile telecommunications firms. However, the extent of content suppliers’ participation in revenues will vary widely (between 0.50 percent and 10 percent).

- **Promotions and Sponsorships**: The mobile phone can deliver highly effective and targeted marketing messages. Mobile music can even include marketing or advertising messages, like a jingle or additional information (“The album is released on December 6th”), and can link directly to a purchase portal that allows the user to buy more.

- **Transaction-oriented revenues** will play a key role in the mobile environment enabling content providers and aggregators to recoup their investments. Commission rates will vary between 2 and 15 percent, depending on the content vertical (e.g. for entertainment offerings, 7-9 percent). At the same time, content can be forwarded to other consumers with specific restrictions attached (in DRM terms, this is referred to as ‘Superdistribution’).

- **Content aggregation and subscription** describes the sale of content to consumers based on a flat periodic fee for unlimited (or capped) consumption. Content can either be generated specifically for the purpose, or comprise a selection of previously existing content that is otherwise sold unbundled. Mobile content subscriptions can be sold with the provider contract at sign-up (e.g. 40 Euros for 2,000 minutes plus three free subscriptions).

Mobile music can be expected to have a significant impact on the music industry’s main revenue model based on distribution of CDs. In the literature, revenues are divided into two main categories: direct revenues, which result from the consumer, and indirect revenues, which come from associated products via public or private entities (Zerdick et al. 1999, p. 25f.). While in the literature a separation between different revenue streams seems possible, in the business environment, a wide spectrum of combinations can be found just like a newspaper might have revenue streams from advertising, subscription and Short Message Service (SMS).

Supply-side: public and private goods

The theory of public goods holds that goods have different characteristics whether or not there is rivalry or non-rivalry in using them. Public goods are non-excludable and non-rivalrous in consumption, while private goods are sold to those who can afford to pay the market price. In the music market, broadcasting as a public good is used to promote songs, while CDs function as a container for music sold as private goods (Tschmuck 2000).

Copyrights are a means of establishing boundaries between who is allowed to use a particular good and under which conditions, and who is not. Developments in technology seem to remove the grounds for these boundaries. Burke has shown how technological developments in the past gave rise to changes in copyright (Burke 1996, p. 51). At the same time, piracy has always accounted for a significant share of the music market. In 1999, according to IFPI, about 1.9b units of illegal copies were found with a value of 4.1b US dollars leading to a hypothetical market share of 36 percent (IFPI 2000, p.2). On the Internet, piracy has become an even larger mass phenomenon due to the availability of perfect digital copies. With non-excludable Mobile Music, end
consumers become free *riders* who are not willing to pay the market price for music as long as it can be accessed for free. (Heinrich 1994, p. 26).

The distribution of music is dominated by an oligopoly of five major labels. For these music labels, the economic value lies in their artist contracts and in exclusive distribution of their recordings, which enables promotional distribution channels like free TV or radio (Thurrow 1994, p. 81f.). Statistically, infrequent consumption of music albums as private goods accounts for about one hour a day, with revenues of 68 US dollars per music listener per year. On the other hand, public broadcast amounts to frequent, but superficial consumption of three hours a day. This results in 58 US dollars per music listener per year in advertising revenues for the broadcast stations per year from which music labels receive a much smaller percentage as compared to album sales. As a result, the music industry shows high interest in privatising music in order to generate higher revenues not only from traditional products, but also from the mobile market. Increasing piracy challenges the privatisation of Mobile Music, and as a result the music industry has started a number of legal, marketing, educational and technology initiatives.

Law suits from the Recording Industry Association of America (RIAA) against MP3.com, Scour, Napster and others in the U.S. demonstrate the music industry’s efforts to minimize copyright infringement. Just like on the Internet, users might access Mobile Music via wireless large area networks (WLAN) at hot spots like Universities or Airports – so-called “Offshore-Web-Hosting” – from companies like HavenCo. Com or Offshore.com.ai. De-centrally organized peer-to-peer-systems like Gnutella and FreeNet might continue to operate despite law suits driving consumers to “underground” systems (Schreirer 2000, p. 9). The same might apply to multimedia messaging services (MMS) in the mobile environment.

From a technology point of view, standardization efforts such as the Secure Digital Music Initiative (SDMI) and the Open Mobile Alliance (OMA) were started in order to develop specifications that include DRM. Many doubt that the industry can successfully introduce security mechanisms that are unbreakable or that can at least raise a significant barrier against piracy without creating much higher costs (Albers, Clement & Skiera 1999, p. 83). Many examples in other media industries, like the current DVD-protection scheme, have failed to develop secure protection mechanisms. Additionally, on today’s Internet, only a single copy (even by re-digitising from analogue versions) made available is sufficient to be globally distributed in a short period of time leading to a total loss of control by the owner. On the other hand, with integrated billing systems on phones, security has to be higher as compared to PCs, where DRM might as well leverage the same secure infrastructure. Security, both for the content owners and consumers, has been a huge issue on the Internet. In the wireless environment, especially on handsets, hacks are much more difficult. As Consumers trust their cell phones (irrespective of their provider) as their billing partner for calls, billing for content will become more convenient through carriers or third parties with existing billing relationships. Also, privacy and data protection on the consumer side seem to be perceived as less of an issue compared to the Internet, where consumers fear that personal and payment data might be accessible to unauthorized parties. At the same time, security implemented on Subscriber Identity Module (SIM) cards or on chips seem more secure than software implementations on an application or even system level.

In conclusion, a world of Mobile Music with or without DRM seems possible. This is reflected in the following scenarios.

### Four business model scenarios

The goal of using scenarios is to categorise various business models according to several case studies involving new distribution mechanisms like file sharing, digital rights management and Superdistribution using MMS. As described in the previous sections, the virtualisation of music has two significant consequences regarding business models: first, the cost structure for the delivery is structured differently and thereby revenues may be affected. Second, the protection of copyrights has become more difficult in today’s networks.

Four scenarios can be deduced by combining these two uncertainties into a matrix that represents both supply and demand. In this article, for each of the scenarios, one case study is described and possible revenue models are given.

#### Assumptions

These four business model scenarios are subject to the following assumptions:

- in the mid- to long-term, no business models will be viable which infringe on copyright laws. However, there might be systems without commer-

### Table 1: Scenario Matrix for Mobile Music

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<th>Public Good Distribution</th>
<th>Subscription Models</th>
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<td><strong>Indirect Revenues</strong></td>
<td>Free Peer-to-Peer Distribution</td>
<td>Music Service Providing</td>
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<tr>
<td><strong>Direct Revenues</strong></td>
<td>Superdistribution (MMS)</td>
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cial interest that face no legal consequences for enabling illegal copies. Open-source-file sharing systems belong in this category.

- revenue models are based on rational entrepreneurial decisions. Artistic, voluntary or otherwise motivated scenarios are excluded.
- most importantly, these scenarios anticipate a slow migration towards mobile technologies, meaning that traditional media companies maintain distribution control over physical storage media like CDs and DVDs. Zerdick et al. state that electronic markets do not lead to an immediate substitution of the existing value chain. Nevertheless, it is leading to a constant erosion of traditional value chains and the orientation towards the demand side (Zerdick et al. 1999, p. 177).

First scenario: free peer-to-peer distribution

In less than two years Napster became the largest music library in the world with about 1b titles. Napster engaged in no economic incentive or marketing activities, and even more importantly no involvement from the music industry (Becker & Ziegler 2000, p. 14). At a very high level, file sharing systems or peer-to-peer-networks (P2P) aggregate and distribute information. With either central or de-central listings, files can searched for, transferred and stored locally. The main challenge for content owners was Napster’s mass phenomena. Since its launch, Napster attracted almost 70 Million users who knowingly violate copyright laws.

The purpose of open-source-file-sharing systems is to freely distribute information beyond any control and commercial interest (e.g., Gnutella developed by Gene Kan and FreeNet designed by Ian Clarke are examples). Gnutella and FreeNet are designed to run de-centralized – just like beaming content between handsets – which makes it almost impossible to control or to shut down. As a result, not only music files, but other illegal content such as child pornography and terrorist instructions can be found – just like a “digital black market”. The main challenge of these systems is that they can only scale with resources such as content, bandwidth and storage from their users. Because this content can be viewed as public goods, these systems attract free riders – people unwilling to give any contribution in return. During a study of the Gnutella Network it was found that 70 percent of the users do not give any contribution to the system, and that half of the searches were answered by just one percent of the participants. Apart from a significant loss of system performance with longer search and download times, it increases the system’s vulnerability as the system may collapse with the shut down of this one percent of peers. On the other hand, there are concepts like seti@home with users voluntarily contributing resources in exchange for prestige and reputation. As a result, file-sharing systems seem to be able to overcome today’s challenges and will play an important role in the distribution of Mobile Music.

How can the music industry embrace such systems to generate revenues? Revenues can be generated indirectly from Mobile Music in return for the value of consumer’s attention (Seidel 1993, p. 87). This attention can be used to promote either the physical album or the artist in order to increase popularity and thereby earn higher merchandising and advertising revenue. As a result, with Mobile Music being a public good, the combination of online and offline business by integrating Mobile Music and traditional marketing and distribution seems a profitable business model. Despite legal battles from the RIAA arguing that illegal copies cannibalise album sales, market studies are inconclusive at this point. Jupiter identified Napster usage as one of the most important factors for increased music purchases (Sinnreich et al. 2000, p. 1). On the other hand, album sales were decreasing in record stores close to universities where file sharing supposedly reached high usage among students (VNU Entertainment Marketing Solutions 2000, p. 2f). In 1999, Creed offered their hit song on 100 web sites for free downloads and in the process stimulated their album sales. Coincidentally their album “Human Clay” reached the top of the billboard charts (Committee on Intellectual Property Rights and the Emerging Information Infrastructure 2000, p. 80f).

Nevertheless, substitution of the promoted traditional media like CDs and DVD-Audio might increase as soon as a comparable infrastructure for Mobile Music exists.

Second scenario: music service providing

Provided Mobile Music is a public good, collecting direct payments seems almost impossible unless the value lies primarily in the functionality and services rather than in the content itself (Deutsche Bank 2000, p. 14). In this scenario, instead of copy protection, service-oriented new business models are developed to eliminate the motive to copy. Besides content, these services and applications offer convenience, reliability and fast access to music almost anywhere, anytime; these services are referred to as the celestial jukebox. This sector is expected to grow from 2.5m today to 12.3m in 2003 in the U.S. (Black 2000). These revenues would come from charging the consumer directly for the usage of these services and application fees and not based on the consumed content (an example would be monthly usage fees for a media playback application). Ultimately, those companies – including the carrier – would have to combine content, community, application services, context and search functionality. Personalization plays a crucial role in attracting consumers and providing lock-in (Heinrich 1999, p.32). In the networked economy these versions and even individual products...
and services are achievable due to smaller transaction and production/service costs (Piller 1998, p. 16). Using a feedback loop mechanism for Mobile Music, personal playlists can be generated, recommended, updated and shared among other users. Large description data bases like Moodlogic or Gigabeat can analyse relationships among titles and artists according to rhythm, instruments, contextual information and even mood.

Third scenario: subscription models

Protection technologies play an important role in determining whether a media product is a public or a private good. In scenarios three and four, Mobile Music is considered a private good as content owners are able to restrict access to the content, thereby introducing the possibility of excluding free riders and charging for their Mobile Music.

For subscription models, watermarking can provide important contributions to the field of intellectual property protection within a more extensive security framework for identification and proof of ownership (Goldhammer & Zerdick 1999, p. 96). By embedding a watermark into the compressed audio signal during delivery, the customers are aware that a watermark may identify them (Tang 1998, p. 24). Hence, users can be made responsible if the signal is found outside the legal domain by a trigger technology, even in a decompressed and analogue representation. In contrast to encryption technologies, watermarks could be used with today’s infrastructure for CD-Audio as well as MP3-devices. Subscriptions bundle a large number of information goods for a fixed price. In a variety of circumstances a multi-product monopolist can extract substantially higher profits by offering one or more bundles of information goods than by offering the same goods separately (Bakos & Brynjolffson 1999, p. 2f). At the same time, bundling can be used to introduce new artists and titles as a strategy to overcome the information paradox, which states that the value of information can’t be determined a priori of consumption.

In this scenario, for the first time in their history, the music industry has the opportunity to create a continuous relationship with the end consumer. This relationship offers a foundation on which Mobile Music can generate substantial revenues. Revenues can be considered indirect when charged independently from the usage (e.g. in combination with a carrier’s monthly plan). Nevertheless, the subscription model represents a mix between indirect and direct revenues. Forrester expects additional revenues from subscriptions of 3.3B US dollars (Schreier 2000, p. 12). A premium membership might offer a flat rate, eventually combined with services from the second scenario, while an advertising-based membership might limit access in quantity, time or actuality.

Fourth scenario: superdistribution

In 1990, a visionary architecture was developed for the distribution of digital goods. The Japanese Ryoichi Mori coined the term Superdistribution for this new concept of licensing information. The fundamental idea is to allow free distribution of digital content, while controlling access to usage and changes with the content owner defining the terms. According to his prototype, called Software Service System (SSS), which was implemented as a peer-to-peer-architecture, the following components must be available (Morin 1999, p. 21):

- a persistent cryptographic wrapper must stay in place when the digital property is used, copied, redistributed, etc.
- a digital rights management system with a trusted tool that tracks the deals and the usage associated with the access to the digital property
- payment information has to be exchanged securely among the parties
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- payment information has to be exchanged securely among the parties

Under the third scenario bundling was mentioned as being attractive for content companies to extract higher profits. In the music industry this has always been the case with album sales where only one or two hits from an entire album initiate the purchase. Digital products possess optimal unbundling capabilities, which in turn can be re-bundled for custom-mixes. With multimedia messaging and Superdistribution, consumers might start “cherry picking” their hits thereby endangering the traditional revenue model of album sales. In this scenario, by using digital rights management and Superdistribution, major labels maintain control over the distribution of music and might even be able to more effectively enforce their copyrights.

Conclusion

In this paper, scenarios for mobile business models that depend on uncertainties on the supply and demand sides of the music industry were examined. It was argued that Mobile Music could be...
In a less controlled environment, the nature of direct or indirect revenue streams. As a result, consistent business models in four scenarios were developed, demonstrating that a spectrum of potential revenue streams exists for Mobile Music both as a public and private good. The main distinction between these scenarios depends on the supply side, where copyright for Mobile Music can be protected by digital rights management technologies.

Summarized findings and recommendations:

- **Transaction revenues offer a preferable revenue option for Mobile Music as it is independent from bandwidth use, allowing for more flexible pricing schemes.** Pricing that can be adjusted to consumer preferences, and not based on costs, has traditionally been higher for transactions (i.e. CDs) than based on advertising (i.e. Broadcast).

- **In controlled environments like today's carrier networks, the privatization of Mobile Music seems likely with the adoption of DRM, as all value chain participants have a long-term interest in higher transaction revenues.** This opens different revenue streams like subscription plans and Superdistribution for copy-protected music from scenarios three and four.

- **In a less controlled environment with network access via WLAN to today's Internet, the adoption of DRM seems more difficult.** Users still might be able to access pirated content – the "digital black market" – and thereby bypass the Mobile Music value chain. Revenues can only be generated as in scenario one and two, by promotions, sponsorships and the license of Mobile Music services mainly based on application fees.

In providing reliable access to illegal copies, piracy sites may still be accessible via WLAN. However, making payment mechanisms and customer service simultaneously available to thousands of people remains the more complex task. Which companies are able to position themselves in the role of music service providers?

- **Companies with music brands emphasizing repeat visits such as those established by radio and television stations or music retailers; these companies have already proven their ability for selection and aggregation of music.**

- **Companies with strong existing customer relationships, through billing and access like the mobile carriers, might be able to benefit from their knowledge about their customers and provide better, personalized services based on consumer preferences and location.**

- **Companies with strong ties to end devices, like device-specific soft and hardware-developers as well as the manufacturers of consumer electronics themselves. These companies might be able to expand their revenues beyond hardware and offer services through the user interface that they control.**

A strong customer relationship via the end device will add service contracts to revenues from devices.

Under current copyright law, most companies might have to negotiate licenses directly with the music labels, their syndication partners or through royalty collecting entities in order to legally offer these services. This will enable the music industry to shift revenues from physical media to the mobile world.

It still may be too early to base further analysis on industry data like content revenues, so it becomes apparent that future research in this area is needed, especially in order to further analyse implications of the suggested scenarios from various perspectives, including market size and consumer benefits.

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