

“DRM Inside”
DRM and the Future of Digital Media¹

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Abstract

The debate about the future of digital rights management (DRM) suffers from tunnel vision. It focuses on the perception of a “dismal valley” for DRM, and whether DRM-free experiments will bring an end to the approach altogether. The situation reflects the core issue that current DRM provides no compelling benefits to consumers.

To see beyond the current confusion, it helps to realize that DRM’s future is intimately tied to digital media and to the trajectories of its supporting technologies. There are large forces at work such as the rise of ad-supported online services and social media. The most crucial stakeholders – the new generations of consumers – have rising expectations for digital media. They are drawn to easy conveniences that are tuned to their lifestyles. In a hectic world of increasing competition for their attention, they seek freedom from excessive distraction and interruption. To discover new and engaging media, they follow thought-leaders and tap into their social networks. They want to use their various media devices together, and are frustrated with devices that do not work together easily. In order to be competitive in the future, digital media systems will need to manage user experiences and social networks. The new media services will open up new business models and will depend on DRM.

DRM Inside

A few years ago, Intel had a customer-relations and branding problem. Their core product was the processor chip powering many personal computers. As an internal component of computers that were manufactured and sold by other companies, Intel’s chip was largely invisible. Consumers could not readily tell which computers had it or why Intel mattered. Facing an aggressive rival and continuing to invest heavily in research and development, Intel wanted to convey the message that computers based on their chip were superior. An advertising campaign created the “Intel inside” trademark to increase awareness of the chip’s advantages and to steer end-customer’s to the right computers at the time of purchase.

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Like a processor chip, DRM is an *internal* component in digital media and systems. It is mostly invisible to customers². Today’s customers perceive no advantages with DRM. They can not always tell which products have it or why it should matter in a positive way. In the next few years, people will continue to buy new digital media and systems. Many brands will continue to be visible on the surface – whether it is a title like “Harry Potter” for books and movies, a performer’s name for a popular tune, a consumer-electronics company’s name for media gear, or the name of a communications company that delivers the bits to a player. What we have to ask is how DRM can contribute in compelling ways to the consumer experience so that they will prefer content and systems that have “DRM inside.”

In the following we develop scenarios with rising expectations for ease-of-use. The scenarios show how modern lifestyles are redefining consumer expectations and shifting the competitive landscape for media systems.

The Price of Attention

The main economic model for Internet search companies and other web-based companies is a reworking of a familiar business model from older media: advertising. Advertising has long provided the main economic support for magazines and newspapers and also for conventional radio and television. Advertising can be broadly aimed at the general public or narrowly targeted to groups with special interests. The potential and value of web-based advertising is achieved when ads reach specific qualified buyers at moments when they are ready to purchase and can be influenced in their choices.

Advertising competes for consumer attention. “What information consumes is rather obvious,” remarked Herb Simon in 1971: “the attention of its recipients. Hence a wealth of information creates a poverty of attention.”³ At times, the competition of highly-visible advertisements for consumer attention leads to excesses such as those studied in

² Absent tangible benefits to consumers, there may be a misguided desire to keep DRM invisible, especially if it has a negative association for consumers by making media less useful or more difficult to use.

³ Simon, Herbert. “Designing Organizations for an Information-Rich World.” in *Computers, Communications and the Public Interest*, pages 40-41. Martin Greenberger, ed., The Johns Hopkins Press, 1971.

biology. In biology, competition for mates for reproduction can lead to extremes in color and plumage. Extreme variations threaten a species when they reduce its overall fitness.

Similarly for web-based advertising, “competition for eye balls” led to excesses in pop-up advertisements, banner ads, flashing logos, bouncing figures, and pages so loaded with advertisements that the content became hard to find. Modern browsers enable consumers to block many of these ads. Such developments parallel the development of countermeasures in commercial television broadcast, where recording technology intended for time-shifting is used to fast-forward over advertisements.

From a consumer perspective, advertising can be annoying even in largely non-commercial settings like public radio. During pledge week when National Public Radio stations interrupt programming to solicit public support, a listener on a short commute can completely miss the news or other programs. Long-winded and inconvenient solicitations take over the broadcast and listeners hear them even if they have already subscribed. We put up with such inconveniences. After all, the car radio doesn’t know whether you’ve paid a subscription or not. This is the way things have to be. Except that it isn’t.

Suppose that our digital media systems gave us the capability to increase convenience, reduce annoying distractions, and buy back our time. For example, consider a version of digital television that is by default supported at least in part by advertisements. Suppose that when a digital video system encounters content classified as an advertisement, it checks whether we have a certificate⁴ for skipping such ads. The certificate encodes previously-agreed-upon conditions by which we agree to pay to avoid the interruptions of advertisements. When an ad comes along, the system checks the validity of the certificate, logs the event, and continues the presentation with no visible interruption. On a periodic basis, we are billed for the skipped ads and the revenue is distributed to the creators, distributors or advertisers as appropriate. A similar scenario could play out for digital radio or even web surfing. The DRM certificate could enable consumers to enjoy digital content uncluttered by advertisements.

⁴ A “certificate” in this case is a dated, digitally-signed and registered agreement between the consumer and appropriate content-providing and billing services. The underlying technology is meant to make it easy for the media system to detect the certificate and test its validity.

DRM could offer consumers the freedom to enjoy content without the distraction of advertisements. This freedom would be available only in media and media systems that have DRM inside.

In these scenarios, what DRM offers to consumers is freedom. The freedom is to enjoy new content from multiple vendors without the distraction of unwanted advertisements. Unlike technological interventions that just cut out the ads, DRM-based approaches need not reduce the income of vendors that need money to develop quality programming. The trusted media systems would look after the interests of both consumers and media distributors with pre-arranged agreements about criteria for paying for shows, paying to skip advertisements, or substituting premium content for ads. Media businesses also have freedom to experiment with low-friction business models based on advertising, together with consumer-chosen alternatives based on subscriptions or purchases. These freedoms would be available only in media and media systems that have DRM inside.

Content Discovery in Social Media

Avoiding advertisements is just one example of how DRM inside could enable new capabilities that consumers and other stakeholders would find compelling. DRM could also open up business models that support exploration and discovery of interesting digital content.

In music as in other media, consumption of content follows a long tail distribution. From the perspective of a media store, this means that profits and sales volume come mostly from a small number of popular recordings. For consumers past the age of twenty or so, it means that if they go to a media store, they will often leave without finding what they want⁵. Each of us has a personalized “media diet”. Part of a personal diet aligns with popular taste. Other parts correspond to special interests. We may have friends with

⁵ Catalog stores try to carry a deep selection of recordings. Unfortunately, they have been going out of business. In contrast, Target and other broad retailers carry only the first few hundred most-popular recordings and sell them as a loss-leader to drive traffic to other products. Even when a catalog store carries 12,000 or so different titles, most of their customers will not find everything they are looking for. Web-based distributors of CD’s and online digital distributors do better. They can amortize the cost of “shelf-space” over larger markets and maintain an inventory of several hundred thousand titles – reaching a much larger fraction of the long-tail distribution.

similar tastes in one area, and other friends who share interests in other areas. Although our personal interest profiles do not match the popularity curve, there are always other people who share our interests. Often, we find out about new music or other information in our areas of special interests through our social networks.

Digital media today do not come close to the potential for supporting the discovery of music or other content. There is a vast, untapped opportunity to use social networks to drive distribution, discovery and sales of interesting content.

Consider the following scenario. Suppose I am exercising at the gym and listening to a tune on my music player. It occurs to me that Morgan might be interested in the tune I am listening to right now. Assuming a player design with extreme ease-of-use for recommending music, I could tap a big button on my music player and say something like “Message for Morgan. Morgan – check out this piece *The River Sings* by Enya. It reminds me of *Orinoco Flow*.”⁶ Such ease of use is within reach given the state of the art of current mobile phones, which already provide hands-free calls to anyone in our digital address book. The user interaction is extremely easy because Morgan is already in my music-related address book and the music player knows to recommend the tune that is playing. I don’t have to select Morgan’s name from a list, specify a tune, or think about formats. I just push a button, speak my message, and get back to my workout. My music system packages up my message in the tune recommendation and dispatches it to Morgan’s music system. That’s a new kind of ease-of-use.

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Another source for discovery is ambient music that I encounter during the day. Suppose that my music player proactively samples music all day long and automatically identifies and logs the music. Given this automatic capability, consider a scenario where I go to

⁶ In his comments on this example, Morgan (my son) actually exclaimed, “Who the h*ll listens to Enya at the gym?” It struck me that if he could have clicked on *Orinoco Flow* in our e-mail correspondence, he would be reminded that that piece moves along at a pace compatible with a cardiovascular warm up!

Paige’s party where some music is playing. After I return home, my wife and I talk about the music. All of the music from the party has already been identified and entered into a log and located in my calendar under “tunes heard at Paige’s party”. Notice the elements of ease-of-use for the party scenario. I did not have to stop what I was doing at the party. I did not interrupt the playing of music to find a CD or look at a play list. I did not have to locate and ask the host what music was playing. If I notice that the music playing is especially engaging, I can signal my player – (say) “tap three times” or some other gesture – causing it to flag the tune with a strong self-recommendation when it logs it for later recall.

To complete the process of music discovery, we also need to simplify finding and acting on recommendations. In search engines like Google the advertisements that appear on a page are matched to the search terms that the user entered. For example, if a user searches for “camera lens,” not only do informational web pages show up but also advertisements for deals in buying lenses for cameras. The advertisements are presented when they are expected to be relevant to the user at a time when he is likely to be interested in making a purchase.

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Users are likely to be interested in sampling and buying music when they are about to pick a tune to play and when they are constructing a play list. Suppose that recommendations from our friends or from trusted thought-leaders in music showed up in our music collections *together with music that we had already purchased and organized*. For example, returning to the Enya example, suppose that Morgan was exploring Celtic music. As he browsed his collection, my recommendation for *The River Sings* could show up in his collection – together with the recommendation from me.

The recommendations for *The River Sings* could appear together with music that Morgan has previously purchased. If Morgan is browsing by genre or artist, then the recommendation would appear inside his Celtic or Irish music collection together with other music from Enya. He could simply click on the recommendation to hear a quick

sample of the music. He could also purchase the music for unlimited play without leaving his collection.

Going another step, Morgan’s music system could prioritize and filter recommendations so that he is not overwhelmed by them. For example, in keeping track of recommendations from different sources, it could filter out recommendations from people whose advice he has not liked previously, and emphasize recommendations from people whose suggestions he has valued.

These music discovery scenarios overturn at least three pieces of conventional wisdom: (1) You organize music after you buy it. (2) Music players have nothing to do with music discovery or advertising. (3) Advertising is only relevant for the most-popular recordings. This old wisdom is replaced by a fresh approach where our personal music collections become platforms for discovery and sales of recordings of personal interest.

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This approach opens up social networks for music discovery and viral marketing. A key to success is extreme ease-of-use tuned to lifestyle. Making recommendations becomes as easy as leaving voicemail. Identifying and remembering ambient music is made easy by a player that does proactive sampling and identification. Acting on recommendations becomes easy because the most trusted and relevant recommendations appear exactly when we are likely to be interested in exploring or buying music. Together, it adds up to a social medium for music discovery, servicing the long tail of specialized tastes that is under-served by today’s “old media” approaches⁷.

The approach could also open up new business models⁸. For example, the recommendation-based sales system could provide rewards to people whose recommendations lead to music purchases. For another example, the same sales channels

⁷ A version of this music discovery scenario could also work with subscription services like Rhapsody. However, absent further DRM underpinnings, recommendations and easy action on them might only work among friends if they subscribe to the same service.

⁸ For another example, “popularity pricing” would slowly raise the price of with increasing demand as artists become more popular. This would create an incentive for discovering artists early (before they get hot) and would reward artists.

could be used to offer music-related collaterals such as concert tickets and T-shirts for sale. Finally, in support of community building, the music social networks could also connect birds-of-a-feather to online information resources – such as information pages, wikis, and discussion groups. People who get involved with one version of a song may enjoy discussions with others about other versions. The community that participates then becomes a focus market for some related materials. Distributors could use digital tickets and other DRM technology as to build customer interest and loyalty in the service.

For equipment manufacturers, the scenarios suggest the emergence of new expectations for ease-of-use. No longer will it be enough for just music navigation and play to be simple. Socially-enhanced music discovery will grow as new basis for competition. Next generation consumers will want their media systems to support music discovery with DRM inside.

Symbiotic Media Systems

Ubiquitous computing began as a topic of research in the 1990's, exploring the idea that small computational devices embedded in our living environment could provide integrated information services. The hallmark of success was that the computers would “disappear.” Thoroughly networked and integrated with each other, computers would gather and share information in support of our everyday activities. In idealized scenarios, people would routinely use the services, but seldom notice the computers.

Ubiquitous or symbiotic music is an outgrowth of ubiquitous computing, emphasizing proactive, context-aware behavior of systems. However, today's media systems do not approach the ideal of usability.

Imagine that when we walk from our home to our car, the music and other programming comes along automatically, moving across devices as needed. In principle, we should not need to carry any medium or device at all. Starting the car, we would continue to enjoy the music or program with little or no interaction or gaps.

There are multiple system-level obstacles to creating such an experience: (1) Music devices are not thoroughly integrated as systems. (2) It is still too difficult for users to manage the registration and coordination of devices..

Consumers of digital music must actively manage a complex set of devices. Instead of disappearing, the computer stands out in a hodgepodge of often incompatible devices that require special handling and extra attention that takes away from what should be a simple and elegant musical experience. Even iPod users, who can register multiple devices for music copies with iTunes, need to keep track of which devices are registered and handle multiple synchronizations. Typical home entertainment systems and automobile entertainment systems are outside of this process and invisible to it. The registration of devices could also be a lot simpler⁹. In short, the overall music experience is complicated and often frustrating even for technophiles.

With digital music and more modern lifestyles, we have more devices – at work, in our cars, and in our homes. It would be more appropriate for our devices to act together as a single system.

Suppose that users could use their mobile phone at any time to change the play lists and tune selections on their jewelry-sized “nano” player. Suppose that they could vote (“thumbs-up” or “thumbs-down”) on music that they hear on their jewelry-sized players and that the effects of this voting on play list construction and tune preference would be reflected through-out all of the devices in their music system. Suppose that users could interact with their home entertainment system – (say) using a Wii-like wand – and make changes that take effect across all of their devices. Building on the content recommendation and discovery scenarios, suppose that a user could send a recommendation on their mobile phone about the music that was playing on their jewelry-sized player. Suppose that a user out for a walk could choose to hear the latest “music for walking” play list from a friend or other trusted source – paying only for any music that they do not already have.

These examples show how multiple personal music devices could act symbiotically with each other to create a unified music experience. These scenarios require a design

⁹ In the last few years, security research has taken on a new theme of “usable security,” recognizing that people tend to turn of security all together when it is too difficult to use. For example, see Balfanz, Dirk; Durfee, Glenn; Grinter, Rebecca E.; Smetters, D.K., In Search of Usable Security: Five Lessons from the Field. *IEEE Security & Privacy*, September-October 2004 (Vol. 2, No. 5), pp. 19-24.

aesthetic that recognizes that consumers want all of their devices to act together as a unified system, moving content and preferences gracefully across devices without being told. In opening up opportunities for new business models in media services, the scenarios rely on the underpinnings of “DRM Inside.”

Concluding Thoughts

In broad categories the stakeholders of digital media include artists and other content producers, distributors, entertainment system makers, and consumers. Today’s DRM systems are focused mainly on reducing unauthorized copying. Only content owners directly recognize any benefits from this. For equipment manufacturers, copy protection requires extra cost and complexity. For consumers, current DRM degrades ease-of-use. The future of DRM and digital media generally depends on providing compelling benefits to all stakeholders, especially consumers.

Turning this situation around requires addressing both the perception and the reality of DRM. There is plenty of room for DRM to provide exciting value to consumers. The future of DRM is really about the future of digital media, the future of content and delivery technologies, and the future of business models for digital content. The latent opportunities are not yet exploited because today’s media and media systems greatly underutilize the power of digital systems to serve people’s needs.

Today’s new consumers live in an increasingly hectic world. They are drawn to media systems where ease-of-use is increasingly tuned to their lifestyles. Systems with DRM inside could create improved and compelling media experiences. We sketched scenarios where DRM systems enable users to have calmer experiences by reducing unwanted advertisements. We also showed how users could more readily discover engaging music and interact with their friends with media systems that are tied into their social networks. Social media services would also offer viral marketing options for content creators and competitive options for companies that can integrate communication into their media systems. People with modern lifestyles would be better served if their media devices acted together as a coherent system. When compelling benefits from new media services depend on DRM technology, they will lead to consumer insistence on media and media systems with “DRM inside.”