

Can iTunes be weTunes?- Is FairPlay Playing Fair?

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Abstract

Digital Rights Management Systems (DRMS) are increasingly being used to lock in consumers to proprietary technologies of respective companies. One market where this has become increasingly noticeable is the digital music market and accompanying digital players. Currently there is no single DRM standard for digital music, since music purchased from one competitor may not be compatible with another competitor's jukebox software or digital player. Neither is there readily available technology to enable consumers to play their music regardless of where it is purchased. There is little incentive or push to make competitors license their technology or provide support for other technologies to enable interoperability of different technologies. Consequently, consumers purchasing from such competitors in-effect become locked into their proprietary technology and its accompanying DRMS. This paper examines the consequences of such market behaviour focusing on the most popular music store iTunes (owned by Apple), its dominance in the industry and the implications of Apple's decision not to open its FairPlay DRM scheme which controls all music purchased from iTunes. The success of the iTunes music store, together with its iPod music range has meant that it has quickly become the dominant company in both the online music and music player hardware markets. Such dominance has been greatly aided by the ability to use digital technologies (such as DRM) and anti-circumvention legislation (The DMCA) to increase its power and control over its products. This paper, examines the effect of Apple's current dominance in the online music marketplace and the potential problems it poses for the digital music industry. It discusses the attempt by RealNetworks to secure interoperability with Apple's FairPlay scheme and the resultant response of Apple. Finally it examines the potential benefits, problems and legal issues raised by the actions of RealNetworks, and argues for interoperability.

1. Introduction

In recent years a proliferation of online music services have been launched offering legitimate digital tracks for downloading. The launch of these music services (with many featuring music licenses from major record labels such as BMG¹ and EMI²) is seen as one of the many ways that the record industry is seeking to reaffirm the need to legally obtain music and to stop consumers from illegally obtaining pirated versions (largely from Peer-to-Peer (P2P) networks).

Cary Sherman, the head of the Recording Industry Association of America (RIAA)³ describes the illegal downloading of music as "devastating" in terms of the impact on the music industry.⁴ Indeed Sherman attributes the fall in music sales by approximately a third between 1999 and 2002 as being the result of online piracy. Although legal music services have found it difficult to compete with the free P2P model⁵, their music sales have increasingly grown over the years.

For example the Apple iTunes store, to date has sold over 250 million tracks⁶ and other stores such as Napster have sold at least 5 million.⁷

A vital component of these legal music services is the Digital Rights Management (DRM) systems which are used to control the usage rights given to each song/track. Use of different DRM technologies by different companies, have lead to a market in which there are various file formats for digital music, each determining playability on specific music players. This has lead to consumers having to deal with incompatible music files each limited to specific devices on which they can be played. In effect, various companies have attempted to lock consumers into their proprietary technologies, as part of their business strategy. This however, does not seem to be in the interest of consumers. Use of DRMS, however, is legally protected and circumvention of DRMS is strictly prohibited under the law (discussed later), except under limited circumstances.

This paper examines issues related to the use of DRM to protect digital music. In particular it takes a case study approach, investigating an attempt by RealNetworks Inc to achieve interoperability with Apple's iTunes. The paper examines the benefits and problems with interoperability and looks at some legal questions arising from the case study. It further examines the legality of RealNetwork's actions. First a general overview of DRM and its use in protecting music from copyright infringement will be given. Next, online sellers will be discussed with regard to DRMs used, rights models and business models. The paper will then focus on Apple's iTunes and its DRM technology. This is followed by a discussion of the RealNetworks Music Store (RMS) and its attempts to achieve interoperability with Apple's iTunes. This discussion is further extended to examine the benefits and problems with the RealNetworks approach. Finally the paper examines the legal implications of the case study and argues for interoperability of digital music as a way forward.

2. DRM & Music Technology

DRM can be defined as: "...a bundle of software, services and technologies that confine use of digital content to authorised consumers, and manages consequences of that use throughout the entire life cycle of the digital content".⁸

DRM systems are protected by anti-circumvention legislation in the EU (Directive 2001/29/EC, – "Directive"⁹) and US (The Digital Millennium Copyright Act 1998 – "DMCA"¹⁰).

The EU Directive, requires that Member States "provide adequate protection against the circumvention of any effective technological measures", which prevent or restrict acts not authorised by the rights holder.¹¹ This includes prohibiting the manufacture, importation or possession of any technological device, product or service whose primary function is to circumvent a technological protection measure. The Directive also requires Member States to take appropriate measures to ensure the legitimate interests of other parties especially beneficiaries of exceptions and limitations¹² provided by national laws.¹³

Under the DMCA (Sec 1201), three major acts are prohibited namely: circumventing a technological measure that controls access to "a work protected under this title"¹⁴; manufacturing or trafficking in any technology, device or service which is primarily designed for the purpose of circumventing¹⁵ a technological measure that (a) controls access to "a work protected under this title"¹⁶ or (b) protects the rights of a copyright owner.¹⁷ The DMCA also states that other rights,

remedies or defences to copyright infringement (including fair use) are not affected¹⁸ and gives seven specific exemptions to the act of circumventing a technical protection system.¹⁹ One of these exemptions given under Sec 1201(f) is to enable reverse engineering²⁰ and consists of three “reverse engineering” defences: (i) Circumvention of an access control measure is allowed to enable a person to identify and analyze the elements of a program that are necessary to achieve interoperability of an independently created computer program with other programs; (ii) a person is allowed to develop and employ technological means that are necessary to enable interoperability; and (iii) the said technological means may be made available to others to enable interoperability of an independently created computer program with other programs. The section also states that the reverse engineering process must not involve copyright infringement or violate other laws.

Using DRM technology, consumers are granted various usage rights which enforce the provisions of licences granted when a song/track is purchased. Typical usage rights focus on the amount of computers the songs can be played on; the amount of burns allowed to CD, and the number of times the songs can be transferred to digital music players. These digital music players typically are designed to playback MP3²¹ files and more recently files encoded in selected DRMS. For example the Creative Zen Micro players (from Creative Technology Ltd²²) are capable of playing file formats such as MP3, WAV²³ and protected Microsoft Windows Media Audio (WMA)²⁴ files (which are encoded in its Windows Media DRMS). Unprotected WMA songs can also be played.

DRMS are widely used to protect copyrighted music, however, they have raised many concerns especially regarding access to works under the Fair Use Doctrine. Another concern is the interoperability of DRM. Currently no agreed framework exists to create a global DRM standard or to make current systems compatible with each other. Indeed this may be a deliberate economic strategy for companies to maintain market share in digital music sales and compatible hardware players. While this may benefit businesses, consumers may not be well served by such practices.

3. Online Sellers

There are a significant number of online music sellers²⁵ now in existence. An overview of four of the most popular sellers in terms of brand recognition and/or market share is given in Table 1 below. It should be noted that the 'Rights model' category lists usage rights in the following order: (a) number of computers songs can be played on; (b) number of burns allowed and; (c) the portability of the music to digital music players.

Table 1 – Popular Music Sellers.

Name	Website	DRMS used	Rights model	Business models
iTunes (Apple) ²⁶	http://www.iTunes.com	FairPlay	(a) Five computers (b) Unlimited but have to change playlist after 7 times. (c) Unlimited but only to FairPlay players (currently iPod)	Paid downloads

(i) RealNetworks Real Music Store RMS ²⁷	http://www.real.com/musicstore http://www.rhapsody.com	Helix DNA	(a)Three PC's (b)Unlimited but have to change playlist after 5 times ²⁸ (c)Unlimited but only to Helix DNA supported players.	Paid downloads /Subscription (but pay to burn to CD)
(ii) RealNetworks Rhapsody (Subscription service)				
Napster ²⁹	http://www.napster.com	WMDRM (Windows Media DRM)	(a)Three PC's (b)Unlimited but have to change playlist after 5 times. ³⁰ (c) Unlimited but only to WMDRM supported players.	Paid downloads Subscription
Sony ³¹	http://www.connect.com	ATRAC	(a)Three PCs (b)5 burns (c) Unlimited but only to ATRAC supported players.	Paid downloads

3.1 Apple's iTunes

Apple's iTunes store was launched in April 2003³² and at the time featured a catalogue of 200,000 tracks all priced at approximately 54 pence (99 cents). The basic process of purchasing a track involves downloading and installing the iTunes jukebox software. This software, apart from facilitating the online store, also acts as a repository for managing tracks e.g. creating playlists and transferring music to Apple's digital music player called the iPod. Songs can then be searched for via the online store, previewed and then purchased via a credit/debit card. Apple uses the Advanced Audio Codec (AAC) format (which forms part of the MPEG-AAC specification) to encode its songs.³³ These songs are further encapsulated within Apple's proprietary DRMS called FairPlay. Use of FairPlay enables the administration of usage rights as shown in Table 1. Songs purchased via the Apple iTunes store can be transferred to the iPod range of players via the iTunes jukebox software. Additionally Apple supports a range of unprotected formats which can be imported directly into iTunes and then transferred to the iPod family.³⁴ Unprotected WMA files can also be imported but not played directly on the iPod; having to undergo a process of conversion to the AAC format (or one of the other several supported formats dependant on the user setting). Once converted, they can then be uploaded to the iPod. Protected WMA files (encoded in WMDRM for example), cannot be imported into iTunes or be played on the iPod.³⁵ This is because the only DRMS supported by Apple iTunes and its iPod family is FairPlay. Hence 3rd party DRM purchased songs will not play on iTunes or the iPod range. Additionally, due to Apple not licensing its FairPlay DRMS to other 3rd parties, it has in effect become the sole supplier of its FairPlay purchased music.

Part of the reason for this move seems intentional. While the iTunes store sells many tracks, Apple acknowledge that the store makes minimal profit and that the main motive is that users of iTunes will purchase high priced iPods.³⁶ Conversely, users of iPods must purchase music from the iTunes store since it is the only store which sells music supported by the FairPlay DRMS. Hence this is a win-win situation for Apple since profit (however minimal from the iTunes store) is generated in this symbiotic way.

The rise and eventual dominance of iTunes and the iPod players is attributed to many factors. Knight³⁷ acknowledges that Apple's usage rights, with respect to its liberal burning limitations

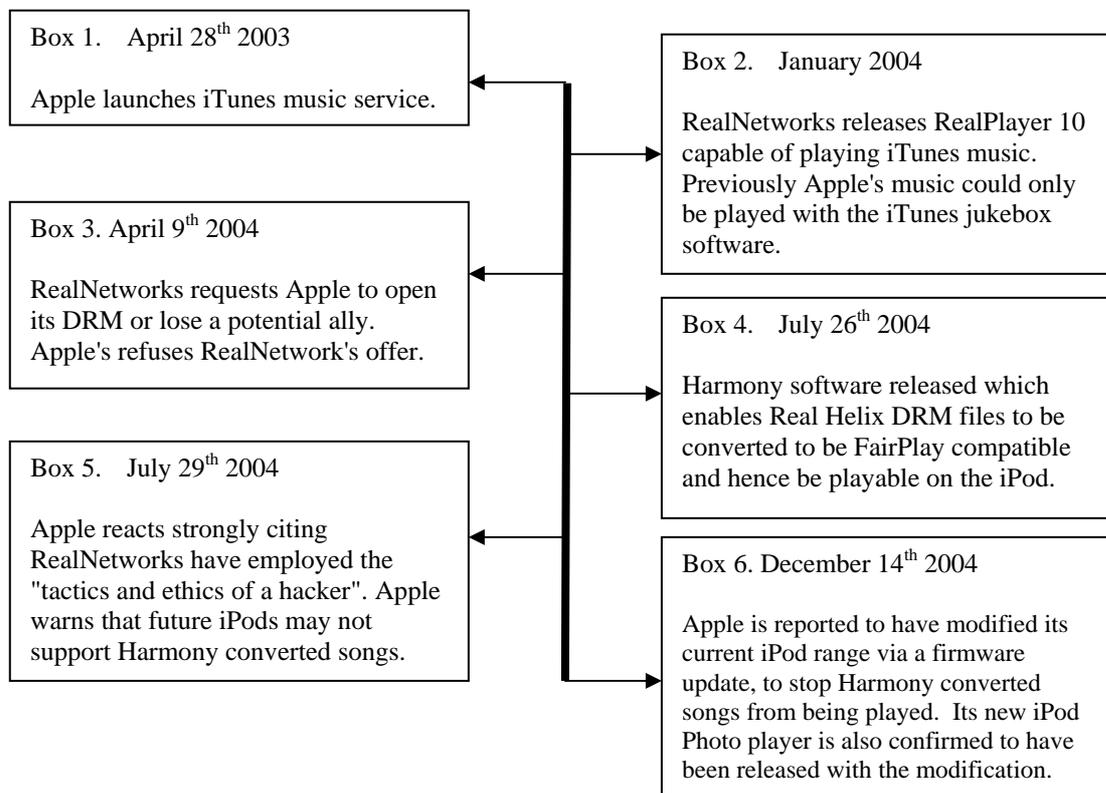
was one of the features that contributed to its initial success. The pricing of the music, fixed at 99 cents (for singles) was also deemed a favourable factor in Apple selling many tracks. A report commissioned by Jupiter Research³⁸ found that 47% of consumers would be willing to purchase singles at 99 cents provided the content was assigned liberal usage rights e.g. playback on multiple computers (a benefit which Apple provided). Gasser, Bambauer, Harlow et al³⁹ note that the price of iTunes tracks was also, at the time of its launch, lower than the already existing offline services e.g. CD shops. Also iTunes offered a more flexible option than existing digital subscription services (such as RealNetworks Rhapsody⁴⁰), in that the tracks were actually purchased and not rented. This difference is significant, since for subscription services, once a user stops subscribing then generally they are not able to keep their rented music tracks. However, with iTunes the tracks were purchased. Hence even if the user stopped using the iTunes store, they could still keep their music collection and listen to it.

Other factors such as the simple interface; vast functionality⁴¹ and a large catalogue range⁴² have also contributed to iTunes ongoing success. Indeed as of January 24th 2005, iTunes commanded 70% of the global online music market; had sold over 250,000,000 songs with a current rate of 1.25 million per day being purchased⁴³ and sales of its iPods accounted for 92.1% of the US digital player market.⁴⁴

4. Case Study - Attempting interoperability with FairPlay

Since the launch of Apple's iTunes music service, there have been attempts by other competitors to achieve interoperability with its FairPlay DRM especially due to its increasing popularity. One such attempt was made by RealNetworks Inc. Figure 1 below gives a brief timeline of events, which will be discussed in this section.

Figure 1 Analysis/Timeline of Events



In January 2004 RealNetworks released RealPlayer 10 software which contained programming code to enable purchased iTunes files to be played via RealNetworks' software.⁴⁵ In addition to playing FairPlay files, the software was also capable of playing music encrypted via WMDRM, and RealNetwork's own Helix files. While RealNetworks did not have Apple's permission to use its FairPlay DRM, in actual fact it did not need to. RealNetworks had obtained the freely available QuickTime Audio development kit⁴⁶ and worked a solution⁴⁷ to play the songs through RealPlayer 10. This entailed the requirement of having the native media player (e.g. iTunes jukebox software) already installed to enable replay. RealNetworks was thus facilitating the playback of iTunes songs without altering any usage rights accompanying these songs. Apple did not respond to this move.

On the 9th April 2004, Robert Glaser the CEO of RealNetworks sent an email to the Steve Jobs, the CEO of Apple. In the email, he proposed that Apple should open up its FairPlay DRM with RealNetworks and enter into a partnership concerning digital music.⁴⁸ Glaser further mentioned that if a deal with Apple could not be reached then it would enter into an alliance with Microsoft and its WMDRM. The email was not received favourably and was leaked by Apple to the New York Times and in turn became public knowledge.

In July 2004, RealNetworks Inc released a software package called Harmony that was incorporated into its RealPlayer 10 products as an update. Harmony enabled files purchased from its Real Music Store (encapsulated with its Helix DRM) to be converted into a format compatible with Apple's FairPlay DRM for playability on the iPod music device.⁴⁹ A typical example of use of Harmony would be as follows:⁵⁰

- Apple iPod user purchases song from Real Music Store (RMS) encapsulated with Helix DRM.
- Using RealPlayer 10.5, the user wishes to transfer the song to their iPod which supports only purchased files that are FairPlay compatible. The user connects their iPod.
- The software detects the connected iPod device and determines the DRM used (FairPlay).
- The underlying formats of both DRMS are AAC. Hence all Harmony does then is remove the Helix DRM protection and apply the FairPlay based DRM, in effect still giving a protected file albeit with a different DRMS and with usage rights preserved intact.

Since Apple did not licence their FairPlay DRM or agree to the previous proposed alliance, RealNetworks reverse engineered the FairPlay DRMS and found a way to encapsulate its songs to be compatible with Apple's technology. This action was not received favourably by Apple. They responded harshly to this move, accusing RealNetworks of hacking into its software and warned that they would investigate if any violations occurred under the DMCA.⁵¹ Apart from considering legal action Apple also warned that it might block Harmony converted songs in future releases of its iPods, as well as its current range. Indeed by December 2004, it was reported that Apple had carried through with these actions by making its newly released iPod Photo player incompatible (with Harmony), as well as releasing firmware updates for its existing iPod range.^{52,53}

5. Is Interoperability the way ahead?

The case study above highlights the important issue of interoperability, which currently concerns the digital music industry. Apple's response to RealNetworks demonstrates that the digital music market is tightly controlled. The attempt by RealNetworks to achieve interoperability, however, has given a glimpse of the possible benefits of interoperability but has also highlighted some possible problems. These issues are discussed in the following subsections.

5.1 Real Benefits

5.1.1 One Small Step for RealNetworks - One Large Step for DRM

By opening the FairPlay scheme to a vendor other than Apple, RealNetworks took a first but unauthorised move towards interoperability of DRM standards. Two main issues that exist with DRM are that:

- I. There is no global DRM standard or specification that vendors can adhere to. The World Wide Web for example makes use of several widely followed languages such as HTML and XML as defined by the World Wide Web Consortium.⁵⁴ Although deviations from the specifications can happen,⁵⁵ they are largely followed by most. By contrast, no global agreed standard exists for DRM, although the outcomes are the same in terms of controlling of content.
- II. The lack of technological systems to interface one type of DRM with another. The biggest advantage over the first issue here is that this enables vendors to develop their own DRM and then let the intermediate software convert one type of DRM to another.

The actions of RealNetworks mirror that of the second issue with the Harmony component effectively translating one type of DRM, to another type of DRM, while maintaining the usage rights. This in effect increases the choices that consumers can have in terms of both the digital players they can buy and the online music stores that they can purchase from. For example if consumers were able to use the RealNetworks' Harmony software as intended they would have a greater choice of music track/song selection. Currently iTunes have over one million tracks and Real Music Store has over 700,000 tracks which combined gives 170,000 singles available for download. While many of the tracks sold by both stores would be the same songs, consumers would still have other types of choice in terms of bit-rate encoding and usage rights given by the respective stores. Hence an iTunes customer who may want a higher quality encoded song, would be able to purchase a track from the Real Music Store (which encodes songs at 192 bits-per-second (bps) as compared to 128bps for iTunes) and yet still be able to play the song on his/her iPod.

The state of the digital music market is still at a stage where buying a track from one online store may not work on a digital music player because of different DRM schemes. A report published by Shelly Taylor and Associates on digital downloading, lamented music stores, including iTunes for "engaging in a form of guerrilla slavery; using proprietary formats...and proprietary portable devices...as a result, user's...realise they have been conned".⁵⁶ The attempt by RealNetworks to achieve interoperability can be argued as one step closer to reducing this form of 'music slavery' since the Harmony software enables music to be transferred to players supporting Helix DRM, WMDRM or FairPlay DRM. Thus consumer choice is widened since it no longer matters what player they need.

5.1.2 Digital Music's Aim- The Compact Disc

The ideal state of digital music with respect to online stores/hardware players should be like the Compact Disc market in terms of interoperability. For example without software such as Harmony to convert between the various DRMS, users purchasing from online music stores are faced with decisions, as already noted, in terms of the stores they can purchase from. This is because they must have the DRMS that the consumer's music player supports. Otherwise, the consumer will have to purchase a compatible player or change music store. This is significantly different for a consumer purchasing a music CD. Almost all audio CDs adhere to the Red Book standard⁵⁷ and are playable on any audio CD player regardless of where the CD is produced and bought from, or whether the player manufacturer is Sony or Panasonic. Conversely, for the online music market, due to no agreed standard, this situation is still a considerable distance away from being even close to the interoperability enjoyed in the CD market. Although CDs are different to digital tracks (in terms of CD songs being sold on a physical medium) it has been argued that the public perception of ownership of music in either form is the same.⁵⁸

In view of the above discussion it is worthwhile to note that in an effort to combat piracy, in the past few years, record companies have been releasing CDs incorporating copy protection technology. While initial trials were disastrous⁵⁹, copy protected CDs have slowly become accepted. A manifestation of this is the copy protected CD 'Contraband' by Velvet Revolver, which achieved a number one status in the American music charts.⁶⁰ The DRM protection for Velvet Revolver CD was provided by the US company SunnComm. These CDs contain pre-ripped tracks encoded in WMDRM format for use on the PC or portable players. However as noted earlier, with the hardware market dominated by the iPod and with Apple's refusal to allow access to its DRM, buyers of these CDs were effectively locked out of using these pre-ripped tracks on their iPods. The CEO of SunnComm Peter Jacobs, did acknowledge that the majority of the feedback from buyers of the CD were "related to getting the songs onto an iPod".⁶¹ While Jacobs conceded that no immediate solution was available, he stated the next version of SunnComm's DRM would enable compatibility with the iPod. Of course, for this to happen, Apple must provide support in terms of licensing FairPlay or allowing access to it. Although SunnComm could follow RealNetworks' example and reverse engineer FairPlay for the purposes of interoperability (hence coming under protection from the DMCA exemption clauses), all Apple has to do is update its software systems and block out any SunnComm compatible files- just like it did with RealNetwork's Harmony.

5.2 Real Problems

5.2.1 Have the Consumers Already Decided?

When RealNetwork's released Harmony, it followed this by launching a campaign entitled 'Hey Apple! Don't Break My iPod!' and setting up a website called 'Freedom of Choice'.⁶² This website included a petition inviting users to sign to show their support in persuading Apple to open up FairPlay. In addition to this it also announced that for a limited three week period it would offer songs from its store at half price.⁶³ The half price promotion was a success since over three million tracks were sold⁶⁴, although the low pricing could not be sustained permanently due to the financial cost.⁶⁵ RealNetworks, have continued to sell the top 10 most popular songs (as indicated by Rolling Stones⁶⁶) at half price to retain buyers.

While RealNetworks claimed that the promotion was a success in terms of the number of songs sold, it was unable to ascertain how many of the buyers were iPod owners.⁶⁷ More interestingly Apple's update to its current iPod range, to prevent Harmony files from being played was

reported in December 2004.⁶⁸ The updates concerned however, were actually made available several weeks earlier than reported. The correct dates for Apple's updates were 20th October 2004 (for older models) and 15th November 2004 (for latest 4th generation iPods/iPod mini players), respectively. Thus the fact that Apple's updates were reported at least a month after they occurred may indicate a possible low iPod user base for Harmony.

It is interesting to note that RealNetworks suffered in terms of a backlash that occurred to its campaign. Best⁶⁹ reports that that online petition resulted in users leaving offensive comments criticising RealNetworks for their actions. The extent of this harsh criticism meant that RealNetworks had to change the petition functionality to only enable users to leave their names. Eventually this was removed too, due to abusive names being chosen.

From the discussions above, it appears that the argument for choice and open competition with regard to RealNetworks' attempts at interoperability may be countered by the possible fact that consumers may have already made their choice. That is, they want to use iTunes and the iPod player. In terms of competition, while Apple does command significant portions of the hardware and online music markets, it seems to have achieved this in a competitive way. Apple was neither the first company to bring out a digital music player nor the first company to launch an online music store. However it seems to have brought out both successfully. Apple seems to be one of few computer companies in the position of controlling both software and hardware with respect to the iTunes music store and iPods. Hence it is able to seamlessly integrate the two components resulting in a pleasant consumer experience when using these products.⁷⁰

The RealNetworks software on the other hand, has not publicly been recognised as easy to use as compared to iTunes. RealNetworks' reputation with its products, particularly its RealPlayer range has often been criticised for being hard to use and intrusive in asking users to upgrade to the premium version.⁷¹ While this has improved in its latest versions, its reputation is still hard to dispel.^{72,73} Hence it is evident that despite the move by RealNetworks to open access to FairPlay and to provide other incentives (such as half price promotions) in an attempt to entice users to buy from its store; other factors such as the usability and design of the software come into effect, when deciding where to purchase from.

5.2.2 Is RealNetworks Providing a Choice?

In an interview given by Robert Glaser (CEO of RealNetworks), he noted that part of RealNetworks' aim was to bring choice to the consumer in terms of the music services they can use and the portable players especially with respect to iTunes and the iPod.⁷⁴

With reference to these arguments, however, it is inevitable that RealNetworks' own products come into scrutiny. RealNetworks' Harmony is intended to provide choice and reduce the extent to which the consumer is tied down to one music store or portable player. However its own Real Music Store cannot be accessed on the Macintosh platform⁷⁵ nor can its Rhapsody subscription service.⁷⁶ Both are not yet available outside the United States. The iTunes store works on both Mac and Windows platforms, in addition to having stores outside the United States. Hence despite Apple's dominance with its products and the potential for abuse; it can be argued that it provides interoperability and choice in terms of both iTunes and iPod being usable on either platform and available in several countries.

6. Were RealNetworks actions lawful?

The actions of RealNetworks in creating interoperable software (Harmony) arguably involved 'reverse engineering' which is a defence under the DMCA in certain circumstances (see Section 2 above). The DMCA also requires that in the process of 'reverse engineering' infringing acts must not be committed and other laws must not be violated. It is worthwhile to note that the Harmony technology converted songs from their Helix DRM format into another DRM format which was compatible with the iPod. Hence Harmony converted one copy-protection to another and in effect did not bypass or circumvent a DRM technology⁷⁷. The lack of legal action against RealNetworks, was a lost opportunity to test the legality of RealNetworks' actions. This has therefore left open the question of whether RealNetworks' actions were lawful. The recent judicial ruling in October 2004 by The U.S. Court of Appeals for the Sixth Circuit in the case of *Lexmark International Inc., v Static Control Components, Inc.*,⁷⁸ presents an interesting insight into how the law may be applied to RealNetworks.

6.1 Lexmark International Inc., v Static Control Components, Inc.,

Lexmark (the printer manufacturer) sold discount refillable toner cartridges that contained a microchip which prevented Lexmark printers from functioning if the cartridge was not refilled by Lexmark. The microchip contained a Toner Loading Program (which calculated toner levels in Lexmark printers) and data to enable the printer to operate. The Toner Loading Program varied slightly in its code for different models of Lexmark printers. In order to prevent use of unauthorised cartridges, a publicly available encryption algorithm (Secure Hash Algorithm-1 or SHA-1) was used to perform a 'secret handshake' between a printer and a microchip. This involved calculating a 'Message Authentication Code' based on data in the microchip's memory. The printer would then only function if the codes calculated by the microchip and printer matched each other. Each Lexmark printer contained a Printer Engine Program which controlled a variety of printer functions. After the authentication sequence, the Printer Engine Program downloaded a copy of the Toner Loading Program from the microchip onto the printer. Before running the Toner Loading Program, the printer performed a 'checksum operation'. This involved performing a calculation on the data bytes of the transferred copy of the Toner Loading Program, and comparing the value with a 'checksum value' located on the toner cartridge microchip. The printer will only continue to operable if the two values matched.

Neither the Toner Loading Program or the Printer Engine Program were encrypted and could be read and copied from their respective memory chip.

Static Control Components (SCC) developed the SMARTEK microchip which contained a copy of the Lexmark's Toner Loading Program to enable compatibility with the Lexmark printers. These microchips were then sold to companies that manufactured toner cartridges. This enabled non-Lexmark refilled cartridges to be used on Lexmark printers. Lexmark therefore brought a complaint against SCC alleging three theories/charges of liability: (i) copyright infringement of their Toner Loading Program; (ii) that the SCC microchip was in violation of the DMCA due to circumventing a measure designed to control access to the Toner Loading Program (a copyrighted work) and (iii) that the SCC microchip also violated the DMCA by circumventing a measure designed to control access to the Printer Engine Program (a copyrighted work).

The case was first heard in the District Court which issued a preliminary injunction against SCC, based on the likelihood of success for Lexmark. The District Court also ruled that the DMCA's 'reverse engineering' exception to liability did not apply in part because SCC's SMARTEK microchips could not be considered 'independently created computer programs' as required

under the DMCA 1201(f)(3). This was because the microchips contained exact copies of Lexmark's Toner Loading Program. The case was then sent to the Appeals Court where the preliminary injunction was lifted and the case remanded for further proceedings.

On the copyright infringement charge, the Appeals Court found that the Toner Loading program was not copyrightable in part because functionality and efficiency considerations limited reproduction of such a program in any other material way. The Court heard testimony that "if any single byte of the Toner Loading program is altered, the printer will not function"⁷⁹ It therefore concluded that there was justification for SCC copying the program to enable it to make a product compatible with the printer.

On the second and third charges, Lexmark alleged that the SCC microchip circumvents Lexmark's technological measure (the SHA-1 authentication sequence) which effectively controls access to the Toner Loading program and the Printer Engine Program which they claimed were copyrighted works. The Court considered the third charge before the second and concluded that it was the purchase of a Lexmark printer that allowed "access" to the Printer Engine Program (i.e. the buyer's ability to make use of this program) and not the authentication sequence⁸⁰. This was because a buyer was able to read the literal code of the Printer Engine Program from the printer memory without using the authentication sequence/code. The Appeals Court noted that the DMCA only applied to a technological measure that controlled access 'effectively' and did not apply in this case where one form of access was restricted while another (reading from the printer memory) was left wide open.

The second charge was dismissed in part because the Court concluded that the SCC microchip did not provide access to the Toner Loading Program but replaced it⁸¹. The Appeals Court also noted that since the Toner Loading Program appeared on the Printer Engine Program, the purchasing of the printer (but not the microchip) permitted access to the Toner Loading Program. The Court further stated that the DMCA concerned technological measures that control access to a work protected under copyright law. This meant that since the Toner Loading Program was not a copyrighted work (as decided in action one) then the DMCA did not apply in the second charge.

The Appeals Court further considered whether SCC's SMARTEK microchip qualified under the DMCA's 'reverse engineering' defence. The Appeals Court noted that SCC's SMARTEK microchip contained other functional computer programs in addition to Lexmark's Toner Loading Program and was capable of additional functionality beyond the chip on Lexmark's toner cartridges. The Court considered two of Lexmark's arguments regarding the applicability of the DMCA 'reverse engineering' defence namely: (i) that the defence only applied to achieving interoperability with independently created programs which existed prior to the 'reverse engineering' of Lexmark's Toner Loading program and (ii) that the technological measures had to be 'necessary and absolutely needed' to ensure interoperability between the SCC's SMARTEK chip and the Lexmark's Toner Loading Program. In rejecting the first argument the Appeals Court stated that simultaneous creation of an interoperability device and another computer program is not prohibited under the DMCA provided that the computer program is independently created. For the second argument the Appeals Court noted that DMCA was silent on the degree to which technological means was necessary, however, the Toner Loading Program satisfied this requirement, since without it (to perform the checksum operation) the printer would not operate.

In a separate concurrence opinion judge MERRIT. J noted that in future companies will not be allowed to use the DMCA together with copyright law to create monopolies of manufactured goods. He also noted that in assessing circumvention under the DMCA a key question concerns the purpose of the circumvention technology since the DMCA was intended to prevent the pirating of copyright-protected works.⁸²

6.2 Applying the Lexmark decision to RealNetworks

There are interesting issues from the judgement of the Appeal Court, which can be used to rationalise the legality of RealNetworks' Harmony software. This rationalisation exercise, however, at best is speculative due to the lack of specific technical details of RealNetworks' activities. It may, however, be relevant in providing a general guide for assessing the legality of future similar attempts at interoperability in light of possible consumer demands.

Apple will find difficulty in any action under the DMCA alleging circumvention of the iPod because Harmony facilitated access to the iPod which is not itself a copyrighted work. In countering this argument Apple may argue that the iPod contains DRM copyrighted software (to discriminate between different file formats) and that Harmony facilitated access to this software by copying aspects of their FairPlay DRM code. Apple will only succeed with this argument if they can show that the software is protected by copyright and that a technological 'access' control measure existed (between a digital song and the copyright protected iPod software) and was circumvented. While it is difficult to speculate on this point because of the lack of precise technical details it must be noted that Harmony simply converted the Helix DRM format into a FairPlay compatible DRM format, and did not engineer a technological measure to 'access' software on the iPod.

With regard to 'reverse engineering' RealNetworks could perhaps launch a successful defence under the DMCA 'reverse engineering' exceptions provided that they can at least demonstrate the following: (i) that the computer program (i.e. the RealNetworks Helix digital song file format) was independently created either prior to or simultaneously with the 'reverse engineering' process; (ii) that the technological measure used to ensure interoperability between RealNetworks digital song format and the iPod (i.e. Harmony software) was 'necessary and absolutely needed'; and (iii) that no copyright infringement or other laws were broken in the process of 'reverse engineering'.

The first requirement seems to be a given, since RealNetworks' Helix digital song file format was in existence before the advent of the Harmony software. For the second requirement RealNetworks will have to argue that the only way to achieve playability on the iPod is to use the specific technical measure employed by Harmony to convert the RealNetworks DRM to the FairPlay compatible DRM. For the third requirement, RealNetworks will have to show that no laws were broken and that there was no copyright infringement in the process of 'reverse engineering'. If software from Apple's Fairplay DRM was actually copied then RealNetworks would perhaps argue that the software is not copyrightable due to the close nexus between its functionality and expression. As in the Lexmark case, the Court will consider whether the software code copied is unique and the only method of achieving interoperability with the iPod. If this is the case then the software will not be copyrightable and hence not a protected work under the DMCA.

Finally the comments of MERRIT J, appear to indicate that the DMCA will not be allowed to be used to maintain monopolies, therefore, a court may be reluctant to rule in favour of Apple. This

is especially true where consumer interests may favour a policy bias towards compatible digital music files.

7. Conclusion

The interoperability of existing digital music file formats will be beneficial to all consumers. While businesses may see the current situation of locking consumers into propriety formats as a way to maintain market share, consumers are not being well served by this model. The strong legal protection enjoyed by DRMS currently deters any commercial circumvention devices to aid consumers. However, the attempt by RealNetworks to reverse engineer Apple's FairPlay DMS provided an opportunity to see the potential benefits of interoperability and to assess the legal implications of such activities. It is doubtful whether the activities of RealNetworks were illegal and can be prosecuted under the DMCA. Apple's preference for a technological response appears to have been a lost opportunity to legally test this issue. However, the judgement of the Appeals Court in the Lexmark Case, may provide an insight in how US law may be applied to RealNetworks. The Lexmark judgement may not favour Apple in terms of its application of copyright law and the DMCA, and its apparent anti-monopoly bias. There is no doubt that new interoperable devices will be developed in the future so as to cater more to the needs of the consumer rather than to the pockets of big business. Let's hope that the consumer truly is king.

¹ Bertelsmann Music Group (BMG) is the world's fourth largest music group. <http://www.bertelsmann.com/>

² EMI is the the world's largest independent music company and also the oldest record company. <http://www.emimusic.co.uk/>

³ Recording Industry Association of America. <http://www.riaa.com/>

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¹⁰ DMCA 1998, <http://www.copyright.gov/legislation/dmca.pdf>

¹¹ Directive 2001/29/EC, Article 6(1)

¹² This would imply exceptions and limitations (Article 5) to the reproduction right (Article 2) and the right of communication to the public (Article 3) (e.g. private use, public libraries, broadcast organisations) should be allowed. Right holders, however can limit the number of reproductions for private use given under Article 5(2)(b).

¹³ Directive 2001/29/EC, Article 6(4).

¹⁴ DMCA, Section 1201(a)(1)

¹⁵ Circumvention means "avoiding, bypassing, removing, deactivating, or otherwise impairing a technological measure". Section 1201(b)(2)(A).

¹⁶ DMCA, Section 1201(a)(2)

¹⁷ DMCA, Section 1201(b)

¹⁸ DMCA, Section 1201 (c)

¹⁹ DMCA, Section 1201(d)-(j) These specific exemptions pertain to: allowing non-profit libraries and education institutions to make a determination (in good faith) whether to acquire a copy of the work; activities of law enforcement and government; reverse engineering to achieve interoperability of a computer program; encryption research to investigate flaws of encryption technologies; preventing access of

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- minors to Internet material; protecting personally identifying information; and testing security flaws and weaknesses.
- ²⁰ Reverse engineering is a process which involves analysing a technology to understand how it is designed and operates. Chilling Effects Clearinghouse <http://www.chillingeffects.org/reverse/faq.cgi>
- ²¹ MP3 is a compression format for music files. With MP3, CD-quality songs can be compressed by a factor of 14 without any noticeable affect on quality. See: <http://computer.howstuffworks.com/mp31.htm>
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