

Infrastructure for the Celestial Jukebox

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Abstract

The vision of a dynamic and intelligent Celestial Jukebox, in which any cultural artifact is available to dedicated appliances or home computers via wired or wireless channels, animates many predictions for the future of media delivery. The chief proponents of this vision are transnational media firms selling hardware, software and content. Despite a prolonged downturn in the global economy for media and software, the technical and legal design of the Celestial Jukebox nears completion. We examine the development and implications of the Jukebox as it is manifested in several online music services available to US consumers (which we term Music Service Providers, or MSPs), in which the 'Big Five' record companies (Universal, Sony, Warner, BMG and EMI) provide content and/or hold equity stakes. First, we identify and describe the Celestial Jukebox's key technical components – Customer Relationship Management ('eCRM' or 'CRM') and Digital Rights Management ('DRM') software – and their intermeshing characteristics. We then discuss the implementation of CRM/DRM in MSPs and list the primary stakeholders in the leading MSP systems. We conclude with a discussion of the MSPs' role in advancing what Vincent Mosco terms a 'pay-per' society, in which cultural goods are purchased on a transitory, rather than permanent, basis.

Introduction

The 'sonic boom' that accompanied the unrestricted, unprotected and anonymous exchange of digital music files at the turn of the twenty-first century is now received history (Alderman 2001; Brown 2001); Napster's loss at court has been mourned as 'the day the music died' (Weisman 2001). After buying out or shutting down potential rivals for online music distribution (McCourt and Burkart 2003), and suing customers who (often unwittingly) failed to participate on their terms, the Big Five record companies have devoted their attention to creating an attractive business model that will also shape the restructuring of Hollywood's distribution systems (Wallach 2001; Rae 2003). This model, they hope, will be the Celestial Jukebox, which dispenses audio-visual files and streams in dribs and drabs through wireless and broadband Internet connections.

The provenance of the term 'Celestial Jukebox' is uncertain. The term first received widespread attention in 1994, with the publication of Paul Goldstein's *Copyright's Highway: The Law and Lore of Copyright from Gutenberg to the Celestial Jukebox*. Goldstein describes the Jukebox as:

a technology-packed satellite orbiting thousands of miles above the Earth, awaiting a subscriber's order – like a nickel in the old jukebox, and the punch of a button – to connect him [sic] to any number of selections from a vast storehouse via a home or office receiver that combines the power of a television set, radio, CD player, VCR, telephone, fax, and personal computer. (Goldstein 1994, p. 199)¹

The genealogy of the term 'Celestial Jukebox' reveals a distinctly US cultural flavour. Some historians find 'incredible abundance' to be the overriding characteristic of life in the US (Marx 1964; Nye 1994), and faith in technology has been one of the great tropes of American culture. Jaw-dropping wonder and religious awe at technological innovation are nothing new; in 'The Dynamo and the Virgin', Henry Adams described his epiphany at the Great Exposition of 1900:

... [T]o Adams, the dynamo became a symbol of infinity. As he grew accustomed to the great gallery of machines, he began to feel the forty-foot dynamos as a moral force, much as the early Christians felt the Cross... Before the end one began to pray to it; inherited instinct taught the natural expression of man before infinite and silent force. (Adams 1990, p. 353)

The rhetorical valence of its nickname, the Celestial Jukebox, is religious, implying that the essential service it provides possesses heavenly attributes, and may even be a gift from God (or, perhaps, the Big Five deities). In the Christian tradition, access to the heavenly jukebox may satisfy a need for reward and recognition, either for hard work and good deeds in life, or else a part of God's blessing in the afterlife. The Celestial Jukebox is a metaphor for an appliance for consumers with 'pushbutton fantasies' (Mosco 1982); similarly, in 1831, Timothy Walker envisioned the US as 'an Automated Utopia in which "machines are to perform all the drudgery of man, while he is to look on in self-complacent ease"' (Marx 1964, p. 185).

Coming as it does from the US, a culture that has been criticised both for worshipping technological idols and for a Puritanical obsession with imposing cultural homogeneity, the music industry groups purveying the Celestial Jukebox as a commercial service are also pushing American branded intellectual property, for a largely American customer base.² The rationalisation and vast extension of intellectual property rights in the US preserved the content industry's competitive advantages in the commercial distribution of digital media.³ Protections afforded industry through the Digital Millennium Copyright Act ('DMCA') of 1998 and the Sonny Bono Copyright Term Extension Act of 1998 do not yet extend to the rest of the world. Factors inhibiting the international availability of the Celestial Jukebox include a combination of infrastructure unavailability, lack of disposable income, insufficient intellectual property rights for the Big Five, and the persistence of local affinities for local cultural practices and artifacts.⁴

In what follows, we discuss the political economy of the Celestial Jukebox as an expression of 'pay-per society' in which an intellectual commons is privatised and meted out by culture industries (Mosco 1990). We restrict our scope of analysis to commercial music produced and distributed by culture industries. We then examine MSPs as institutional sites for specific customer relationship management ('CRM') and digital rights management ('DRM') integrations and applications working together. We conclude with a discussion of the potential economic, political and cultural costs of the Celestial Jukebox's lockdown via CRM/DRM. In the next section, we describe the functions that CRM/DRM must perform to reform attitudes about file-sharing and privatise and lock down the Internet commons.

The desacralisation of music with e-commerce

We argue that, despite its nominal spiritualism, the Celestial Jukebox works in fact to desacralise online music sharing by using two discrete but intermeshing software applications – CRM, which is intended to steer the 'right' content to the right consumers at the right moments of their online activities, and DRM, which is designed to

prevent unauthorised copying of content and enforce restrictions on its use.⁵ When combined, these technologies provide a personalised online media experience for consumers within the confines of what Strauss (1999) terms a 'Digital Fort Knox', or impenetrable fortress securing a rich treasure. The record industry needs the new infrastructure, both to protect from unauthorised file-sharing on peer-to-peer networks, and to create an alternative to physical ('bricks and mortar') retailers. To the Big Five record companies, which hold the intellectual property rights for their recordings, retail markets for physical artifacts, such as chain stores for music CDs, are fraught with uncertainty, legal liability, and lost revenues. The Big Five (Universal, Sony, BMG, Warner and EMI), who collectively control 75 per cent of global music sales (Goldsmith, Karnitschnig, Peers and Orwall 2003), stand to reduce substantially their marketing uncertainty and enhance their revenues by leasing content via online outlets rather than selling content in physical markets. Their widely publicised legal campaign against file-sharers in the United States during 2003 and 2004 attempted to staunch the flows of unlicensed copies of commercial music on the Internet by intimidating P2P file-traders and orchestrating anti-'piracy' public relations blitzes around college campuses in the US (Harmon 2003B; Wingfield and Smith 2003A). The music industry created the music service providers to provide an alternate, legitimised platform for the Napster diaspora, while killing off the file-sharing rituals that characterised the digital bonhomie of the precommercial Internet.

While the Celestial Jukebox offers secure distribution for the Big Five, the application of CRM/DRM technologies to the virtual communities of Internet music consumers further individuates and isolates consumers. In combination, these software applications make a new kind of lock that also surveys its users and reports on their behaviour. It is constructed through the interaction of software code and legal code that admonishes and prevents users from sharing files or streams. The DMCA now makes communal sharing practices illicit.⁶ For members of the file-sharing communities that traded in music, the software and legal technologies of individuation and isolation have fashioned a Celestial Jukebox resembling a confessional, where the I-Thou relationship is personalised and mediated through a priestly caste of invisible technologists.

Even before the Napster decision confirmed that the new intellectual property rights operated as intended, by imposing an artificial scarcity of intellectual property on the Internet, the music industry was at the forefront of recent battles to determine the future of online content delivery. With lawsuits and legislation placing a bottleneck in legal flows of music on the Internet, commercial online music distribution is now dominated by several entities created by consortiums of the Big Five music oligopoly, leading software concerns, and Internet portals. The four primary entities are Emusic, MusicNet, Napster 2.0 (formerly Pressplay) and Rhapsody (see Table). These online commercial music service providers (MSPs) employ enterprise content management software to host and deliver music files and streams,⁷ CRM to segment users into identifiable sub-groups by behaviour, and DRM to enforce terms of service contracts and payments from consumers. We use case studies of MusicNet and Napster 2.0 to represent realignments of Big Five interests and technology practices behind the creation of the MSPs. Rhapsody, an ostensibly independent service that has licensed portions of the Big Five's catalogues, and Emusic, which features the catalogues of independent record labels, are considered for comparative purposes.⁸

As they re-commodify and restrict access to music files and streams that only recently had been free and widely available, MSPs have had limited, but growing,

success with consumers.⁹ Certain factors in the business model remain in flux, such as the selection of a subscription or 'pay per play' approach, as well as the longevity of downloads.¹⁰ MSPs may represent a transitional form of media organisation; their long-term role may be to serve as intermediaries for collecting royalties and cross-licensing catalogues for the Big Five, although a full cross-licensing arrangement among ostensibly rival firms would invite new antitrust action.¹¹ The MSPs' next of kin, the film studios and book publishers, are faced with similar choices. Nevertheless, the MSPs are ascertaining the market for online music delivery on the Big Five's terms and provide a template for the Celestial Jukebox. The Big Five's collusive behaviours and vertical integration may predispose MSPs to abuse market power on the Internet, and the surveillance systems and individuating controls of CRM/DRM introduce new privacy risks for consumers.

The commercialisation of the Internet for media e-commerce in the US

The Celestial Jukebox's development indicates that the Big Five, in the guise of protecting their intellectual property and creating value for investors, intend to create an Internet 'toll booth' for traffic managed by their proprietary systems. The tollbooth or jukebox metaphor is an increasingly accurate description of industrial reality, reflecting the Internet's gradual transformation into a distribution channel for media conglomerates. Commercial activity on the Internet was outlawed in the US until 1991 (Alderman 2001). The Internet backbone was operated under US government contract until the privatisation of NSFNET in 1995 (Winston 1998). At the same time, a boom in high-tech products and services helped the US recover from an economic recession. Firms in technopolies like Silicon Valley, Boston, New York, Virginia, the North Carolina Research Triangle and Austin boosted computer and information technology exports, and information-intensive industries contributed growing portions of the US gross national product. Corporations upgraded their computer hardware and software and created a presence in cyberspace, and consumers similarly plugged into the Internet en masse before the 'Internet Christmas' hype-fests of 1998 and Y2K.¹²

The hi-tech boom was reflected in statements by the White House (particularly comments by Vice-President Al Gore) and the Federal Communications Commission, which presented a Celestial Jukebox based on private, rather than public, initiative as both inevitable and desirable (Hundt 2000).¹³ This utopian rhetoric was intended to rationalise an intense deregulatory push that culminated in the Telecommunications Act of 1996 (TCA96), which removed barriers to mergers and acquisitions in the telecommunications and entertainment sectors. Primary stakeholders, including companies that increasingly consolidated content with distribution, rallied behind Vice President Gore's National Information Infrastructure Initiative, which promised to unroll a media-saturated carpet across all communities in the country (Aufderheide 1999).

The privatisation of the Internet backbone (a key tenet of proposals for the National Information Infrastructure) accelerated the Internet's potential for creating markets in media services. Client-server architectures proliferated to run applications for making online transactions. Portals such as Yahoo!, Excite and AOL commercialised the Internet's anarchic public arena through user registrations, search functions, chat communities, and top-down topic navigation 'channels'. Portals aggregated

traffic and handed online session information off to advertisers such as DoubleClick, which profiles Internet users and pushes advertisements to them using CRM.¹⁴ Registration policies and end-user license agreements allowed the portal networks to profile the identities of users, merge and enrich profiles with extra user information, and establish brand loyalties that would encourage these users to return again and again. As the Internet became increasingly commercialised in the late-1990s, a succession of software companies undertook the technical development of the lockdown in hopes of reaping substantial licence fees from online merchants, media conglomerates, and other copyright owners. These software firms, a sample of which appear in the Table, developed a host of auto-recommendation, personalisation, and rights management platforms for online marketing and e-commerce.

These technical developments occurred in tandem with revisions of intellectual property law that benefited established corporate interests. Although the proponents of the TCA96 claimed that the development of cyberspace would result in increased democratic participation, the public was not invited to express its interests to legislators while the latter were creating the intellectual property law that would underpin the Celestial Jukebox (Schaumann 2002).¹⁵ The 'pay-per society' expressed itself in the Digital Millennium Copyright Act of 1998 (DMCA), which ignored the fair use precedent established in *Universal v. Sony* and criminalised previously legal computer file copying by private individuals. Before the Internet was widely diffused and commercialised, peer-to-peer networking was the norm, not the exception, to online information flows. However, the popularity of Napster and peer-to-peer distribution systems created fears among media conglomerates that the Celestial Jukebox would break out of the lockbox they envisioned. The Big Five record companies successfully addressed this threat at court, devastating the legal basis for operating a decentralised alternative to the Celestial Jukebox. Meanwhile, the Big Five have reinforced their existing market oligopoly through collusive online distribution arrangements, vertical integration, and mergers and acquisitions (McCourt and Burkart 2003).

This tightening of industrial control has been matched with a refinement of practices for managing consumer demand. While placing greater protections on intellectual property assets, owners and distributors of cultural products increasingly rely on information-intensive initiatives to control uncertainties and reduce risk in the marketplace. These companies have honed their marketing and distribution capabilities through 'personalisation' technologies that offer customised advertising, product recommendations, and other 'pushed' content in e-commerce marketplaces. These personalisation platforms are intended to discern customer preferences, create 'conversions' or sales, up-sell and cross-sell catalogue offerings, and build brand loyalty by fostering a sense of community among consumers, as if these users were receiving cues and explicit purchase recommendations from trusted authorities in retail stores. Personalisation software therefore contributes the essentials of a personal profile to rights management software, which in turn enforces new copyright rules aimed at discouraging unauthorised use and duplication.

The Big Five's strategy now is to re-aggregate traffic through advertising, segment online markets with CRM, and enforce terms of use (such as pay-per-play policies, limits on subscriptions and CD burning, and debit accounts) for their new music services through DRM, with the intention of convincing consumers to pay for what had only recently become free. The MSPs will personalise services as they re-aggregate traffic, achieving finer and finer market segmentation, all the while enforcing the new digital copyright regime via terms of service that include

surveillance and limit fair use. The leading MSPs¹⁶ and their primary stakeholders are listed in the Table.

The political economy of the Celestial Jukebox

Since 2000, both Internet and old-line media firms have suffered a decline in revenues and a cash squeeze in venture capital and portfolio investment. Declining sales have, in turn, put pressures on the Big Five record companies to constrict the supply of Internet outlets for music.¹⁷ These developments accompany increased pressures on Internet service providers (ISPs) to police the activities of their users in order to staunch unauthorised traffic in recordings. Nothing in the current CD standard, the Red Book, authenticates or copy protects CDs at the time of production. In a similar fashion, nothing in the MP3 standard requires permission to play a music file on an MP3 player. DRM is intended to resolve these problems by encoding licensing terms into digital files and tracking consumers' adherence to these terms as they access online streams or play files on computers or MP3 players.¹⁸ Minimal DRM provides user authentication and secure (encrypted) file transmission, while robust DRM includes digital watermarking of copies, secure certificates, and file metadata management.¹⁹ A comprehensive DRM system would seal off the original production at the mastering, manufacturing (or syndication, if streaming) and playback stages. Like forensic evidence, DRM should leave a trail of check-offs and documented assurances of identity and authenticity.²⁰

MSPs use 'network power' (Sassen 1999) to augment the Big Five's dominance of recording sales and licensing. To control the ways in which consumers may access music files, each file is accompanied by metadata 'tags'. These tags, written in an extensible mark-up language based on XML, are encoded with rules for the price, duration, frequency, rendering, transfer and payment for that file. These tags restrict users to only those services for which they have paid in advance or agreed to pay for on a per-use basis (such as mp3 download, audio stream, and/or CD burn).²¹ Using XML, the Big Five can translate terms of use directly from DMCA legalese into communication standards for online authentication, accounting and billing. Personalisation code generated in real time by CRM servers can also use metadata tags.

How, then, to draw customers into these systems and retain them? CRM employs data mining algorithms (particularly clustering algorithms) to identify and track music downloads and streams from Web server logs and other records of online behaviour.²² The hope is that detailed profiles of customers' behaviours, and that of their online cohorts, will increase sales by translating online behaviours into market segmentation analyses. Companies employing CRM systems are building the Celestial Jukebox to increase sales with 'push marketing', pushing the preferred content to each consumer; the incorporation of DRM systems into the Celestial Jukebox ensures that consumers receive only the products and services that they pay for, and on the providers' terms. CRM is intended to build and know audiences, while DRM is designed to regulate their online use.

Knowing the audience

As long as the supply of cultural products exceeds demand (Doyle 2002), producers and distributors will seek to minimise risk by differentiating consumer markets. The

online practices of corporate oligopolies have extended and deepened long-standing trends in print and broadcast media to segment consumers, develop niches or market segments, and commodify audiences (Barnouw 1978; Strasser 1989). As media proliferated, demographic segmentation became increasingly important to producers.²³ In order to validate and refine these segments, media companies relied on traditional marketing techniques, such as circulation figures, ratings, and other audience-constructing techniques to measure their success against competitors. However, methods for retrieving, coding and analysing quantitative data, such as subscription rates, telephone surveys, and user diaries, are expensive, imprecise, and subject to errors and bias.

More recently, producers have increasingly focused on the quality, as well as quantity, of audiences by measuring their consumption habits, lifestyles, and psychological characteristics. Psychographic research, based on the Values and Lifestyles Program (VALS) typologies developed by SRI International of Menlo Park, California, represents such an attempt to further define and segment audiences. In addition to providing demographic information about consumers, VALS delineates audience 'clusters', based on attitudes, behaviours, and consumer tastes. Such techniques rely heavily on 'ascription', a statistical method in which probability is applied to available data to supply unavailable information. This method leads critics to accuse psychographic researchers of 'making up numbers' (Beville 1988). The typologies used in clustering, such as 'old-fashioned' or 'other directed', are arbitrary labels that may not accurately represent the data.

These methods have been further supplemented by active surveillance measures such as people meters, yet media producers remain hampered by a lack of real-time information about their target audiences. Distinguishing real demand from false readings is an ongoing problem in the absence of a continuous stream of information about consumer behaviour in the marketplace. Furthermore, the concept of a 'fixed' audience is highly suspect. Ang (1991) notes that the audience's composition is shifting and tentative; the need to 'capture' this audience fuels producer speculation on audience behaviour, which in turn creates a greater emphasis on more 'accurate' and detailed scrutiny. Advanced research, which seeks to bring the audience under microscopic view, reveals that it is constantly dissolving and reforming. Audiences are never fully captured; instead, they are pursued through accumulating more information. Research confirms that audiences are constantly changing aggregates of indicators, fuelling the need for more and more data. The interactive nature of the Internet allows producers and distributors to count 'hits' and monitor consumer transactions in real-time, creating streams of detailed information about online user behaviours that also may be further enriched and merged, traded and sold as commodities in their own right.

The data mining and analytic functions of personalisation software provide companies with marketing knowledge required for managing customer databases. However, while intellectual property laws have been strengthened, the ultimate goal of cultural producers and distributors – predicting consumer behaviour – remains elusive in e-commerce, just as it has for traditional sales channels. Personalisation systems are descriptive, rather than predictive. They cannot tell why a customer decided to make a transaction; instead, they are only able to make correlations. Such systems are no better informed about the individual user's inclinations than what the user has told the system (which itself has parameters imposed by coders). The effectiveness of CRM systems is contingent on the completion of data profiles by

users, who may perceive such efforts as invasive, and evade or resist data gathering techniques.

Content classifications also are problematic, given the impossibility of creating a comprehensive source for genre definitions and mappings. Genre classification is an intensely subjective process, concerning continuously proliferating, evolving and hybridising categories. As the database size increases, finding affinities between product groups and audience segments can actually become more difficult. Marketers, therefore, may stand to benefit from breaking the database down into a specific, rather than infinite, number of segments (similar to VALS and clustering typologies). However, parsimony hampers precision, and vice versa.

Although the predictive aspects of CRM are limited, the customer information they generate is now so robust that producers and distributors must evaluate the pay-offs of personalisation against the potential costs of privacy violations. Since the expensive resolution of the DoubleClick privacy case, personalisation software vendors may seek to develop minimally invasive profiling techniques in order to avoid legal tangles for their corporate clients. By managing the direct link between vendor and purchaser, the new online music delivery systems provide content providers with addressability, or specific targets for selected products or services. The MSP knows where the music was sent, and can contact consumers for upgrades, new products and marketing information – and can monitor and control unauthorised use.

Like CRM, DRM systems are similarly hobbled by conceptual and technological inadequacies that may suppress the viability of MSPs. DRM takes output from CRM, including user authentication, online session information, and subscriber status. For maximum effectiveness, DRM must be built into every component of 'trusted systems', including encoding, artifact, delivery and decoder. Hardware, software, and licensing standards need close coordination for harmonious integration, so internecine conflict within the nascent DRM industry reveals important congruencies and divergences of stakeholder interests. A proposed 'universal' DRM scheme, the Secure Digital Music Initiative, has failed to develop a comprehensive standard due to rivalries and dissension among its principal actors, e.g. the Intertrust (jointly owned by Sony and Philips Electronics) suit against Microsoft for DRM patent infringements.²⁴ In addition, DRM may result in cumbersome systems that discourage consumer use; at present, DRM software employed by MusicNet, Napster 2.0 and Rhapsody preclude file mobility by tagging and locking music files onto a limited number of playback devices. An entire music collection could be permanently destroyed, and its costs unrecoverable, if a hard drive or portable player fail.

A steady and predictable revenue stream from audiophiles paying subscription fees for licensing, rather than sale, is the stuff of which music business dreams are made. Unlike one-time sales, subscriptions generate steady cash flow and provide a convenient benchmark by which to measure growth. Since subscriptions are usually paid in advance of receiving the product or service, they avoid the volatility of retail sales or pay-per-play. Subscriptions also maximise revenues from those who use the service infrequently, while encouraging increased use among heavy users, and allow the provider to charge higher rates to advertisers (Meyers 2001, p. 25). Subscriptions present new challenges, however. Prices would need to make up in volume what is lost in profitability, suggesting cost pressures and even price wars among music services.²⁵ Subscriptions also would penalise chain music stores and retail outlets, which account for 80 per cent of sales in the popular music market. Record company consortiums may try to offer their own subscription models, but ultimately will have

to license their catalogues to each other to attract the largest number of users – yet licensing content between the Big Five invites antitrust action. Perhaps the most significant problem, however, is institutional stasis. The recording industry's infrastructure and practices are built on mass producing, distributing, promoting and selling mechanical copies of recordings, which contributed to their hesitancy in entering the online market.

The first generation of MSPs enter an uncertain business environment. The economic recession that began in 2000 has reduced disposable income, and sales of recordings dropped 4.7 per cent in 2001 (Weinraub 2002, p. C8). Music is a low-margin item for the networks sending user traffic; streams or 'burns' of singles may be used as loss leaders to attract new members to AOL and other services or to promote other products (as is the case with Apple's iTunes, which is designed to spur sales of iPod music players). Thus, MSPs may pursue new services for future revenues. MSPs are learning that online music consumers store, arrange and manipulate personal collections of files in habitual ways. The record collector's impulse may be satisfied with new interfaces for navigating personal collections (via search, browsing and sorting) or the collections of friends. Whether or not an enforced ephemerality of music files (through expiration) and unsaveable streams makes them inherently less valuable to consumers is an important question left for future research. For the MSPs and their parent companies, it is clear that the operation of the Celestial Jukebox builds up a treasure chest of business analytics and user preferences with intrinsic value of its own as a database.

Conclusion

The abrupt transition from the 'digital bonhomie' (McCourt and Burkart 2003) of the Napster network and other peer-to-peer communities to the Celestial Jukebox and its CRM/DRM lockdown is a contemporary shock with at least three imminent reverberations. It is an experiential shock for consumers, who must become corporate clients of MSPs to avoid criminal charges for illegal music copying, and begin receiving music as a paid service. It represents an abrupt shift of Internet culture, which had popularised file swapping as a communal activity of consumption. Its combination of legal and software code lurches us closer to the pay-per society, wherein each cultural artifact or useful piece of information delivered through a commercial network has a price attached to it. CRM is sophisticated spyware that may be useful for influencing consumers in a technocratic feedback loop of mood matching, personalisation and preference-setting. DRM personalises network power with the enforcement of rule-based policies with customised or 'one-to-one' treatment, and with 'trusted' communications that are secured with encryption. In an online environment, such as a portal (Microsoft Network, Netscape, Yahoo, Lycos), the personalisation can be consistent and seamless between sub-networks, because CRM and DRM can share user information with other networks, particularly in vertically integrated industries such as the industry for online music. CRM and DRM together centralise network power in a client-server architecture and individuate user behaviours.

The Celestial Jukebox's imperfections and vulnerabilities can still hobble its widespread adoption for music delivery and consumption. From a legal standpoint, the shared ownership and coordination of formally 'competitive' entities introduces the risk of antitrust campaigns. From an industrial standpoint, the CRM/DRM lockdown re-inserts, rather than eliminates, online intermediaries (the MSPs), in the

Table. This sample of MSPs was derived by enumerating those providers of online music subscription services that feature catalogues and equity participation from the five major record companies.

MSP	Terms of service	CRM/DRM partners	Media client	Network
AOL MusicNet . ²⁶	<i>Basic rate:</i> \$8.95/mo	CRM: RealPlayer	RealSystem	AOL
Time Warner (Warner Music) Bertelsmann (BMG Entertainment) EMI Group (EMI Recorded Music) Sony	<i>Streamed songs unlimited</i>	DRM: RealNetworks (xMCL) ²⁷		
	<i>Downloads:</i> unlimited; premium service (\$17.95/mo) allows 10 files burned per month			
Napster 2.0 . ²⁸	<i>Basic rate:</i> \$9.95/mo	CRM: MediaUnbound	Windows	MSN, Yahoo
Sony Universal (Universal Music Group)	<i>Streamed songs:</i> unlimited <i>Downloads:</i> unlimited; 99 cents per track	DRM: Microsoft (XrML) ²⁹		
RealOne Rhapsody . ³⁰	<i>Basic rate:</i> \$9.95/mo	CRM: MoodLogic, Muze	Microsoft ³¹	Lycos
Time Warner Bertelsmann EMI Group Sony Universal	<i>Streamed songs:</i> unlimited <i>Downloads:</i> unlimited; 79 cents per track	DRM: Intertrust (xMCL)		
eMusic . ³²	<i>Basic rate:</i> \$9.99/mo	CRM: AgentArts	Winamp	Yahoo AOL
Universal	<i>Streamed songs:</i> unlimited <i>Downloads:</i> unlimited; no additional charge per track	DRM: Supertracks		

process introducing new transaction costs to consumers. From an industrial standpoint, MSPs can exacerbate, rather than diminish, marketing problems due to an oversupply of user data that hampers effective customer correlation. From a cultural standpoint, MSPs create innumerable 'communities of one' by further individuating and privatising music consumption in a pay-per society. From a consumer standpoint, they attempt to 'square the circle', standardising fluid, subjective, and often deviant tastes, by subjecting an individual's consumption behaviours to deterministic tests for the best 'fit' with other consumers. Consumers may reject personalisation as too intrusive, too shallow or too artificial. MSPs may become widely perceived as unjustly imposing restrictions and new costs on consumers (including costs of lost privacy). These problems sow the seeds for low subscription rates and future 'rent strikes' by MSP tenants. Finally, every copy protection scheme to date has been broken.

While perfect control is impossible, effective control is probable; as Lawrence Lessig (1999) states, locks can be picked, but that does not mean locks are useless. The growing sophistication of CRM/DRM has helped corporations develop 'trusted systems' for managing customer data, while also offering consumers more opportunities to shop, research and access personal account information online. However, it is imperative that members of the public also enjoy certain rights and protections in the Internet marketplace as consumers and as citizens. Many groups in the US have noted the failure of markets and regulations to protect consumers' rights online. These groups, whose interests often diverge, have commonly highlighted DRM's potential to erode citizens' privacy, rights to 'fair use' of intellectual property, rights to free speech, and rights to freely choose applications from a variety of software standards and platforms (EPIC 2002).

The formation and alignment of the MSP oligopoly comprising the Celestial Jukebox is in line with Big Five tradition. Stringently enforced parameters on intellectual property are encoded into new formats and technologies, perpetuating the individuating characteristics of media marketing wherever possible. Pushing the commodification process from the media products at the top of the value chain to the protocols operating below will create problems for unaffiliated media companies with e-commerce sites but without home networks. MSPs provide the copyright holders intimate, real-time knowledge of their Internet audiences – their consumption habits, their demographics, and other enriching information that assists in market segmentation. Because 'code is law' in cyberspace (Lessig 1999), by enabling certain activities and restricting others, software firms effectively dictate *de facto* rights management practices, independently of the *de jure* protections and rights of consumers by intellectual property law. A technology practice forming in and around the Celestial Jukebox is yet to follow, but the Jukebox encapsulates and locks down much of the music and media that only recently made up a substantial tract of the Internet commons. The pay-per society is taking shape quickly, as our new Celestial Jukebox illustrates. This American-styled box puts new and enduring constraints on music's viability as a cultural practice protected from pure market functionality.

Endnotes

1. Goldstein (1994) adds that he 'claims credit neither for the celestial jukebox metaphor nor for any success in tracking down the creative mind that coined the term' (pp. 251–2).

A long-time observer of the music industry told the authors that the RIAA used the term in 1989–1990 in an effort to obtain performance rights for digital transmissions (personal

- correspondence, Seth Greenstein, 30 November 2003).
- The critics of American cultural imperialism are diverse, and include Postman (1986), Barber (1996), Schiller (1997) and Mattelart (2003).
 - We denote as 'content' any Internet-based object comprising code that can be traded in markets for audio-visual products and services.
 - The harmonisation of intellectual property rights between the US and the rest of the world remains a thorny problem for free trade proponents. The Euro-DMCA Directive has had a fitful history (GartnerG2 and the Berkman Center for Internet and Society, 2003; Broersma 2003). Chief among the obstacles is the European tradition of moral rights for artists, which is not recognised in the US, and European protections for consumers' names and other personal information stored in databases. The US still has not implemented privacy protections for consumer databases. Much of the coordinating efforts have been undertaken by the World Intellectual Property Organisation, a World Trade Organisation sub-group that claims to be 'an international organisation dedicated to promoting the use and protection of works of the human spirit' (<http://www.wipo.int/about-wipo/en/overview.html>).
 - Digital rights management technologies can use hardware, software, and a combination of both (Sagey 2002). For a primer on CRM, see Kerr *et al.* (2003). Soon DRM will become incorporated into digital TV and radio broadcasts in the US, encoded as 'broadcast flags' in live programming, and supported by consumer electronics devices, including TVs and PCs, unless consumer rights advocates succeed in court challenges (see Musgrove 2002), or an incipient DRM regulatory movement takes off (McCullagh 2003).
 - The shrinkage of the intellectual commons online is a pervasive theme in Lessig (2001). DRM researchers from Microsoft have termed the shared space of file sharing technologies the 'Darknet' (Biddle *et al.* 2002).
 - Enterprise content management, or ECM, allows firms or other enterprises with multiple divisions to consolidate and coordinate all of its electronic files, or 'assets', within one application that handles multiple publication outlets (Internet, intranet, wireless Web, print) and policies for publication roles in the enterprise, following customised rules for editorial staging and versioning 'content'.
 - Rhapsody literally claims to be the arrival of the Celestial Jukebox (http://www.listen.com/rhap_about.jsp?sect=juke).
 - In September 2002, E-music claimed 60,000 registered users, while Rhapsody claimed 10,000 subscribers (Strauss 2002). As of May 2003, Pressplay had fewer than 50,000 subscribers (Harmon 2003A). Many leading artists who own the rights to their recordings, or the publishing rights to their songs, have been unwilling to license their work to MSPs, or may allow their works to be streamed but not downloaded. Each service averages 250,000 songs – less than half of the popular music in circulation (Angwin and Winfield 2003).
 - In May 2003, Apple introduced its much-ballyhooed iTunes Music Store, which allows *a la carte* downloads of music files for \$1 apiece without requiring a subscription fee. Other entrants featuring *a la carte* downloads include BuyMusic and Music Match, with services from Microsoft, Sony and Wal-Mart in development. However, the DRM technology used by all of these services ensures that their downloads remain 'tethered' to a limited number of playback devices. Given the thin profit margins for download-only services due to wholesale costs to music companies (Wingfield and Smith 2003B), it is likely that successful MSPs will offer a combination of radio-like streaming, subscription-only content and 'events', and individual downloads.
 - RealJukebox and Windows Media Player already have raised the eyebrows of European regulators (Brandon 2002), and the US Department of Justice is examining Napster 2.0's use of Microsoft's APIs (Infoworld). In addition, MusicNet and Napster 2.0 are the subjects of antitrust investigations both in the US and Europe (Mathews and Wilke 2001).
 - Between 1997 and 2000, the number of users online in the US rose from approximately 58 million to 120 million (Tedeschi 2001).
 - The very language of the debates in the US legislature and its Telecommunications Act of 1996 (TCA96) expresses a technological utopianism that serves democratic ends.
 - In April 2002, DoubleClick settled a privacy lawsuit related to its collection and use of personal user data for \$1.8 million.
 - The Consumer Broadband and Digital Television Promotion Act, originally known as the 'SSSCA', would require all computers to restrict use of copyrighted material including music files and CDs, video clips, DVDs and e-books (<http://www.stoppoliceaware.org/>).
 - iTunes is not considered to be an MSP, because ownership is not, in part or in whole, represented by one of the Big Five. iTunes exists as a loss leader to promote sales of portable music player hardware.
 - Claims of file sharing cutting into revenues are problematic. A study by Jupiter Media Metrix found that users of peer-to-peer networks were 41 per cent more likely to have spent more on music in 2001 than average online music users (<http://www.newsbytes.com/cgi-bin/udt/im.display.printable?client.id-newsbytes&story.id=176141>).
 - This paper considers software DRM. DRM providers offer DRM functionality in three forms: as a software platform, as a hosted service, or as a vertically focused application that includes DRM capabilities. Hardware manufacturers that include DRM functionality include Nokia, Palm, Philips, RCA and SonicBlue.

19. Watermarking impresses invisible insignia on audio-visual files. Secure certificates authenticate trusted servers. Metadata are 'data about data' that describe and travel along with every file or stream delivered from a content management system, and carry encoded instructions for CRM and DRM functions.
20. While at least two dozen companies offer rights management systems for the Internet, the market is currently dominated by a handful of firms. DRM standards depend in large part on their selection of supported metadata standards. Adobe integrates its Extensible Metadata Platform (XMP) into its publishing products, while Microsoft and Xerox employ Extensible Rights Metadata Language (XrML) on Microsoft platforms. Digital World Services, a division of Bertelsmann, created ADORA DRM, a secure online subscription and CD manufacturing service which is available to Bertelsmann clients. Sony uses Intertrust (also used by AOL Music and Listen.com/Rhapsody), as well as key2audio, a DRM encoder used for mastering copy-protected CDs.
21. Online streaming and other royalty payments are in negotiation (<http://www.wired.com/news/politics/0,1283,53896,00.html>)
22. Napster 2.0's CRM package, MediaUnbound, uses a combination of human-selected and computer-generated recommendations. Napster 2.0 also uses reporting software called LimeLight, which monitors online behaviour in two ways: through analysis of the user's activities with the graphical user interface, and through server logs that record file downloads and the number and duration of visits.
23. For example, as the national broadcast networks devoted more and more of their resources to television in the 1950s, radio station programmers began to focus on music selection as a means to define specific audiences that would attract local advertisers.
24. 'InterTrust believes that Microsoft's forward-going technology infrastructure significantly relies on InterTrust inventions for DRM and trusted computing' (<http://www.intertrust.com/main/ip/litigation.html>).
25. To build interest in its service, Rhapsody offered loss-leading downloads at 49 cents apiece for a six-week period in February and March 2003 (Mossberg 2003).
26. MusicNet is available only to AOL subscribers; the ownership of MusicNet is approximately 39 per cent Real, 19 per cent TW, 19 per cent BMG, 19 per cent EMI, and 4 per cent Sony.
27. xMCL is an attempt to absorb XrML as a more open metadata standard.
28. Although Roxio purchased Pressplay in May 2003 for \$39 million with the intention of rechristening the service as Napster, Sony and Universal retain equity stakes.
29. Xerox and Microsoft developed and promoted XrML as the ContentGuard DRM metadata standard. In 2002, ContentGuard turned its intellectual property over to the OASIS (Organisation for the Advancement of Structured Information Standards) standards group in 2002.
30. RealNetworks purchased Listen.com in April 2003 for \$36 million.
31. Lycos Music Player is a modification of Windows Media Player.
32. Emusic is the only MSP that does not regulate the customer's choice of final format for downloads.

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